



LUND UNIVERSITY

School of Economics and Management

# Consumer Behaviour in the Sector of Household Robots

*Elderly People as Adopters*

by

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May 2016

Master's Programme in International Marketing & Brand  
Management

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# Abstract

The primary purpose of this Master's thesis was to understand the consumer behaviour of elderly people, more specifically the silent generation in regards to adopting household robotics. The objective was to gain a deeper understanding on the attitudes, beliefs and intentions, as well as values and attributes that are affecting the consumer behaviour of elderly people to determine whether elderly people are willing to adopt household robotics. For this purpose, the research question "How do elderly people consume household robots?" was chosen. In this research the qualitative research methods were used to conduct this inductive research.

This inductive research was supported by a two-fold data collection method. A total of 5 respondents that were independent elderly candidates were chosen to participate. All respondents resided in the West Yorkshire region, United Kingdom. Firstly, respondents partook in an initial interview, which was then followed up by a telephone interview a short duration after.

The research revealed that consumer behaviour of household robotics differed among elderly people. The differences foreseen were particularly due to elderly people's level of technological dexterity and knowledge of household robots, with many left alienated due to restricted knowledge and lack of awareness. However, when well-informed of household robotics via word-of-mouth and demonstrations willingness to adopt was boosted. Likewise, the need for attention to advertise and provide awareness was ascertained to ensure familiarity and trust with functioning and pricing. Research findings also indicated that household robotics would be desirable particularly for disabled elderly individuals to ensure a better quality of life.

Keywords: household robots, consumer behaviour, silent generation, elderly people

# Acknowledgements

We would like to begin by thanking everyone that was involved in this project. Especially we would like to show our gratitude for the participants that were part of the study. Without you this would not have been possible. We would also like to thank our supervisor Christian Koch, for advising guidance given throughout the thesis project. Last but not least we would like to thank you our family members, especially Millariia Wikman and Martina Johansson that were beside us even in the times of trial.

- Juuso Waldén & Liam Johnson

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# 1 Introduction

*This chapter is set to introduce the reader to the topic discussed in this thesis. Firstly, the background of the topic and its relevancy is discussed. Furthermore, the purpose and the research questions of the thesis will be set and the definitions of the key concepts as well as the outline of the thesis will be presented.*

## 1.1 Background

The world around us is constantly changing, and the change is moulding the ways people conduct their everyday tasks. Today, the advancements in the sphere of technology and networking have made human beings to adapt to change once again (Hur, Yoo & Chung, 2012). These advancement have also led to the introduction of intelligent robots that can provide assistance to humans and their everyday lives. However, while change is taking place in the field of technology, also the landscapes of population and resources are experiencing change (Vuorimaa, Harmo, Hämäläinen, Itälä & Miettinen, 2012). One such group that is discovering change is elderly people, as the proportion of the elderly people has been expected to double by 2050 (World Health Organization, 2015).

Moreover, in an increasing manner elderly populations have desires to live longer in their own homes (Pollack, 2005). This connected to the current trend of increasing costs of health care and decreasing amount of caregivers (Vuorimaa et al. 2012) forms a situation, where this segment of population is in danger to compromise in their quality of life. In this respect several studies have been done in relation to combining health care and assistive household robots (Kantorovitch, Väre, Pehkonen, Laikari & Seppälä, 2014; Vuorimaa et al. 2012; Seelye, Wild, Larimer, Maxwell, Kearns & Kaye, 2012). Moreover, the general acceptance in regards to cleaning robots, such as iRobot's Roomba has been also studied by several authors (Forlizzi, 2007, Sung, Guo, Grinter & Christensen, 2007). Thus, a number of studies have been done in regards to household robots and assistive robotic systems.

In addition, as household robots are introduced in an increasing manner in the domestic environments, the need to understand the reason behind the adoption increases (Sung et al. 2007). This is especially the case in the sphere of household robots, where the industry is currently developing new, more intelligent solutions constantly (Vuorimaa et al. 2012). For example, solutions such as web and network based solutions have opened whole new possibilities to industries, as these technologies open the possibilities to create integrated systems within the homes, such as smart homes that could serve the purposes of various consumers including the elderly people (Vuorimaa et al. 2012). However, while consumers have been studied from the perspective of the health care industry, the consumer market aspect has not been at the primary focus of research (Young, Hawkins, Sharlin & Igarashi, 2009).

In some cultures, including South Korea and Japan, these solutions and household robots in general are being adopted extensively (Hur, Yoo & Chung, 2012). In these cultures the household robots are widely accepted and used in the household environments. While the awareness of the products is also relatively higher compared to other cultures, consumers are more aware of possibilities that are available in the markets. However, the case is not the same in many Western cultures, where the adoption of household robots is still relatively low, although increasing constantly (International Federation of Robotics, 2015). As the reasons behind the consumer behaviour in regards to household robots have not clearly been identified in the Western countries, the authors chose to conduct a study focusing on the working class silent generation elderly people in the United Kingdom. By focusing on this certain segment, it is possible to understand the consumer behaviour of elderly people of today in the Western context.

In the perspective of the authors, the solution to the problems of increasing resource needs for caregivers of elderly people, as well as to the improving of the quality of life may lie in household robots. At least household robots can offer a great alternative to choose from to the elderly people. For this reason, it is important to study and understand the attributes that are affecting to the consumer behaviour of the household robots in the segment of elderly people.

## 1.2 Research Purpose and Question

The purpose of this study is to understand the consumer behaviour of elderly people, more specifically the silent generation, in regards to household robots. The research aims to gain a deeper understanding on the attitudes, beliefs and intentions, as well as values and attributes that are affecting to the consumer behaviour of elderly people. For the purposes of this thesis the following questions and sub questions were developed:

- How do elderly people consume household robots?
  - What are the attitudes, beliefs and intentions of elderly people towards household robots?
  - What values in household robots are demanded by elderly people?
  - Are elderly people willing to adopt household robots?

## 1.3 Research Scope

This thesis aims to look at the consumer behaviour of elderly people, specifically the silent generation. Therefore, this research limits itself to examining people between the ages of 74 and 91. In addition, as this thesis aims to examine the less studied Western perspective of consumer behaviour of elderly people in regards to household robots, this research further narrows its scope to examining elderly people only within the United Kingdom. The scope was further limited to include people that were part of the working class prior to retirement. This perspective was chosen in order to discover the consumer behaviour in the low-to mid-range price categories as these are expected to play major role in the markets for the elderly people in the future, due to limited incomes from pensions (AgeUK, n.d.).

## 1.4 Definitions of Key Concepts and Terminology

### Elderly people

In a more general context, people that are over 60 years old are considered as elderly people (World Health Organization, 2015). However, in the context of this thesis, elderly people are defined as the silent generation.

### Silent generation

The term silent generation refers to the generation born in the time between 1925-1942, and aged around 74 years to 91 years today (Howe & Strauss, 2007). These people have lived their childhood during the times when the Great depression and World War II were moulding the world (Howe & Strauss, 2007), hence they have adapted to change several times in their lives. The term is further elaborated in a dedicated chapter.

### Working Class

In this thesis we will use the definition of Gove (ed. 1993, p.2635), as it defined working class as: “The class of people who are employed for wages usually in manual labor; the social class, grade, or stratum made up of these workers”

### Household robots

There are several different definitions to household robots. This paper defines household robots as intelligent actors that provide assistance in the everyday life of the elderly people within the perimeters of home. This paper limits itself to examining household robots with low to medium prices, meaning that most consumers can afford to have access to these robots. These household robots make everyday life easier by assisting, cleaning or maintaining within these perimeters. This includes generally accepted robots such as vacuum cleaners and lawn movers, but does not exclude intelligent home appliances or robots with emotional capabilities. The further discussion related to the term can be viewed in a dedicated chapter.

### Consumer behaviour

This concept focuses on understanding on what basis consumption decisions are made (Sheth, Newman & Gross, 1991). Furthermore, the concept relates to choices made between

alternative products, which in the sphere of this research implies choices made between different household robots. This concept is further elaborated in a dedicated chapter presented later on in the thesis.

## 1.5 Outline of the Thesis

This thesis is structured into five chapters, of which the first of them, the introductory chapter has been covered in the above paragraphs. In the following chapter, the relevant literature from the perspective of the research is discussed. This chapter will build up the theoretical aspects of the thesis. In the third chapter the methodical aspects of the study, namely how the study was conducted is presented and discussed. In this chapter the data collection methods and research approaches are also discussed. Furthermore, the fourth chapter is dedicated to the analysis of the results collected from the research conducted by the authors. These findings are further reflected against relevant theories presented in the second chapter. Lastly, the fifth chapter is set to discuss and conclude the thesis with managerial and theoretical implications as well as to set recommendations for future research.

## 2 Literature Review

*In this chapter the aim is to review the literature of household robotics, generational aspects as well as consumer behaviour of the target group of the study, namely elderly people. Moreover, concept and definition of the household robots is reviewed and defined for the purpose of this study. In the context of this research, literature provides the foundation for this research and hence acts as equivalent of theory. As quoted by Bryman and Bell (2015) “In many cases, the relevant background literature on a topic defines the focus of research and thereby acts as the equivalent of a theory” (Bryman & Bell, 2015, p.22). However, due to the inductive nature of this study, this review was put together only after the data collection in order to prevent it from influencing the collected data. Moreover, as the topic covered in this paper is relevantly new in the academic sphere (Kantorovitch et al. 2014), the vast majority of relevant literature is covered in this review.*

### 2.1 Defining household robotics

The current state of household robotics has demanded a lot of engineering efforts during the centuries (Stanford Computer Science, n.d.; Computer History Museum, 2016). However, the definition of robot, how we see it, has also varied over time. For this reason, the development of household robots is reviewed in addition to an exploration of how the current situation has emerged. In addition, it is important to understand the sphere of household robots and their functions in the portfolio of household robots. Lastly, the chapter will define the meaning of household robot for the purposes of this paper.

#### 2.1.1 Development of household robots

The history of robots reaches far back to Ancient Egypt, where human figures struck water clocks on an hourly basis around 3000 B.C. (Stanford Computer Science, n.d.). These mechanical works can be considered as the first robots due to their automated nature and advancement considering the time when they were constructed (Stanford Computer Science,

n.d.). Following this invention in the 400 B.C., Egyptians managed to create a wooden mechanical pigeon that had an ability to fly in the air. Moreover, maybe more surprisingly, Egyptians yet again, constructed during the 200 B.C. hydraulically operated statues that were able to produce speech, gestures and prophecies, hence showcasing the abilities to create these machines already during the time before Christ (Stanford Computer Science, n.d.). However, despite the ahead of its time achievements, the biggest milestones have been achieved during the 20<sup>th</sup> century (Stanford Computer Science, n.d.).

The modern robots started to develop around the 1930's. One of the first of its kind was Elektro robot that was showcased in the year 1939 in the World's fair. Capabilities of Elektro robot were limited to the ability to respond with voice commands by recorded answers. In addition, Elektro was able to move its head, arms and to "smoke" cigars (Computer History Museum, 2016). Robotics has taken big leaps from those times especially in the industrial section by rooting the technology to everyday industrial processes of today (Young et al. 2009). The first industrial robot to breakthrough in the industrial markets was The Stanford arm in the 1970's, it was able to assemble Ford T models water pump by using optical and contact sensors (Computer History Museum, 2016). Technology utilized in the industrial robots like The Stanford arm and its successors have provided the foundations to today's household robots and hence they are an essential part of the history of household robotics (Young et al. 2009).

The first attempt to bring robots into a home environment was in the 1980's, when Robot types such as HERO and TOPO line-ups were introduced. Although these robots did not become a success in the consumer markets, these robots worked as pioneers in the field of household robots. The first success of the household robots in consumer markets was in the 2000's, when iRobot Roomba robot vacuum cleaner made its way, in addition to early adopters, to the homes of average consumers. (Kantorovitch et al. 2014)

During this century the household robot markets have experienced revolutionary development, enabled by Internet and digital technology that has been developing drastically in the recent years (Hur, Yoo & Chung, 2012). As an outcome of the development of these technologies of digital technology and networking, household robots have emerged. These technologies are being used today in the process of creating the robots of tomorrow that are even better and more intelligent than their predecessors (Hur, Yoo & Chung, 2012). Today, the robots have started to become more and more familiar to consumers in home

environments, as different kind of robots from lawn movers to vacuum cleaners have been introduced to consumers by big brands such as Phillips and LG (Kantorovitch et al. 2014; Ferrus & Somonte 2016). The development of the technologies and availability of robots have resulted in wide variation of different kinds of household robots, which are reviewed in the following subchapter.

### 2.1.2 Sphere of household robotics

The spectrum of devices that can be labelled as household robots is vast in today's market. For the purpose of clarification many separate categorisations of household robots have been made. The simplest one is categorising the robots as indoor and outdoor robots. However, the spectrum of robots is much more colourful than what this categorisations suggests. Ferrús and Somonte (2016) suggest an alternative categorisation of robots, as they divide them between domestic robots that are welfare-orientated and domestic robots with hygienic feature.

In their categorisation, welfare-orientated robots include a wide variety of robots from elderly care services, disabled people help, and from telecare sectors (Ferrús & Somonte, 2016). One of the robot types that can be categorised under the welfare-orientated robots is exoskeleton robots (Ferrús & Somonte, 2016). These robots are mainly developed to help people with limited mobility to get their ability to move again back. These robots are external constructions that are worn by the users. One of the limitations of these robots is ease of use, as the users have to be able to wear them independently. The other problem is price, as these robots cost around 150,000 US dollars (Ferrús & Somonte, 2016). For this reason, not many consumers have the possibility to own one.

In addition, humanoid robots such as Honda's ASIMO can be considered to be a welfare-orientated robot, as its main purpose is to help people with disabilities (Ferrús & Somonte, 2016). These humanoid robots resemble humans a lot as they weight around 50 kg and can move in a human like manner (Ferrús & Somonte, 2016). In general humanoid robots can imitate emotions and move around objects in a human like manner, hence providing assistance to people with disabilities (Ferrús & Somonte, 2016). This type of robots has received media coverage in the news, and due to the movies such as Star Wars or Terminator, and has therefore become known by the audiences.

Furthermore, robots can play an even more assistive role in the domestic environment, as assistant robots such as Care-O-bot, which are designed to support the every day life of humans. These kinds of complex care robots are extremely expensive and hence they are mainly used for research purposes rather than in the domestic environment. The strength of these robots is, however, their ability to manipulate objects autonomously and their possibility to provide telecare functions, which allow taking care of humans from a distance (Ferrús & Somonte, 2016; Kantorovitch et al. 2014). These solutions include safety bracelets that detect falling and inform the caregiver in case of an incident (Vuorimaa et al. 2012).

In addition to these, Vuorimaa et al. (2012) identify also medical dispensers as welfare oriented robots. These robots can be used in the home environment, or at the care homes to monitor and ensure that medication is taken. For example, Addoz Med-O-Wheel Smart automatically notifies the user to take the medication, and doses the medication when the transparent cover is pressed. Confirmation of usage is sent to the caregiver and to the server of Addoz, where usage can be analysed. This kind of welfare-oriented robot makes it possible for elderly people to live longer in their own homes (Vuorimaa et al. 2012).

The second category of household robots consists from robots that are used for cleaning and maintenance, such as vacuum cleaning robots, floor scrubbing, mopping robots and lawn mowing robots (Ferrús & Somonte, 2016). From these the vacuum cleaning robots have made it already to the manufacturing of major brands. The main operational idea is based on an algorithm that guides the robot through the home environment, simultaneously vacuuming the house. During the operation the vacuum cleaner can identify objects to avoid collision and to clean dirt from the floor by using built-in sensors (Ferrús & Somonte, 2016).

Another robot that has already made it to the homes of consumers is the lawn mower robot. The operational idea behind these robots is very similar to the vacuum cleaning robots. These lawn mower robots operate automatically based certain time frames. Swedish company Husqvarna was the first one to innovate a lawn mower that uses solar power and hence is not fully dependent on charging docks. Through this innovation, the Husqvarna lawn mower can increase its cut area to 2500 square meters due to the solar technology. (Ferrús & Somonte, 2016)

In the sphere of household robots, also so-called social robots are beginning to emerge. These emotionally engaging robots are capable of placing orders, tell weather, or to be a social

companion. One such robot is Jibo, a stationary interactive family helper, which should be available on the markets soon. In general, these robots work as social companions that help in everyday tasks such as coordinating and communication (Guizzo, 2015).

The previously discussed robots represent robots that are conventionally seen as robots as they are mobile and move autonomously (Norman, 2005). In addition, home appliances can be seen as household robots as they have more technology than for example vacuum cleaners in them (Norman, 2005). This applies to so called smart home appliances that are connected to the network and can operate in cooperation with other gadgets (Vuorimaa et al. 2012). Some examples include a fridge that can be used to order food and a dishwasher that uses cameras to detect whether dishes are clean or not, thus saving water (Morrison, 2016). Even though these appliances are not normally viewed as robots, they include more technology than some of the robots mentioned earlier (Norman, 2005). This matter is further discussed in the next subchapter, where the definition of household robots in the context of this paper is defined.

### 2.1.3 Definition of household robots

In the academic literature several attempts have been made to define household robots. These attempts include several different definitions. One of the most conventional definition is given by Young et al. (2009), as they define household robots as “machines that have intelligent behaviour, resemble (physically and behaviourally) a human or animal, are mobile, are able to physically interact with their environment, and so on.” (Young, et al. 2009, p.99) This definition also encapsulates and reflects the current view of roboticists (Young, et al. 2009).

However, as the term “robot” covers a wide variety of connotations, it may be open to interpretative flexibility based on various factors of context, task at hand and people interacting with the robot, which results in variations in the use of the term (Young, et al. 2009; Norman, 2005). This discussion is further elaborated by Norman (2005) in relation to what can be categorised as a household robot. Norman (2005) discusses this matter by stating that even conventional home appliances, such as coffee makers, microwave ovens and dishwashers can be seen as robots, even though they do not move around the space. However, these appliances have even more intelligence than for example robot vacuum cleaners that are

generally accepted as household robots (Norman, 2005). On the basis of this discussion, this paper assumes these home appliances to be included to the definition of household robot.

The conventional definition as a starting point, Young, et al. (2009) further elaborate the household robots to mean “a machine that (a) is designed to work with individuals and groups in their personal and public spaces, (b) has a dynamic spatial presence in those spaces, and (c) can “intelligently” interpret its environment and interact physically with it.” (Young, et al. 2009, p.99). In their definition, they acknowledge the subjectivity of intelligence and the difficulty of defining it precisely. Moreover, the definition does not include requirements of robots to look like humans, to be mobile or communicate by using human language (Young, et al. 2009).

Furthermore, Young, et al. (2009) raise the question of intelligence and the possibility to define it, which leads to the discussion of responsibility of actions of robots as intelligent actors. This matter relates more to the question of whether the robot itself can be seen as an intelligent actor that can make decisions by themselves (Johnson, 2014). In the article Johnson (2014) argues that the major obstacle in claims that human beings are solely responsible for the behaviour of the machines, is that robots, and artificial technologies in general, are entities that learn while operating (Johnson, 2014). A great example of this kind of a learning entity is the robot vacuum cleaner such as Roomba that learns over time the obstacles in the home environment by using built-in sensors in the robot (Sung, Grinter & Christensen, 2010).

For this purpose, Matthias (2004) has coined the concept of responsibility gap between human user and machine that is been used. Johnson (2008) introduces several viewpoints for and against the robots. One of the most interesting viewpoints presented discusses whether or not engineers could be held responsible for the actions of the robots, as they are responsible for the design and programming of robots (Johnson, 2014). Eventually the faith of the existence of responsibility gap is in the hands of people, and the choices that are made in relation to the technologies that are used in the robots of the future (Johnson, 2014).

On the basis of the discussion in the previous paragraphs, this paper defines household robots as intelligent actors that provide assistance in the everyday life of the elderly people within the perimeters of home. This paper limits itself to examining household robots with low to medium prices, meaning that most consumers can afford to have access to these robots. These

household robots make everyday life easier by assisting, cleaning or maintaining within these perimeters. This includes generally accepted robots such as vacuum cleaners and lawn movers, but does not exclude intelligent home appliances or robots with emotional capabilities.

## 2.2 Adoption of household robots

Several factors are affecting to the adoption of the household robots. One of the most prevalent factors is the aging of the population (Seelye et al. 2012). While the population is ageing with speed, it wants to live longer in their own homes (Seelye et al. 2012). Naturally, ageing combined with independent living poses difficulties in many aspects (Seelye et al. 2012). For this reason, household robots and other assistive technologies have gained interest in the recent years (Seelye et al. 2012).

Factors that are affecting to the adoption of the household robots include functional value, which is one of the biggest aspects affecting to the adoption of the household robots. The main reason for why it is playing such a big role, is that functionality is the underlying factor that determines how much value that product will bring to the customer (Hur, Yoo & Chung, 2012). In fact, the functionality of the product has been identified to be a major determinant on buying the product and, thus adopting the product (Hur, Yoo & Chung, 2012).

According Forlizzi (2007), five dimensions of the product have to be understood in regards to adoption. These five dimensions are function, aesthetics, symbolism, emotion and social attributions. Moreover, these factors solely and in combination initiate the process of sensemaking, which results in physical or emotional responses. These responses then further initiate and link to the familiar and unfamiliar, which finally affects to the adoption of the product (Forlizzi, 2007).

Quality is complimentary with the functionality, as consumers seek to have products that will maximize their utility by being able to use the product in the long-term perspective (Hur, Yoo & Chung, 2012; Fuentes, 2014). For this reason products, such as household robots should be designed with the long-term functional and quality values in mind. This is also what Ferrús and Somonte (2016) suggest as they state, “in domestic robots (form related to function and intimacy through ambiguity, accountability and support) that could increase people’s

enthusiasm towards domestic robots and smart homes ... even domestic users came to adapt their homes to use the robot” (Ferrús & Somonte, 2016, p. 100).

For example, in the study conducted by Forlizzi (2007), autonomy and accessibility were mentioned as key benefits that were enforcing the adaptation of the household robots. These factors clearly show that household robots are providing benefits that help anyone, including elderly people to live more independently in their homes, having more autonomous lives. However, home is recognized to be a place where specialized human needs emerge (Forlizzi, 2007). For this reason, several social and cultural values are effecting to the adoption of the household robots. Different age groups and generations are demanding different functions, and people with disabilities have their own limitations and requirements regarding these products (Forlizzi, 2007).

This is visible for example in the segment of elderly people that are living independently, as their most prevalent fear is the fear of falling. In order, to mitigate those fears, commercial products, such as assistive household robots have been introduced. This kind of system increases the feeling of safety and increases trust (Abbate, Avvenuti, Corsini, Light & Vecchio, 2010). In other words, connected systems of household robots are adopted to the homes of elderly people in order to mitigate the risks and consequences of falling. Hence security factors work as intermediates to adopt household robots. (Kantorovitch et al. 2014)

Furthermore, owning a household robot includes aspects of social and symbolic value as they can communicate associations of belonging to certain social class. Hence, adopting household robots may not always be a result of functional aspects, but rather reasons beyond the functional aspects of the product (Hur, Yoo & Chung, 2012). These reasons include creating symbolic image of owning a robot that might be seen as advanced or something unique and privileged (Hur, Yoo & Chung, 2012).

This phenomena is affected by cultural factors that are also affecting to the adoption of the robots, as there are already cultures that have adopted household robots in large extent, while in many other cultures, such as the Western culture, these robots have not yet been adopted extensively (Hur, Yoo & Chung, 2012). Thus, the cultural factors play also major role whether or not it is seen preferable to adopt household robots or not. In Asian cultures such as Japan or South Korea, household robots are already established strong hold in these markets due to the technology driven culture (Hur, Yoo & Chung, 2012). As the culture is more open

to new innovations, it is also more open to adopting new inventions such as household robots (Young, et al. 2009).

In summary, different social factors have to be considered when introducing household robots as people respond to them in unique ways based on various factors discussed in the previous paragraphs. This is due to the fact that individual consumers perceive the technology differently than what for example industries or science view the robots. For this reason, in order to maximize the adoption of household the discussed factors have to be considered (Young et al. 2009).

### 2.2.1 Attitudes, beliefs and intentions

In order to better understand the process of adopting the household robots, the concepts of attitudes, beliefs and intentions behind the observed behaviour have to be understood. One of the best-known authors from this field, Fishbein and Ajzen (1975) suggest that these four variables of beliefs, attitudes, intentions and behaviour are interacting and interlinked in the process of adopting the product or service. This proposed theory has provided the foundations for the study of consumer behaviour (Bagozzi, Gürhan-Canli & Priester, 2002), and although this is not the only theory available, this theory is seen most suitable for the purpose of this research because it can be considered as the cornerstone of the field of attitudes and beliefs affecting behaviour.

In this process, beliefs are creating the foundations to this process and initiating the process. This comes evident from the statement “beliefs about an object provide the basis for the formation of attitude toward the object, and we have shown that attitudes are usually measured by assessing a person’s beliefs” (Fishbein & Ajzen, 1975, p.131). Hence, it is clear that the beliefs toward certain object such as household robots create basis for the attitudes to rise.

However, the concept of belief has to be further clarified so that the meaning is understood. Fishbein and Ajzen (1975) define belief as “beliefs refer to a personas subjective probability judgments concerning some discriminable aspect of his world ... belief as the subjective probability of a relation between the object of the belief and some other object, value, concept, or attribute” (Fishbein & Ajzen, 1975, p. 131). In this perspective individuals pursue

only certain attributes that are seen favourable, leading to consequences of these beliefs (Fishbein & Ajzen, 1975).

Furthermore, as a basis of forming beliefs, two sources can be identified: direct observation (descriptive beliefs) and unobservable (inferential beliefs) (Fishbein & Ajzen, 1975). As the label direct observation suggests, beliefs are formed based on observation of attributes of the object at hand, for example: the table is round. Hence, the belief is based on the attributes that are observed in the environment and trusted to have maximal certainty, at least internally on the individual level (Fishbein & Ajzen, 1975). In this respect, the personal descriptive beliefs are rarely questioned as they are based on direct observations, which guide us to understand the world around us (Fishbein & Ajzen, 1975).

However, unobservable or inferential beliefs are based assumptions of unobservable characteristics or disposition. These characteristics can be formed, for example, in the process of interaction with another person or in the context of this research, household robots (Fishbein & Ajzen, 1975). These unobservable characteristics in the context of this research can be friendliness or intelligence. Moreover, in the process of creating beliefs past experiences is used. However, as the existence of consumer household robots is a fairly new concept and thus, lack of past experiences with household robots, there is a possibility that beliefs are created based on sources such as movies or through the image given by media (Sung et al. 2007).

As the attitudes are consequences of the beliefs, the meaning of attitudes has to be also well understood. Fishbein and Ajzen (1975) define that “ An attitude represents a person’s general feeling of favourableness or unfavourableness toward some stimulus object” (Fishbein & Ajzen, p. 216). In their definition, beliefs are in a central role as the person is seen to hold favourable (positive) or unfavourable (negative) beliefs, and hence attitudes towards the object. In this sense what Fishbein and Ajzen (1975) suggest is that “ Each belief links the object to some attribute; the person’s attitude toward the object is a function of his evaluations of these products” (Fishbein & Ajzen, 1975, p.216). Thus, when a person is introduced to a new product, such as a household robot like a vacuum cleaner, beliefs are formed based on selected attributes of the product, while simultaneously the attitude is formed based on evaluations of the selected attributes.

However, these attitudes and beliefs can be modified via informative actions such as advertising (Fishbein & Ajzen, 1975). When the consumer has a neutral attitude toward the products, this can be affected positively or negatively through advertising. However, this demands that the attributes that are advertised positively are aspects that the consumer values and evaluates. In the case where a positive belief is created through advertising, it is not always correlating to positive attitudes (Fishbein & Ajzen, 1975). In order to assure that the attitudes are positive, the right attributes should be target on the basis of the target group. Moreover, the information source may also be other than advertisement, as the information can be acquired through word-of-mouth or directly from caregiver personnel that assists at the start of the use of a household robot. These occurrences can provide the information to elderly people that affect to the beliefs and attitudes positively in relation to the adoption of the household robots.

Lastly, after the beliefs and attitudes are formed by the consumers, intentions are eventually created. Intention is defined as “a person’s location on a subjective probability dimension involving a relation between himself and some action. A behavioural intention, therefore, refers to a person’s subjective probability that he will perform some behaviour” (Fishbein & Ajzen, 1975, p.288). In this perspective, one’s attitude towards an object determines the intentions to perform the behaviour in the future, while the intention lead to the performance or non-performance of the certain behaviour (Fishbein & Ajzen, 1975, pp.511-512). Namely, if a person has a positive attitude towards the object, the most likely outcome is the performance of conducting consumption behaviour, while if the attitude is negative the most likely outcome is choosing not to adopt the household robot to the domestic environment. In practice the findings of Fishbein and Ajzen have broad practical implications as they state, “if it is possible to influence attitudes towards products, politicians or minority groups changes in consumer behaviour, voting decisions or interracial relations may follow” (Fishbein & Ajzen, 1975, p. 387).

As a conclusion, beliefs, attitudes and intentions are tightly connected to each other. For this reason, the previous discussion as a basis, it can be argued that beliefs and attitudes are affecting to the intentions to adopt of household robots. In the case of elderly people, even though the history of robots reaches far back in time, the household robots as they are today have not been experienced ever before (Young et al. 2009). For this reason, the beliefs and attitudes of the elderly people might be sceptical towards household robots as this group of

people might not know what to expect in respect of household robots (Forlizzi, 2007). Especially, because of these reasons, the underlying beliefs, attitudes and intentions should be understood in regards to the adoption of household robots. If the reasons are understood, there is a possibility to better offer these robots to ease the everyday life of the elderly people and make their life more convenient and tolerable (Kantorovitch et al. 2014).

## 2.3 Generations and consumer behaviour

All generations have experienced their time and their set of customs. Some of those customs have established their positions as accepted customs; some of them on the other hand have just disappeared (Howe & Strauss, 2007). Moreover, during the last centuries all generations have lived during periods of times when something special happened. These events have moulded the generations and the perceptions, behaviours, attitudes and beliefs (Howe & Strauss, 2007). Due to those events, only those people who lived through that particular period of time can understand the time in which they have lived (Howe & Strauss, 2007), ultimately effecting to the way these generations react to things, and adopt new things into their lives (Kantorovitch et al. 2014).

Some of those generations have been bigger in terms of their size than previous ones. As a consequence of better living conditions and improved health benefits around the world, the elderly population is expected almost to double during the time period of 2015 to 2050 (World Health Organization, 2015). One of those generations that is becoming older at the moment is the silent generation. In the following chapter we take a deeper look as to what these people have experienced and why they behave in the markets the way they do.

### 2.3.1 Silent generation

The silent generation is the generation born between 1925-1942; hence they are aged around 74 years to 91 years today. These people have lived their childhood during the times when the Great depression and World War II were moulding the world (Howe & Strauss, 2007). Moreover, these individuals have experienced the Cold War, the collapse of USSR, demolition of Berlin Wall and unification of Europe among many other things.

As mentioned earlier these particular events have made people of this generation to be what they are, moulding them personally based on the experiences that they have, and the age that they were when those events occurred (Howe & Strauss, 2007). For this reason, each generation grows up to the next phase, trying to change what was wrong in their generation, so that the life of the next generation would be better (Howe & Strauss, 2007). As the times change, we cannot observe the behaviour of certain age group, since people do not belong to age brackets. Rather, they should be observed in the generations, due to their unique set of experiences (Howe & Strauss, 2007). People of that certain era are united by their common memories, languages, habits, beliefs and life lessons (Howe & Strauss, 2007).

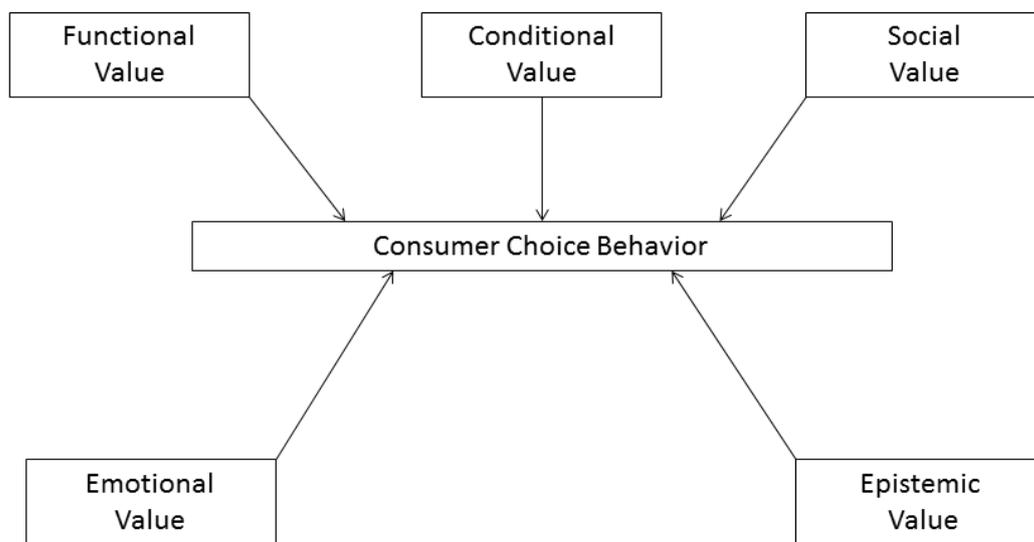
As Howe and Strauss (2007) argue, generations follow historical patterns and therefore offer a powerful tool to observe the future behaviour of the societies. However, in this thesis the focus is solely on the silent generation, as the researches want to understand the current behaviour of today's elderly people. For the following reason, the silent generation was chosen as the subject to be studied.

As discussed earlier, historical events and circumstances mould people of that era creating generations. For that reason, generations also share the same set of attitudes, beliefs and behaviours. However, also the reverse is true as the current moment and future can shape the generations (Howe & Strauss, 2007). As members of silent generation have a vast pool of experiences they are ideal to be studied in regards to the adoption of new things to their lives (Howe & Strauss, 2007). In the next chapter we are going to discover the consumption behaviour of the silent generation.

### 2.3.2 Consumer behaviour of silent generation

Understanding the consumer and their behaviour has not been in the interests of researchers until recently, hence being a relatively new field of study. However, the first foundations of the field of consumer behaviour were established already almost three hundred years ago by economists such as Bernoulli (Richarme 2005). The modern academic research on consumer behaviour, and consequent marketing thought, started to rise only in the early 20<sup>th</sup> century (Sheth, 1985). Over the years, consumer behaviour has increased its prominence in research. This research has been affected by several fields and transformed it into a recognized field of study. Due to the adoption of several influences, several approaches to consumer behaviour have emerged for the use of marketers (Foxall, 1990).

However, authors such as Sheth, Newman and Gross (1991) have created even more refined theories of consumer behaviour, such as consumer choice behaviour theory that relies on five values that effect to the consumption behaviour (figure 1). The theory is focusing on explaining why consumers choose to use or buy the products and why consumers choose one brand over the others (Sheth, Newman & Gross, 1991). According to Sheth, Newman and Gross (1991) consumers choose based on functional value, conditional value, social value, emotional value and epistemic value. The main key points in this theory are “1. Consumption choice is of multiple consumption values, 2. The consumption values make differential contributions in any given choice situation, 3. Consumption values are independent” (Sheth, Newman & Gross, 1991, p.160).



*Figure 1. Consumer Choice Behaviour (Sheth, Newman & Gross, 1991)*

Furthermore, it is essential to understand the underlying assumptions behind these values, and thus their definitions. For Sheth, Newman and Gross (1991), functional value represents

”perceived utility acquired from an alternative’s capacity for functional, utilitarian or physical performance” (Sheth, Newman & Gross, 1991, p. 160). It is worthwhile noting that especially functional value is assumed to be the driving force behind the consumption choices traditionally. This functional value is measured based on characteristics such as reliability, durability or price (Sheth, Newman & Gross, 1991). In the case of household robots this would mean that purchase decision is based on possible expectations about durability or perceived cleaning power, and hence choice is based on certain attributes related to the product.

As discussed already earlier, consumption of household robots is related to social value as well. Sheth, Newman and Gross (1991) perceive social value to be ”utility acquired from an alternative’s association with one or more specific social groups” (Sheth, Newman & Gross, 1991, p.161). Social value is hence a value that is gained from the perceived social image that is complimentary with consuming the certain product. In the case of household robots, perceived social value could be gained from the high-tech image associated with the usage of household robots.

Emotional value in terms of Sheth, Newman and Gross (1991) is defined as “capacity to arouse feelings or affective states” (Sheth, Newman & Gross, 1991, p.161). Thus, emotional value refers to attachment to the certain product or service, which can be driven by non-cognitive and unconscious factors (Sheth, Newman & Gross, 1991). In the case of household robots, this could be seen as an emotional bond between the user and the household robot, while the user might also give humanizing factors to the robot.

Epistemic value in terms of Sheth, Newman and Gross (1991) is seen as “capacity to arouse curiosity, provide novelty, and/or satisfy desire of knowledge” (Sheth, Newman & Gross, 1991, p. 162). Epistemic value hence arises when curiosity towards products or services emerge. Such situations can be for example new experiences (Sheth, Newman & Gross, 1991). Moreover, epistemic value can rise also from the boredom to the product or brand, or from the desire to learn something new (Sheth, Newman & Gross, 1991). In the case of household robots, this can be discovered as curiosity towards new technology, or willingness to try something new; compare to an old and dull vacuum cleaner, or urge to understand and learn about the new technology that the household robotics represent.

Finally, Sheth, Newman & Gross (1991) suggest that conditional value is a “result of the specific situation or set of circumstances facing the choice maker” (Sheth, Newman & Gross, 1991, p.162). Thus, conditional value deals with matters that are purely based on situational factors. For example, Christmas cards represent such example (Sheth, Newman & Gross, 1991). However, products that have conditional value can be also associated to emergency situations such as police or more intricate situation such as consuming popcorn in the movies (Sheth, Newman & Gross, 1991). In the case of household robots, conditional value can be perceived as, for example, using a household robot to vacuum the dusty house.

Furthermore, understanding the consumer behaviour of elderly people in regards to household robots is reviewed. Xu, Ng, Tan and Huang (2014) identify what elderly people consider while they are consuming household robots. One aspect that they found was that elderly people had high weighting on the product quality. This was one of the main factors that the elderly people were concerned of, hence clearly indicating that this group of people was focusing on functional aspects of the product. In this case, the focus was on the functional aspect of quality of the product.

Moreover, elderly people also considered several other functional value aspects, as it was found that elderly people among all other age groups wished that household robots could help with the home tasks (Xu, Ng, Tan and Huang, 2014). More importantly, reliability and efficiency to perform these tasks were stressed. However, elderly people were also surprisingly positive towards adopting household robots, even though they had concerns regarding the learning process. In this perspective, elderly people showed significant curiosity towards products, as they were in the first place concerned about the learning process, and secondly, really jumping to the process of adopting the household robots (Xu, Ng, Tan and Huang, 2014)

In addition, Forlizzi (2007) discovered that generational differences existed between the different age groups. In Forlizzi’s study, elderly people engaged more in their role as homemaker and caregiver than younger generations that were more opportunistic in their cleaning (Forlizzi, 2007). However, after introduction of a household robot, the roles switched and elderly people started to clean more opportunistically, whereas younger people started to plan their cleaning (Forlizzi, 2007). As mentioned already earlier in this paper, the factors of autonomy and accessibility were key factors affecting to the adoption of the household robots

(Forlizzi, 2007). In this perspective, elderly people valued the functional aspects of the household robots.

Moreover, also elderly men showed interest to the activity of cleaning, hence overruling the traditional gender roles between men and women (Forlizzi, 2007). These roles normally are really in place in the homes of elderly, where the woman is in charge of cleaning (Forlizzi, 2007). Due to the household robot, the behaviour was changed, thus communicating epistemic value that has been found also in the research of Xu, Ng, Tan and Huang (2014).

The sphere of values reaches also to the emotional value, as it was found in the study of Sung, Guo, Grinter and Christensen (2007) that the people, including the elderly, created emotional bonds to their robots by giving names to their robots and hence making them more equal to the users. Moreover, emotional bonds formed towards household robots were so intimate that people even apologised to the robot when they interrupted their work. Even more strong evidence of creating emotional value was observed when robots were called with the pronouns of “he” or “she” depending on the family, where the robots was placed (Sung, Guo, Grinter & Christensen, 2007). However, robots were called as “he” more often than “she”. In the perspective of Sung, Guo, Grinter and Christensen (2007), this was due to the masculine perception of the robot. Overall, it can be concluded that emotional value was created through forming relationships with the robots (Sung, Guo, Grinter & Christensen, 2007).

In relation, elderly people also showed emergence of social values in relation to household robots in the study of Sung, Guo, Grinter and Christensen (2007). In the study it was found that household robot owners were proud to show and present their household robots to visitors, they were also highly appraising of the robot to the people that did not have household robots, such as vacuum cleaner (Sung, Guo, Grinter & Christensen, 2007). These robots were also borrowed to neighbours and relatives, so that they could realise the power of the household robots. Moreover, this behaviour happened in all age categories that were participating to the study (Sung, Guo, Grinter & Christensen, 2007). Social value was also created internally in the families, as it was a great conversation starter and topic of discussion. In this basis it is safe to say that household robots create also social value in the consumer behaviour of elderly people.

Finally, it must be noted that all of the consumption of the household robots is not always based on want, but connected to specific situations such as emergency situations at home of

the elderly people. For example Kantorovitch et al. (2014), Vuorimaa et al. (2012) and Seelye et al. (2012) discuss this matter as they suggest systems that will monitor the elderly people and inform relatives and caregivers about possible falling or accident in the home. In this case household robot, for example a vacuum cleaner could work as an assistant to check if the accident has been severe and if help is needed (Kantorovich et al. 2014). In such case, the consumption of household robots is purely based on conditional value, or the “result of the specific situation or set of circumstances facing the choice maker” as Sheth, Newman and Gross, (1991, p.162) defined in their text.

On the basis of the previous discussion, it is safe to conclude that consumption of household robots can include all five different values of the consumer choice behaviour theory of Sheth, Newman and Gross (1991), on a situational basis. Moreover, it is worth to note that studies reviewed in this chapter have mainly included the perspective of age categories, rather than generations, when speaking of elderly people. In this sense, the perspective of studying the phenomenon from the generational aspect, as done by this thesis, is unique.

## 3 Methodology

*This chapter presents the research approach and the study design used in this research. Furthermore, the overall research strategy and method as well as the data collection methods are visited. In addition, the data analysis techniques and the quality of the research and potential issues are discussed.*

### 3.1 Research Approach

In the process of creating the research approach concepts of ontology and epistemology has to be addressed as these conceptual realms are guiding the nature and perspective of the research throughout the thesis. An essential part of this process is determining the research philosophy that guides the development of the choice of a philosophical perspective of the study. Generating the perspective of the research at the beginning stages is crucial, in order to state the purpose and the core meaning of the study (Mason, 2002).

“An epistemological issue concerns the question of what is (or should be) regarded as acceptable knowledge in a discipline.” (Bryman & Bell, 2015, p.26) A central matter in regards of this context is the question of possibility to study the social world with same principles, procedures, and ethos as the natural sciences (Bryman & Bell, 2015). From the epistemological perspective this thesis takes an interpretivist perspective to the world and thus focuses to “interpretive understanding of social action’ rather than to the external forces that have no meaning for those involved in social action.” (Bryman & Bell, 2015, p.28) This being addressed, the positivist view that takes stand that the social phenomena can and should be studied using methods from the natural sciences is being dismissed (Bryman & Bell, 2015). The interpretive view allows studying the social reality of the individuals from their point of view by accessing their ‘common-sense thinking’. In addition, as social reality has meaning for the individuals, they act based on these mental meanings that are applied to their own actions and actions of others (Bryman & Bell, 2015). Moreover, as the interpretivist

perspective tries to understand the behaviour and actions of human beings, it is often used along inductive research methodology (Bryman & Bell, 2015).

In addition to epistemology another conceptual realm has to be considered, when formulating the philosophical assumptions of this thesis. Ontology considers the nature of social entities (Bryman & Bell, 2015). In this thesis subjectivist approach is used, hence the social phenomena are perceived to be constructed by the individuals in order “to make sense of their experiences.” (Bryman & Bell, 2015, p.35) As the world is structured around the creations of social interaction, they are under constant revision. Thus, research methodology that is able to set framework which enables understanding of the different individual views of the world communicated through words and constructed perspectives is preferred (Bryman & Bell, 2015). By understanding the verbal communication of the respondents, there is a possibility to understand the individual social worlds and further larger social constructions. Finally, the construction of the social worlds applies also to the authors as this thesis presents certain view of the world expressed by authors (Bryman & Bell, 2015).

## 3.2 Research Design

The presented research approach as a starting point, this thesis employs the qualitative research strategy. The qualitative research strategy can offer various benefits as “Through qualitative research we can explore a wide array of dimensions of the social world [...] the understandings, experiences and imagining of our research participants, the ways that social processes, institutions, discourses or relationships work, and the significance of the meanings that they generate.” (Mason, 2002, p.1) and “It is used where interest is centred on gaining an understanding of a market, rather than quantifying relevant aspects.” (Ghauri & Cateora, 2014, p.120). As described earlier, this thesis is focusing on understanding the underlying social constructions created by individuals. For this purpose the qualitative research method, which rests on words rather than numbers (Bryman & Bell, 2015), offers the best methods to study elderly peoples’ beliefs, attitudes and intentions, as well as perceived values towards household robots.

Moreover, this research is conducted by using an inductive approach, where the theory of the research is developed in a ‘data-driven manner’ using qualitative data (Bryman & Bell, 2015, p.26). The inductive approach allows the study of a phenomenon in a wider perspective and to

understand various different aspects that might affect to social constructions. The strength in this approach lies in its ability to observe phenomena from various perspectives without limiting itself to certain theories, which would be the case in a deductive approach. However, the systematic approach that the deductive approach offers might be lacking when using an inductive method (Bryman & Bell, 2015). It is however worth noting, that an inductive approach includes always an element of the deductive approach as well (Bryman & Bell, 2015). Researchers are not *tabula rasa*, but instead there is always some pre-understanding brought to the research. In this particular research, the deductive element was presented by the researchers' prior studies from the field of marketing, which has exposed them to the concepts related to consumer behaviour, and therefore influenced the question frame for the semi-structured interviews.

The sampling method used in this research was purposive sampling, as this method allows answering to the set research questions by selecting the best representation of the case at hand. This means that only those that are concerned to add value to the research have a chance to be included in the sample. By targeting certain type of people, there is a possibility to focus on certain segments of consumers. The advantage of using purposive sampling is the possibility to strategically select the participants that are providing added value to the research. The added value is seen as different perspectives from people that are relevant considering the goals of the research. However, purposive sampling method is non-probability sampling method, hence the results are not generalizable for bigger population. This can be considered as a weakness, however when considering the goal of the research as defined by the set research questions this research does not seek for generalizations, but merely to explore and understand (Bryman & Bell, 2015).

In this research the researchers targeted a limited number of people corresponding to the narrow requirements of age, nationality and social class. The elderly people were approached and asked whether they would be willing to partake in the research at a local fish-and-chips shop in West Yorkshire, United Kingdom that is popular among the local senior population. The sample size of five respondents was finally chosen in the sampling process on the basis of the limited scope of the research (Bryman & Bell, 2015). This approach partially mimics a multiple case study design in which a small sample size is used in order to investigate in detail a specific phenomenon in a specific context (Bryman & Bell, 2015; eds. Ritchie & Lewis, 2003; Yin, 2009). Despite the obvious limitations in terms of the inability to make

generalizations (Bryman & Bell, 2015), the adoption of this small sample approach made it possible to have deeper discussions about the topics, in addition to the increased possibility to discover new perspectives in the short time frame of this project. Moreover, as the method used in this research is non-purposive, the aim was not to gather data from where generalizations could be made, which warrants the use of a small sample (Bryman & Bell, 2015). This sampling approach focused on the quality and the insights of the interviews, which are at the core of this research. In addition, to guarantee the quality of the interviews, a native speaking researcher was assigned to conduct the interviews, in order to mitigate the risk of language or translation problems (Bryman & Bell, 2015).

### 3.3 Data Collection Method

#### 3.3.1 Face-to-Face Semi-structured Interviews

Interview is the most widely used method in the qualitative research, mainly as it will allow the respondent to freely express the personal interpretations about social constructs and individual opinions (Bryman & Bell, 2015). This flexibility of the semi-structured interview, or qualitative interview as referred to by Mason (2002), is its main benefit, and hence this method best reflected the intentions of this research of understanding a phenomenon, by enabling the gathering of insightful information in a more comprehensive manner than what the structured method allows (Bryman & Bell, 2015).

Furthermore, the interest in the semi-structured interview method is not restricted only to the researchers' point of view; instead it is focusing more on the interviewee's point of view. This further helps to gain insights about the studied phenomenon: elderly people and household robots in the case of this research. The data collection in this research is mainly focused on primary data collection. In the sphere of qualitative research, flexible interview methods are used (Bryman & Bell, 2015). These include the data collection method used in this research, as semi-structured interviews are the primary source of data gathering.

In the conducted interviews, pre-made questions were prepared as an outline for the interviews, with the purpose of guiding the interview. Questions were focused around the themes of household robots, factors that influence buying behaviour and images and perceptions regarding the topic (see Appendix A for the question frame). The prepared

questions as a guiding core helped to structure the interviews in a manner that allowed the respondents to address the topics seen relevant for the research without obstructing the respondents' ability to express their views of the world freely (Bryman & Bell, 2015). This set-up also provided the researcher with the possibility to ask supplementary questions about the arising topics and to gain a deeper understanding of the topicalities being discussed.

The semi-structured interviews were conducted in Great Britain during the time period of 22.03.2016 to 03.04.2016, with the interviews lasting on average for 18 minutes (see Table 1). All the interviews were conducted as face-to-face interviews, where both parties could interact with each other in a more comprehensive way, meaning that both parties could transparently communicate through speech, reactions and expressions. All the interviews were conducted in the settings where the respondents felt confidence and trust towards the researcher, namely at the homes of the respondents. All the interviews were recorded and transcribed for the purpose of later analysis and informed consent was given prior to the commencing of the interviews (see Appendix B).

*Table 1. Face-to-Face Semi-Structured Interviews*

Interviewee No.	Age	Gender	Time
1 (Donald)	74	Male	21 min 45 sec
2 (Pauline)	76	Female	16 min 41 sec
3 (Barry)	78	Male	16 min 5 sec
4 (Eileen)	75	Female	16 min 51 sec
5 (Edith)	87	Female	21 min 5 sec

### 3.3.2 Telephone Semi-Structured Follow-up Interviews

Following the initial face-to-face interviews, a set of follow-up interviews was conducted with the participants. This was done to supplement the shorter primary interviews, and to gain further insights to the matter. In addition this provided an opportunity to examine the effects of the primary face-to-face interviews in introducing the elderly people to household robots.

For this purpose the interviews were structured around the respondents' views on different types of household robots and their attributes (see Appendix C).

In total four interviews lasting 30 minutes on average were carried out, as interviewee no. 5 was unable to participate due to health concerns (see Table 2). These interviews were conducted in order to gain a deeper account of the perceptions of elderly people regarding household robots. The interviews began with a reminder of the previous interview, which was followed by questions regarding different types of robots and the participants' opinions towards these. As the method of data collection was maintained as a semi-structured interview, the interviewees responses directed the course of the interviews and therefore each interview was unique.

Although the data collection methodology was kept constant as a semi-structured interview, the follow-up interviews were conducted via telephone. Although this method of collecting data can be argued to be less personal and therefore less suitable for collecting qualitative data (Bryman & Bell, 2015), because the researcher had established a personal relationship with the participants during the face-to-face interviews and the technology was well known by the respondents prior to the interviews, the data collected through the use of telephone was highly detailed and provided the required depth to understanding the participants' beliefs, attitudes and intentions as well as perceived value as set by the research questions.

*Table 2. Telephone Semi-Structured Follow-up Interviews*

Interviewee No.	Time
1 (Donald)	42 min 37 sec
2 (Pauline)	21 min 34 sec
3 (Barry)	24 min 21 sec
4 (Eileen)	31 min 49 sec
5 (Edith)	Not conducted due to health related issues

### 3.4 Data Analysis

As a result of this qualitative research, a vast amount of information was gathered in various forms. In addition to recordings of the interviews, field notes and transcripts were generated in order to allow for detailed accounts to be analysed (Bryman & Bell, 2015), since when analysing the data, the process must be conducted in a way that guarantees authenticity and validity of the end results (Bryman & Bell, 2015).

In the sphere of qualitative research, there are a number of data analysis techniques that are commonly accepted by the academic community (Bryman & Bell, 2015). In this research the data analysis method of conventional content analysis was found to be the most suitable from the commonly accepted techniques (Hsieh & Shannon, 2005) to address the set research purpose.

Content analysis as a method is used to determine the contextual meaning behind the text by focusing on content and characteristics of the language (Hsieh & Shannon, 2005). However, the qualitative content analysis goes beyond studying of words and aims to categorise large amount of information into categories that represent similar meanings (Weber, 1990 cited in Hsieh & Shannon, 2005). The ultimate goal of the content analysis is “to provide knowledge and understanding of the phenomenon under study” (Downe-Wamboldt, 1992, p.314).

In regards of the data analysis process, the gathered data was first read word by word in order to find out the common themes and codes around the texts. This was done by highlighting words and generating initial themes at the margins of the transcripts. After this, notes were made by the researchers regarding the first impressions, thoughts and initial analysis of themes. This process was repeated several times in order to identify all relevant themes and codes in the texts. After all themes and codes were identified from the data, they were grouped into relevant categories and clustered. This helped to also identify the links and relations between the topics, as a cluster of themes on the margins of the transcripts implied a possible relationship between the themes. Finally, these initial themes were categorized to larger groupings by examining possible further connections, and as an end result the final themes were generated. (Hsieh & Shannon, 2005)

Like with all data analysis methods, using the conventional content analysis it has its own challenges. In the case of conventional content analysis, there is a threat that researches fail to

develop complete understanding of the context of the research, which in turn affects to the identification of the key categories (Hsieh & Shannon, 2005). However, the credibility of the results can be established through investigator triangulation, meaning that both researchers are part of the process of coding and analysis of the results, thus the risk of bias of results and inability to identify categories is being mitigated (Thurmond, 2001). This method of triangulation was applied in this research for the purpose of ensuring that the key findings were as accurate as possible.

In addition, there lies a possibility that the conventional content analysis can be unintentionally confused with the other similar qualitative methods such as grounded theory or thematic analysis (Hsieh & Shannon, 2005). However, in the case of this research this is perceived as minor risk, as the researchers were familiar with these methods from their earlier researches. Overall, conventional content analysis provided the tools to discover the information that is needed to answer to the research questions that were set in place.

### 3.5 Quality of Research

A central part of the research is to assure the validity and reliability in order to guarantee the quality of the research (Bryman & Bell, 2015). The most common criteria to assess the different aspects of research are external reliability, internal reliability, external validity and internal validity. However, as these criteria are most often used to assess quantitative research, there has been debate about transferability of these to qualitative research (Bryman & Bell, 2015). Guba and Lincoln (1994) have proposed alternative criterion to be used in the case of qualitative research. This criterion includes aspects of trustworthiness and authenticity that can assess the multiple social realities from the more critical perspective (Guba & Lincoln, 1994; Bryman & Bell, 2015). Moreover, as the research applies principles of constructivist approach to the research, the aforementioned criteria is developed to mitigate the quality concerns of constructivist approach in mind, and hence this approach is perceived to be fit for purpose in this research (Guba & Lincoln, 1994).

Furthermore, in order to increase and ensure the credibility and validity of the results, triangulation was used in this research. In this respect, Patton (2002 cited in Yin, 2009) identifies four different types of triangulation of which investigator triangulation was adopted. This entails that both researchers have been part of reporting, coding and analysing in order to

mitigate risks of bias of the results (Thurmond, 2001). In this respect, complementary skills of the researchers have been deployed in the research, in order to lessen the risk of bias in the results of the research.

In the perspective of the validity of the research, the interviews in this research were conducted in the native language of the respondents, by a native speaking researcher. Moreover, the validity of the research is further ensured by the adopted data collection method and sampling that were used to provide information that is relevant and academically accepted. However, due to the nature of the research as a non-purposive study with a multiple-case study like design, and the consequent limited sample size, the results of the study are not generalizable to a whole population. This is due to the sampling method that is restricting the possibility to generalize the result to the wider population (Bryman & Bell, 2015). However, the aim of the research focus has been on understanding social constructs and social worlds in the specific context of elderly people and household robotics, rather than testing theoretical frameworks, as is done in an explanatory research.

### 3.6 Limitations

One of the main limitations in the design of this thesis is posed by the limited number of participants interviewed. As the scope of this thesis was relatively narrow, the number of respondents was reduced to mimic a multiple case study design. A larger pool of respondents generally implies a higher quality and an ability to make generalization, providing that the sample size is large enough (Bryman & Bell, 2015). However, since this thesis did not seek to make generalizations, but instead to provide an exploratory research, the inability to make generalizations is not a concern. Another limitation is provided by the short duration of the face-to-face interviews. Due to the small sample size and the purpose of gaining understanding, the duration of the interviews should have ideally been longer which would have enabled to gain a deeper understanding. However, by conducting additional follow-up interviews, the researchers attempted to compensate for this limitation. These follow-up interviews came to provide longer and more detailed accounts necessary to build further understanding of the beliefs, attitudes and intentions as well as values towards household robotics.

## 4 Analysis and Discussion

*This chapter will introduce the empirical findings from both the face-to-face Semi-structured interviews and Telephone Semi-structured follow-up interviews conducted. The findings have been collaborated and categorised in consideration of the theoretical discussion. This categorised structure will provide a logical structure to provide an insightful analysis of the independent elderly respondents and their viewpoints of household robots garnered from the findings.*

### 4.1 Understanding of household robotics

In this section, the understanding of elderly people towards household robotics will be displayed, as this will give an overview of current knowledge that the elderly consumers have regarding the household robots in the markets. In order to be able to conduct consumption behaviour one has to know what the markets have to offer. For this reason, the chapter will include displaying the respondents' knowledge of household robotics and perceptions of what can be considered as one. With consideration to Ferrus & Somonte (2016) sub categorizations of household robotics shall be analysed. Knowledge of domestic robots types and domestic robots with hygiene features shall be measured through understanding of indoor and outdoor robotics, as these are the common typologies in the robotic markets. Lastly, by following variant definitions by Norman (2005) and Vuorimaa et al. (2012), this section shall also highlight elderly people's understanding of home appliances too.

#### 4.1.1 Household Robotics

First of all, throughout the semi-structured interview stage, following greetings and familiarisation with one another the respondents were directly questioned what they consider a domestic robot 'to be'. As aforementioned, Young et al. (2009) covets that household robots are machines with intelligent behaviour that represent human or animal's nature with the ability to interact with its environment and beyond. To the few respondents, this was an

answer, which required pensive thought before providing an answer; whereas others could not truthfully conjure up a connection, nor an answer. An explanation to the long pauses exhibited, could be an indication of unfamiliarity and non-recognition of terminology of household robots; which directly conveys that certain respondents were not coherent with the topic of household robotics at hand. It could also be justified that respondents garnered a degree of anxiety when prompted, as it was out of their comfort zone. Thus, it was necessary to thereafter produce a definition of household robots and its types to respondents, to engage respondents and relieve any anxieties; to produce lucid responses and gain initial opinions on the concept of household robots.

*“Well a household robot is one that cleans the house isn’t it?”*

- **Edith**

*“Just like a machine, obviously that looks like a robot that does work for your household and helps people that probably cannot do it themselves”.*

- **Eileen**

What can be vindicated from these findings is that all respondents understood that household robotics were in fact machines, which provide functional tasks. Certain respondents considered that these tasks related to household tasks such as cleaning or going beyond that and helping people too; which questions whether the respondents consider household robots to be social or welfare-orientated as well. What can be also suggested, is that the inquisitive nature and use of rhetorical questions by interviewees is that their knowledge is limited but they allure a sense of curiosity; which possibly indicates that they may in fact become more knowledgeable in the future, now that the topic of household robotics has ‘peaked their interest’. This sense of curiosity could be an indicator that elderly people are willing to adopt, but their lack of knowledge on household robots alienates them from the prospect of doing so.

To further speculate, respondents may have proposed that a household robot does perform household tasks such as cleaning as it is what the respondent would desire a household robot to do; despite possibly having no knowledge of household robots prior to the interview. To delve even further, respondent’s definitions as aforementioned such as cleaning or helping, are only set tasks which particular household robots can do. This conceptualises that in fact certain respondents do not have knowledge of the overall sphere of household robotics, and

most likely only pertain knowledge to domestic robots or humanoid robots; or even folklore as respondents did not differentiate between different household robotic types.

Albeit, when respondents were asked to further position themselves on their definitions; it is fair to say that in some cases their definitions deviated. With the example provided, one respondent considered driverless cars to be domestic robots. The inclusion of devices, such as driverless cars, which are not generally considered as household robots under this category, seems to imply that there may be some confusion among the elderly about what constitutes as a household robot.

*“Well the latest is the driverless cars”.*

- **Barry**

Yet again, this exhibit of misapprehension of household robots can illustrate that the respondent is ill-informed or unfamiliar with the concept of household robotics. When prompted, Barry stated that he became knowledgeable about robotic cars from television coverage, which may suggest that the pushing marketing campaigns of any robotic technology are not captivating the comprehension of its elderly audience. In spirit, household robotic companies in particular should therefore seek to categorise household robotic products more fervently in promotions to engage awareness of its products and prevent misapprehension; as the elderly may be willing to adopt if their functional knowledge of a household robot is more understood.

Furthermore, the notion of confusion and misunderstanding of what a domestic robot is, was truly accentuated by one respondent who openly admitted that they lacked any knowledge about domestic robots; which is a fore reason to why they have not chosen to adopt a domestic robot beforehand. Pauline’s display of no knowledge of household robotics was exemplified as she could not provide any definitions about domestic robots or provide any additional details, such as what functions they thought a domestic robot may provide. Although, the term ‘domestic robotic’ could have been alienating, and a term which this respondent was not familiar with. The inability to conjure any definition strongly suggests that this particular respondent was poorly informed about domestic robots, or simply had no interest in them. Still, the respondent found domestic robotics to be alienating as Pauline referred to the concept as being a ‘new thing’. This suggests that many elderly people may not be aware of current technology trends; never mind domestic robots. To categorise, some

elderly people may be deemed to be ‘old-fashioned’ and do not seek to upgrade the use of technology in everyday life; as they are content with the possessions they have. Thus, it may be difficult to assuage elderly people with old-fashioned tendencies into adopting household robots.

*“I don’t know anything about them at all really...”*

- **Pauline**

### Indoor Robots

Indoor robotics can be considered to be a subcategory of household robots. It is a common typology, which is used in academia and in specific markets. The purpose of an indoor robot is essentially to operate inside the home; or any inner space for that matter. All respondents seemed to be able to familiarise with this concept. What was most surprising was that one respondent immediately identified domestic robots to be ‘mechanical vacuum cleaners’. This was later explained, as the respondent had witnessed the use of a robotic vacuum cleaner in the home of a friend.

**Interviewer:** [...] *What does the term ‘household robot’ bring to your mind?*

**Respondent:** [Pause] *Mechanical Vacuum Cleaners.*

- **Barry**

To help respondents familiarise with the term indoor robotics, it was decided to examine their knowledge of a well-known indoor domestic robot, the robotic vacuum cleaner. When certain respondents were questioned on their knowledge of robotic vacuum cleaners they could not provide an understanding, as they were not familiar with one. Due to this, it can be debated that the lack of knowledge of robotic vacuum cleaners can be due to low product awareness of indoor robotic product types as exhibited by Eileen who proclaims that she has “never seen one” To delve deeper, Eileen refers to a robotic vacuum cleaner as ‘one’ which hints of unfamiliarity of what a robotic vacuum cleaner truly is, which would indicate no knowledge of its functions of differentiation between a robotic vacuum cleaner and a conventional vacuum cleaner. Equally, it could be considered that Eileen can represent the notion that

many elderly people fail to assimilate with household technologies and thus have no knowledge; which consequently would dissuade them from adopting.

*Interviewer: What do you think about robotic vacuum cleaners?*

*Respondent: I have never seen one.*

- **Eileen**

### Outdoor Robots

Outdoor robotics are essentially domestic robots which operate outside. When respondents were prompted on their knowledge of outdoor robotics, all respondents simultaneously understood that it was a robot, which operated outside. Therefore, to further question their knowledge, it was decided to ask respondents if they were familiar with a common outdoor domestic robot; the robotic lawn mower. As shown below, one respondent in particular was relatively knowledgeable about robotic lawn mowers, having seen one function at a local park as provided by Leeds City Council. Due to this, the respondent could reflect on the functions it could do. The respondent highlighted in particular, the functioning of sensors and further explained that the robotic lawn mower can be used in all climate conditions.

*Respondent: “[...]. I do know that Leeds City Council park department use the grass cutting robot”.*

*Interviewer: “What tasks does it do [robotic lawn mower]?”*

*Respondent: “Err, cuts the grass obviously on its own; instead of needing a gardener to tend to it. It’s great, how it can run independent. I have seen that if anyone steps in front of it, it has some kind of a sensor so it stops mowing. So I would say it’s quite aware of its surroundings you know?”*

- **Barry**

In comparison, certain respondents claimed that a robotic lawn mower would be similar to a ‘automatic vacuum cleaner’ implying that it would be autonomous. Also, this respondent claims that a robotic lawn mower would be ‘like a usual lawn mower’ which suggests that it would perform the same operations as a lawn mower.

*“I have never seen one, but I imagine that it would look like a usual lawn mower as well. It would be as the same as the automatic vacuum cleaner would be, it would be brilliant”.*

- **Eileen**

Although, this respondent’s knowledge is blind sighted, as suggested they have not ever seen a robotic lawn mower, and this is how they would predict it would look and function. Equally, Eileen comments that the use of a robotic lawn mower would be “brilliant” despite having never seen one function. Had it not been for this respondent’s lack of knowledge, the likelihood would be that she would have been in possession of one; which dictates that if domestic robotic companies, namely robotic lawn mower companies were to promote information to the elderly more fittingly then elderly people would be more willing to adopt.

#### Home Appliances

Moreover, to gain an overall perspective, respondents were asked what a ‘smart home’ is, to test their knowledge and understanding of smart household appliances. By gathering elderly people’s understanding of smart household appliances, it helps to provide a measure as to what degree elderly people welcome the use of technology in their home. As Norman (2005) suggests, household appliances can be considered to be household robotics as they possess more technology than other domestic robotics and due to the fact that many smart home appliances can be interconnected with other gadgets. The terminology of smart homes managed to dumbfound all respondents; whereas one respondent was able to suggest that a smart home would be an intelligent home with the use of technology. Continuing, certain respondents were able to suggest what smart home appliances they had from the understanding of the concept of a ‘smart home’ by naming the technologies that they use in their home such as a television, telephone, computer and so forth.

**Interviewer:** [...] *Would you say that you have a smart home?*

**Respondent:** *To a certain extent, yes.*

**Interviewer:** *Why?*

**Respondent:** *Well, because the things that everybody else uses. Like we use an automatic washing machine, dryer, vacuum cleaner, 65” television and computers. All that sort of stuff we have got.*

- **Donald**

Further, certain respondents often characterised a smart home to be a home that is ‘tidy’. A home where ‘things are kept where they should be’. When further questioned if this had any relation to technology, this question was rebuffed claiming that people make a ‘smart home’. This strongly suggests that many elderly people have no knowledge of the concept of a smart home, and ultimately smart home appliances, which implies their lack of use with smart home appliances. In this trend, it would suggest that many elderly people may be technologically averse; and not willing to adopt modern technological solutions; particularly as Pauline exhibited favouring a home which was made ‘smart’ by people instead of technology. In view of this, the attitudes and beliefs of this elderly segment would have to be transformed in order to assimilate with adopting household robots.

***Interviewer:** What do you think a smart home is?*

***Respondent:** I think that a smart home is a nice tidy home.*

***Interviewer:** Okay a tidy home? Do you think it has anything to do with technology?*

***Respondent:** No I think it’s the people that make it.*

- **Pauline**

In contrast, when particular respondents were questioned what technology they have owned in their home they considered a ‘smart phone’ and ‘smart meter’ to be household appliances. In effect, this conveys that elderly people may use a smart phone as a gadget to control household appliances and welcome the use of computerised alternatives with the use of smart meters. When elicited further, the respondent claimed to have knowledge about smart home appliances as they helped provide a sustainable solution; both economically and environmentally. In particular, Barry further reiterated that a smart meter is purposeful as “Wherever you can save energy is a good thing [...] as it is good for the consumer, the country and the world”. As a result, this highlights that elderly people are considerate on the amount of energy consumed due to environmental reasons; possibly if household robots were to market themselves to be more environmentally friendly it would be more appealing to elderly people, and possibly evoke them to adopt more.

**Interviewer:** *What do you think a smart home is?*

**Respondent:** *Like I say, a home that contains a smart phone, a smart meter for your energy consumption and to keep you up to date with what you are using and how you can save. I think these are very good.*

- **Barry**

### Social Robots

With the intention of focusing this research towards independent elderly people, this research has predominately focused on domestic robots due to their low-medium price ranged, which is viable to elderly people whom are mostly on pensions. Thus, it was decided that not all respondents would be questioned on their understanding of social robots. However, respondents that answered explained that they are robots that will ‘talk to you’ and ‘obey commands’. As explained by Guizzo (2015), social robotics can be defined to be emotionally engaging robots that are communicative, such as informing about the weather. With that being said, the respondent suggests that a social robot is able to interact with humans only but not necessarily with other robots. Moreover, with the suggestion that a robot can ‘make a cup of tea’ could also be a misinterpretation of a smart home appliance or a humanoid robot, which could both function this task. This once again implies the lack of awareness of the definitions and different categories of household robots.

**Interviewer:** *How would define a social robot?*

**Respondent:** *A social robot is a robot that is social really. It will talk to you and obey your commands. For example, if you asked it to make a cup of tea for you, it would.*

- **Donald**

In addition, when a respondent was further elicited and asked to provide an example of a social robot. They could not establish a common link to any available household robotics that they may have knowledge of. Due to this, the respondent believed that a social robot was in fact to be a future invention and not ready available now, which proposes that the respondent has limited knowledge of social robots. The respondent may have this viewpoint, possibly alike many other elderly people as the product awareness of social robots may be low. This can be supported from the findings collated, as no respondent could name a social robot nor state what functions it may have.

**Interviewer:** *Can you give an example of a social robot?*

**Respondent:** *No, I can't think of any social robots at the moment. I think this is something that will be available in the future, it is too technical for now.*

- **Donald**

### Welfare oriented household Robots

When the respondents were questioned what a welfare robot was, particular respondents struggled to familiarise with the term. As previously discussed, Ferrús and Somonte (2016) covets that welfare-orientated robots include a wide variety of robots from elderly care services, disabled people help and from telecare sectors. Although, when respondents were provided with a suggestion of what it could be, they articulated that it was a robot that offered care, which 'came into their home' implying that it was an object, a machine. In the suggestion provided below, the respondent also suggested that the welfare robot is to be used in favour of having a carer; which implies a welfare-orientated robot would be of use to a person who is in need of medical attention.

**Interviewer:** *[...] What do you think a welfare robot is?*

**Respondent:** *I have no idea. I have never heard of one. I am guessing it is a robot that provides care to a person instead of having a carer come to their home.*

**Interviewer:** *How would a welfare robot care for a person?*

**Respondent:** *I don't know really. I suppose by giving them medicine, bathing them, making them food? I couldn't say.*

- **Edith**

Continuing, despite respondents having limited to no knowledge about welfare oriented household robotics, one respondent in particular speculated on the concept. In particular, Eileen envisaged that a welfare robot would be programmed to call a doctor or an ambulance to care for elderly people that were poor or lonely or in need of care. The participant further stated that she would imagine a welfare robot to emulate the role of an in-home carer by performing necessary tasks such as bathing and providing medicine to their patient. In fairness, Eileen stipulates genuine functions which welfare orientated household robots possess; although with Eileen having no knowledge to a welfare robot beforehand these are

merely assumptions not knowledge. If, elderly people alike Eileen were to be more knowledgeable of welfare orientated household robots, they would be more likely to adopt as in many cases as with the causality of ill health high among elderly people, such technology is likely to appeal to them in needs of assistance.

*[...] As I said to have a normal carer in when an elderly person is ill, they could call a doctor or an ambulance. Where I think, that should be the same with domestic robots. They should be programmed to do this too. Which I don't know how it would go about it but that would need be for elderly people that are poor or lonely.*

- **Eileen**

#### 4.1.2 Household Robotics outside the scope of this research

When obtaining findings from the interviews, the main intention was to gain a full understanding of the knowledge of domestic robots from elderly people, as they are low to medium priced, which humanoid robots are consequentially not. Thus, it has been determined that domestic robots, as defined by this research are more in reach to elderly people, particularly as the majority of elderly people live on pensions and or savings.

Furthermore, although the main intent of the research findings was to gain knowledge of household robotic products, it was decided to prompt additional questions to consider the full sphere of household robotics to gain a perception of elderly people's scope of knowledge and whether it at all differentiated from knowledge of domestic robotics.

Firstly, as aforesaid Ferrús and Somonte (2016) propose that a humanoid robot is a welfare-orientated robot as its main purpose is to help people with disabilities. Additionally, humanoid robots have the tendency to mimic human characteristics too. When questioning respondents, some understood the concept of a humanoid robot and how it is designed to replicate the functions of a human being and even questioning the purpose of it; which propose some degree of knowledge.

***Interviewer:** [...] What do you think about humanoid robots?*

***Respondent:** The problem there is, that they give them the form of a human being, which mimics the shape of a human being, but is that necessary?*

- **Donald**

However, most respondents, as demonstrated by the quote from Eileen, had rather limited knowledge of humanoid robots with most respondents requesting for an explanation of the terminology. Therefore, this can be interpreted in two formats; firstly, that due to the low availability of humanoid robots compared to other household robots elderly people have low awareness and hence little knowledge; secondly, humanoid robots are simply not of interest to elderly people hence their limited or non-existent knowledge of them.

***Interviewer:** Do you know what a humanoid robot is?*

***Respondent:** No.*

***Interviewer:** What do you think it is?*

***Respondent:** [pause] I don't know; I am not quite sure. Could you explain it to me please?*

- **Eileen**

## 4.2 Consumption Values of Silent Generation

In this section, the consumer behaviour of the silent generation in reference to household robotics will be analysed in detail. This section, shall understudy the theoretical background of different consumer behaviour characteristics exhibited by the silent generation. In essence, this section shall determine consumer behaviour characteristics of the silent generation, in order to examine and analyse the values raised by participants in connection to household robotics.

### 4.2.1 Functional Values

As what can be recalled, Hur, Yoo and Chung (2012) covet that functional values are what can be considered as the biggest aspect affecting the adoption of household robots. This is due to the fact, that the functionality of a robot is the underlying factor as to why a household robot can bring value to a product. All respondents considered household robots to be functional products that would be able to perform an array of tasks; in some cases more than what is available with current household robots available on the market.

*“If you could get one that generally did most things and what is a good all-rounder, then yes. You would buy that one. What people tend to do is, they get one for one particular job; then another for another particular job and then you end up with four or five different ones. Really, you could have pulled the money together and purchase a robot that did everything”*

- **Donald**

In comparison, certain respondents fended that they would only desire a domestic robot, which offered functions, which they were unable to, or struggle to do themselves. Many of the tasks, which respondents seek a domestic robot to replicate, were due to their health conditions and old age that prohibited or limited them from performing the tasks. Although, the tasks, which were suggested, are of different variants; which the respondent claims a singular domestic robot could perform.

*I would just want one to clean my windows instead of having to climb up the steps because I have them paid to be done on the outside. But inside, I get the step.*

- **Edith**

*One that would help me do the housework, put the washing in the washing machine where can't bend down. Doing jobs where I can't bend specifically now and more than anything in the garden which I find impossible to do now.*

- **Eileen**

Continuing, many respondents placed much trust in the functionality of domestic robots, branding them to be relatively simple to use. Arguably, it can be foreseen that respondents placed trust, as domestic robots are autonomous devices, which function without human intervention. As the respondent below claims, domestic robots would be ‘relatively simple to use’ as it would ‘do the chores for you’. Respondents tend to rely heavily on the autonomous functioning of domestic robots; otherwise they ‘do not see the point in buying one’; which indicates less human intervention would be a unique selling point (USP) for all household robotics.

**Interviewer:** [...] Do you think that domestic robots are simple to use? Or not?

**Respondent:** Relatively simple, yes. I would think so yes.

**Interviewer:** *What makes them simple to use?*

**Respondent:** *Well, I guess because they do the chore for you. You would imagine that it does it itself and you leave it to its own devices. Otherwise, what would be the point in buying one?*

- **Barry**

Whereas, not all respondents considered that domestic robots would be reliable. In particular, one respondent questioned the functions of the robotic vacuum cleaner posing doubts on its full functionality possibly in comparison with a conventional vacuum cleaner. The concern was that the robotic vacuum cleaner would not do as good as a job because of its inability to get into corners or around furniture. As a result of this, certain respondents later admitted that they would not seek to own a robotic Hoover for these reasons and questioned whether the robotic Hoover had the intelligence to either move furniture or navigate into corners with a type of programming. In essence, the respondent indirectly questions the effectiveness of the shape of the robotic Hoover if it is unable to navigate into particular areas of the home.

**Interviewer:** *What do you think about robotic vacuum cleaners?*

**Respondent:** *I can't see them getting into the corners.*

**Interviewer:** *Why not?*

**Respondent:** *Well, if you put a thing in the middle of the room and set it working. How does it know to get into the corners? And, if it gets stuck in the corners or it can't get in for furniture, what does it do then?*

- **Pauline**

On the flipside, apart from certain respondents whom reflected negatively on the functioning of household robots. One respondent, in particular pursued the option into buying a robotic lawn mower. Donald's main reasoning into buying a robotic lawn mower was because it could provide the functions of a conventional lawn mower but autonomously; coupled with seeing a demonstration of the product's functions from a trusted friend.

A robotic lawn mower was advantageous to Donald, as he himself is disabled and unable to tend to his garden; and he was concerned that his spouse would have to tend to the garden herself, when she too has disabilities. Donald stated that a conventional lawn mower was too "cumbersome" and "heavy" for his spouse to use, so the independent functioning of the device was well received. The respondent decided on adopting a robotic lawn mower prior to

the initial interview together and due to his lack of knowledge of such domestic robotic technology he had not pursued the possibility of adopting one beforehand. Likewise, this was a common trend with other respondents, whom had limited knowledge of the functional abilities of household robots, which had restrained them to adopt; but when informed their curiosity heightened as their knowledge of the functions of household robotics grew. For example, Donald was able to differentiate between the different mower blades; be that rotatory or hover which implies that the respondent decided to study product specifications too and had an understanding of the robotic lawn mower market's norms.

*“[...] We recently got one [robotic lawn mower], purchased one because my wife is disabled and she has a hard time getting around the garden now. It was the choice between a rotary mower and a hover mower. So, she tried the hover mower that a friend had got and found that it was just so simple to use.”*

- **Donald**

Most respondents claimed that the pricing of a domestic robot would simply be too outlandish and expensive to purchase. Due to this, certain respondents claimed they would be unwilling to purchase a domestic robot because they believe it would be too expensive, even to exaggerate at £1 million. This is predominately due to the fact that most respondents had minor or no knowledge of domestic robots and thus refuting that it could be sold at a reasonable price. Other, respondents would place great consideration on the price due to their economic circumstances; primarily because they were living on a pension which as the respondents reflected was considerably lower than a full-time wage. In light of this, respondents signified behaviours of frugality as they were seeking the best functionality at a competitive price due to their economic situations respectively.

*“[...] I am on a limited budget because I am an old aged pensioner (OAP). So my limit would be the cost that is available to me is the one that I can just about manage for the best unit possible.”*

- **Donald**

*“A million pounds if you wanted something like that”.*

- **Edith**

Furthermore, when respondents were asked to provide an estimate on how much they believed that domestic robots roughly costs, the prices varied but not considerably. As previously mentioned one respondent scoffed a domestic robot would cost a £1 million; whereas other respondents were more relative and estimated between £500-£2000. When quizzed if they felt that this price estimate was affordable, certain respondents claimed it was not as it would not be manageable on a pension income. Owing to this, many respondents have remained price conscious and demand a price reduction or would prefer to wait for the prices to reduce to then consider purchasing a domestic robot.

***Interviewer:** To estimate, what would you imagine [a domestic robot costs]?*

***Respondent:** I would say about £2000.*

***Interviewer:** Would you buy one at this price?*

***Respondent:** Definitely not, it is way too expensive, especially for elderly people on pensions like myself.*

- **Eileen**

*“At this moment in time I don’t know if they have come down in price, but I would suspect they would cost something around £500-£600”*

- **Barry**

Interestingly, one respondent whom later acquired an interest in domestic robotics after the initial face-to-face semi-structured interview, sought upon himself to consider purchasing a robotic vacuum cleaner from overseas. This respondent, Donald, claimed that prices in the UK market were less competitive compared to US and Chinese markets where production was more and prices were cheaper; partially due to the exchange rate. Donald, also claimed to purchase technology from wholesale websites such as Alibaba and auction sites like eBay in favour of purchasing from UK outlets as he was able to purchase newer technology at a more competitive price. Although, Donald did not make a purchase, as postage was deemed to be too expensive and he did not know of any of the brands available in the UK market.

**Respondent:** [...] I don't think it is available now in this country, but it was in sale I think in America. [...] I think it was about USD \$310?

**Interviewer:** Okay. Do you think that was a fair price?

**Respondent:** Well, I would think so bearing in mind that in this country you pay up to £200-300 for an upright Hoover.

**Interviewer:** Yes. Did you purchase it?

**Respondent:** No. [...], I had thought about it, but then the import not duty but the postage if you like is horrendous from the U.S. so it makes it a non-viable sale.

- **Donald**

#### 4.2.2 Emotional Values

Throughout the empirical research, the discussion of domestic robots in the home environment provoked many differing emotions, possibly because people generally like to have a sense of control with possessions concerning their home, as it is personal and sentimental. To recall, emotional values, as Sheth, Newman and Gross (1991) state, are the feelings of attachment towards a product or service and or other feelings, which are constrained with said product or service.

*“if you have a person comes in to do your work for you, you can have a conversation and a cup of tea with them and have a natter; but you couldn't natter to a robot”.*

- **Pauline**

*“I would be frightened of mechanical things going wrong and hurting me”.*

*“A robot is just a toy you can't speak to a toy all your life you would go crazy”.*

- **Edith**

Generally, most respondents, when asked to explain their opinions of household robotics after considering the functions household robots may possess, attested for vast trepidations. Most respondents had a feeling of anxiety and lack of perseverance, as household robotics were too familiar and alien in some regards. Many respondents, much preferred the concept of human aid and intervention; in favour of a household robot, simply because it was not human.

Whereas, the idea of a robot being social and to interact with humans would be bothersome as it would still be objectified as a machine, merely a ‘toy’. With the respondents leading independent lives, the idea of sharing their independence with a household robot that was social evoked fear and annoyance as the respondents argued they would be unable to build a rapport with a machine as they would hope for in a person.

Likewise, the exhibits of these emotions shown by certain respondents signify their lack of trust placed in household robotics. Specifically, certain respondents questioned the reliability of the functioning of household robots with the concern that they would not function appropriately; possibly because it is new technology that they are not familiar with, or because they restrain from using modern technology in their everyday rituals. As Pauline states, she would rather “stick to what she knows” meaning she is in fact unfamiliar with household robots and because of this she places a sense of distrust in wanting to adopt one. Other concerns were that a robotic vacuum cleaner, in the situation provided would malfunction and “go crazy” with distress of not being able to control the device. Due to this, Pauline forthrightly claimed she would prefer the use of a cleaner; particularly if she was no longer able to perform household tasks herself. Therefore, the distrust, which certain elderly people may have, may prohibit them from adopting household robotics if they do not familiarise with the product features and functions.

*“I wouldn’t know what to do with the vacuum if it didn’t work or went crazy. I’d rather stick with what I know”*

- **Pauline**

In contrast, certain respondents claimed that a household robot can be trusted; in fact, more trusted than a carer. In particular, as Eileen states that she would feel anxious to have a carer in her home as the respondent would feel unnerved at the prospect of a person that they did not trust; particularly with their prized possessions. Whereas, Eileen further reiterates that she would place further trust in a household robot as it would abide her command and essentially she maintained control in her household.

*“Elderly people get carers in their home and they cannot always be trusted. You know with the personal things that you have got. Then again, everybody is the same. I think it [household robots] would probably be better yes.*

- **Eileen**

This respondent also praised any use of household robots, naming it a “brilliant” addition to any elderly person’s home and that in 20-30 years time she foresaw that the use of household robotics would be the norm; in favour of carers. Although, with this particular respondent’s knowledge of household robots; in particular welfare-orientated household robotics limited, if this respondent was to become more knowledgeable may have differing opinions as this respondent’s opinions are based on assumptions.

In retrospective, one respondent would consider emotional affinity with a household robot, a humanoid robot in particular as their ability to socialise can be justified for elderly widows whom are coping with the loss of their loved ones. Donald, relates that an elderly widow could confide in a humanoid robot as they are most likely to be lonely and in need of emotional support. Although, Donald does make the fine line that an elderly widow would recognise that it is ‘not a human being, but as good as’ suggesting that the comfort of a human person would be the primary option for an elderly person in this proposed situation.

*The other thing is that when a partner has died they are left on their own and become very lonely. So if you could make this robot, to look like a human being and you could converse with it and it understood and returned response. You have a readymade partner there that will make you feel that someone is there with you. Not a human being, but as good as.*

- **Donald**

#### 4.2.3 Epistemic Values

From the findings, it is fair to consider that domestic robotics have residual epistemic values on elderly people. As Sheth, Newman and Gross (1991) covet, that epistemic value is the curiosity towards products and willingness to experience using the product. As domestic robots are relatively unfamiliar to elderly people, interest in their capabilities is seemingly

high. This implies that the elderly people interviewed demonstrate an interest towards the products and gaining first-hand experience of their usage.

***Interviewer:** But would you consider going to a demonstration if it was a demonstration of domestic robots?*

***Respondent:** Yes, because of curiosity. I would be curious to see that they do what they say they do.*

- **Pauline**

*Well, I think they would have to go into their homes and demonstrate them into what they can do. Because personally I do not have a clue what they can do because I have never seen one work. As I said I would be intrigued and very interested. That's what I think they should do go into people's homes.*

- **Eileen**

Moreover, what was particularly striking was that certain respondents were eager to know more about household robotics but only if they were able to see a demonstration of a robot functioning. One respondent, Pauline commented that she would be “curious” to see how a domestic robot would function and would consider going to exhibitions or witnessing demonstrations to know more about domestic robotic products. This eagerness, is clearly stated as Pauline also reflected that she has never been to or desired to go to a technological related exhibition or demonstration in the past; although, the prospect of a domestic robot tended to be rather appealing. Another respondent, Eileen shares the same notion, reflecting that her knowledge is limited of household robotics but at the possibility of demonstration to gain further understanding of household robotics, the respondent may well be pursued into adopting a robot. What can be understood is that many elderly people may be curious about adopting a household robot, but they are reserving their impulses, as their knowledge is restricted. Therefore, household robotic companies should surely seek to appetize the curiosity of their products from the elderly community.

Although, certain respondents have demonstrated that essentially “curiosity may kill the cat” as they may have been curious somehow in how a household robot functioned and performed in the past, but the marvel of a new concept may have prevailed to be overcompensating and deemed too estranging to relate to. This demonstration of stepping back afoot, is rectified by

Barry, whom revealed that an elderly friend at the time, somewhat thirty years ago, spoke of the use a robotic vacuum cleaner in her home to which he found to be “surreal”.

*Because it was kind of surreal. Strange if you don't mind me saying as it was a totally new concept. Probably too advanced at the time.*

- **Barry**

What is interesting, is that this device was used by a trusted friend in the past, but this respondent did not seem to follow-up on the advancements of robotic vacuum cleaners nor seek to adopt one himself. The likelihood of this is because at the time of demonstration, this respondent was not considered to be elderly, and may have categorised the device to be of use to elderly people only. What can be signified is that this inherited trepidation from the past may have instilled feelings which has prevented this elderly respondent from possibly adopting a robotic vacuum cleaner.

#### 4.2.4 Conditional Values

Due to the quality of life as we get older, elderly people have a higher tendency to become more dependent on aid, in particular to maintain an independent life. Ageing, alongside other afflictions such as illness or disabilities are the conditional values which respondents claimed would be a predominate reason into considering adopting a domestic robot. Conventionally, elderly people that desire to lead an independent life wish to stray from any secondary help; as it can be a life transition which they have not yet actualised. Therefore, the possibility of not depending on the help and reliance of a carer or family members can be a tangible solution; particularly in certain cultures which implore independence possibly due to pride or because of financial situations. This is a premise, where household robotics would be advantageous to elderly people to be able to maintain their independence and help with domestic tasks. As Eileen reiterates, a household robot would be a welcomed addition to her home as she bemoans at the difficulties of everyday chores as well as having to care for her severely disabled husband too. A household robot which could replicate these tasks, and make this respondent's everyday living easier and elderly people in similar predicaments, it is assumable this segment would be willing to adopt household robots.

*Err, because they would be a great help for the amount of work I have to do. Not just the housework but I have to care for my husband who is severely disabled too. So, it would help me with the housework and the garden.*

- **Eileen**

Continuing, certain respondents claimed that domestic robotics would be appropriate for elderly people particularly if they are handicapped or have any other relevant health concerns. The relation of elderly people to domestic robots by respondents seemed to emphasise to those with disabilities; namely because of the difficulty in doing everyday chores. Another shared viewpoint from certain respondents was that it was a nonfigurative possibility to depend on help of carers due to economical reasons.

*If I were in a chair, I would like something like that [domestic robot] as it would of course be difficult to move.*

- **Edith**

*It would be good for disabled people, in particular to have them in the house and they could help with the domestic chores and especially cut the lawn. In particular, disabled people like me just can't do anymore and can't afford to pay for help.*

- **Eileen**

In certain countries, not all health care services are free and costs of health care services can be unforeseeable to elderly people that solely depend on a pension income. Equally, elderly people may undermine the quality of health services that are provided and would thus prevail to enact personal care on their own accord. As Eileen confirms, it's a situation which can be colloquially referred to as "Catch 22", meaning without the ability to care for herself nor be able to be dependent on health services Eileen has no other alternative. With this being said, the addition of household robotics; particularly welfare orientated household robotics would be an alternative to assist elderly people depending they were available at a tangible price range.

#### 4.2.5 Social Values

Comparatively, social values are a considerable aspect when defining consumer behaviour of the silent generation in consideration of household robots. As previously touched upon, Sheth, Newman and Gross (1991) rectify that social values are an alternative association of a product with one or more specific groups. When respondents were questioned which type of people would seek to own a domestic robot, they argued younger people. The reasoning behind this, was because respondents felt that younger people were more technologically dexterous and thus more suited to domestic robotics products and because younger people have less time on their hands due to full-time employment and caring for their families too. As Pauline comments, younger people are more apt at adopting new technology; whereas elderly people find it to be complexing, stating that she restrains from keeping up with technological trends.

*Because younger people use technology all the time. I can't keep up to speed with it, it's definitely more for younger people as I think elderly people don't understand a lot of technology that is out today.*

- **Pauline**

While, one respondent remarked that domestic robots would also be most adoptive to younger demographics as they have more responsibilities, which constrains them of time to do habitual tasks such as household chores. Eileen, specifically characterised that working mums, assuming with full-time careers are away from the home while working which leaves any household tasks to be completed in the evening; although this can be bothersome to young mothers whom may have toddlers in nursery whom require mothering at a tender age. In retrospective, this respondent further states that elderly people have time on their hands with no responsibilities and with time availability it gives more opportunities to attend to household tasks which a household robot would do. Henceforth, household robots may be appealing to independent elderly people whom still have a degree of responsibility, be that working or caring for family members as this may constrain them of time.

*"I think that domestic robots will appeal to everyone; in particular young working mums whom are at work all day and have children in nursery and they have to come home on a night and start doing the housework. You know? They must be very tired, so I think they will be very handy for younger people"*

- **Eileen**

Whereas, other respondents claimed that domestic robots would only appeal to certain genders. In particular, one respondent claimed that domestic robots would be most appealing to ladies that “*didn’t like housework*” which does not suggest their age or profile with the connotation that they could possibly be housewives as the respondent branded them ‘*ladies of leisure*’. The respondent commented that domestic robotics would not be appealing to men as they would not be ‘*interested in these things*’; but may possibly be interested in a robotic lawn mower.

**Interviewer:** *Can you think of any other people that they [domestic robots] might appeal too?*

**Respondent:** *Well, like ladies that don’t like housework.*

**Interviewer:** *What would be the reason for them to buy one then?*

**Respondent:** *For an easier life I suppose.*

**Interviewer:** *Do you think it could be appealing to men too?*

**Respondent:** *I do not think men would be as interested in these things. Maybe the lawn mower but definitely not a Hoover.*

- **Barry**

To analyse, these assumptions can be considered to be extremely conservative compared to how modern society functions today. What is apparent, is that this respondent familiarises with specific gender roles which for the silent generation are most likely to have been their norm; considering they were influenced from an era where gender roles were more structured and conforming. It is questionable, if other elderly people relate to these idealisms, but the marketing of household robotics may appeal to certain elderly audiences if it is more gender role specified; but as this is one respondent’s opinion this notion is debatable.

### 4.3 Attitudes, Beliefs, Intentions & Behaviours

In this section, the attitudes, beliefs, intentions and behaviours of respondents when concerning household robotics will be analysed, in order to structure the understanding of the process of adopting by elderly people.

This section, shall akin to the four behavioural characteristic variables as actualised by Fishbein and Ajzen (1975) the cornerstone scholarly work in the adoption of household robots. Alike previous sections, this section will help lead to the discussion of whether elderly people, namely the silent generation are truly willing to adopt household robots by scrutinising in detail respondent's observed behaviour.

#### 4.3.1 Attitudes and Beliefs

To begin, it is fair to interpret that the attitude and belief characteristic variables are interrelated when considering the adoption of household robots, as both characteristics are dependent on one another. As understood, Fishbein and Ajzen (1975) covets that belief creates the foundation to the process of adoption and initiation process, which in effect creates a basis for attitudes to rise. Certain respondents when asked to air their initial beliefs of what a robot was they could execute a reply due to lack of familiarity with household robotics. Other respondents, which had descriptive beliefs, justified that a household robot would be used for cleaning or would distinctively be a robotic vacuum cleaner. What was particularly striking was that one respondent claimed that a domestic robot would be 'a wife'.

***Interviewer:** What does the term 'domestic robot' bring to your mind?*

***Respondent:** Err- a wife?*

***Interviewer:** A wife! Why do you say a wife?*

***Respondent:** Well, probably because I am old school and when you got married in my age group in the sixties. A wife's main duties at home were to look after the baby, cooking, cleaning, doing the washing. But now of course, it has all changed. Its equal. It's even Stevens.*

- **Donald**

When prompted further, Donald whom inferentially explained that it was because a wife's main duties at home were to look after the family and tend to household chores as he experienced in the sixties. To analyse this hollowly, it could be depicted as misogynistic with the inclination of gender roles; although to specify deeper the respondent stipulates that he believes that a domestic robot could emulate all the tasks what a housewife may commonly pursue. This belief foreshadows that the respondent presumes a domestic robot to be an intelligent machine, guessingly one unit that is able to perform all household task functions in

one. In pursuit of this idea, this respondent is likely to envisage a humanoid robot rather than a domestic robot, particularly as the respondent expects it to imitate human characteristics.

Further, throughout the first interview stage, certain respondents were asked to define what a 'robot' meant to them. This question was to foresee if respondents provided any analogies between household robots and the generic term 'robots' to prompt their beliefs and understanding further. What was particularly interesting was that two respondents Edith and Donald referred to robots as to what they have seen on the television.

***Interviewer:** When you think of a robot what is the first perception, the thing that comes to your mind?*

***Respondent:** Straight away, comes Robbie the Robot from the old movies.*

***Interviewer:** Okay. Tell me more...*

***Respondent:** Well, it depended which movies he was in actually. As the writers used to write him in as a good robot; but of course when Mr. Nasty came along he put a different chip in him he became a nasty robot!*

- **Donald**

***Interviewer:** [...] What is a robot to you then?*

***Respondent:** A robot is a mechanical man.*

***Interviewer:** Why do you say that?*

***Respondent:** Because it is what I have seen on the television.*

- **Edith**

Explicitly, Donald made the assumption that a robot would be alike Robbie the Robot, which according to the respondent was a popular television show, which aired in the 1950's. Despite the age of this programme, it has left certain residual beliefs on how a robot would be depicted by Donald. As the respondent points out, that the robot was controlled by its maker and its personality would change depending on the programming it had; it could endeavour good behaviour or consequently bad behaviour depending on the owner's temperament. To extract Donald's perspective of his analogy, his attitude of household robots remained upbeat and stated that it was merely science fiction and due to the age of the programme, societies understanding and development of technology has changed. This opinion remained, when prompted whether the respondent would like to adopt a robot similar to Robbie the Robot.

Donald figured it was a robot, which he understood as a child from an aged time, which today this robot type would not suffice with modern technological suitability and trends.

Contrastingly, Edith could not associate any robots, which she had seen on the television, but she believed a robot to be a mechanical man. This conception, illustrates that the respondent characterises a robot to share the same characteristics as a human alike a humanoid robot. When prompted of her attitudes of this envisaged robot, the respondent did not favour the requirement of household robots as it would “*do somebody out of a job*” and stated robotic use should be only used in an industrial environment. This respondent’s beliefs and attitudes combined are a standpoint against adopting household robotics tend be fossilised attitudes, which in essence would be an obstacle for this particularly elderly consumer type in adopting a household robot.

#### 4.3.2 Intentions & Behaviours

After the attitudes and beliefs of a household robotic product have been rectified, an elderly person may then consider if a household robot is a viable option for them to adopt in their domestic environment. This is when their intentions are known. As previously highlighted, a particular respondent decided upon fulfilling their intentions after committing to purchase a robotic lawn mower as Donald held the belief that it would serve to assist his disabled spouse in gardening tasks. The point being made is that Donald had conditional intentions to buy once his beliefs and attitude were rectified by adopted knowledge. Effectively, this coincides with Kantorovitch et al. (2014) viewpoint that elderly people’s intentions to adopt are more prominent, if a household robot aids to ease everyday life and make life more convenient to its owner. The end result has been that Donald’s spouse’s living quality has been heightened due to what could be rectified as conscientious adopting.

*Well yes, lawnmowers, we recently got one, purchased one because my wife is disabled and she has a hard time getting around the garden now.*

- **Donald**

Moreover, to reflect on intentions by knowledge, certain respondents whom had estranged beliefs and mixed attitudes, still prevailed to have intentions to adopt if they were to know more about household robotics; in particular, how they function. This willingness was particularly highlighted by Eileen and Pauline whom would only adopt a household robot if

they were to see a demonstration. The respondents often lamented that they knew too little about the product to adopt, but the concept interested them greatly. Thus, a demonstration would be a viable opportunity to see visually how the household robotic product functions to gain knowledge by experience. A perfect example of this as highlighted previously, is of one respondent, which witnessed the functioning of a robotic lawn mower as operated by the local council in a park where Barry often visits to walks his dog. Due to this, Barry was highly familiar with the functioning of the machine and was willing to adopt in the future; although, he was most captivated at the prospect of owning a robotic vacuum cleaner due to a previous hearsay by a friend.

Another point, which can be understood, is that respondents seemed to have a problem with trust; which effectively marred their intentions to adopt. This issue of trust has been a focal point for a reason not to adopt as previously touched upon, but this lack of trust decisively comes from elderly people's lack of knowledge and adversity to adopting new technologies in their domestic environment. Due to the anxiety exhibited, certain respondents felt the concept of household robots would be too daunting to experience in their home despite the value they could bring. Such anxiety was foreshown by Edith, whom was concerned that other elderly people would be frightened in the fear that the machinery would malfunction and would have a difficult interface pursuing it to be too complex to use. This concern worsened as the respondent feared they would be electrocuted and essentially be put in grave danger if in possession of a household robot. To assure elderly people of the functioning ease and safety, household robotic companies should be considerate of the promoting of safety to elderly people and ease of use; which in effect may make elderly people more assured and willing to adopt.

*I think they'll [elderly people] be all frightened [to adopt a household robot]. Because you would be frightened if it's going to go wrong? Not just looking at it, it's just touching the machine and thinking is it going to go wrong? Like if I put a bulb in, I do not like doing that. You know? Will I get electrocuted or?*

- **Edith**

Similarly, this disposition in trust is often encouraged by elderly people's exaggeration or unfamiliarity of the price of household robotics. All respondents argued that the price of a household robot would not be affordable, as they valued it to be a luxury product. In effect,

this possibly false perception has prohibited elderly people's intentions to adopt as they tend to be more frugal and cost conscious compared to other consumer segments while living on a fixed pensioner's income. Whereas, if elderly people were to be more informed about the pricing of household robotics, and assured that it would be a 'life enhancing' investment, then there is a likelihood that their intentions would incite them to adopt. As evidence to this, one respondent went above and beyond to rectify that the price would be the most influential in adopting a household robot. Eileen intrinsically rectified that "the price is important" and further stated that above all other factors, that she almost always compares market prices before purchasing.

***Interviewer:** So you think you might consider purchasing a domestic robot now [after the telephone follow-up]?*

***Respondent:** Yes, maybe. Yes.*

***Interviewer:** Okay, what would persuade you even further to purchase a domestic robot?*

***Respondent:** Probably, the price.*

***Interviewer:** The price?*

***Respondent:** The price is important. Another thing, as I have said before I would have to see a demonstration. I would either think fantastic, marvellous I want one; or it's not what I thought I don't want one.*

- **Eileen**

Bearing this in mind, if the promotion of household robotic products were visibly marketed with clear price guidelines, then it would further inspire elderly people to adopt household robotic products.

## 4.4 Discussion

In the previous subchapters the findings from the study conducted by the authors have been analysed. Based on this analysis, the main findings are discussed in the light of the theoretical assumptions and constructions.

As the purpose of this research has been in understanding the consumer behaviour of the elderly people, it is crucial to understand to what extent this particular group is aware of the

products that are available in the markets. However, the understanding is not limited only to the products that are available on the markets, instead it is relevant to understand also the extent of knowledge that these consumers have related to these products; starting from the concepts and abilities of these robots. As a logical extension from this, understanding is needed by the consumers to make the consumption choices and to consume products; there is no consumption without the awareness of the products, their abilities and their availability.

One of the main findings of the study was that elderly people of the silent generation in the scope of this research do not have specific information in relation to the robots that are available on the markets. As elderly people are not fully informed about the range of household robots that are available on the markets, they are also unaware of all the possibilities that these robots could offer to them. As these consumers are not well informed about the product segment, they partially seem to lack the information needed to perform consumption behaviour. For this reason, it is important to discuss the aspects found in the analysis to pinpoint the needs of these consumers.

Furthermore, the study found out that elderly people in the scope of this research were looking for robots that could provide help in everyday tasks. As suggested by several authors, domestic robots can offer valuable help to elderly people (Kantorovich et al. 2014; Loera, 2008; Sung, Grinter & Christensen, 2007). In the words of Sheth (1991), elderly people are looking for functional value from household robot products, namely the capabilities, durability, functionality and price are playing a major role in consumption decisions. On the basis of the findings, it can be also argued that the functional value is among the studied elderly people the most significant factor what comes to the adoption of the household robots. This was apparent from results where 4 out of 4 elderly people suggested in telephone interviews that the functional value was a major contributor in the respect of buying behaviour. However, several respondents voiced concerns that they need to see the robot working before they believe on the functionality of the robot.

In addition, the study found out that the emotional values in relation to household robots exist as some of the respondents were indicating in the interviews that they would rather take a robot in their home than another human being, as they felt that they could trust robots more than other human beings. The connection to the positive emotional values was further strengthened as some of the respondents suggested that robots could work as social companions. From this perspective, the household robots could indeed help to alleviate the

loneliness of the elderly people and even the loss of a lifetime partner. For example Forlizzi (2007) found out that there is emotional connection between a household robot and human being. However this research further shed light to the possibilities that the emotional connection could be used to alleviate the emotional strain of losing a spouse, or being lonely. Furthermore, these findings are tied to the social values and aspect that robot could serve as a social companion as well.

However, not all respondents perceived the household robots positively, rather some of the respondents perceived robots as frightening and even felt that these could possibly hurt them. Moreover, these respondents had very little to no exposure and interest towards robots, which could explain their stance towards robots. In this respect, it was clear that the respondents had clear beliefs about household robots that were based on the image that was not grounded on actual experience with the household robots, but rather their pre-existing beliefs and attitudes.

One of the maybe most interesting findings was to discover the importance of epistemic value to the respondents. The respondents were authentically curious about the household robotics and it was found in the interviews that the interest towards household robots had risen as a consequence of the interviews. Furthermore, the interest and curiosity towards household robots was displayed in the form of finding additional information about the topic and even resulting in actual purchase behaviour of the robot in the case of one respondent.

Furthermore, also the conditional values play an important role in the consumption behaviour of household robots as pointed out in the interviews, the physical condition of the elderly might have suffered during the years and hence as they might have disabilities or restrictions in their movements. From the interviews, household robots were identified as a possible solution to the every day problems that the elderly people face. In this perspective, this research verified the findings from the previous researches (Vuorimaa et al. 2012; Kantorovich et al. 2014).

As lightly touched upon in previous paragraphs, the study also identified the beliefs, attitudes and intentions behind the consumption behaviour. On the basis of the findings of the study, the beliefs and attitudes of the elderly people towards household robots are not always fully based on facts, rather the majority of respondents had based their beliefs on images and assumptions gathered from other sources than actually experiencing the use of the actual household robot. In this perspective, the authors suggest that the awareness of household

robots should be raised in the segment of the silent generation by using the methods that are accepted by the members of the segment. One possible method identified based on the responses gathered from the interviews is using demonstrations to these consumers, as this would allow showcasing the actual performance of the household robot to these consumers.

Furthermore, as the beliefs were based on assumptions rather than factual knowledge and experience, this resulted in negative attitudes and intentions towards household robots. As Fishbein and Ajzen (1975) suggest, beliefs, attitudes and intentions are connected to each other resulting positive or negative behaviour towards observed products. In the domain of this research, this theory was confirmed as some of the respondents had negative beliefs, attitudes resulting as negative intentions towards household robots, whereas those respondents that had positive beliefs and attitudes had positive intentions towards these products. As this theory holds, it is important to understand the importance of these aspects to the adoption of the household robots in the perspective of the segment of elderly people and the silent generation. For this reason, it is important to engage to raise the awareness of these products by contributing to altering the negative beliefs and attitudes by transforming them to positive intentions.

As found in the study, functional value is playing a major role in the consumer behaviour in addition to emotional, epistemic values and conditional values. Furthermore, these aspects have significant influence on beliefs, attitudes and ultimately to intentions (Hur, Yoo & Chung, 2012), and hence when the altering of the beliefs, attitudes and intentions are addressed these values should be in the focus of the process, as they have the most significant influence on the adoption of the household robots.

Ultimately, by affecting these values, beliefs, attitudes, and intentions leading to behaviour, the concerns of the elderly people regarding household robots could be mitigated. As found in the interviews these concerns include the conquest of the world by robots to the concerns about the functionality of the household robots. Even more so, raising the awareness of these products among the members of silent generation could help them to identify and match the needs and household robots that have potential to fulfil these needs.

## 5 Conclusion

*In recent years, household robots have become increasingly more common in the domestic markets. For this reason, this field of studies have started to attract more interest among scholars. However, many of these researches have focused on interfaces and behavioural aspects towards robots, and less to the consumer buying behaviour. As these robots become more common in the domestic environments, more understanding is also needed to comprehend different aspects affecting to this behaviour.*

*In the perspective of this research, the main conclusion was that consumers of silent generation, in the scope of this research, demanded especially functional value from the household robots. Moreover, it was found that the underlying beliefs, attitudes and intentions are effecting ultimately to the buying behaviour. These aspects were found to affect to the behaviour especially via beliefs and attitudes that were formed based on limited awareness of the products, having limited experience with the actual products. For this reason, the authors suggest that awareness related to these products should be raised. In the perspective of the authors, the key aspect of increasing the awareness lies in the methods used, as these have to be accepted by the elderly people. This is why the authors suggest that methods such as demonstrations should be used in the case of elderly people, in order to mediate the different product values to these consumers, and to alter their underlying beliefs and attitudes toward household robots.*

### 5.1 Research Purpose

This Master's thesis aimed to understand the consumer behaviour of elderly people, more specifically the silent generation, in regards to household robots. For this reason, this research aimed to deepen the understanding of beliefs, attitudes and intentions to discover the underlying values and attributes affecting to the consumption behaviour. In order to fulfil the purpose of the thesis, the following main question and sub questions were formed:

- How do elderly people consume household robots?
  - What are the attitudes, beliefs and intentions of elderly people towards household robots?
  - What values in household robots are demanded by elderly people?
  - Are elderly people willing to adopt household robots?

The purpose of this thesis has been fulfilled, as the results from the findings have been able to provide information to answer to these questions. On the basis of the data collected, it was found that the attitudes, beliefs and intentions towards household robots were predominately positive. The position towards household robots varied between the different categories of the household robots. The most favourable position was towards robot vacuum cleaners and lawn mowers, as these were seen as functional tools that could improve the everyday life, without having a fear of intruding or malfunctioning. However, the least favoured category appeared to be humanoid robots, which fell outside the scope of this research as respondents perceived these robots to be scary and unreliable, as they felt that they could not create a trust relationship with these robots.

Moreover, the beliefs were mainly formed based on information other than actual experience with the robots. Those respondents that had knowledge or experience with household robots had positive beliefs about the robots, whereas those respondents that did not have experience with the robots had mainly negative beliefs about these robots. These beliefs further affect to the attitudes towards the robots, as respondents that had positive beliefs about the robots had also generally positive attitude towards the robots as they saw them as useful tools in their everyday lives. On the contrary, respondents that had negative beliefs had even so negative attitudes that they could not believe that household robots could bring anything good to their everyday lives. These findings further correlated to the intentions to buy household robots as those that had positive beliefs and attitudes had indeed an intention to buy household robots. In fact one of the respondents had actually bought a household robot in between the first and the second interview. This demonstrated that positive beliefs, attitudes and intentions would in some cases translate to actual buying behaviour.

Furthermore, the findings indicated that the most prevalent value in the adoption of household robots in the case of respondents representing silent generation was functional value, namely durability, functionality and price were major determinants adopting of household robots. Furthermore, epistemic and conditional values were also affecting to the adoption of

household robots as curiosity towards household robots was serving as a bridge towards positive beliefs, attitudes and intention leading to the buying behaviour. Moreover, the conditional values were affecting to the curiosity as disabilities or difficulties to move around enabled the curiosity towards the household robots, as respondents indicated that these products could improve their lives and they would be interested to try these in their homes to see the actual benefit.

In this respect, the elderly people of this research were for the most part willing to adopt household robots, if the awareness would be raised and the functionality of these robots would be proven to them. In light of this information, the authors have managed to fulfil the set research questions and aims of this thesis.

## 5.2 Theoretical and Practical Implications

In the sphere of theory, this thesis has managed to identify a gap in existing literature. As the field of research discussed in this thesis is yet relatively new, not much literature if any has previously focused on generations as far as the authors know. The generational aspect taken in this research has provided a new aspect to the topic, which has revealed the importance of previous collective experiences of people in shaping their attitudes, beliefs, intentions and ultimately their consumption behaviour.

Furthermore, from the theoretical perspective, in the sphere of household robotics, authors are not aware of studies that combine attitudes, beliefs, intentions and values in order to study consumer behaviour. Hence, this thesis contributes to the theory by combining two previously separate theoretical perspectives to work together as a single perspective in order to reveal the underlying consumer behaviour. By using this approach it is possible to attain a wider perspective to the phenomenon under study. Therefore, this research has had wider angle to the study of consumer behaviour, which revealed several practical implications.

This study found that respondents of silent generation value functionality in household robots, however the majority of them are lacking in knowledge and awareness related to household robots. For this reason, efforts should be placed to raise the awareness of this generation within the product category. As discussed earlier, one of such methods pointed out in the results were demonstrations that would allow companies to communicate their products in a

way that these consumers understand. By employing this method, simplicity as well as efficiency would be achieved, as the communication would be directed directly to these consumers. Moreover, this group of consumers have not been acknowledged to the extent that they would deserve, as there is huge potential for companies to reach. This is evident from the results, as respondents indicated that there is yet room for further development of products as well as market for existing products. Focus should be put to products that could help to ease the everyday lives of elderly people, such examples of existing products are robotic lawn mowers and vacuum cleaners. In addition, in the interviews respondents indicated that there is a market for multifunctional robots that combine several functionalities. Furthermore, also the development of home appliances as robotic products was pointed out as a potential growth opportunity for companies.

### 5.3 Future Research and Limitations

On the basis of the findings of this research, the authors suggest that further efforts should be placed on further studying consumer behaviour of elderly people towards household robots from a generational approach. This research has attempted to study the phenomenon by employing a wider perspective by incorporating a combination of attitudes, beliefs and intentions along with values in order to generate understanding. Furthermore, since especially the generational aspect can provide new information to the research of this area, this perspective should be applied in future research on the subject. In addition, further research should be conducted in assessing whether a difference to the attitudes and beliefs of elderly people towards household robots can be generated by employing demonstrations, as suggested by this thesis.

However, it has to be addressed that because this study was done as a qualitative exploratory research aiming to understand this new field of study, only a small sample size was used. For this reason, the generalizability of the findings is limited and future research should focus on generating a larger sample in order to find out whether the findings of the research apply on a wider scale.

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# Appendix A

## Questions for Semi-structured face-to-face Interviews

### Knowledge and expectations

- 1). What does the term 'domestic robot' bring to your mind?
- 2). What would you expect a domestic robot to do?

### Product Awareness

- 3). Do you own or have you owned any domestic robotics in your home?
- 4). Do you know of anybody that owns a domestic robotics? If so, who?

### Image

- 5). Do you think that domestic robotics appeal to elderly people? (How do you perceive usefulness of domestic robots?)
- 6) In your opinion, what kind of a person would most likely buy a domestic robot?

### Purchasing Decisions

- 7). Who do you think elderly people would like to own a domestic robot?
- 8). Would you like to own a domestic robot in the future? Yes/No?
- 9). If you could buy any domestic robot, which would you buy and why?

# Appendix B



LUND UNIVERSITY  
School of Economics and Management

## *Consumer Behaviour in the Sector of Household Robots: Elderly People as Adopters*

*Juuso Walden & Liam Johnson*

### *Interview Consent Form*

I have been given information about *Consumer Behaviour in the Sector of Household Robots: Elderly People as Adopters* and discussed the research project with *Juuso Walden & Liam Johnson* who are conducting this research as a part of a Master's in International Marketing & Brand Management as supervised by Christian Koch.

I understand that, if I consent to participate in this project I will be asked to give the researcher a duration of approximately between 15 to 30 minutes of my time to participate in the process.

I understand that my participation in this research is voluntary, I am free to refuse to participate and I am free to withdraw from the research at any time.

By signing below I am indicating my consent to participate in the research as it has been described to me. I understand that the data collected from my participation will be used for thesis and journal publications, and I consent for it to be used in that manner.

Name: .....

Email: .....

Telephone: .....

Signed: .....

# Appendix C

## Questions for Semi-structured Telephone Follow-up Interviews

### **Smart homes**

What do you think about smart homes?

Do you think elderly people can benefit from smart homes?

-> if yes, in what ways (how)?

### **Security**

Do you feel safe in your home?

How could your home feel safer?

Would you feel safe if your home was equipped with technology?

What is your opinion - will technology make home safer/ less safe?

-> Motivate why would or would not?

### **Adoption**

What type of robot would you own if you had the choice?

What do you think about automatic vacuum cleaners?

What do you think about automatic lawn mowers?

What do you think about humanoid robots?

### **Functionality**

Are domestic robots best served indoors or outdoors?

What should a robot do? (What functions should a robot have?)

What robot should do (what functions robot should have)?

### **Monetary**

How much are you willing to pay for a domestic robot?

Any particular domestic robot, you would opt to pay more for?