

**An investigation into the Adoption of E-commerce
among Older People**

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The thesis is submitted in partial fulfilment of the requirements for the award of the
degree of Doctor of Philosophy of the
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Declaration

Whilst registered as a candidate for the above degree, I have not been registered for any other research award. The results and conclusions embodied in this thesis are the work of the named candidate and have not been submitted for any other academic award.

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Abbreviations

ANI	Annual income
CPI	Consumer Price Index
DIT	Diffusion of Innovation Theory
DPA	Data protection act
EDU	Education status
EMS	Employment status
ETO	Ethnic origin
GEN	Gender
IT	Information Technology
ITQ	Information Technology Qualification
MT	Motivation Theory
OLS	Ordinary Least Squares
PBC	Perceived Behaviour
MAS	Marriage status
NINDS	National Institute of Neurological Disorders and Stroke
RBT	Resource based theory
RES	Residential status
RNIB	Royal National Institute for deaf people
PBC	Perceived Behaviour control
SN	Subjective Norm
SP	Security and Privacy
TAM	Technology Adoption Model
UCC	User created content
UK	United Kingdom
USA	United States of America
TRA	Theory of reasoned Action
TPB	Theory of Planned Behaviour
W3C	World Wide Web
WHO	World Health Organization

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Presentations

E-commerce adoption among older people and barriers they face: Online WebEx ECRET
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Abstract

The adoption of e-commerce offers much potential to enhance the quality of the lives of older people. It offers potential for empowerment, the ability to manage and control their finances, reduce care costs and being reliant upon others, thereby living independent lives. Inaccessible websites are however creating barriers for older people with age-related impairments such as vision and motor decline, cognitive and hearing impairments which prevent them or limit access to using the internet thereby adopting e-commerce.

The aim of the thesis is to examine the current state of e-commerce adoption among older people. The objectives of the research were to investigate the extent of e-commerce adoption, the uses, the barriers and the determinants of e-commerce adoption and explore the accessibility and usability issues of online grocery shops. The methodology uses a mixed methods approach in two studies, sourcing both quantitative and qualitative data via surveys, observation and interviews. The findings of the Study One suggest that the extent of e-commerce adoption among older respondents was fairly low. One of the outcomes of the study was the development of an Index of Adoption of E-commerce (IAE) which could be used in future to measure adoption of e-commerce among different user groups. The results show that all respondents owned a credit, debit or visa card, and those older people that have used e-commerce, mainly did so for booking holidays and paying bills. A notable finding was that the least utilised e-commerce activity was online grocery shopping.

Results also indicate certain barriers in adopting e-commerce, which include difficulty in understanding the information on websites, reading and navigation, concern over security issues such as personal information and unauthorised use of credit cards, as well as lack of trust relating to the quality of products sold online. The results in respect of the determinants of e-commerce adoption by older people suggest that age, marital status, school type, education qualification, IT qualification and ethnic origin are significant determinants of e-commerce adoption. However, gender, residential status, income and employment status are insignificant determinants of e-commerce adoption. The results of Study Two also indicate that online shopping websites were difficult to access with all participants agreeing that they were difficult to use, particularly the registration aspect.

The thesis highlights the importance of knowledge of the current state of adoption of e-commerce among older people. Its original contribution is centered around the understanding of barriers in relation to e-commerce adoption, as well as the development of an index to measure the extent of adoption of e-commerce which could be used in future to measure adoption of e-commerce among different user groups. The thesis also calls for recognition and support for opportunities for the researchers, policy makers and online businesses to adopt an effective strategy to address this matter with urgency. Some recommendations are also provided.

CHAPTER 1: INTRODUCTION AND OVERVIEW OF THE RESEARCH

1.1 Introduction

The internet is an important tool to enable older people to live independent lives (Adams, Stubbs & Woods, 2005; Karavidas, Lim & Katsikas, 2004; Schulz et al., 2015) and e-commerce in particular could provide a means to enhance the quality of their lives (Age UK, 2013; Karavidas et al., 2004; Olphert, Damodaran & May, 2005; Schulz et al., 2015; Slegers, Van-Boxtel & Jolles, 2012). E-commerce offers real potential for empowerment (Chakraborty, Lee, Bagchi-Sen, Upaghyaya & Rao, 2016), able to manage and control their finances (Chakraborty et al., 2016), and potentially reduce care costs and being reliant upon others (Schulz et al., 2015). For example, e-commerce could enable them to access essential products and services needed for daily living such as the purchase of groceries and household goods, online banking, book for holidays and flights and shop for the best deals on car and house insurances. Inaccessible websites are however creating barriers for older people specifically those with age-related impairments (Zaphiris, Kurniawan & Ghiawadwala, 2007; Sambhanthan & Good, 2011; Nielsen, 2013; Saldano, Martin, Gaetan & Vilte, 2013). This then presents issues because older people would find it difficult to use such technologies (Nielsen, 2013) which do not accommodate their specific needs.

Reflecting on these circumstances, older people aged 50 plus account for 40 per cent of consumer spending in the UK, and this figure is expected to rise (Ipsos MORI, 2007). This UK consumer spending percentage was also mirrored by the Daiichi Life Research Institute who estimated that the over 60s account for 40 per cent of Japan's consumption spending. The population of older people is increasing worldwide (Age UK, 2017; Caprani, O'Connor & Gurrin, 2012; Chen, Downey, McGaughey & Jin, 2016; Kuo, Chen, & Hsu, 2012; Meech, 2012; Olphert et al., 2005; Wagner, Hassanein & Head, 2010; WHO, 2007). From a business perspective, website designers and online businesses are essentially losing out on a potentially, lucrative market (Chen et al., 2016; Eastman & Iyer, 2004; Kuo et al., 2012; Wagner et al., 2010; WHO, 2007). According to Boston Consulting Group, the over 55s will account for more than half the consumer spending growth in developed countries over the next two decades worldwide (Lucas, 2012). The executive vice-president and chief strategy officer at Aeon, Japan's largest supermarket group once said, "The elderly people are the

wealthiest, most active, healthiest and longest-living retirement generation in the history of the world”, (Lucas, 2007). Furthermore, older people (aged 50-74 years) have managed to spend over twice as much per year on theatre and cinema tickets compared to the under 30s and in 2011 they spent more on foreign travel compared to what they did in 1999 against the younger people (Intergenerational Foundation Programme, 2012). This downward trend suggests that young people did not have as much disposable income to spend on foreign travel in 2011 as they had done in 1999.

1.2 Research Motivation

The researcher has worked with older people for many years in the health care industry and has noticed how older people could benefit from adopting e-commerce. The researcher has seen some relatives buying laptops for their loved ones living in nursing or residential homes so that they can communicate with them more easily yet the primary concern is that they would not know how to use them. Also, some of the health care establishments have bought computers and connected the internet for use by older people. For those very few who have managed to use them, the quality of their lives have been visibly transformed. The researcher has seen older people communicating with friends and family through emails and skype which helps significantly with reduction of sense of isolation and increasing independence. But for the rest of the older people, the main problem was neither the care workers nor the relatives could afford the time to train them. Also for those who did adopt e-commerce they managed to purchase products and services for themselves, for friends and family especially birthday presents and Christmas presents for their grandchildren.

Furthermore, there is evidence which shows that e-commerce could potentially enhance the quality of life for older people (Karavidas et al., 2004; Olphert et al., 2005, Age UK, 2013). Especially for those with age-related impairments such as reduced mobility, reduced vision and cognitive impairments which can potentially make conventional independent shopping difficult (Olphert et al., 2005). They could do online shopping for food groceries, household goods, insurances and other services in the comfort of their homes. Furthermore, the ageing population of the world is increasing not just in the UK but worldwide (Age UK, 2017; Kuo et al., 2012; Meech, 2012; Olphert et al., 2005; Wagner et al., 2010; WHO, 2007). Regarding older people residing in their own homes, the researcher also noticed that while there was a positive move to engage older people to adopt these technologies by introducing

community libraries, there was nothing put in place for consistent, ongoing training or workshops for older people to continue learning and receiving advice. So as a result, laptops would end up in locked drawers, and computers collecting dust.

Finally, judging by the amount of studies which have so far been published in academic journals on e-commerce adoption by older people (for example, Olphert et al., 2005; Iyer & Eastman, 2005; McCloskey, 2006; Leonard, 2012), it is noteworthy that few articles have been published. Of these, only a few studies are based on UK data (Olphert et al. 2005; Morris et al. 2007; Hill et al. 2008; Marston et al., 2016), It is also noted that what has been researched relates specifically to technology adoption with minimal mention of e-commerce adoption. This suggests that more research on e-commerce adoption by older people is explicitly needed in general and specifically in the UK. Upon embarking on a literature search, it was found that there was scope for contribution to existing knowledge. The researcher was then provoked to initiate the proposal of this research.

1.3 Research Question, Aims and Objectives

This research aims to investigate the state of the extent of adoption of e-commerce among older people. Within this context, the study also examines the uses of e-commerce among older people, investigates the barriers to adoption of e-commerce among older people and explores the determinants of e-commerce adoption among older people. To answer the research question and achieve the aims of this research, several objectives were met:

Objective 1: To investigate to what extent have older people adopted e-commerce

Study One, which was outlined in Chapter 4 and the results presented and discussed in Chapter 5 was conducted to achieve the first objective. An extensive literature review was done to attain knowledge and have a better understanding of the current state of the extent of e-commerce adoption. A quantitative study was conducted using a questionnaire as the main method to gather data. The questionnaire elicited the activities involved in the adoption of e-commerce among older people. The extent of adoption of e-commerce as explained in Chapter 4, was measured by the extent to which older people undertook e-commerce activities. Specifically, an Index of Adoption of E-commerce (IAE) was developed and used. The formation of this index can be viewed in Chapter 4.

Objective 2: To examine the uses of e-commerce among older people

The second objective was achieved by conducting a survey using the same questionnaire, but mainly from the responses from Section C in Questionnaire (see Appendix B). The three groups used for the uses of e-commerce were adopted from previous studies which investigated the uses of technology and e-commerce (Iyer & Eastman, 2006; Martinez-Pecino, Martos & Silva, 2013; McCloskey & Lepper, 2010; McCloskey, 2006; Ryu, Kim & Lee, 2008; Sorce, Perotti & Vidrick, 2005; Smith, 2008). Among the groups were Group A was by category, Group B was by items, Group C was by household bills. In other words, Group C was self-explanatory depicting household bills paid online.

Objective 3: To investigate the barriers to e-commerce adoption among older people

Section D of the questionnaire in Chapter 4 was developed to satisfy the third objective. The barriers were divided into four aspects which are Ease of use and Usefulness from the Technology Adoption Model and trust, privacy and security. The questionnaire (see Appendix B, section D) elicited information from respondents' perceived attitude on the barriers (ease of use, usefulness, security and trust) to e-commerce adoption with regards to how they feel when performing on the internet. Chapter 3 which discussed age-related impairments was also developed to provide a better understanding of the barriers faced by older people. The discussion showed how each of the age-related impairments could be used to explain the changes which affect the human body causing older people immerse limitations in interacting with the e-commerce websites and engaging themselves in e-commerce adoption.

Objective 4: To determine the individual characteristics associated with the extent of e-commerce adoption.

The fourth objective was achieved by conducting Study One, specifically ten hypotheses were formulated (see Chapter 4) and tested to establish the relationships between the individual characteristics and the Index of Adoption of E-commerce. The individual characteristics [Gender, Age, Marital Status, Residential Status, School Type, Employment Status, Education Qualification, Information Technology Qualification, Yearly Income, Ethnic

Origin] were tested to determine if they influence the extent of adoption by developing ten hypotheses and the formation can be viewed in Chapter 4.

1.4 Research Contribution

The research contributes to existing literature in several ways. The results obtained from the extensive literature review informed these contributions which highlights the importance of knowledge of the current state of adoption of e-commerce among older people. First, its original contribution is centered around the development of an Index of E-commerce Adoption (IEA) which enabled the quantifiability of the extent of e-commerce adoption for the first time. A rigorous strategy was adopted to develop this tool. The IEA contributes to practice and has huge potential to be used in future to measure the extent of e-commerce adoption among different user groups as well as to assess e-commerce adoption trends. The extant studies are limited to just mentioning the percentage in adoption of e-commerce, for example, Marston et al. (2016)'s study found 48% did online banking, 39% did online shopping), but do not specify the actual type of activities involved. This shows that these studies are limited to specific activity but with the index developed in this research, it's a comprehensive list of all the possible activities which are involved in e-commerce. Now, its not a case of have you adopted e-commerce or not? Nowadays, everyone have adopted e-commerce because everyone has a credit card and use ATMs. It is to what extent have you adopted e-commerce? Hence, the novelty of the development of the index of e-commerce adoption done in this research.

Second, this research is the first one to conduct a thorough examination of the individual characteristics that influence the extent of e-commerce adoption as well as using several theories to test their applicability among older people. Additionally, among the limited evidence of studies which has investigated the determinants of e-commerce adoption, the focus has been on 1 or 2 or 3 at most 4 individual characteristics but not 10 as found in this research. For example, Sum et al. (2009)'s study investigated on education and income; Chakraborty et al. (2016)'s study investigated on age, gender and education. The systemic and holistic approach used in this research will make a difference because it uses a comprehensive list of individual characteristics. Also the theories such as TAM and DIT have been mostly tested using younger population and this research is extended that to the older population. That means it has enhanced our understanding on the adoption of e-

commerce among older people hence the contribution. So given the arguments that results might differ because of the age related impairments as discussed in Chapter 3, and also because of their vulnerability as discussed in Chapter 2, Section 2.3 under Security and Privacy, this research is contributing new insights.

Third, a framework of recommendations and guidelines was developed and have the potential impact to be used by website designers, online businesses, government and researchers to develop websites which are accessible to older people. The research findings provides insightful knowledge from which others in the same field of e-commerce adoption will benefit immensely.

1.5 Understanding the Problem space

Despite the benefits that e-commerce adoption can bring to older people, it appears that we know very little so far about the extent to which they have adopted e-commerce. This is mostly because several existing studies are limited to technology adoption by older people and therefore treated e-commerce adoption as a peripheral issue yet it is also important. Knowledge of the current state of adoption of e-commerce by older people is even more important given the growing population of older people (WHO, 2007; Wagner et al., 2010; Kuo et al., 2012; Meech, 2012) and their buying power (Eastman & Iyer, 2004; Lucas, 2007; Stroud & Batchelor, 2008). This means that businesses have a lot to benefit by knowing the current status of e-commerce adoption by older people and taking necessary action to foster its growth among this clientele.

Research literature, however, reveals significant barriers to the adoption of technology/e-commerce by older people. For example, for those older people without their own computers, limited access to internet technology through public libraries and community centers can be a problem given that some of them may have mobility problems (Arch, 2008; Charness & Boot, 2009; Demiris, Finkelstein & Speedie, 2011; Wallace, Graham & Saraceno, 2013; Goodwin, 2013). Moreover, knowing how to make use of the technology presents a problem, and there is a need for appropriate training at various levels both in basic information technology and in the information handling skills (Lagana, 2008). Some older people also have difficulty in searching for information they require, as some websites contain complex information that is difficult to understand (Czaja, & Lee, 2007;

Sambhanthan & Good, 2011; Nielsen, 2013; Lian & Yen, 2014). Security and privacy are also significant barriers to the use of e-commerce by older people (Gatto & Tak 2008; Olphert et al., 2005; Tatnell & Lepa, 2003; Hill, Beynon-Davies & Williams, 2008), with the issue of credit card transactions found to be a major concern (Smither & Braun, 2001; Lagana, 2008; Meneely, Burns, & Strugnell, 2009).

Despite the barriers to e-commerce adoption, the number of pensioners with internet access at home has tripled in the past decade, according to UK Office for National Statistics (ONS, 2010; Age UK, 2013). The increase in some old people using the internet is in part due to the efforts of Age Concern UK which held over 1000 local events across the country to help provide IT taster sessions to older people (ONS, 2010). Despite the efforts, the ONS (2017) found out that of the 4.8 million older people who had never connected to internet in 2017, just over half (2.6 million) were aged 75 years and over. This is a significant number given that the pensioners are more than any other group likely to benefit more by adopting e-commerce.

1.6 Research Methodology

The research adopts a mixed method approach, and a discussion and justification were outlined. The framework used for the research was divided into two studies which are linked. Study One uses a quantitative approach mainly in the form of a questionnaire and Study Two uses a qualitative approach. The methods used in Study Two were observations and interviews. The aim is to provide a better understanding of why older people were not keen to perform specific activities with regards to e-commerce compared to some and also to find out their concerns which relates to online shopping. In this methodology chapter, the research framework and research philosophy are discussed, and this is followed by the theories that are used to explain why certain factors may be influential in technology/e-commerce adoption. These theories are TAM, Diffusion of Innovation theory, Motivation theory, Theory of reasoned action, Theory of planned behaviour and Resource-based theory. The research design, which consists of research methods and hypotheses development are also described.

1.7 Research Structure

This thesis is made up of eight chapters and is organised as follows. Chapter one covers the overview and background of the study, followed by the motivation and need for the study. The aims, objectives and the research questions to be addressed are explained. Then an outline of the research methods, key findings and the contribution being made to existing studies by the current study are presented.

Chapter 2 presents the literature review of the study. The review identified the existing studies that have investigated the extent of adoption of technology/e-commerce among older people. However, the review also included some studies on technology adoption because the same studies discussed about e-commerce adoption though not in detail. The chapter also reviewed the determinants of e-commerce adoption among older people, and then the limitations of the existing research were outlined.

Chapter 3 describes the accessibility issues faced by older people. The chapter discusses key factors relating to each of the age-related impairments. These factors can be used to explain why older people are faced with limitations or disadvantages as regards to adopting e-commerce. Firstly, Visual impairments were discussed followed by Auditory, then Motor impairments and lastly the Cognitive impairments. The discussion aimed to show how each of the age-related impairment can be used to explain the changes which affect the human body causing older people to immerse limitations in engaging themselves in e-commerce adoption. It is evident that the age-related impairments addressed in this chapter shaded light on the obstacles faced by this group of people in their quest to be part of the evolving world of technology/e-commerce and their cry to enjoy the benefits it brings.

The fourth chapter presents the methodology adopted for this research. The chapter discusses the research philosophy, and this is followed by some of the theories that are used to explain why certain factors may be influential in technology/e-commerce adoption. Then the research design and hypotheses development are explained, followed by a discussion of the research methods used in the two studies including the design of the questionnaire, observations and interviews. The chapter concludes with how the data is analysed.

The fifth chapter presents and discusses the findings of Study One. It starts with describing the respondents' demographics. As regards to the question of how older people use e-commerce and the devices they use, the results suggested that all the respondents owned a credit, debit or visa card, with a mean of 1.00. The extent of adoption of e-commerce adoption was then measured by the extent to which older people undertake e-commerce activities. Specifically, an index of e-commerce adoption was developed and used. The formation of this index can be viewed in Chapter 4. The IAE used in this study is calculated using the six sections (devices used, activities performed online, products or services bought, household bills paid online, goods or items sold online). The chapter also discusses the uses of e-commerce, the barriers to e-commerce adoption and the determinants of e-commerce adoption among older people.

The sixth chapter presents and describes Study Two of the research. Firstly, the chapter discussed the respondents' background then the accessibility and usability issues of two online grocery shops, Asda and Tesco. These websites are explored to provide a better understanding to the issues faced by older people when they shop online for groceries. The study also focusses on gaining a better understanding of the older participants' attitudes and motivation. The results in Study Two suggest that the online shopping websites were difficult to access with all participants agreeing that it was difficult especially on the registration part of both websites, which may partly explain the low e-commerce adoption rate found in Study One.

In Chapter 7, recommendations and guidelines are outlined to guide website designers, online businesses and governments to develop e-commerce websites which are inclusive and accessible to older people. The need for online businesses to provide training to older people is recommended followed by recommendations to website designers and governments.

Finally, Chapter 8 discusses the summary of research findings followed by the contribution made to existing research. The impact of the research and the research limitations are then explained next. An outline of further research is given. The penultimate section describes the strengths of the research. Finally, the conclusions of the research are discussed.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This research investigates the extent of e-commerce adoption, the uses of e-commerce, the barriers and determinants of e-commerce adoption among older people. However, the literature review also discusses technology adoption by older people because it is relevant for this research for two reasons. First, extant related research suggests that technology adoption in general such as the use of internet is a precursor to e-commerce adoption (Cooper and Burgess, 1998; Lawson et al., 2003). Therefore, some of the factors that influence the adoption of e-commerce are likely to be similar to those of technology adoption.

The use of e-commerce continues to increase (Nielsen, 2014; Wachowicz, Ludwiszewski & Redlarski, 2012), and older people could potentially benefit in many ways from adopting it (Meng et al., 2017). However, previous research have shown that few studies have focussed specifically on e-commerce adoption by older people (e.g., Jokisuu et al., 2007; Sum et al., 2009) which suggest that e-commerce adoption among older people is still in its nascent stage. Knowledge of the current state of adoption of e-commerce by older people would be beneficial to online businesses, websites designers, researchers and government authorities. So, the discussion of these few studies that exist on e-commerce adoption by older people will help to make clear the contribution of the current research.

To answer the research questions outlined earlier in Chapter 1, a literature search strategy was developed. The literature review was carried out with the focus to find out what research has been done and currently been done on e-commerce adoption among older people and to identify the gap/gaps in the previous research. Through this literature review the following objectives will be defined clearly:

- To investigate to what extent older people have adopted e-commerce.
- To find out the uses of e-commerce among older people.
- To investigate the barriers to e-commerce adoption by older people.

- To determine the individual characteristics associated with the extent of e-commerce adoption among older people.

This chapter is organised as follows: The next section, section 2.2 discusses the literature search strategy adopted, followed by the results of the searches and thematic analysis conducted. Then literature synthesis is carried out in section 2.3, with a discussion of relevant definitions, then themes and categories are developed and presented. The penultimate section 2.4 discusses the limitations of previous research. Finally, a summary and conclusion of the literature review are presented.

2.2 Method

2.2.1 Search Strategy

To carry out the literature review, a search strategy was designed. A list of key words and search terms were developed to help with the initial search. These key words and search terms were identified through sources such as a dictionary, Google Scholar, e-commerce websites, e-commerce books, published research literature relating to e-commerce, technology and older people.

The Search Strategy History Table was formed and is illustrated in Appendix B and a list of search procedure keywords were developed. To combine these key words Boolean logic (AND, OR and NOT) were used to find different combinations of search terms. Some variations of the search terms were also obtained through use of the database truncation symbol (*). For example “elder*” will find words such as elder, elderly and elderly people; “old*” would bring up old, older, and older people. Exact phrases were searched for using quotation marks, for example, “electronic commerce” or “older people”. By doing this, the databases allowed the search for phrases thereby reducing the number of results got and made results more relevant. Search procedure keywords can be viewed in Table 2.1.

Table 2.1 Search procedure keywords

e-commerce e-commerce internet old old age ageing adopt* usab* "buying and selling"	"electronic commerce" "elderly people" older people" OAP ageing online barrier technolog*	"silver surfer" "senior citizen" pensioner* elder* accessib* older adult adoption Comput* Aged
-------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------

Discovery Service tool was used to carry out a systematic search of the relevant literature. This searching service tool allowed finding of related articles by searching multiple databases at once. The multiple library databases include:

- *Engineering Village*: allows searches for journal articles, technical reports and conference proceedings and technical reports
- *ACM Digital Library*: searches through all the journals and proceedings published by the Association for Computer Machinery from the 1960s onwards.
- *ScienceDirect*: allows searches to index, abstract and full text of academic journals and e-books on scientific and medical research.
- *IEEE Xplore*: allows searches to the full text of all IEEE publications since 1988.

Although older publications could be accessed through the discovery service tool, the initial search only retrieved papers published within the inclusion criteria which was between January 1, 2000, and December 31, 2012, publications which were written in English in Academic journals, Conference proceedings and books. These papers discussed the adoption of e-commerce among older people, and some of the papers which relate specifically to technology adoption had minimal mention of e-commerce adoption. The exclusion criteria included the papers published in other languages, not English. The dates outside the fore-mentioned dates, papers on e-commerce/technology adoption among younger people. The chosen inclusion and exclusion criteria were given for the following reasons. This was done to obtain more current and relevant publications which answered the research question. The initial query allowed the search to be performed within the title,

subject terms and abstract of the paper. Even though the service tool has the functionality to search within the full text of the paper, the functionality was not applied at this stage. This was to limit the possible number of paper within the exclusion criteria. As a result, the searches outcome was more manageable but not excluding any relevant papers.

2.2.2 Search Results

The initial search was conducted and revealed 1735 possible papers. The inclusion criteria were then applied to each abstract of each papers then 937 excluded papers were identified and removed. The remaining 798 were included papers. The next stage was to review the text of the included papers and then 539 duplicate papers were removed. As a result, there were 241 included papers which were made up of 91 useful papers, 43 inaccessible papers and 107 papers were not useful. Figure 2.1 illustrates the literature search strategy flow diagram showing the amount of the papers which were removed at each stage of the search.

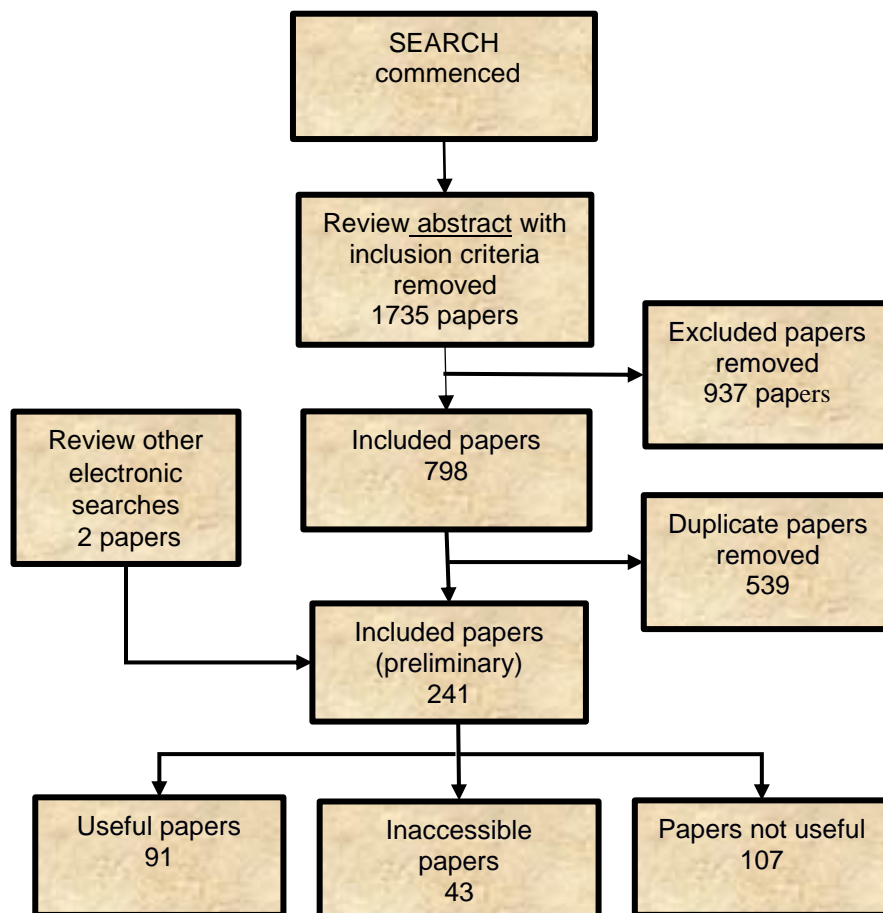


Figure 2.1 Literature search flow diagram

As illustrated in Figure 2.2, it is easy to see that between the years 2000 to 2005, there was minimal research conducted on e-commerce adoption by older people. A slight increase was then noted in the number of publications in the years 2006 to 2007 and then a sharp decline in the following year 2008 with a gradual increase observed from 2008 to 2012. Initially, the search was done from 2000 to 2012, but as literature review is an on-going process, the search continued the entire period of the research so that current publications were not excluded.

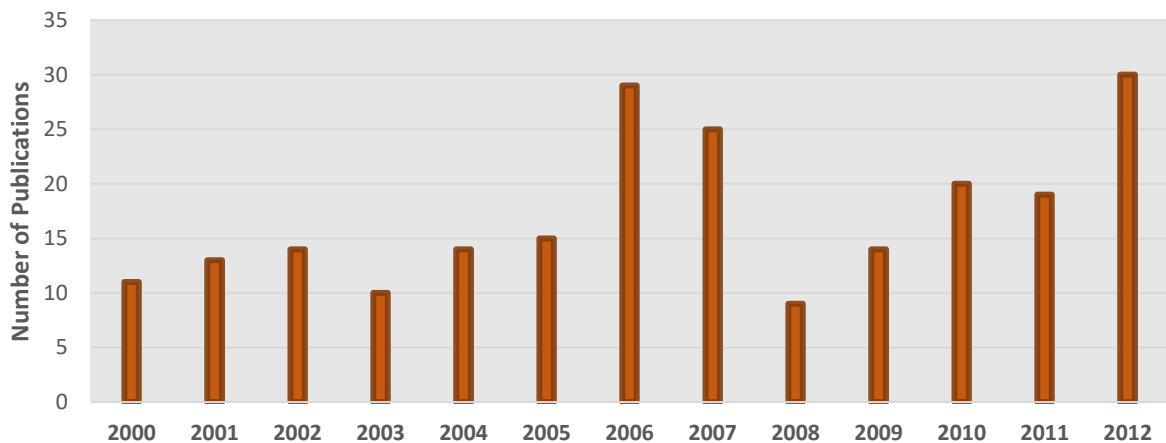


Figure 2.2 Publications on E-commerce/Technology adoption by older people

A database was developed in Excel to hold and better manage the volume of publications yielded in the initial search. Then the database was later converted to pdf file and then transported to NVivo 11 for analysis. The database contained complete references to

selected paper with the following information (author/s, year, title, country, journal, pages, keywords).

NVivo 11 software package was used to conduct the thematic analysis. This was used to record patterns, categories and themes within data which was related to the research questions. Figure 2.3 shows some of the papers which were imported from an Excel database. The papers were arranged alphabetically, and on the right side, each entire paper could also be viewed for reference.

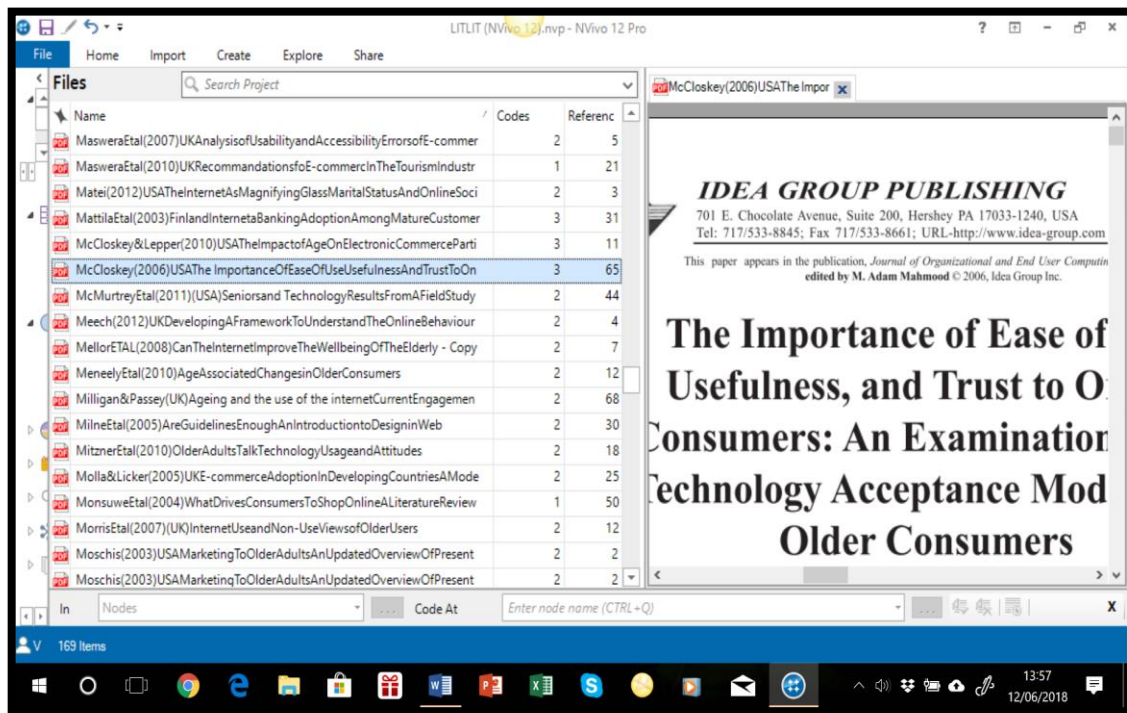


Figure 2.3 An example of papers imported to NVivo 11 for analysis

Figure 2.4 shows relevant papers at the left side, and on the right side, the results of the word frequency query with similar words were grouped. For example, words like (comput, computers, computation, computing) were put together because they were familiar with each other hence forming a relationship. It also showed the length of the

word, the word frequency and the word weighting percentage. As can be depicted from the word frequency query results, The frequency returned 'internet' with the highest count with a weighting of 87%. That means the papers discussed the word internet the most.

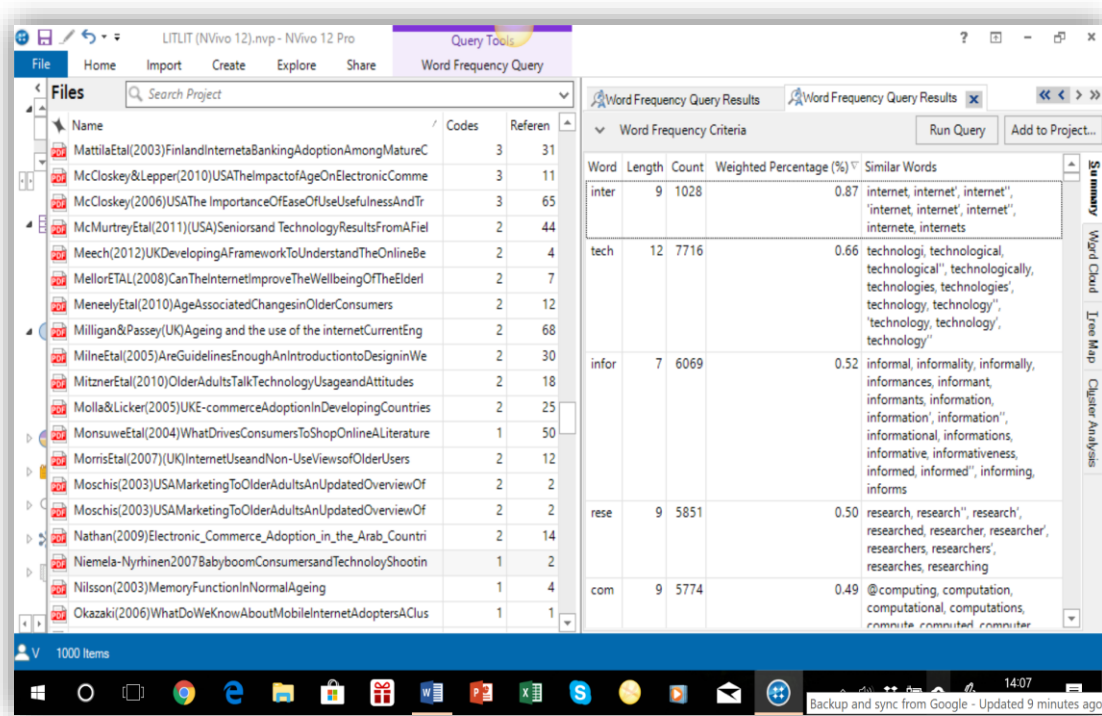


Figure 2.4 An example of Word frequency query results

Once the papers were imported from Excel into NVivo 11, familiarisation of data began by visualising the results by use of word cloud, word tree and text search. Firstly, the word cloud as shown in Figure 2.5 was used to identify frequent terms used in the papers. This helped to identify prominent words and phrases used in the relevant papers thereby familiarising with what the paper was discussing about without actual reading each paper. The larger the word, the more frequent it appears in the papers. For example, the word “internet” appears the most frequent, and it shows that the author discussed this term the most. Followed by

patterns, categories and relationships are generated by this particular word. It helped the researcher to familiarise with the data within the different papers.

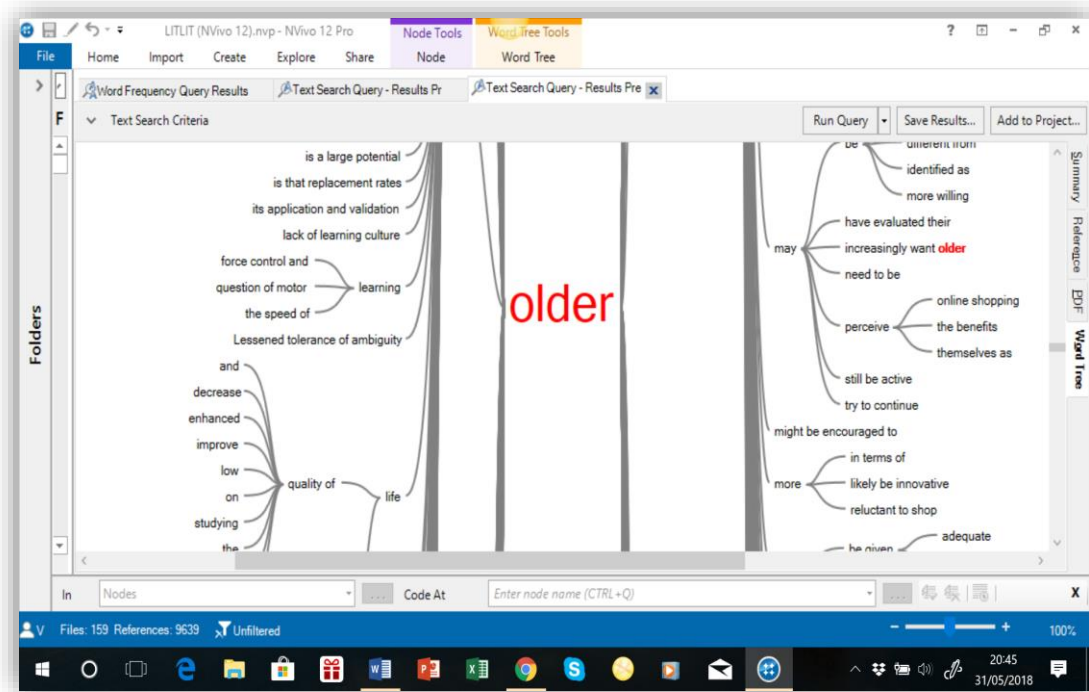


Figure 2.6 An example of text search query results using ‘older.’

Figure 2.7 illustrates the text search query results obtained from the word shopping. This helped in quickly identifying what the papers are saying about “shopping”. It also helped to visualise information to easily look across authors and themes allowing the opportunity to create nodes with all references obtained about the word. Coding was done, and nodes developed forming categories such as types of online shopping.

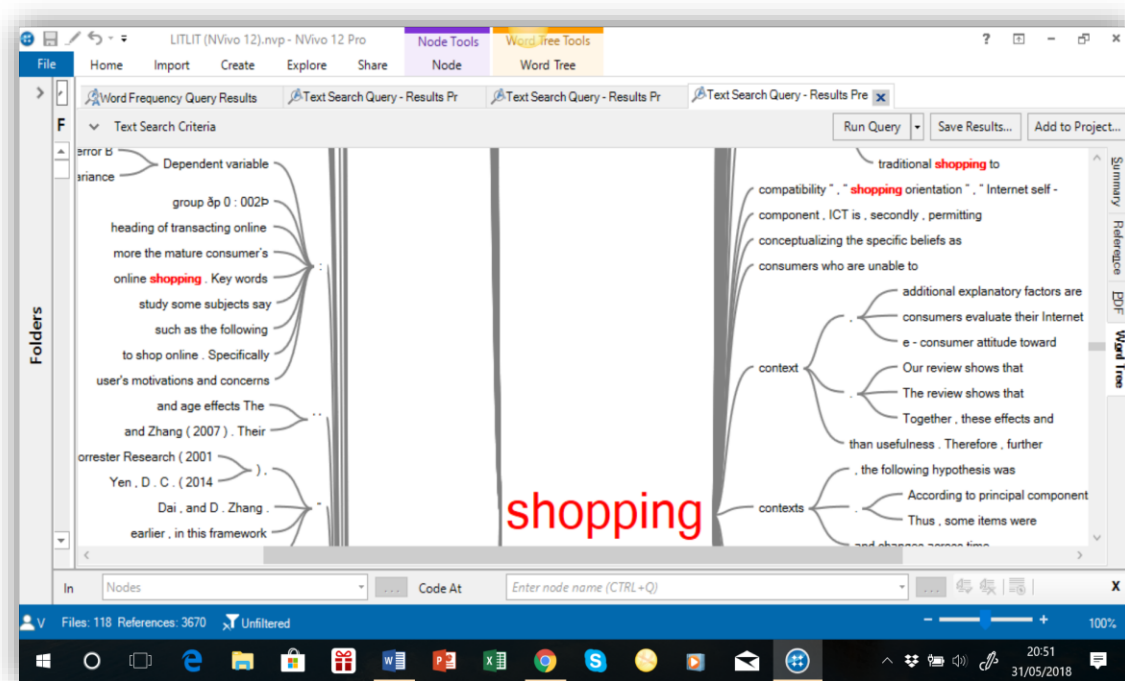


Figure 2.7 An example of text search query results on 'shopping'

Figure 2.8 illustrates the text search query results obtained from the word barriers. This helps in quickly identifying what the papers are saying the word “barrier”. It also allowed the opportunity to create nodes with all references obtained about the word. Coding was done, and themes such as attitude, security and privacy, lack of trust, accessibility and usability and poor design, training and support and cost were identified as significant barriers. These barriers are discussed in section 2.3.7.

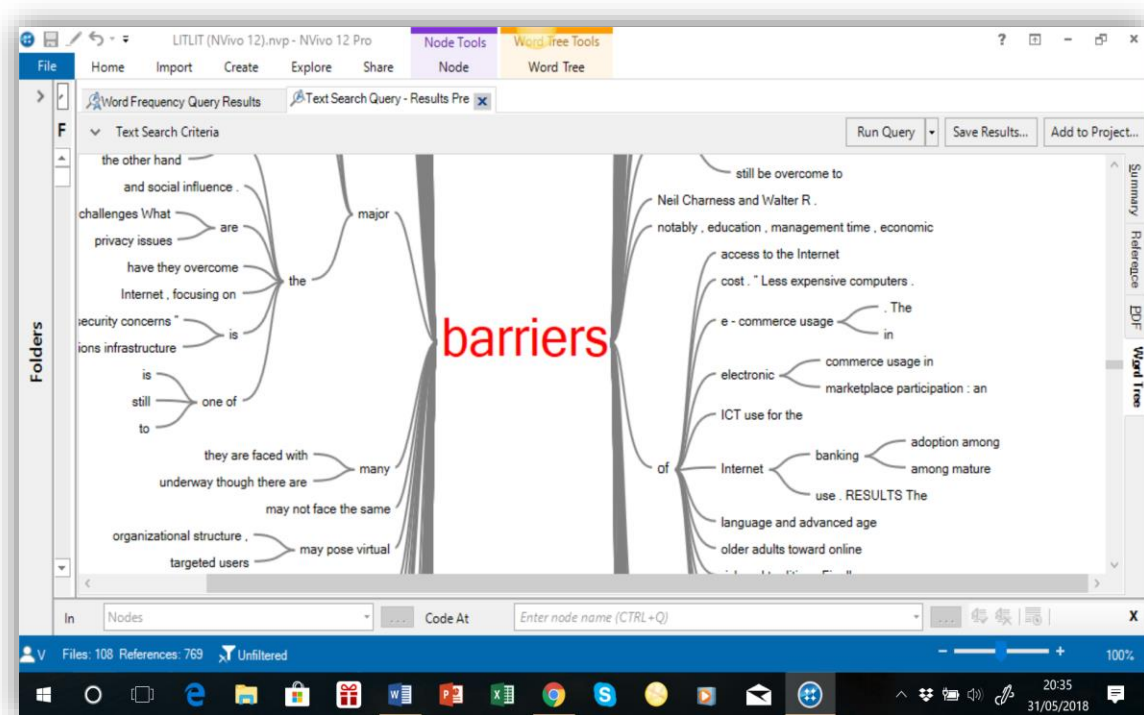


Figure 2.8 An example of text search query results on 'barriers'

A text search was run on the word “factors”, and the results were obtained as shown in Figure 2.9. It showed how the word “factors” was used in the different sources allowing the opportunity to create nodes with all references obtained in the word. Relationships were formed through the text searching and patterns or themes identified. Themes such as trust, usefulness, EOU, previous experience, gender and education were identified and are discussed in detail in section 2.3.8.

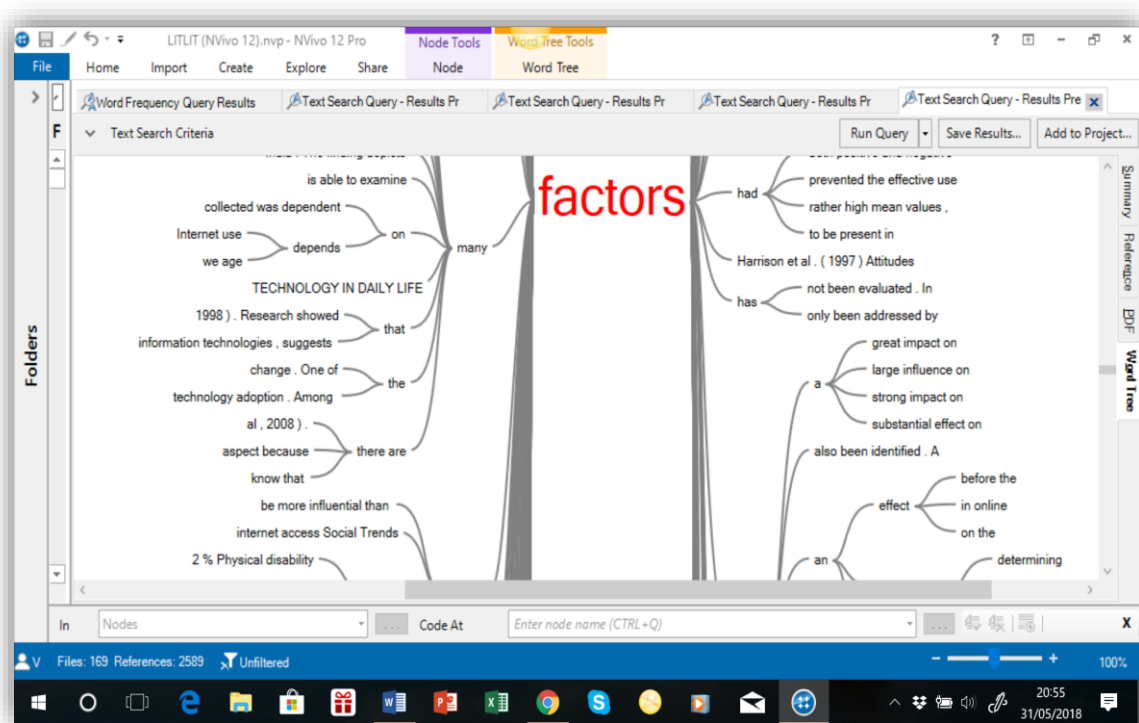


Figure 2.9 An example of text search query results on 'factors'

2.3 Literature Synthesis

2.3.1 The genesis of E-commerce

E-commerce was first introduced via electronic data interchange (EDI) on value-added networks (VANs) in the 1960s. Since then, E-commerce has been in practice, and customers used Automatic Teller Machines (ATMs) to purchase goods using point of sale terminals and credit cards. Systems which are known as inter-organisational systems then followed this. These systems crossed organisations and enabled them to exchange information and conduct business by electronic means (Molla & Licker, 2001). In 1995, Amazon began a book shipping business in Jeff Bezos' garage, and eBay also introduced online auctions in the same year which then exploded in 1997 with (Beanie Babies frenzy) teddy bear toys. E-commerce continued to grow following this first online shopping. For

example, the USA online sales were \$341.7 billion in 2015 (more than a third of USA total retail sales, a 14.6 % increase over, in 2014 (Rouse, 2016).

2.3.2 Definition of e-commerce

Lawrence et al. (1998) defined e-commerce as the buying and selling of information, products and services using any one of the thousands of computer networks that make up the internet. Some of the activities included in the buying side of e-commerce are purchase of goods, purchase of services such as insurance, arranging and paying for travel and accommodation, online banking, online share purchase, the use of automatic teller machines (ATM) and soliciting investment advice (Tatnall and Lepa, 2003). On the other hand, the selling side involves selling goods and services on the internet such as eBay or a car on Auto Trader.

2.3.3 Adoption of E-commerce and Technology

The current research focusses on the adoption of e-commerce by older people, but it would be impossible to discuss this topic in isolation without the mentioning of the adoption of technology and the internet. As discussed earlier in the previous section, technology adoption and use of the internet is an antecedent to e-commerce adoption, as one cannot use e-commerce without the enabling technology. The close relationship between these technologies is illustrated in Figure 2.10. Since e-commerce covers a wide range of areas and can be conducted through a variety of technologies such as computers, mobile phones, laptops barcode readers, credit/debit cards, it is impossible to discuss each of these in this particular research. Therefore, this is an area of research which must be investigated in the future, especially as the population of older people is increasing and the use of e-commerce continues to grow.

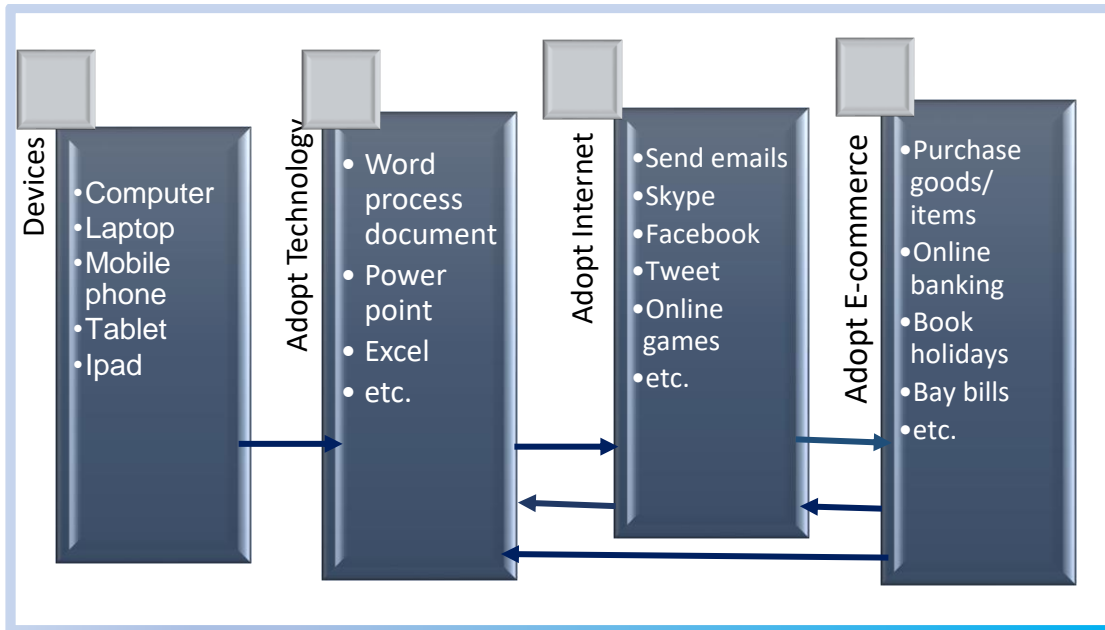


Figure 2.10 The Adoption of E-commerce and Technology diagram

2.3.4 Definition of ‘older people’

When faced with the question: ‘who are older people?’, some research studies focusing on e-commerce adoption by older people have mostly defined or explained ‘older age ’ differently as shown in Table 2.2. Regrettably, it is almost impossible to identify either a uniform definition of “older age” or even a uniform starting point of old age. The fact is that the ageing process differs from individual to individual, culture to culture, society to society and age to age (Kim, 2012). For example, in the USA, Smither and Braun (2001) and Sorce, Perott and Widrick (2005) included respondents aged 50 years and older in their sample of the ‘older’. However, the samples of older people in studies by Bradley and Poppen (2003) and Opalinski (2008) were aged over 60 years while those in Eastman and Iyer (2004) were aged between 65-85 years. Also, in studies by McCloskey (2006) and Mitzner, et al., (2010), the older respondents were aged between 52-87 years and 65-85 years respectively. There is also no consistency in whom the researchers using UK data classified as older people. For example, studies by Morris, Goodman and Brading (2007) and Hill, et

al., (2008) suggest anyone over 50 years of age were classified as older whereas Meneely, et al., (2009) took anyone over 60 years as older. Berry (2011)'s study involved older people aged between 55-74 years of age and Marston, Kroll, Fink, De Rosario and Gschwind (2016) participants were aged 65 and over.

Looking at the international research, definitions as to what constitutes 'older' also differ greatly. In Finland, Niemela-Nyrhinen (2003) included older people aged between 50-60 years and Reisenwitz, Iyer, Kuhlneier and Eastman (2007)'s study investigated those with an age range of 65 and over as older. However, Vuori and Holmund-Ryttonen (2005) and Jokisuu, Kankaanranta and Neittaanmaki (2007) all defined older as those between 55-90 years old. In a study carried in Australia, Sum, Mathews and Hughes (2009)'s respondents were aged 55 and over and in Korea, Ryu, Kim and Lee (2008) classified those aged over 55 years as older. In Taiwan, Kuo, et al., (2009) defined older as between 43-60 years while a South African study by Beneke, Frey, Chapman, Mashaba and Howie (2011) took those people aged 55-75 years to be older. Finally, in Slovenia, those between the ages of 51 and 84 were classified as older by Juznic, Blazic, Mercun, Plestenjak and Majcenovic (2006) and yet in Singapore, Chong and Theng (2004)'s sample of older people were aged like 60 years and over.

Despite the inconsistencies in how 'older people' are defined no study has tried to justify why the definition differed from that used in previous studies (for example, Beneke et al., 2011; Dunphy, Monk, Vins, Blythe & Olivier, 2013; Jokisuu et al., 2007). The explanation for this might be that part of the reason for this is the lack of agreement as to what age one becomes 'older'. For example, as far back as 1875, in Britain, the Friendly Societies Act, enacted the definition of old age as, "any age after 50", yet pension schemes mostly use the age of 60 or 65 years for suitability (Roebuck, 1979). Even the United Nations (UN) has not adopted a standard measure but generally uses 60+ years to refer to older people (WHO, 2007).

In the developed world, most countries have accepted the chronological age of 65 years as a definition of elderly or older person (World Health Organization, WHO, 2007). So the beginning of old age is roughly equivalent to retirement age in most developed countries which 60 or 65 years. However, this contrasts with the situation in many parts of the developing world including Africa with the chronological time having little or no significance in the meaning of old age (WHO, 2007). Thus, for example in Africa definitions of an old

person or 'older' person correspond with the chronological ages of 50 to 65 years, based on the setting, the region and the country. Given this lack of agreed definition and the fact that most studies use a different explanation of 'older', it is possible that this lack of agreed definition has caused and will continue to impact on results of studies on e-commerce adoption amongst older people.

2.3.5 Who are 'older people' in this research?

The definition of older people adopted for this research were older people aged 55 years and above for the following reasons. The retirement age in the UK when one is entitled to a State pension is at the age of 65 years for men and women (has changed from 60 to 65 years), (Age UK, 2017). However, the UK government has also introduced an Early pension release transfer at the age of 55. This allows people who are 55 years of age to claim some of their pension or all of it even if they are still in employment. Thus, the age of 55 and above was seen to be the appropriate age for older people in this research.

2.3.6 Extent of e-commerce adoption among older people

In this section, the extent of e-commerce adoption among older people was explored. It was found that a percentage was used as a measure of the extent of adoption. Most studies and their results of the extent of e-commerce adoption are shown in Table 2.2 under the Extent of adoption column. It was also noted that most of the studies on the extent of e-commerce adoption had been carried out in the USA so far. For example, Kaye (2000) found that 17% of the older respondents had adopted e-commerce. In another study, four years later, Eastman and Iyer (2004) reported that 35% of the older people had adopted e-commerce and two years later they did another study and found the same results. Karavidas, et al., (2004) also in the USA found out that 24% had adopted e-commerce. Sorce et al. (2004) found that 33% of the respondents had adopted e-commerce for related financial information. In another study by Juznic et al. (2006), surprisingly a low percentage of e-commerce adoption of 7% was found considering the participants were aged between 51 to 84 years, which includes the technology savvy baby boomers whom previous studies and

literature have found to be increasingly participating in e-commerce (Meech, 2012; Niemela-Ryrhinen, 2007; Vouri & Holmlund-Ryttonen, 2005).

Table 2.2 Extent of e-commerce adoption among older people

Author(s) & Year	Country	Age range	Extent of Adoption	Uses of E-commerce
Kaye (2000)	USA		17%	-shopping & pay bills
Eastman & Iyer (2004)	USA	65-85	35%	-online shopping
Iyer & Eastman (2004)	USA	Above 65	35%	-online shopping
Karavidas et al. (2004)	USA	53-88	24% 21%	-investments -book travel
Sorce et al. (2005)	USA	50 and over	56.9% 42.3%	-buy online (oldest) -shop online (youngest)
McCloskey (2006)		52-87 yrs	59%	-online shopping
Opalinski (2008)	USA	Over 60	41.8%	-online shopping
Keenan (2009)	USA	50 and over	44 % 41 % 34%	-buy online products -travel reservations -online banking
Selwyn et al. (2003)	UK	Over 60	11% 18%	-online banking -buy goods and services
Morris et al. (2007)	UK	Over 50	10%	-finances -online shopping not popular
Hill et al. (2008)	UK	Over 50	74% 29% 0.34%	-online shopping -book holiday and travel -online banking
Marston et al. (2016)	UK	65 and over	48% 39%	-online banking -online shopping
Chong & Theng (2005)	Singapore	60 and over	33%	-finances
Juznic et al. (2006)	Slovenia	51-84	7% 1%	-bill paying -online shopping
Jokisuu et al. (2007)	Finland	55-90 yrs	70% 25% 16%	-online banking -purchase online tickets & books -online shopping
Sum et al. (2009)	Australia	55 and over	71.4% 68%	-online shopping -flight or travel booking
Beneke et.al. (2011)	South Africa	55-75	37% 28% 2%	-online banking -make travel arrangements -buy groceries

In Finland, Jokisuu et al. (2007) also involved older people who were aged between 55 to 90 years. The study's objective was to examine the access to and use of ICT, reasons for not adopting specific technologies and problems that older users have with technology. The study found out that 70% had adopted e-commerce in online banking, 25% in buying online tickets and books and 16% in online shopping. Sum et al. (2009)'s study investigated how older Australians use the internet, but it was interesting to note that even though they respondents regarded e-commerce activities less popular than other internet activities like, communicating with friends and family or accessing local news their actual percentage score was still high. They found that 71.4% had adopted e-commerce in online shopping and 68% in flight or travel booking and 45.1 % had invested money in the mutual fund or stock. The high adoption rates found may be explained by the fact that 48.4% of the respondents were baby boomers (aged 55 to 64 years) who are considered to be technology savvy. The other reason might be that the majority of the respondents (91.4%) used a computer at home, so they were well experienced in using the internet. Finally, in South Africa, Beneke et al. (2011)'s study investigated older people who were over 55 years of age. The study found that 37% had adopted e-commerce in online banking, 28% in online travel arrangements and 2% on buying online groceries.

Some points may be raised in relation to the findings of the research into the extent of e-commerce adoption by the older people across the world discussed above. For example, in the case of USA, there are some inconsistencies in the reported results may be due to the different definition of 'older' and also it is not clear whether the pattern of the adoption rates are increasing or not. For example, Sorce et al. (2005) investigated the shopping and buying behaviour of older online shoppers but also included younger people in the study for comparison which was also similar to McCloskey and Lepper (2010)'s study which investigated respondents who were aged 18 to 70 and above. Sorce et al. (2005) found that 56.9% had adopted e-commerce and a year later, McCloskey (2006) found 59% had adopted e-commerce, but in that same year, Iyer and Eastman (2006) also found 35% had adopted e-commerce. Maybe the results of both Sorce and McCloskey's studies were influenced by the age of the respondents who took part in the studies. Their higher percentages of e-commerce adoption may be better explained by the same age range of the respondents who included baby boomers and Iyer and Eastman (2006)'s respondents were aged above 65 years. Also, Sorce et al. (2005)'s study included university staff and

students who are familiar with using the internet most of the time and furthermore, the respondents from McCloskey (2006)'s study were highly educated.

2.3.7 Uses of e-commerce among older people

There are limited uses of e-commerce among older people recorded in previous studies and are shown in Table 2.3. Among these uses, online shopping is the most common (Eastman & Iyer, 2004; Hill et al., 2008; Iyer & Eastman, 2004; Jokisuu et al., 2007; Juznic et al., 2006; Opalinski, 2008; Selwyn, Gorard, Furlong & Madden, 2003; Sorce et al., 2005; Sum et al., 2009; Marston et al., 2016). However, there were no names of items or goods mentioned in the online shopping. Besides online shopping, other studies have also found that older people use e-commerce for paying bills (Beneke et al., 2011; Juznic et al., 2006), booking holidays, flights and other travel arrangements (Beneke et al., 2011; Hill et al., 2008; Karavidas et al., 2004; Sum et al., 2009), financial investments (Chong & Theng, 2005; Karavidas et al., 2004; Morris et al., 2007), purchasing online tickets and books (Jokisuu et al., 2007) and buying groceries (Beneke et al., 2011), buy books (Jokisuu et al., 2007).

Table 2.3 Uses of e-commerce among older people

Author/s and Year of study	Online shopping	Pay Bills	Buy Groceries	Online Banking	Financial Investments	Book Holidays/ Flights	Buy Tickets	Buy Books	Comparison shopping
Selwyn et al. (2003)				Yes					yes
Eastman & Iyer (2004)	yes				yes				yes
Karavidas et al. (2004)					yes	yes			yes
Sorce et al. (2005)	yes					yes			
Vuori & Holmlund (2005)	yes			Yes	yes	yes	Yes		
McCloskey (2006)	yes								
Chong & Theng (2005)					yes				
Morris et al. (2007)				Yes					yes
Reisenwitz et al. (2007)	yes								
Jokisuu et al. (2007)	yes			Yes			Yes	yes	
Juznic et al. (2007)	yes	yes							yes
Hill et al. (2008)	yes			Yes		yes			yes
Sum et al. (2009)	yes				yes	yes			
Keenan (2009)	yes			Yes		yes			
Beneke et al. (2011)		yes	yes	Yes		yes			
Marston et al. (2016)	yes			Yes					

Figure 2.11 illustrates the number of studies that discussed the uses of e-commerce. Among the findings, it can be visualised that online shopping has the highest number of studies followed by online banking then comparison shopping.

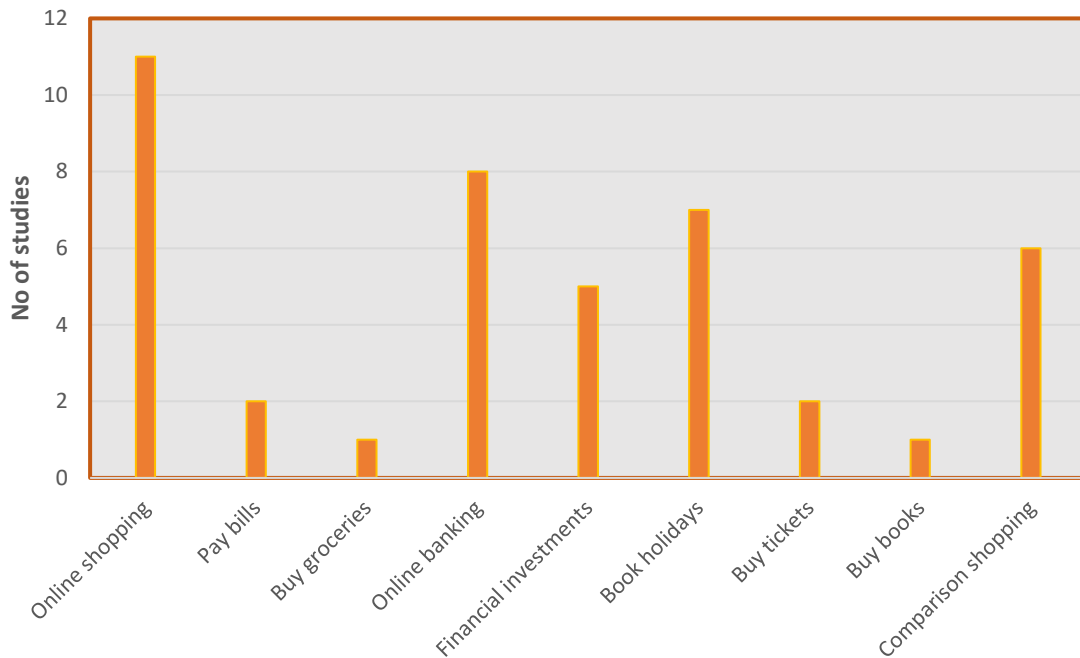


Figure 2.11 Graph showing previous studies on uses of e-commerce among older people

2.3.8 Barriers to e-commerce adoption among older people

Barriers to e-commerce adoption are factors that prevent individuals from adopting e-commerce. Since one of the current thesis' objective is to determine factors associated with e-commerce adoption, a discussion of barriers to e-commerce specifically will enable the identification of more factors that may distinguish adopters from non-adopters of e-commerce. This will allow the testing of the effect of some factors that have not been tested as possible determinants of e-commerce adoption among older people. As illustrated in Section 2.4 and Figure 2.3, some of the barriers to technology adoption and the internet can automatically be barriers to e-commerce adoption because technology adoption and use of the internet is an antecedent to e-commerce adoption. However, in this section, only

those barriers specific to e-commerce adoption are discussed. Hence, the discussion as to why this group of people are comfortable with sending emails, able to skype and tweet but are not willing to engage in online banking or pay bills online.

It has been noted that much-existing literature has focused on the barriers to adoption of technology and use of the internet in general by older people and has ignored investigating the barriers to e-commerce adoption by older people. The following sections discuss the barriers to e-commerce adoption that have been identified in the existing literature as illustrated in Table 2.4.

Table 2.4 Previous studies on barriers to technology/e-commerce adoption

Barrier	Studies
Attitude	Smither & Braun (2001); Tatnall & Lepa (2003); Eastman & Iyer (2004); Selwyn (2004); Vuori & Holmlund- Ryttonen, (2005); Olphert et al. (2005); Jokisuu et al. (2007); Morris (2007); Lagana, (2008); Roberts, (2009); Berry, (2011); Knowles & Hanson, (2018)
Security & Privacy	Lloyd (2001); Gietzelt (2001); Tatnall & Lepa (2003); Olphert et al. (2005); Gatto & Tak (2008); Hill et al. (2008); Age UK (2011); Keenan, (2009); Vines et al., (2011); Chakraborty, (2016)
Lack of Trust	Gefen (2000); Slyke, (2003); Gatto & Tak (2008); Chakraborty, (2016)
Accessibility, Usability and Poor design	Tatnall & Lepa (2003); Bitterman & Shaley (2004); Czaja (2007); Disability Rights Commission, (DRC) (2004); Eastman & Iyer (2004); Gatto & Tak, (2008); O'Hara (2004); Olphert et al. (2005); Milne, (2005); Watering, (2005); Xie, (2007); Smith, (2008); Arch (2009); Meneely et al. (2009); Logwiniuk (2012); Kuo et al. (2012); Darvishy & Zehnder (2013);Nielsen (2013)
Training and support needs	Eastman & Iyer (2004); Jokisuu et al. (2007); Morris (2007); Gatto & Tak (2008); Lagana (2008); Arch (2009); Charness & Boot (2009); Berry (2011)
Cost-related/ Affordability	Eastman & Iyer (2004); Cutler (2005); Olphert et al. (2005); Jokisuu et al. (2007); Vaportzis et al. (2007); Sourbati (2009)

It can be visualised easily from Figure 2.12 that there is limited research on barriers to e-commerce among older people. Among the few existing research, most studies have discussed accessibility and usability as the most barrier showing that there is much to be

done to bridge the digital gap among older people. Therefore, a detailed discussion on issues concerning accessibility, usability and poor design are discussed in detail in the following chapter, Chapter 3, highlighting key factors relating to each of the age-related impairments.

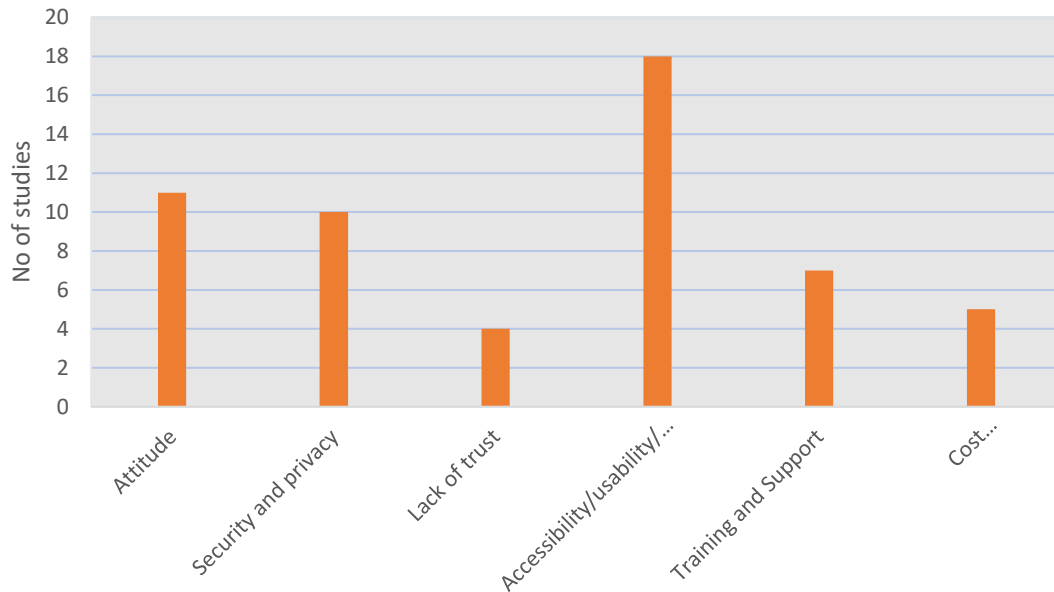


Figure 2.12 Graph showing previous studies on barriers to technology/e-commerce adoption

2.3.8.1 Attitude barrier

Attitudinal issues among older people may act as a hindrance to adopt e-commerce (Berry, 2011; Eastman & Iyer, 2004; Jokisuu et al., 2007; Lagana, 2008; Smither & Braun, 2001; Tatnall & Lepa, 2003) because they might still value some of their traditional way of doing things. It was noted that older people often make a deliberate, conscious decision not to engage in any technology, for example when they perceive that the technology will replace the traditional shopping they are accustomed to (Knowles & Hanson, 2018; Olphert, 2005).

In another word, if an older individual has a negative attitude towards online banking or online shopping, it is highly unlikely that this individual will engage in e-commerce. A study

by Berry, (2011) found that some older people highlighted non-material reasons such as lack of interest to explain why they do not use the internet. Eastman and Iyer (2004)'s study found that attention should be given to these attitudinal barriers before older people fully appreciate the internet and what it brings. Some older users also felt threatened by the internet (Tatnall & Lepa, 2003) preferring to interact with a person rather than a technology (Smither & Braun, 2001). That means this particular group of people would prefer to shop in traditional shops compared to online shops. Also, the way that the society labels older people as users of technology creates some stereotype (Roberts, 2009), hence creating a negative attitude. As a result, websites which are not inspiring are developed. The study went on to suggest that web developers should have the following attitude, "design for ourselves and society as we grow". This will result in the birth of new technologies that society will use as they age because the web developers will start designing for themselves and society, not for older people. However, the older people who have managed to embrace the world of technology find it easy to use the internet. For example, Vuori and Holmlund-Rytkonen (2005) found that 90% of older people in the study believed that the internet was easy to use, with more than 70% considering that they would be able to learn to use it quickly.

2.3.8.2 Privacy and Security

The significant barriers to e-commerce adoption among older people are security and privacy issues (Chakraborty et al., 2016; Teo, 2006). These barriers have been a focus of concern (Horrigan Torkadeh & Dhillon., 2002; Keenan, 2009; Knowles & Hanson, 2018), among older people because of untrustworthy people who will use their credit cards information without their consent or knowledge (Gietzelt, 2001; Olphert et al., 2005; Tatnall & Lepa, 2003). There is evidence that older people are particular targets to financial abuse and fraud (Action for Elder Abuse (2006; Fox, 2004; Grimes et al., 2010) because of their trusting nature (Davies, 2008). Besides raising concerns, Pew and VanHemel (2004) found that the credit card issue also directly affects the acceptance of a particular technology, (for example, e-commerce). In another study by Gatto and Tak (2008) the privacy issue was a significant concern, which resulted in the older people avoiding activities that could put their personal information at risk for identity theft. One study examined people's intention to participate in e-commerce in the context of a significant data breach (Chakraborty et al.,

2016). They found that the impact of perceived risks was negatively substantial among older participants compared to their younger counterparts. In a similar study by Grimes et al., 2010, older participants were less knowledgeable about internet security risks and threats. Hence their vulnerability results in them being victims of such crimes compared to younger users. Also, Morris et al., (2007)'s study found older people did not like online shopping for reasons such as fear of financial fraud.

In Denmark, they have managed to safeguard bank customers by having legislation that makes access to basic methods of payment a service obligation for banks (Age UK, 2011). Older people in the UK experience financial abuse, and it is thought to be hugely underreported, even though one charity estimates that those losses alone were worth 7.8 million pounds (Action for Elderly Abuse, 2006). MetLife Mature Market Institute (2011) also found out that financial older abuse was reported by a study which estimated that total losses were worth around 2.9 billion dollars in 2008. This might explain the reason why the older people are very reluctant to use any form of technology which might increase their vulnerability to financial abuse, for example, by engaging in e-commerce.

2.3.8.3 Lack of trust

One of the significant barriers to e-commerce adoption among older people is lack of trust (Chakraborty et al., 2016). The degree of trust people places in another person, a device, a service, a procedure, or a system may be measured by expressed or observed satisfaction, acceptance, or willingness to use it. Typically, trust increases as individuals continue to be exposed to the technology, and a history of successful use noted, (for example e-commerce website). However, trust can be weakened by websites which are complex and not reliable. This shows that trust plays a vital role if the online retailers want to capture and retain online buyers particularly older people. In another study, Gefen (2000) reported that familiarity with an online retailer also impacts trust in that retailer, which in turn cause purchase intention, regardless of other perceived innovation characteristics (Slyke, Belanger & Comunale, 2004). It is not surprising then that some participants indicated that they would purchase from websites they already know or have bought from in the past (Chakraborty et al., 2016).

2.3.8.4 Inappropriate Training and Support Needs

To engage in e-commerce, the older people need appropriate training and support (Lagana, 2008; Taylor et al., 2014). The training should be designed thoughtfully with good training motives which empower them to use technology rather than discourage them (Pew & Van Hemel, 2004). That means training must be tailored to meet the needs and wants of older people and must also be appropriate to their skills, knowledge and abilities (Berry, 2011; Eastman & Iyer, 2004). Special considerations in designing appropriate training programmes for this group of people should go beyond universal design to take into account the age-related impairments and disabilities. It is also essential to make appropriate use of memory aids so that working memory is not overburdened.

It was noted that where there is the provision of support, it is often insufficient for the needs of older people (Rosenthal, 2008). Therefore, not only should the provided support and training be timely, it should be adequate for the intended user (Rosenthal, 2008; Wagner et al., 2010). In the UK, the government set up many online community centres to provide internet access to the public. An investigation of whether the provided facilities are accessible to those who are older with age-related impairments would help the present situation. It appears these are failing to meet the needs of older people and it is essential to find out why (Morris, 2007). As was also highlighted by Morris (2007)'s study, many respondents learned to use the internet through a class, which shows that these online community centres are important and provides the potential to engage in e-commerce.

A study by Arch (2009) found that among the reviewed studies, many older people were generally not aware of the possibilities of utilising adaptive strategies or use of assistive technology with their computers or browsers. The study also suggests that even many trainers of older people were not aware of adaptive strategies or the existence of applicable assistive technologies. This highlights a gap in knowledge amongst older users and the trainers. Despite their security and privacy concern, older customers were willing to engage in online banking provided the banks give them the necessary support and guidance on how to use the systems (Dixit & Datta, 2010).

In a recent study by Vaportzis et al., (2017), participants noted that their instructions were too technical, raising a point that technicians not users wrote the instructions. This still calls

for website developers to start developing websites and manuals for themselves and the society.

2.3.8.5 Cost-related barriers/ Affordability

To participate in the world of technology, the cost of access is considered an essential factor. As highlighted by Olphert et al. (2005)'s study, the cost is a particular barrier for older people who are pensioners with less money. This is consistent with Cutler (2005) who found that technology can be expensive so much that older people cannot afford. In another study, Gietzelt (2001) also found that 13% of the participants mentioned cost as a barrier and Jokisuu et al. (2007) also found that 19% of the respondents considered computers to be more expensive for them to buy.

However, cost as a barrier to technology and internet use is disputed by Eastman and Iyer (2004) who found that older people could afford to buy since they have more disposable income than many other groups of the population. Sourbati (2009) found that cost-related barriers can be seen to diminish in significance as the price of necessary equipment and internet connection decrease and also the introduction of online community centres. It is interesting to note that Olphert et al. (2005)'s study concluded that many older people are not prevented from access to the internet for reasons of cost or ability. The study went on to say they are making a conscious choice not to become digitally engaged to preserve valued aspects of traditional forms of social interaction or avoid dangers they perceive in using the internet thereby engage in e-commerce. Although previous studies found that older people can afford to buy the equipment and all the other expenses (Cutler, 2005; Olphert et al., 2005) this was disputed by a recent study by Vaportzis et al. (2017). Vaportzis et al. (2017)'s study found that participants were concerned about the cost of tablets and other technologies and also the need for the cost to update the software. Some participants also highlighted that despite the low initial price it is likely that the technologies which are cheaper have relatively fewer facilities, so that means they will end up spending more to update the technology.

2.3.9 Determinants of e-commerce adoption among older people

There are only a few studies that have specifically investigated what factors determine e-commerce adoption among older people. The determinants and studies are summarised in Table 2.5 and are further discussed in the following sub-sections.

Table 2.5 Previous studies on determinants of Technology/ E-commerce adoption

Determinants	Studies
Trust	Gefen (2000); McCloskey (2006); Lepper & McCloskey (2011)
PEOU	Sorce et al. (2005); McCloskey (2006); Ryu et al. (2008); Smith (2008); McCloskey & Lepper (2010)
Perceived Usefulness	Sorce et al. (2005); McCloskey (2006); Ryu et al. (2008); Smith (2008); McCloskey & Lepper (2010)
Gender	Jokisuu et al. (2007); McCloskey & Lepper (2010); Lepper & McCloskey (2011)
Age	Sorce et al. (2005); Jokisuu et al. (2007); Ryu et al. (2008); McCloskey & Lepper (2010); Lepper & McCloskey (2011); Villarejo-Ramos et al. (2014)
Education	Smither & Braun (2001); Jokisuu et al. (2007); McCloskey & Lepper (2010)
Experience	Karjaluoto et al. (2002); Iyer & Eastman (2006); Ryu et al. (2008)

Figure 2.13 illustrates the determinants of e-commerce adoption and the number of studies discussing each barrier. It can be visualised that most studies have concentrated on age as a barrier compared to the others.

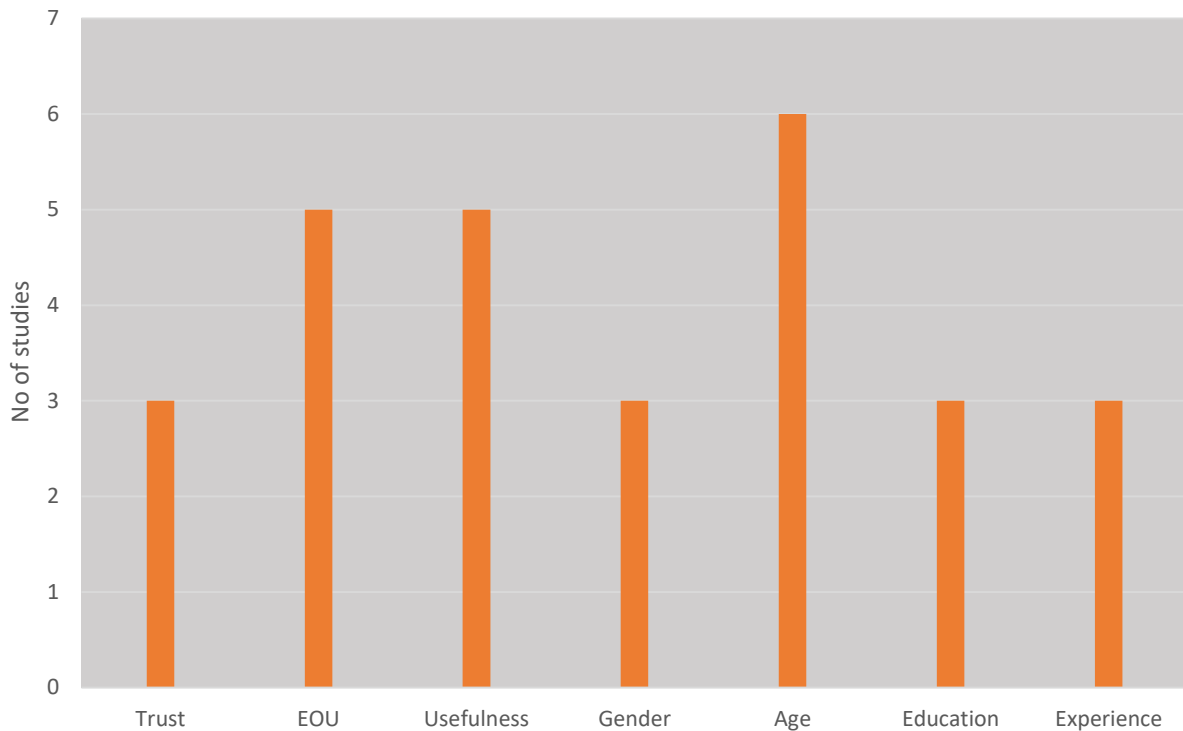


Figure 2.13 Graph showing previous studies on determinants to e-commerce adoption

2.3.9.1 Trust

Trust is a critical characteristic of e-commerce (Gefen, 2000). It is defined as the expectation that others will not behave opportunistically or take advantage of a situation (Gefen, 2003). It is was found that buyers are prevented from adopting e-commerce if there is lack of trust (Hoffman et al., 1999). There is no reason why consumers should expect to benefit from using a website if the online business cannot be trusted (Pavlou, 2003; Gefen, 2004). For example, McCloskey (2006) found that trust has a significant effect on e-commerce adoption, which was consistent with Gefen (2000) who carried a study of 217 undergraduate business students and MBA students. The study found trust to influence e-commerce adoption in websites which sold books. McCloskey and Lepper (2010)'s study investigated whether age had an impact on trust and to what extent does trust impact e-commerce participation. The study found that trust had a significant impact on both ease of use and usefulness which was consistent with McCloskey (2006) who found trust to be positively related to e-commerce. However, McCloskey and Lepper (2010)'s study also found that men

and women did not differ in the level of e-commerce participation or attitudes concerning trust. In another study, Corbitt et al. (2003) found that participants were more likely to purchase from the internet if they perceive a higher degree of trust in the website thus trust is proving to be an important element in the adoption of e-commerce.

2.3.9.2 Perceived Ease of Use (PEOU)

Perceived ease of use refers to “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 320). Often, older people experience a decreased ease of use (EOU) compared to young people (Charness & Boot, 2009; Taylor et al., 2014). It is, therefore suggested that it is easy to navigate the websites (Taylor et al., 2014; Charness & Boot, 2009) even though this applies to all user groups. Among the studies which investigated ease of use was Smith (2008). He found that perceived ease of use of e-commerce websites were found to be significantly influenced by the positive usability of the websites. In another study by McCloskey and Lepper (2010) ease of use was found to have no direct influence on e-commerce participation.

A year later, McCloskey and Lepper (2011) found that most of the participants agreed that online shopping is more comfortable than traditional shopping, which contradicted McCloskey (2006). McCloskey (2006) found that ease of use does not appear to influence the level of participation in e-commerce despite having significant impacts on usefulness.

2.3.9.3 Perceived Usefulness (PU)

Perceived usefulness is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989, p. 320). Among the studies which looked at the factors which influence e-commerce adoption was a study by McCloskey and Lepper (2010). A 5-point Likert scale was used for questions that addressed attitudes regarding the usefulness of online shopping. Three items were developed and used to measure the usefulness of e-commerce which was: convenience, efficiency and saving time. McCloskey and Lepper (2010)’s study found that higher perceptions of usefulness were found to be positively related to e-commerce while, McCloskey (2006) went further and found that usefulness has a positive direct effect on usage, indicating that it has a significant impact on all four of the measures of e-commerce participation which were investigated: whether it was used, frequency of use, number of times purchases made and amount spent on line. In another study carried out by Smith

(2008), perceived usefulness of e-commerce Web sites significantly influenced older people's attitudes towards using an intention to use the websites positively, thereby engaging themselves in e-commerce activities. In the USA, McCloskey and Lepper (2011)'s study found that most of the participants agreed that online shopping was more convenient and saved time thus usefulness positively affecting e-commerce.

2.3.9.4 Gender

Previous studies have shown that gender is a significant factor in using the internet (Karavidas et al., 2005; Watering, 2010). It has been found that men are more likely to use the internet compared to women (Fallows, 2005; Wu, 2003; Villarejo-Ramos, Peral-Peral & Arenas-Gaitan, 2014; Werner, Carlson, & Jordan-Marsh, 2011) thereby engaging in e-commerce. This was inconsistent with McCloskey and Lepper (2010) who found men and women to behave the same in the level of e-commerce participation. A year later, Lepper and McCloskey (2011) did another study and noticed that women seemed less concerned about security issues than men when using credit cards for online shopping for goods. Mature women were found to be more likely than mature men to agree that internet shopping makes life easier but young men were more likely to agree that e-commerce makes life easier. This is inconsistent with Villarejo-Ramos et al., (2014)'s study which found that men using the online bank facilities found it more comfortable than women. This was explained by the fact that women prefer the personal contact, unlike men.

In a study by Perrin and Puggan (2015), no difference was found between men and women with regards to internet use.

2.3.9.5 Age

There is evidence that age is an essential factor in older people adopting e-commerce (Tatnall & Lepa, 2003; Sorce et al., 2005; Ryu et al., 2008; McCloskey & Lepper, 2010; Villarejo-Ramos et al., 2014). Sorce et al., (2005) found that there were significant differences in online buying attitudes between consumers of differences age groups Similarly, Wu (2003) was consistent with Sorce et al., (2005) who also highlighted the same in their study. According to Jokisuu et al., (2007)'s study, many older participants reported that their age-related issues caused problems because of deteriorating eyesight, motor functions and cognitive capabilities. Another study which investigated how age influences

the adoption of e-commerce is McCloskey and Lepper (2010). They found that older people were less likely to participate in e-commerce while the younger people have greater ease of information access than the older people. The study, however, found that there was no difference between older people aged 50-69 years and young people. This no-significant-difference result might be better explained by the technology savvy participants who were mainly the baby boomers in the mature group (50-69 years age group).

2.3.9.6 Education

Previous research has suggested that older people with higher levels of education are more likely to shop online (Burke, 2002; Lepper and McCloskey, 2011). Lepper and McCloskey, (2011)'s study found that among those aged 50 to 69 and 70 and over, the percentage with at least some college education was higher among participants than among non-participants. This finding may indicate that exposure to a college education increases the level of comfort that individuals feel when they work with technology and the internet which may result in the adoption of e-commerce. However, this was disputed by McCloskey and Lepper (2010)'s study which found out that college education did not have an impact on participation, perceived usefulness, ease of information access or trust. Also, Eastman and Iyer (2004)'s study found out that education was negatively correlated with making a purchase online when they conducted a national survey of older people aged 65-85 years.

2.3.9.7 Previous Experience

Previous experience of technology adoption has also been investigated as a possible factor that could potentially influence e-commerce adoption by older people. For example, Niemela-Nyrhinen (2007) carried out a study which examined Finnish baby boomers and found that those older participants who have high levels of experience used internet and SMS. A study by Iyer and Eastman (2006) found that older people who were experienced in using computers were found to be more likely to use the internet for comparison shopping, but there was no link between older people's satisfaction with their computer skills and use of the internet for comparison shopping. It was also noted that there was a higher level of education among the respondents may be due to the high percentage of men who took part. Karjaluoto, Mattila and Pentto (2002)'s study examined the effect of different factors affecting attitude formation towards internet banking and their relation to use online banking services. The study found that prior experience of computers and technology influenced both attitudes

towards online banking and actual behaviour. The study also found positive banking experience seemed to affect both the older people's attitudes and the way they use and apply e-commerce. It was also found that older people were more likely to purchase from the internet if they have more experience in using the internet (Corbitt, Thanasankit & Yi, 2003).

2.4 Limitations of existing research

The preliminary literature review suggests that there are some limitations to extant research on e-commerce adoption by older people. The purpose of this section is to analyse the limitations of such research so that the potential contribution and contribution of the current research can be delineated. First, judging by the amount of literature reviewed in this chapter, it is noteworthy that a few articles have so far been published in academic journals on e-commerce adoption by older people (for example, Olphert et al., 2005; Iyer & Eastman, 2005; McCloskey, 2006; Leonard, 2012). Of these, only a few studies are based on UK data (Olphert et al. 2005; Morris et al. 2007; Hill et al. 2008; Marston et al., 2016). For example, Morris (2007)'s study used a sample of 353 respondents, Marston et al., (2016)'s study used a sample of 146 respondents, and Selwyn et al., (2003)'s study used a sample of 352 respondents. What has been researched relates specifically to technology adoption with minimal mention of e-commerce adoption. This suggests that more research on e-commerce adoption by older people is explicitly needed in general and specifically in the UK.

Second, one reason for research on e-commerce adoption by older people is to recommend policy, yet it is surprising that there are only a few studies that examine the individual characteristics that influence e-commerce adoption by older people. For example, if the adoption of e-commerce is found to be associated with social status, the government could institute a scheme which makes available computers at a subsidised cost. The existing studies on e-commerce adoption are mostly concerned about attitudes and behaviour towards e-commerce adoption (Iyer & Eastman 2006). Therefore there is a need for studies to examine what individual characteristics influence the decision to adopt e-commerce among older people.

Third, although some studies have examined the barriers to technology adoption (for example, Tatnall & Lepa, 2003; Olphert, 2005), there have been no studies that have examined the barriers to e-commerce adoption specifically by older people. It is therefore important for policy makers and online businesses to understand the barriers to e-commerce adoption among older people so that they can develop accessible and useful websites. For example, if trust is a problem, it may well be that older people need to be educated on how to shop safely online or given guarantees that will encourage them to adopt e-commerce.

Fourth, existing research on e-commerce adoption among older people uses the Technology Adoption Model (TAM) which has been used to explain the adoption of technology. However, there may be some differences in factors that influence the adoption of technology and those for the adoption of e-commerce. For example, one crucial difference is that while older people may not object to adopting technology for sending emails or for reading news, they may object to e-commerce adoption for either buying or selling something by risk or trust. This argument is consistent with Leonard (2012)'s finding that whilst the issues of trust and risk arises when someone is buying something through the internet, the same two issues do not arise when someone is selling because presumably all the seller needs to do is wait until the buyer pays for the product through some secure platform such as pay pal before sending the product. It might be that a different theoretical framework may be needed to explain e-commerce adoption rather than rely totally on TAM.

Finally, TAM relies on perception of individuals yet psychology literature suggest that the perception itself differs or depend on individual characteristics such as age, education etc. which means that since individual characteristics influence perception, adoption of e-commerce may be a function of the interaction between individual characteristics and TAM (perceived usefulness & perceived ease of use). Rather than concentrate on just examining the direct relationship between the tents of TAM and e-commerce adoption, there is a need for research to start exploring whether the perceived usefulness or perceived ease of use is contingent on the individual traits. It may well be the perceived usefulness, and perceived ease of use are modified or moderated by the individual factors in their effect on e-commerce adoption.

2.5 Summary and Conclusion

The objective of this chapter was to synthesise existing literature on e-commerce adoption by older people so that the contribution of the current thesis is clearly defined. Firstly the chapter started with an introduction followed by the literature search strategy adopted, then the results of the searches and thematic analysis conducted were presented. Then literature synthesis is carried out in section 2.3, with a discussion of relevant definitions, then themes and categories are developed and presented. This included the extent of e-commerce adoption, uses of e-commerce, the barriers to e-commerce adoption and the determinants of e-commerce adoption. The penultimate section of this chapter documented the limitations of existing research which also identified the need for further research. Based on the literature review analysis results, the following guidelines were developed for the research:

1. Investigate to what extent the older people have adopted e-commerce.
2. Find out the uses of e-commerce among older people.
3. Investigate the barriers to adoption of e-commerce by older people.
4. Determine the individual characteristics associated with the extent of e-commerce adoption among older people.
5. Develop recommendations for policymakers, online businesses and older people.

CHAPTER 3. ACCESSIBILITY AND AGE-RELATED IMPAIRMENTS

3.1 Introduction

As people age their physical and mental condition decline (Chou, Lai & Liu, 2012; Hollinworth & Hwang, 2010). Their risk of developing health complications increases and they are more likely to suffer from disabilities such as age-related impairments which would prevent or limit access to use the internet (Olphert et al., 2005; Zaphiris & Ghiawadwala, 2007). On the other hand, the world of today is changing at a faster pace and is being driven by computers and the younger consumers are ever-increasingly adopting e-commerce and purchasing products and services using websites such as eBay and Amazon. To make use of these technologies, older people should be able to access them easily. However, the physical and mental decline they face hinder them from interacting with these modern interfaces in a positive way (Chou et al., 2012; Wallace et al., 2013).

To adopt e-commerce the most important thing is for older people to know how to use a computer and then to be connected to the internet. However, the barriers they face makes it very difficult to even think of engaging themselves and use information technology either generally or for e-commerce purposes (Millward, 2003). Demiris et al. (2001)'s study mentioned that older people are not treated as potential internet users by the hardware and software technology designers. Hence this group of people are greatly disadvantaged and denied access to enjoy the benefits of the world-wide-web. The human body is a complex machine which goes through different changes or stages throughout its life. To provide appropriate and effective electronic commerce technologies for the older people it is necessary and important to understand these changes. The human body is made up of organs which decline in their functioning due to the ageing process. These organs are made up of cells which also reduce in number as one grows. Scientists have given some theories which state that this changes might be due to a combination of factors namely genes, lifestyle and diseases.

For websites to be successful, users with various difficulties or disabilities should be able to access them. The term "accessibility" can be defined as the ability of a range of people to use the internet especially those with disabilities (Milne et al., 2005) and it plays a critical

role in e-commerce success (Sambhanthan & Good, 2011). According to Good (2008), accessibility is when, “any one, regardless of economic, geographical, or physical circumstances, can access it” Thus the latter definition encompasses everything and everyone.

Guidelines for creating accessible web content are available but are not followed. In the UK, Darvishy and Good (2013)’s study aimed at defining the most significant criteria for guidance on accessible design. Their research looked at nine areas for web design tailor-made for older people. These areas were fully examined, and recommendations for implementation were outlined. Even though, there are organisations, such as Website Accessibility Initiative (WAI) created by the W3C to establish principles and rules for website design and development (Choudrie et al., 2013), older users are still facing difficulties accessing web-based content (Sambhanthan & Good, 2011). The WAI has produced the Website Content Accessibility Guidelines (WCAG) which offers guidance to developers on how to produce web content to avoid creating accessibility barriers for users with disabilities. These WCAG guidelines focus primarily on technical accessibility. In Brazil, a study by De Lara et al. (2010) proposed the formation of a new set of success criteria that addresses older users accessibility into the normative document of WCAG 2.0 even though the criteria have not yet been integrated as part of the general guidelines. The success criteria should address accessibility problems that impact on disabled users, differently of usability aspects that are applied for all general users.

The WCAG guidelines have become widely accepted as the most authoritative set of guidelines relating to Web accessibility and have formed the basis of the web accessibility policy of many organisations across the world (Milne et al. 2005; Marston et al., 2016). For example, the government of the United Kingdom has been mentioned in court cases relating to legal issues of websites with access barriers in both the USA and Australia, and are also used as the evaluation standard by most automated web accessibility evaluation tools websites. Also, the introduction of assistive and adaptive software has enhanced accessibility (Good & Jerrams-Smith, 2007; Watering, 2005), especially to older people but a consensus has highlighted poor design and incorrect coding as key factors in the cause of problems related to accessibility (Nielsen, 2001). Meng et al. (2017)’s study developed an age-friendly e-commerce system to enhance older people’s browsing experience in e-commerce websites with the expectation of engaging their e-commerce adoption. The

system provides assistive technologies such as the crowd-improved speech recognition and personalised speech feedback.

Usability issues are also seen as a potential barrier with the interface, information structures and navigation being essential contributors (Tatnall & Lepa, 2003). Several studies have shown that many websites suffer from bad design and poor usability (Darvishy & Zehnder, 2013; Olphert et al., 2005), with most significant sources of frustration found to be spams, pop-ups, advertisements and unwanted e-mails (Gatto & Tak, 2008). Other participants mention being frustrated with information retrieval or problems with finding previously retrieved information. Older people also have difficulty in searching for information they require because of some websites containing complex information that is difficult to understand (SOCITM, 2004; Tatnall & Lepa, 2003). Bearing in mind that website designers are likely younger people who may not be familiar with the difficulties older people encounter (Logwiniuk, 2012; Wachowicz et al., 2012), it is very important that this lack of knowledge in the design stage be investigated and dealt with for the benefit of the older population.

The following sections will discuss key factors relating to each of the ageing impairments, and the rest of the chapter is organised as follows: The next section explains the Visual impairments, followed by Auditory in section 3.3, and Motor impairments are reviewed in section 3.4. The penultimate section 3.5 discusses Cognitive impairments and the final section is the summary and conclusion.

3.2 Visual Impairments

Visual impairment contributes to the most common source of accessibility problems (Hanson, 2001; Kurniawan & Zaphiris, 2001). It affects a wide range of people from those who suffer from reduced vision or partially sighted to those who are entirely blind. Ageing is associated with a decline in visual acuity (Charness & Boot, 2009), and visual acuity is the ability to perceive small details. According to ONS, (2003), there has been a rise in the number of British people who are partially sighted since 2000 with the highest increase recorded among the older people aged 78 years or more. Also, among these people 58 per cent of those who are visually impaired are over the age of sixty (WHO, 2002), making it very difficult for most of the older people to overcome the natural barriers to e-commerce adoption. The declining vision conditions suffered by most older people naturally present a variety of changes in vision (Salvi et al., 2006). The following changes occur, the lens stiffens, making focusing in close objects harder, the lens becomes denser, making seeing in dim light harder. The pupil reacts more slowly to changes in light and the number of nerve cells decrease, causing depth perception. Problems which also come with vision impairment are small font size and font colours difficulties. These conditions will consequently limit

internet accessibility among the older people including the adoption of e-commerce. These limitations may include:

- There is contrast sensitivity: from the age of 40, contrast sensitivity at higher spatial frequencies starts to decline until at the age of 80.
- Presence of colour perception and sensitivity: less violet light is registered, making it easier to see red and yellows than blues and greens and often differentiating darker blues from black.
- The ability to focus on near tasks, including a computer screen decreases
- When the pupil shrinks, it results in the need for more light and a reduced capacity to adjust to light level changes (Burns et al., 2013).
- For example, 60-year-old retinas receive only 40% of the light that 20-year-old retinas receive, while 80-year-old retinas only receive around 15%.
- There is a reduction in the visual field, and there is also colour perception and sensitivity (Burns et al., 2013). Less violet light is registered, making it easier to see yellows and reds than blues and greens and often differentiating darker blues from black (Burns et al., 2013).

Apart from the natural ageing of the eye, there are two common eye conditions namely, Cataracts which can be treated when it is in the early years. It is characterized by the clouding of the clear lens in the eye resulting in blurred vision and glare sensitivity. The second condition is Age-related Macular Degeneration (AMD) which is a disease which is irreversible. There are central vision deterioration and an inability to see fine detail and distinguish colour possibly combined with a sensitivity to glare (Williams et al., 2013). The different causes of vision problems in older age and the percentage population who are affected can be illustrated in Table 3.1 and Figure 3.1.

Table 3.1 Causes of vision problems in Older Age (RNIB, 2008)

Eye Condition	Percentage of population (for binocular Visual Acuity < 6/18)
Diabetic Eye disease	2.3 %
Myopic degeneration	2.9 %
Glaucoma	7.9 %
Cataract	24.5 %
Refractive error	31.6 %
Age-related Mascular Degeneration (AMD)	36.2 %

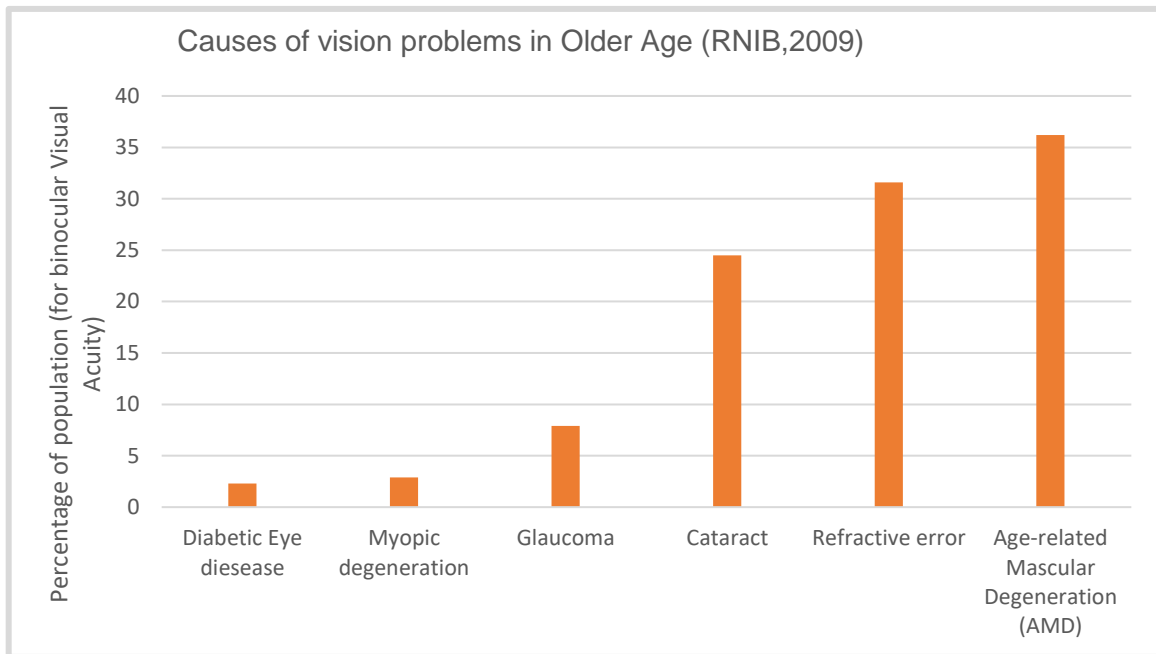


Figure 3.1 Graph showing causes of vision problems in older age

People with Visual impairments rely on changing the presentation of web content into forms that are more usable for their specific needs. For example, listening to the text-to-speech synthesis of the content, enlarging or reducing text size and images, enlarging or reducing text size and images, reading text using refreshable Braille and listening to audio descriptions of video in multimedia (W3C WAI, 2018). Furthermore, some people do not see the content and rely on lists, headings, tables, and other page structures to be properly

coded so that they can be identified by web browsers and assistive technologies. Some people are using customized fonts, colours, and spacing to make the content more readable, or they are navigating through the content using keyboard only because they cannot see the mouse pointer. An accessible design supports different ways of interaction and different presentations of the web content (W3C, 2018; WAI, 2018).

Eye conditions which older people may suffer include: colour blindness which involves difficulty distinguishing between colours such as between red and green, or between yellow and blue, and sometimes inability to perceive any colour, low vision or partial sight which includes poor acuity or vision that is not sharp, tunnel vision (seeing only the middle of the visual field), central field loss (seeing only the edges of the visual field), and clouded vision. It also includes blindness which is substantial, loss of vision in both eyes not correctable and deaf-blindness. According to W3C, WAI, examples of barriers that people with visual impairments suffer when interacting with websites include:

- Text, images, and page layouts that cannot be resized, or that lose information when resized.
- Video content that does not have text or audio alternatives, or an audio-description track.
- Images, controls, and other structural elements that do not have equivalent text alternatives
- Unpredictable, inconsistent and overly complicated navigation mechanisms and page functions.
- Websites, web browsers, and authoring tools that do not support the use of custom colour combinations.
- Websites, web browsers, and authoring tools that do not provide full keyboard support (W3C, 2018; WAI, 2018)
-

3.3 Auditory Impairments

The abilities of older people's hearing decline as one ages (Ryu et al., 2009; Wallace et al., 2013; loss. To distinguish age-related hearing loss from hearing loss that occurs for other reasons, such as long-term exposure to noise can be difficult. Auditory impairments include anything from a mild hearing loss to complete deafness. Examples of auditory disabilities

that older people may suffer include hard of hearing which is mild or moderate hearing impairments in one or both ears, deafness which Taylor et al., 2014). There are many factors which can contribute to this hearing is substantial, not correctable impairment of hearing in both ears and deaf-blindness which is substantial, not correctable hearing and visual impairments. Nielsen (1996)'s early study found that the growing multimedia usage may result in increased difficulties in accessing audio and video files. Czaja and Lee (2006)'s study pointed out that some websites are progressively depending on auditory pointers to guide the website users. Czaja and Lee (2006) went on to say that unless these signals are accompanied by visual components, the users continue to experience enormous difficulty in using the internet.

The Royal National Institute for Deaf People (RNID) estimated that in the UK, around the age of 50 the proportion of deaf people begin to rise sharply. As multimedia and voice are increasingly being used on websites (Hanson, 2001), it makes it a cause for concern for those older people with hearing problems. Even though Kurniawan and Zaphiris (2005)'s study highlighted that the use of sound as an output device could potentially resolve issues surrounding ageing-related visual impairments, but that is not the case among so many older people who suffer auditory impairments. The benefits of the audio output are removed. Some conditions which are more common in older people such as high blood pressure or diabetes mellitus can contribute to hearing loss. There are also medications that are toxic to the sensory cells in the ears (for example, some chemotherapy drugs) can also cause hearing loss. Most older people who experience hearing loss have a combination of both age-related hearing loss and noise-induced hearing loss.

As people age, hearing high-pitched noises becomes a problem experiencing age-associated hearing loss (presbycusis). The most frustrating consequence of presbycusis is that words become harder to understand. As a result, older people may think that other people are mumbling. Even when other people speak more loudly, older people still have difficulty understanding the words. Also, in a noisy environment, hearing in older people is further reduced (Charness & Boot, 2009). There is an inability to differentiate foreground sound with background noises making following conversations particularly not easy for older people (Ali et al., 2013). Charness and Boot, (2009) and Wallace et al. (2013)'s studies suggested that background distractions should be minimised where possible to help older people.

A recommendation was made by Waniek, (2008)'s study to use headphones to limit the background noise. However, this recommendation needs to be tested because there is no literature which has tested this before. To access information on the Web, a person with an auditory impairment faces some challenges. The following examples of the problems frequently experienced by auditory impaired users were outlined by W3C, but it is crucial to note that there is no differentiation between those with moderate and severe impairments. In Table 3.2, the UK population who suffer from deafness and hard of hearing are presented in percentages and also illustrated in Figure 3.2.

Table 3.2 Estimated % of UK Population who are deaf or hard of hearing (RNID)

Deafness Condition	16 to 60 years	61 to 80 Years	Over 81 Years
All degrees of deafness	6.6 %	46.9 %	93.2%
Mild deafness	4.6 %	28.1 %	18.4 %
Moderate deafness	1.6 %	16.5 %	57.9 %
Severe deafness	0.2 %	1.9 %	13.2 %
Profound deafness	0.1 %	0.4 %	3.6 %

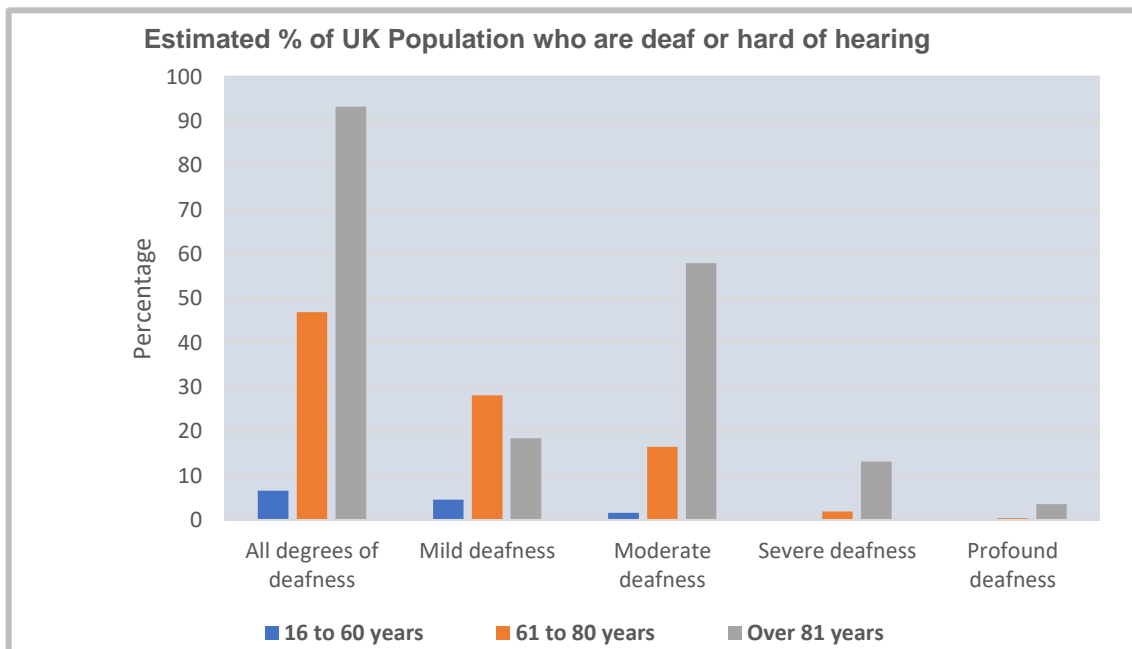


Figure 3.2 Graph showing UK Population who are deaf or hard of hearing

According to W3C, WAI, examples of barriers that people with auditory impairments suffer when interacting with websites include:

- Audio content, such as videos with voices and sounds, without captions or transcripts.
- Media players that do not display captions and that do not provide volume controls.
- Media players that do not accommodate the options to adjust text size and colours for captions.
- Web-based services, including web applications, that rely on interaction using voice only.
- Lack of sign language to complement text and information that is hard to read

(W3C, 2018; WAI, 2018)

3.4 Motor Impairments

Motor impairment is the partial or total loss of function of one part of the body usually a limb or limbs and when people age, the motor skills also decline gradually (Lin et al., 2009; Demiris & Thompson, 2011; Wallace et al., 2013; Goodwin, 2013) resulting in muscle weakness, poor stamina, lack of muscle control, or total paralysis. This will also include lack of coordination, or paralysis, limitations of sensation, joint disorders or such as arthritis, pain that impedes movement, and missing limbs

Examples of motor impairments that older people suffer include: Arthritis which is inflammation, degeneration, or damage to the joints, Fibromyalgia which is chronic pain of muscle and connective tissues, Rheumatism which refers to arthritis and other causes of bone or joint pain and Reduced dexterity which describes the ability to control the hand, such as hand-eye coordination of people with cognitive and neurological disabilities. Some of the problems also covers muscular dystrophy which is progressive weakness and degeneration of muscles, sometimes including arms and hands, tremors and spasms which is involuntary movement or muscle contraction, including short twitches, and continual or rhythmic muscle contractions.

According to Arch (2008) the primary cause of mobility issues for the older people is arthritis and it is the leading cause of disability in people older than 55 years. The US-based Arthritis Foundation reports that 50 percent of Americans over 65 experience arthritis (Arthritis Foundation, 2008), while Arthritis Care in the UK report that 20 percent of all adults in the UK are affected (Arthritis Care, 2007). Another age-related condition is Parkinson's disease, which is a progressive neurological condition affecting movements such as walking, talking, and writing. Arthritis and Parkinson's disease affect a large percentage of older people, causing pain in their joints and hindering mobility and dexterity (Arthritis, Data & Statistics 2006). Both diseases are likely to cause difficulties with using the mouse and even other pointing devices, as well as using the keyboard for some sufferers (Arch, 2008). The four primary symptoms of Parkinson's disease include:

- Tremor – trembling in the hands, arms, legs, jaw and face
- Rigidity – stiffness of the limbs and trunk
- Bradykinesia – slowness of movement
- Postural instability – impaired balance and coordination, (National Institute of Neurological Disorders and Stroke, (NINDS), (2008).

This all happens because of the aging body. With age, bones are likely to become less dense because they contain less calcium, are weaker and can break easily. Bone density become to be less in the late 30s, and this affects both men and women but it tends to speed up in women due to menopause. This happens because there is less production of estrogen which helps prevent too much bone from being broken down during the body's normal process of forming, breaking down, and re-forming bone. That is why women are affected four times more compared to men with a bone disorder called osteoporosis which is characterised by extreme bone loss (Hackel et al., 2000). In a joint, bones do not directly connect to each other. Instead, they are cushioned by cartilage in the joint, synovial membranes around the joint, and fluid. The elasticity of ligaments, which holds joints together and tendons, which hold muscle together tend to become less in aging. Because of the wear and tear cartilage that lines the joints tends to thin. As a result the joints become stiffer and less flexible and fluid in the joints may decrease. The cartilage may begin to rub together and wear away.

The skeleton provides structure and support to the human body. Whereas joints are the areas where bones connect and they enable the skeleton to be flexible for movement. The degenerative changes will start to appear and are characterised by loss of cartilage in the knee and hip joints. There is also the loss of cartilage in finger joints where changes are noted more in women. These changes may be inherited. As a result most older people become less flexible. While the ligaments tend to tear more easily and quite often they tend to heal more slowly. These changes occur because the cells that maintain ligaments and tendons become less active. Due to the cartilage damage, the joints may be more prone to injuries and accidents because joint surfaces have lost the cushion they need for them to slide against each other smoothly. This may result in older people suffering from osteoarthritis, which is one of the most common disorders of old age. As people age, the amount of calcium in bone decreases because the body absorbs less calcium from foods.

The absorption of calcium by the body from the different foods declines and as a result there is also a slight reduction in levels of vitamin D, which helps the body to use calcium. Gradually, these changes in the muscles, joints, and bones affect the posture and gait, and result in weakness and slowed movement in the older people. Hence, the adoption of e-commerce by the older people will enable them to do all the needed shopping without burdening themselves physically or someone to do that for them. This is supported by Trocchia and Janda (2000)'s study, which found that impairments which affect physical mobility, on the other hand, may result in encouraging the use of the internet by the elderly.

This will be difficulty for the older people to adopt e-commerce because of all the symptoms which affect movement, for example, tremors will affect holding the mouse or pressing the keyboard. Previous studies have found older people to have problems with holding the mouse and pressing the keyboard (Czaja, 1996; Czaja, 1997; Arthritis, Data & Statistics 2006). However there are certain difficulties associated with mouse usage specifically which include double-clicking, dragging and using scroll bars (Hanson, 2001). Hanson (2001) went on to point out that some of these problems are due to arthritis, tremors and other physical problems that involves hand-holding and finger-pressing. This was consistent with Meza-Kubo and Moran, (2013)'s study which also pointed out that this gradual decline in motor abilities results in a struggle to make precise movements, especially when using a mouse (Czaja, 1997). To solve the pressing problem, Biswas et al. (2011)'s study recommended

that buttons should not share a common boundary so that the error of pressing the wrong button was reduced.

Older people with physical disabilities may be using a mouse or mouse-like device only, or keyboard or keyboard-like device only to operate the computer. People with physical disabilities rely on keyboard support to activate functionality provided on web pages. They may need more time to type, click, or carry out other interaction, and they may type single keystrokes in sequence rather than typing simultaneous keystrokes (chording) to activate commands. Such keystrokes include commands for special characters, shortcut keys, and to active menu items.

This group of people may have trouble clicking small areas and are more likely to make mistakes in typing and clicking. Providing large clickable areas, enough time to complete tasks, and error correction options for forms are important design aspects. Other important design aspects include providing visible indicators of the current focus, and mechanisms to skip over blocks, such as over page headers or navigation bars. People with cognitive and visual disabilities share many of these requirements.

According to W3C, WAI, examples of barriers that people with motor impairments encounter when interacting with websites include:

- Controls, including links with images of text, that do not have equivalent text alternatives.
- Websites, web browsers, and authoring tools that do not provide full keyboard support.
- Inconsistent, unpredictable, and overly complicated navigation mechanisms and page functions.
- Missing visual and non-visual orientation cues, page structure, and other navigational aids.
- Insufficient time limits to respond or to complete tasks, such as to fill out online forms (W3C, 2018; WAI, 2018)

3.5 Cognitive Impairments

Cognitive impairments cause a multitude of barriers relating to accessibility problems when using the internet (Friedman, 2007) and this affects the older people more than any other group of people. Cognitive impairment is when an individual has trouble concentrating, remembering, learning new things, or making decisions that affect their everyday life. It varies from mild to severe. As was noted by several studies which found that due to this cognitive decline, using technology can be difficult (Hanson, 2010; Gatto & Tak, 2008; Kuo et al., 2012; Williams et al., 2013). Older people are faced with web accessibility problems which their younger counterparts are well equipped for (Bekov, 2007) having been introduced to technology from early childhood. Many factors which contribute to this cognitive decline include forgetfulness, decreased the ability to maintain focus and decreased problem solving capacity. Cognitive barriers have also been identified as preventing the adoption of technology or e-commerce by the elderly. For example, Charness and Boot (2009) found that ageing is associated with a general slowing of cognitive processes, decreased memory capacity, decreased attention control and difficulty in achieving a goal. Also, older people will often experience a decline in their ability to remember things (Wagner et al., 2010; Wallace et al., 2013; Charness & Boot, 2009; Kuo et al., 2012; Chou et al., 2012).

According to Becker (2004)'s study, the cognitive problems which the older people experience when using the internet are attention, concept formation, problem-solving and working memory. Baddeley (1986) and Strong et al. (2001) studies pointed out that working memory involves temporarily holding and manipulating information whilst engaging in a number of cognitive tasks. On the other hand, Fish et al. (2004) defined working memory as the ability to actively keep information whilst requiring temporary storage and manipulation of that information. People who suffer from cognitive deficits experience difficulties in using the internet due to reduced reading comprehension, lowered visual acuity, less hand/eye coordination and finger dexterity, limited fine motor control, complexity, slower learning, lowered information overload thresholds and reduced spatial perception (Friedman, 2007). Specifically, these people might face problems which include reading the text, locating and clicking on small items, i.e icons and drop down menus, navigating the screen, comprehending the screen, and controlling the mouse (Friedman, 2007). They are also faced with the problem of distinguishing foreground images and text from background

material, difficulty in recognising the most appropriate choice when faced with various alternatives (Slatin & Rush, 2003).

To adopt e-commerce the older people will have to overcome this huge obstacle which web designers can play a very important role. However, without the developers' full intervention and participation in this, the older people will continue to be treated like second-class citizens. A disease like Parkinson's disease can cause cognitive impairments directly (Berkov, 2007). Berkov (2007)'s study also pointed out that the same disease can indirectly cause such cognitive impairments through the use of certain medications to treat the disease. Thus, cognitive side effects can be experienced as a result of the medicines used to treat the early physical symptoms. As people age, the speed with which they process information declines (Lin et al., 2009), due to limited resources for processing (Wallace et al., 2013). Functional impairments will also increase with age and it can affect many processes. It can affect the information-processing capacity by reduce the speed of precise movements, increase the variance of their timing, decrease the attention span over long periods of time and increases the time needed to retrieve information from memory as well as the thinking time needed to interpret complex screen displays (Demiris et al., 2001). These changes will functionally result in slowing performance and an increasing number of errors as older people interact with technology that was not designed with their capabilities in mind (Arch, 2008). As a result such impairments will restrict the potential of using and browsing the web by the older people (Demiris et al., 2001) compared to the other groups of people.

3.5.1 Dementia

Dementia is not a disease in itself. It is a set of symptoms relating to a loss of cognitive ability, with symptoms including memory impairments which involves limited short-term memory, missing long-term memory, or limited ability to recall language. Dementia is one among many different causes of memory impairments. It also involves multiple sclerosis causing damage to nerve cells in the brain and spinal cord, and can affect auditory, cognitive, physical, or visual abilities, in particular during relapses. It is a devastating and progressive condition and it is estimated that approximately 800,000 people are living with dementia in the UK alone (Alzheimer's Society, 2012), with the majority of these people aged 65 and over. It makes interacting with technology challenging for sufferers since the

decline in short-term memory (Langdon & Thimbleby, 2010). The interface navigation also becomes difficult, particularly as users find it difficult recalling whether they have encountered information previously (Etcheverry et al., 2012). There are many different types of dementia (Alzheimer's Society, 2012) but among these there are four main types namely Alzheimer's disease, vascular dementia, dementia with Lewy bodies, and frontotemporal dementia.

3.5.2 Alzheimer's Disease

Alzheimer's disease is the most common form of dementia. It is a physical disease which affects the brain, causing cells to die. As with all types of dementia, Alzheimer's disease is progressive. This is compounded by the harm caused by the chemical messenger glutamate, which is released in excessive quantities when brain cells are damaged by Alzheimer's disease. The cerebral cortex of the brain is responsible for higher brain functions such as memory and language. It is a thin shell which covers the entire surface of the forebrain and Alzheimer's disease causes shrinkage of the cortex. The result of this contraction is damage to the sections of the brain which are responsible for thinking, planning and remembering. In addition to this, the hippocampus (responsible for the formation of new memories) is also damaged by Alzheimer's disease.

The main symptoms of Alzheimer's disease are:

- Memory loss - regularly forget names of people and places, appointments and recent events.
- Mood swings - often due to an increased feeling of frustration as a result of worsening memory.
- Withdrawn - will often become increasingly withdrawn due to a loss in confidence and a reduction in communication skills.
- Difficulty carrying out everyday activities – could eventually lead to total dependence on another person to assist in the completion of daily tasks.

3.5.3 Vascular Dementia

Vascular dementia is the second most common form of dementia. It is caused by damage to the brain's vascular system, due to a decreased supply of blood to the brain resulting in the death of brain cells. Some conditions can result in damage to the vascular system

including strokes, heart problems, high blood pressure and diabetes. Early diagnosis is preferable, as treatment of the underlying problem may interrupt the progression of vascular dementia.

Three different types of vascular dementia are:

- Mixed Dementia - a combination of both Alzheimer's disease and vascular dementia
- Subcortical Vascular Dementia - also known as small vessel disease. Often, the symptoms are not always present and may come and go.
- Stroke-related Dementia - can often form after a series of mini-strokes (multi-infarct dementia) or after an obvious stroke (single-infarct dementia).

The symptoms of vascular dementia are often similar to those of a stroke, including paralysis and physical weakness. The additional symptoms include visual misperceptions, memory problems and behavioural changes.

3.5.4 Dementia with Lewy Bodies

Dementia with Lewy bodies is caused by tiny spherical protein deposits building up in the brain. Protein deposits similar to Lewy bodies are also found in the brains of people with Parkinson's disease, thus having some similarities in the characteristics of the two conditions. The symptoms of dementia with Lewy bodies are similar to both Alzheimer's disease and Parkinson's disease. The sufferers may experience visual hallucinations but these hallucinations may diminish if challenged, however, a better course of action would be to provide distractions or reassurance. Dementia with Lewy bodies is extremely difficult to diagnose and as a result, is often misdiagnosed as either vascular dementia or Alzheimer's disease. This incorrect diagnosis can have devastating consequences if neuroleptics are used to treat the person as the side-effects of this medication are similar to that of Parkinson's disease and in some extreme cases, can cause sudden death.

3.5.5 Fronto-Temporal Dementia

Fronto-temporal dementia is the rarest form of dementia and the most common cause in younger people. It is a more general form of dementia which includes Pick's disease and

frontal lobe degeneration. However, all are caused by damage to the frontal or temporal parts of the brain. The frontal lobe is responsible for executive functions such as motivation, regulation of behaviour, emotional responses, the planning of actions and the learning of new tasks. The temporal lobe is predominantly responsible for memory, with the dominant side dealing with verbal memories (such as names of objects) and the non-dominant side in charge of non-verbal memories (such as faces).

The symptoms of fronto-temporal dementia include:

- Personality and behavioural changes -It can make them appear selfish (like the ability to empathise with other people is lost)
- Behaviour may become inappropriate, distracted and aggressive.
- Language difficulties - often have problems with finding the right word, which can lead to circumlocution (where many words are used to describe a simple thing).
- Change in eating habits - this includes over-eating and developing a taste for sweet foods.

The prevalence rate of dementia within age groups can be viewed in Table 3.3 and shows that those in age group 80+ years suffer more from dementia compared to the rest of the other groups. Table 3.3 is also illustrated as a graph in Figure 3.3

Table 3.3 Prevalence rate of dementia with age (ADI 1999)

Age Group	Rate
65-69 years	1.4 %
70-74 years	2.8 %
75-79 years	5.6 %
80-84 years	11.1 %
85+ years	23.6 %

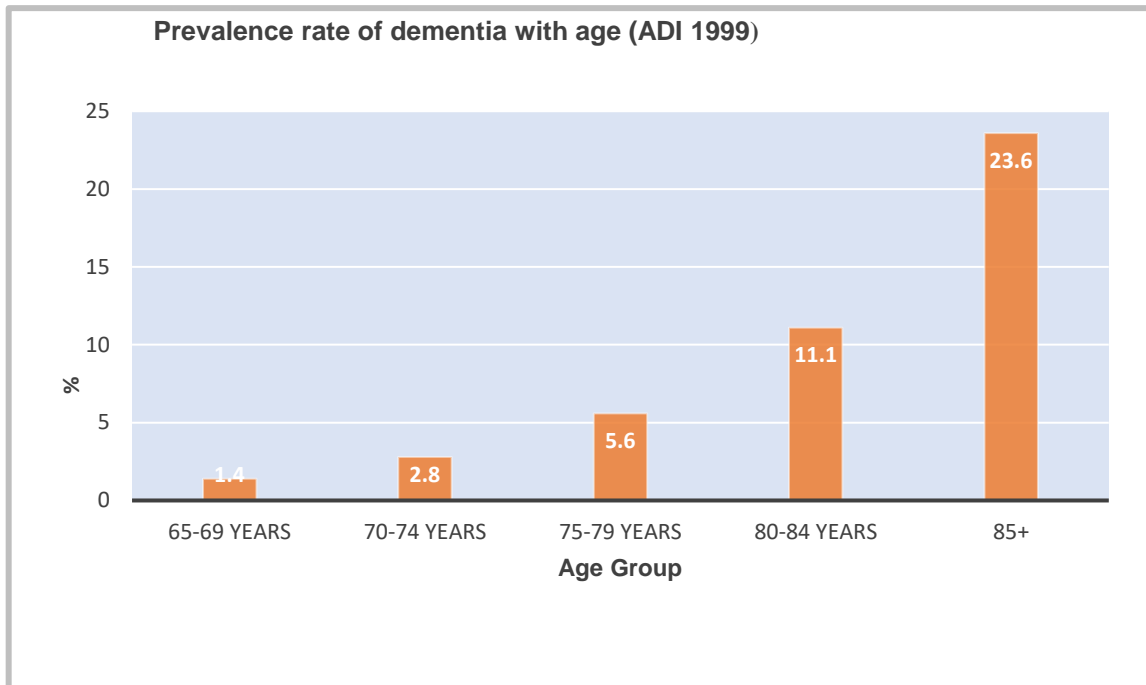


Figure 3.3 Graph showing prevalence rate of dementia with age

3.5.6 Treatment for Dementia

There is no treatment for dementia. In certain cases, medication can be used to temporarily alleviate the symptoms of dementia for between six months and a year. However, these need to be used with care as in some cases they can make the symptoms worse. Particularly, if drugs are prescribed to people with fronto-temporal dementia it can increase aggression. In addition to drugs which are used to minimise the behavioural effects of dementia, there are two main types of medication prescribed to people with Alzheimer's disease. It was also highlighted that technology has the potential to support dementia sufferers (Ancient & Good, 2017). The study went on to develop some guidelines to help interface designers create dementia friendly technologies and among the guidelines were the following: Provision of an interaction which aims, to be inherent, but with the availability of training and post-adoption support, provision of options for interface customisation and demonstrate usefulness and benefit to the users.

According to W3C, WAI, examples of barriers that people with cognitive impairments encounter when interacting with websites include:

- Complex sentences that are difficult to read and unusual words that are difficult to understand.
- Long passages of text without images, graphs, or other illustrations to highlight the context.
- Complex navigation mechanisms and page layouts that are difficult to understand and use.
- Visual page designs that cannot be adapted using web browser controls or custom style sheets.
- Moving, blinking, or flickering content, and background audio that cannot be turned off.
- Web browsers and media players that do not provide mechanisms to suppress animations and audio. (W3C, 2018; WAI, 2018)

3.6 Conclusion

This chapter has discussed some of the age-related impairments that can be used to explain why older people are faced with limitations or disadvantages as regards to adopting e-commerce. The purpose of the discussion was to show how each of the age-related impairment can be used to explain the changes which affect the human body causing the older people to immerse limitations in engaging themselves in e-commerce adoption. The age-related impairments discussed in this chapter are Visual, Auditory, Motor and Cognitive. For each age-related impairment, the discussion started by outlining how natural changes occur as people age and their implications on how they affect the adoption of either Information Technology or E-commerce. In some cases, the results that have been found from previous studies so far are also reported. The age-related impairments discussed in this chapter will now shade light on the obstacles faced by this group of people in their quest to be part of the evolving world of technology and their cry to enjoy the benefits it brings.

CHAPTER 4: METHODOLOGY AND RESEARCH DESIGN

4.1 Introduction

The chapter provides a discussion and justification of the research methodology adopted in this project. The research aim was to investigate the adoption of e-commerce among the older people. Within this aim, four objectives were derived which are as follows:

1. To establish to what extent older people have adopted e-commerce
2. To determine the uses of e-commerce among older people
3. To investigate the barriers to the adoption of e-commerce by older people
4. To determine individual characteristics associated with the extent of adoption of e-commerce among older people.

The rest of the chapter is organised as follows: The next section discusses the research framework and research philosophy, and this is followed by the theories that will be used to explain why certain factors may be influential in technology/e-commerce adoption. These theories are TAM, Diffusion of Innovation theory, Motivation theory, Theory of reasoned action, Theory of planned behavior and Resource-based theory. Then the research design, which consists of research methods and mixed methods are discussed in Section 4.3.1 and Section 4.3.2 respectively. Hypotheses development is outlined in section 4.3.3. Section 4.4 explains the first research method used which is the questionnaire followed by ethical considerations and then data analysis. The penultimate section 4.5 discusses Study Two which includes research methods, online shopping task and how data will be analysed. Finally, in section 4.6 a summary and conclusion of the methodology chapter are presented.

4.2 Research Framework

The framework used for the research was divided into two studies which are linked. The knowledge gained from the literature review on adoption of technology/e-commerce in Chapter 2 was used to develop the questionnaire which was used as the primary method to gather information in Study one. The outline of the questionnaire is discussed later in this chapter in Section 4.4. Study Two will be carried out as a supplementary study to Study One results. Some of the methods used in Study Two will be interviews and observations The aim is to provide a better understanding of why older people are not keen to perform specific

activities with regards to e-commerce compared to some and also to gain understanding about their concerns related to fears about the online shopping or fears about online shopping. The overall outline of the methodology chapter and research design are illustrated in Figure 4.1.

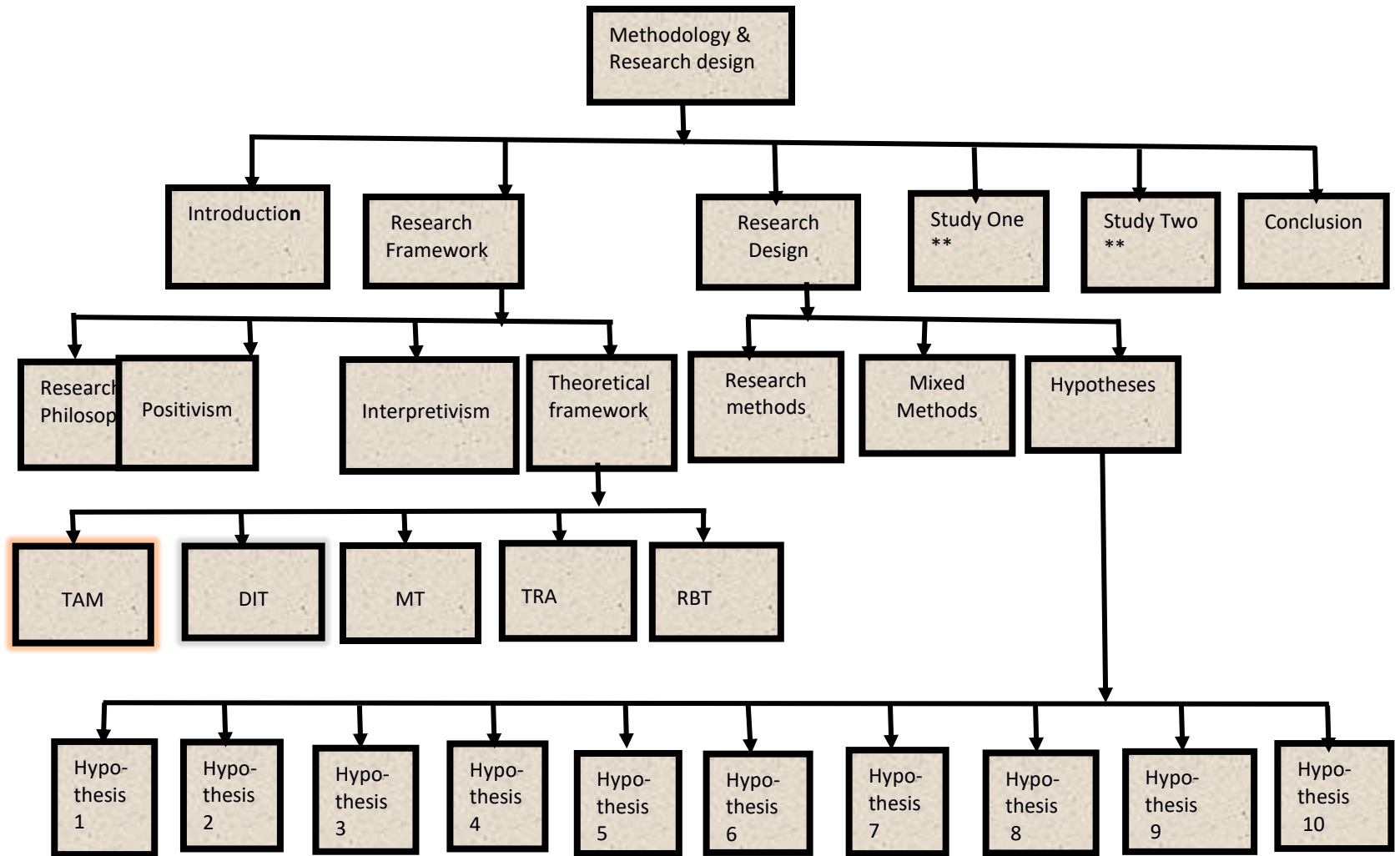


Figure 4.1: Methodology and research design Structure (**Structures in Fig 4.6)

4.2.1 Research Philosophy

The research philosophy adopted for this research is principally the positivist deductive method. To answer the research question, the researcher needs to very carefully evaluate the research strategies, research methods, techniques and procedures used for data collection and analysis (Saunders, Mann & Smith, 2009). There is a wide range of philosophical assumptions however the ones commonly used in social sciences and management are ontology and epistemology (Rajasekar, Philominathan, & Chinnathambi, 2013). The debate on ontology and epistemology is competitive regarding a choice between either the positivist or the interpretivist research philosophy (Bryman and Bell, 2007). Ontology is concerned with the nature of reality. This raises questions about the assumptions researchers to have about the way the world operates and the commitment held to particular views. On the other hand, epistemology is generally a theory of knowledge largely concerned with the guidelines of what constitutes knowledge in a social reality (Saunders et al., 2009).

Research Paradigms are interpretative frameworks, which are guided by a set of beliefs and feelings about the world and how it should be understood and studied (Denzin, 2003). It is a belief system or theory that guides the way things are or more formally establishes a set of practices. In other words, research paradigms provide a conceptual framework for seeing and making sense of the social world. These beliefs include Ontology which deals with the question of what is real and Epistemology which studies the nature of knowledge and the process by which knowledge is acquired and validated (Saunders et al., 2009). Engel (2011) defines Ontology as the study of what there is in the world and Epistemology as the study of how you know it. Ontology (interpretivism) focusses on understanding the existence of being/things how they came about, why and how they work and relate to one another while on the other hand, epistemology (positivism) is a process of truth finding, differentiating believe from facts to gain knowledge (insights). So, ontology is about what is true, and epistemology, on the other hand, is about methods of figuring out those truths.

4.2.2 Positivism

Positivism research is a process of truth finding whereby knowledge is tested using hypotheses (Bond & Corner, 2001; Bryman & Bell, 2007). These hypotheses can either be

rejected or supported depending on the data (Bond and Corner, 2001). Also, the theories are tested or further developed under positivism approach (Bryman & Bell, 2007). Usually, with a positivist approach, quantitative methods are adopted, and the researcher is often independent of the study object and the knowledge.

In this research, the positivism approach will be applied in Study One, where data will be collected by use of a questionnaire and will mainly be quantitative in nature. During analysis, theories such as TAM, Diffusion of Innovation theory, Motivation theory and Theory of Reasoned Action and hypotheses were also tested. Therefore, it could be seen to be deductive in nature. Thus, research from a positivist perspective often follows a structured methodology to enable replication. The emphasis is then a quantifiable observation that leads to statistical analysis (Creswell, 2003).

4.2.3 Interpretivism

The interpretive philosophy highlights the importance of the researcher in understanding the differences between humans and social actors (Bryman & Bell, 2007; Saunders et al., 2009). That means it is rooted in social interaction and its meaning is unique and depends on the researcher's interpretation (Houghton, Hunter & Meskell, 2012). Hence, there is a need for researchers to be mindful of their perceptions and the repercussions of them on the results (Houghton et al., 2012). The philosophy's approach to research consists of methods which are qualitative in nature (Houghton et al., 2012). In this research, interpretivism philosophy was applied in Study Two where qualitative data was yielded by the use of observations and interviews. This enabled a complementary picture on e-commerce adoption among older people to be developed. In other words, this was to supplement the results obtained in Study One which was mainly quantitative in nature, allowing the researcher to develop a deeper understanding of the data (Houghton et al., 2012).

4.2.4 Theories used to explain technology/e-commerce adoption

This section discusses the theoretical frameworks that were used to explain why certain factors may be influential in the development of e-commerce. The research does not rely on any single theoretical framework, but it employs some theories to explain why certain factors may influence the adoption of e-commerce among individuals and especially older people. This is on the basis that e-commerce development decisions are affected by different factors

as reflected by the number of theories that have been used to explain the adoption of technology/e-commerce. Since technology adoption and use of the internet is an antecedent to e-commerce adoption, adoption of e-commerce can not be discussed in isolation of technology adoption. Therefore, the discussion under each theory firstly explains the nature of the theory and then discusses how the theory has been applied to explain the adoption of technology/e-commerce in general by various studies. Hence the theories which influence technology adoption are likely to be the ones affecting e-commerce adoption. That is why the theories which influence technology adoption were also discussed.

4.2.4.1 Technology Acceptance Model (TAM)

Firstly, TAM is a theoretical framework that has been used to explain why some people adopt technology and others do not. The theory aims to demonstrate the key factors which influence new technologies. The model assumes that the success of a system can be determined by user acceptance of the system, measured by the perceived usefulness of the system and the perceived ease of use of the system (Davis, 1989). Perceived usefulness is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance.” Perceived ease of use refers to “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 320). According to the model, a user’s perceptions about a system’s usefulness and ease of use result in an intention to use (or not use) the system (Davis, 1989; Venkatesh, Speier & Morris, 2000).

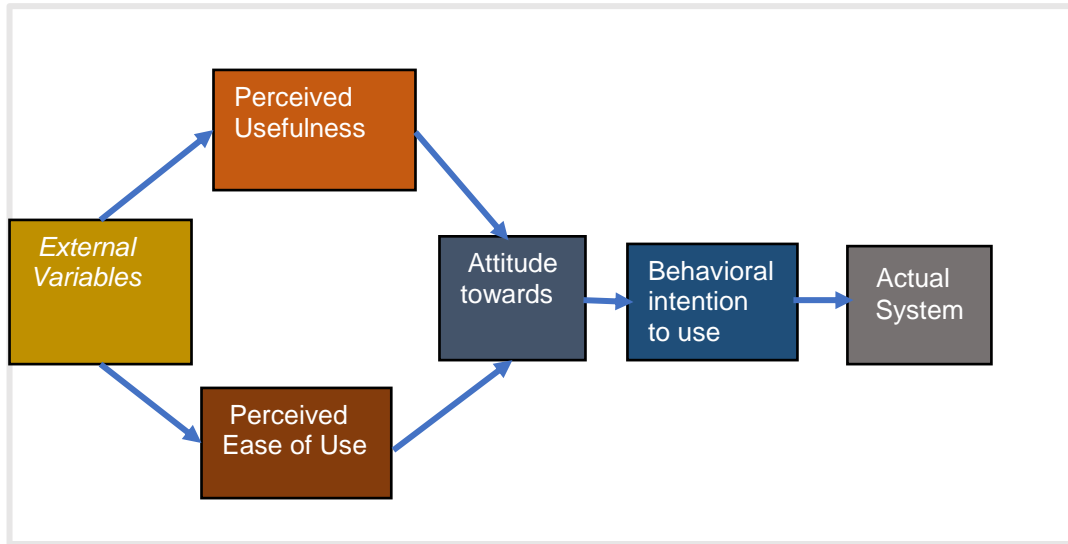


Figure 4.2 Technology Acceptance Model

Source: Davis, (1989)

However, despite the findings generally consistent with the TAM, there are reasons to believe that the theory's application in respect of older people may be different. TAM does not fully influence the adoption of e-commerce. This is because of the differences in the individual characteristics between older people and the mostly young people (mostly university students) that have been used to test the model so far (see, for example, Gefen et al., 2003). TAM does not fully influence e-commerce as shown by McCloskey (2006)'s study which modified TAM by adding trust. The study then examined the impact attitudes has concerning ease of use, usefulness, and trust in using e-commerce. McCloskey (2006)'s findings showed that usefulness and trust were found to have a positive, direct affect on usage. Ease of use had a significant impact on usefulness while trust had a significant impact on both ease of use and usefulness. This shows that while older people may have no concerns with browsing on the internet or sending an email, (i.e., which relates to TAM) they are not eager to share their personal information or credit card details with a stranger, i.e. (which relates to e-commerce).

Another study which showed that TAM does not fully influence e-commerce was by McCloskey and Lepper (2010) who investigated the impact of age on e-commerce participation and its antecedents: usefulness, ease of information access, and trust. Their results showed that while ease of information access had a positive impact on usefulness, it had no direct impact on e-commerce participation. Greater perceptions of trust and

usefulness were found to be positively related to e-commerce participation. The results also showed that the older people had the highest perception of the usefulness of e-commerce but the lowest perceptions of trust. Older people perceived less ease of information access and were less likely to participate in e-commerce than the younger age group. Also, the trust had positive impacts on ease of information access and usefulness.

Another study in Korea by Ryu et al. (2008) investigated older people specific constructs of an online user's intention to participate in video user-created content (video UCC), and the relationship between these constructs and the constructs from the TAM were then tested. Although there was significant support for perceived benefit, perceived ease of participation, and perceived enjoyment Ryu et al. (2008)'s results showed that the extent of a match with their existing value, needs, and lifestyle (compatibility) do not directly affect the intention of participating in a video UCC, but are rather mediated by believed ease of participation and benefits. The results also showed that if older people have much experience in using similar services and that their experience was positive, they will expect the use of video UCC as being more beneficial for them.

In the USA, Gefen et al. (2003)'s study investigated two aspects of the decision why consumers return to a website, thereby examining the relationship between trust and TAM on intentions to purchase. The participants were mainly undergraduate and graduate business students. Gefen et al. (2003) found that online customers are influenced by their trust in the e-businesses, technological aspects of the website interface and that consumer trust is increased by aspects of the interaction. Also their results found that the more useful and easy to use the website in enabling the customers to accomplish their tasks, the more it will be used. The results also showed that experienced consumers' intentions to transact with the last online shop from whom they purchased depend on both trust and the two beliefs identified by TAM, perceived usefulness (PU) and perceived ease of use (PEOU). Gefen et al. (2003) also found out that having a conventional and familiar site increases its perceived ease of use and the effect of familiarity on trust was fully mediated.

Therefore, there is a need for researchers to come up with a theory or model which directly influence e-commerce, probably a modification of existing theories mainly TAM. Existing studies have used TAM (Gefen et al., 2003; McCloskey, 2006; McCloskey & Lepper, 2010) Innovation Diffusion Theory (IDT) (Ryu et al., 2008; Slyke et al., 2004) to explain e-

commerce adoption by older people. However, these theories were originally developed to explain technology adoption in general (e.g., Davis, 1989) but not e-commerce. There are some reasons why the theories may and may not apply to the explanation of e-commerce adoption by the general population and specifically by the older people. For example, TAM may be applicable to e-commerce adoption to the extent that e-commerce requires the use of technology and as long as the individual concerned are comfortable with the use of technology (i.e., they have adopted technology), e-commerce adoption is a natural extension of the use of the computer for other purposes, e.g. browsing the internet, emailing, etc. However, it may also be argued that TAM may not apply in explaining or influencing e-commerce adoption because even if most older people are comfortable with browsing the internet, they may not be comfortable giving their credit card details on the internet.

Therefore, even if a website is useful and easy to use as implied by TAM, the trust may prevent people from adopting e-commerce. This is particularly so for older people given that existing research shows that older people are less trusting than the younger generation (McCloskey & Lepper, 2010). Consistent with this argument, McCloskey, (2009) found that trust was a more important issue than perceived ease of use and usefulness. So, for this reason, it is not at all clear whether TAM and other theories can explain e-commerce adoption by the elderly. Trust was also found to be important in a study by McCloskey and Lepper (2010) who investigated the impact of age on e-commerce, and their results revealed that greater perceptions of trust and usefulness were found to be positively related to e-commerce participation. The results also showed that even though the older people had the highest perception of the usefulness of e-commerce they had the lowest perceptions of trust making them less likely to participate in e-commerce compared to the younger age group.

4.2.4.2 Diffusion of innovations theory

Diffusion of innovations theory is another theory used in technology adoption. The theory examines the how, why, and at what rate new ideas and technology spread through cultures (Rogers, 1992). Diffusion is the process by which a new idea is communicated through specific channels over time among the members of a social system, and innovation is an idea, practice, or object perceived as new by an individual or another unit of adoption (Rogers, 2003). The four main elements which influence the spread of a new idea are the innovation, communication channels, time and a social system. Previous studies which

relate to information technologies have used DIT (Cheng, Kao, & Lin, 2004; Slyke et al., 2004; Greenhalgh et al., 2008; Ryu et al., 2008) and it suggests that there are many contributing factors to an individual's adoption of and intention to use an innovation (Prescott & Conger, 1995). Since the DIT highlights that it is the potential adopters' perceptions of the characteristics of an innovation that impact the diffusion rate, not experts' predictions or assessments of the characteristics that matter (Rogers, 1995), there may be a number of reasons why this may not be applicable to individuals especially the older people. The five characteristics thought to influence the adoption of the diffusion of innovation theory as proposed by Rogers (1995) include complexity, compatibility, trialability, observability and relative advantage.

Using this theory, Greenhalgh et al. (2008)'s study explored the introduction of a centrally stored and shared electronic patient record (the summary care record (SCR)) in England, and the participants were staff members, patients, and carers. Greenhalgh et al. (2008) found out that the summary care records are complex innovations that must be accepted by both individual patients and staff and should also be embedded in organisational and inter-organisational routines. The diffusion process is heavily influenced by the material properties of the technology, individuals' attitudes and concerns, interpersonal influence, by organisational antecedents: readiness and operational aspects of implementation, and by institutional and socio-political forces. Greenhalgh et al. (2008)'s findings confirmed that innovation is more readily introduced when systems are in place to capture data on performance and feed it into organizational learning.

Another study by Cheng et al. (2004) also used the diffusion of innovation theory to investigate the diffusion of online games in Taiwan, and the participants were aged between 13-50 years. The study found the current adoption rate to be 38.57% which according to Rogers' diffusion of innovation theory, online game diffusion has reached the early majority stage and three categories of online players have formed namely innovators, early adopters and the early majority. The results predicted that earlier players are more innovative towards online players and these players are more likely to be young males with low disposable income. They are more sympathetic, curious, experience a larger amount of social and business travels, like to make friends and value credit and thinks is important. In the USA, Slyke et al. (2004) are study investigated on whether trust in Web merchants can still relate to purchasing intentions when more traditional perceptions (i.e. diffusion of innovation

theory) are considered. Their findings indicate that perceptions of trust are related to intentions to e-commerce. Also, they also found that perceptions of relative advantage, complexity, compatibility, and image also have significant relationships with use intentions. Slyke et al. (2004)'s study also confirmed that the importance of potential adopters' perceptions of the characteristics of innovation is significantly related to intentions to use that innovation. Therefore this study supports Rogers' contention that individuals' perceptions of the characteristics of innovation are related to their decisions to adopt or decline to use the innovation.

Since complexity is a factor that has been linked to the adoption of e-commerce under the diffusion of innovation theory, many older people may be reluctant to adopt e-commerce as they perceive this move as being relatively difficult to use and understand compared to sending emails, social networking or playing games. This is on the basis that the introduction of this type of innovation can be intimidating for the older people especially if this requires them to change their normal practices (for example, visiting the bank or shopping at a grocery shop).

Since sociologists, psychologists and marketers have documented the older people as being resistant to change and their eagerness to stick to existing customs (Gilly & Zeithaml, 1985), older people may find no similarity between their existing values, experiences, and beliefs with adopting e-commerce.

4.2.4.3 Motivation Theory

Motivation theory (MT) has been used widely in previous research to explain individual's behaviour towards accepting information technology (Lin & Lu, 2011). Its task is to discover what drives people to work towards a goal or outcome. According to Deci (1975), the theory is divided into two parts namely intrinsic motivation and extrinsic motivation. Intrinsic motivation is defined as one's willingness and interest in performing the activity that is committing an action because of interest in the action itself, rather than external reinforcement. Individuals with higher self-confidence and beliefs that their own abilities will lead to success are more likely to have high levels of intrinsic motivation. Extrinsic motivation focuses on the result rather than the activity itself, i.e. the outcome of the activity or the behaviour in question.

Davis, (1989) defined usefulness as the degree to which a person believes that using a particular information system would improve his or her job performance. When one feels a system is useful, he or she thinks positively about it. Both extrinsic (usefulness) and intrinsic (enjoyment) factors were found to affect the motivation to use an information system (Davis et al., (1992). Moon and Kim (2001)'s study found that enjoyment is a key factor for user's acceptance of the Internet and defined enjoyment as "the pleasure the individual feels objectively when committing a particular behaviour or carrying out a particular activity". Davis et al. (1992) also incorporated intrinsic motivation in the discussion about TAM and stated that the intrinsic enjoyment a user obtains from using information technology to engage in work-related behaviour also promotes behaviour intention.

In another study Gefen (2000) investigated the motivation for buying books online. The study found that the familiar one is with the internet vendor and its processes influenced the respondents' intentions to inquire about books and their intention to buy them. The study found both familiarity and trust affected intended inquiry and intended purchase.

4.2.4.4 Theory of Reasoned Action

The Theory of Reasoned Action (TRA) was developed by Fishbein and Ajzen (1975) and it originated from the field of social psychology. The model uses four factors namely subjective norm (SN, attitude, intention, and behavior (see Figure 4.3). TRA continues to be an important theory used to measure user behavior (Brewer et al., 1999; Pak, 2000) and it focuses on an individual's intention to behave in a certain way. According to Hansen et al. (2004) an individual's intention to perform a certain behavior may be influenced by the normative social beliefs held by the individual. Fishbein and Ajzen (1975, p. 302) define the subjective norms as "the person's perception that most people who are important to him think he should or should not perform the behavior in question" Subjective norms are influenced by our perceptions of the beliefs of those people who are always around us. The people might be friends, parents, colleagues or partners, etc.

According to the TRA, people have a sense or belief about whether or not these individuals and groups of people would agree or disagree with the behavior they will intend to do. For example, attitude is how the older people might feel about performing e-commerce and is generally measured as a favorable or unfavorable mind-set. The attitude towards the buying

and selling on the internet is influenced by a combination of two related factors which are the beliefs about the outcome of buying and selling and the evaluation of the potential outcome. The intention is defined as the propensity or intention to engage in the behaviour and behaviour is the actual activity itself.

The important aspect of an individual's attitude is whether or not it is positive, negative, or neutral. For example, if an individual strongly believes that doing a certain behaviour will lead to a favorable outcome, then it could be said that one has a positive attitude toward that behaviour. Likewise, if that individual strongly believes that the behaviour will lead to an unfavorable outcome, then one is likely to have a negative attitude about the behaviour in question. Peslak and Bhatnagar (2009) carried out a study which reviewed internet shopping, its uses and the factors which influences its success. The review explores e-commerce using the TRA and found that attitude do affect behavioral intention towards e-commerce but the subjective norm was not supported.

Another study by Hansen et al. (2004) investigated the ability of TRA in predicting consumer shopping for groceries online. The study found that consumers' attitude towards online grocery shopping was the most critical predictor of online grocery behavioural intentions. The finding was consistent with the TRA, which predicts that attitude towards behaviour is a determinant of behaviour intention.

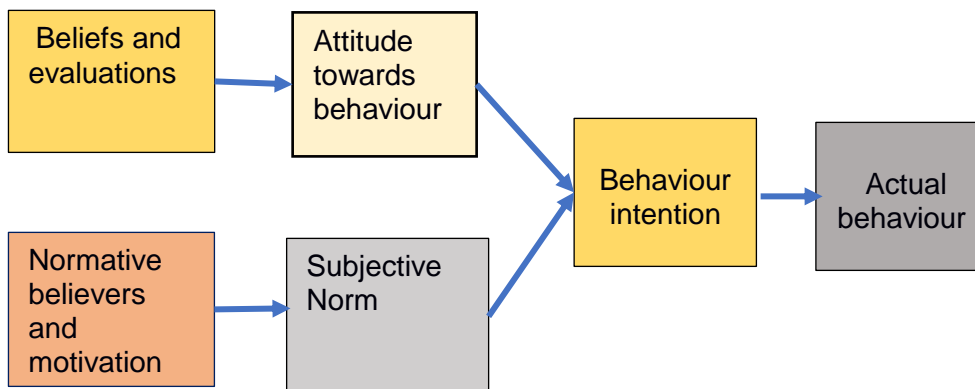


Figure 4.3 Theory of reasoned action Source: Ajzen & Fishbein, (1980)

4.2.4.5 Theory of Planned behaviour

Theory of planned behaviour (TPB) has also been used in e-commerce adoption studies as a theoretical base. It originated as TRA in 1980 to anticipate an individual's intention to engage in a behaviour at a specific time and place. According to Grandon et al. (2009), it is an extension of the theory of reasoned action. Both the TRA and TPB hypothesise that an individual's intention to perform the behaviour in question is a determinant of that behaviour. Intentions are 'indications of how hard people are willing to try, of how much of an effort they are planning to exert, performing the behaviour (Ajzen, 1991, p. 181). This means that the individual's attitude towards the behaviour and the subjective norm determine the intention. Attitude towards behaviour refers to the degree to which a person has a favourable or unfavourable evaluation of the behaviour in question. Subjective norm refers to the perceived social pressure to perform or not to perform the behaviour.

According to Ajzen (1991), TPB states that behaviour is a direct positive function of behavioural intention and perceived behavioural control (PBC). PBC influences behaviour indirectly through intentions, as well as directly when the person does not have complete control over that behaviour and when the individual's perceptions of control are accurate (Madden et al., 1992). Figure.4.4 graphically shows the direct effect of PBC on behaviour and its indirect effect on intentions. One's attitude (A), subjective norm (SN), and perceived behavioural control (PBC) determine behavioural intention. Thus, according to the TPB, BI is a weighted function of A, SN, and PBC. Behavioural control and subjective norms influence perceived ease of use which affects then their adoption intention.

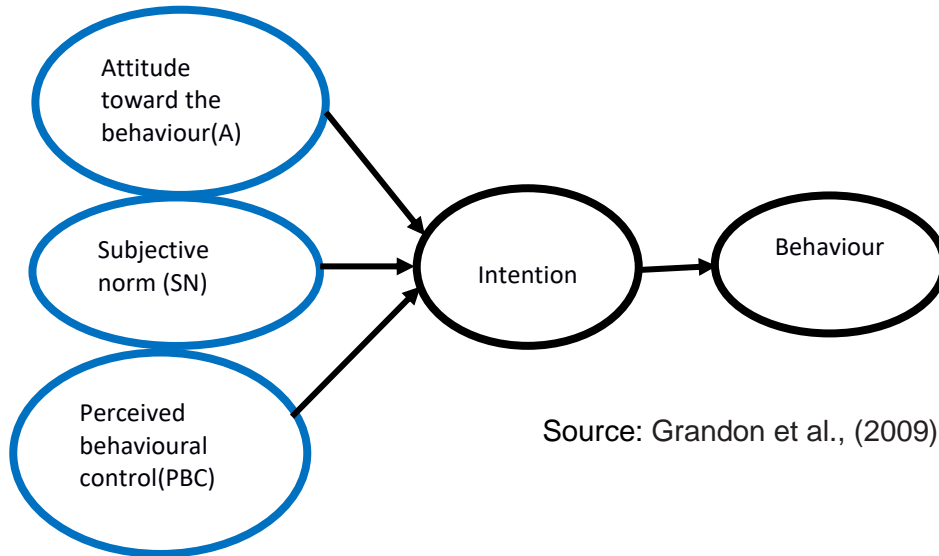


Figure 4.4 Theory of Planned Behaviour

George (2004) carried out a study to investigate online purchase behaviour with a focus on the relationships among beliefs on perceived behavioral control using the theory of planned behaviour as its basis. The average age of the participants was 23 years. The study found that the respondents who were more likely to purchase online had strong beliefs in the trustworthiness of the internet and in their own ability to buy online. The respondents were not concerned about the unauthorized use of personal data provided to third parties. Pavlou and Chai (2002) 's study investigated the driving motive of e-commerce across cultures of China and America. The study found out that attitude had a significant effect on transaction intention for the collective society of China and not the individual. The American society's attitude did not have a significant effect on transaction intention but the individual. Another study by Hansen et al. (2004) investigated the ability of TPB in predicting consumer shopping for groceries online. The study found that consumers' attitude towards online grocery shopping was the most important predictor of online grocery behavioural intentions. The finding was consistent with the TPB, which predicts that attitude towards behaviour is a determinant of behaviour intention.

4.2.4.6 Resource-Based Theory

The resource-based theory (RBT) has evolved in recent years to provide a way to understand how strategic resources and capabilities enable organizations to enjoy the

outstanding performance. It is a theory which has provided a new view point to explain a company's success through its vital step in strategic management (Olalla, 1999; Acedo, Barroso, Galan, 2006). It is also a model that states that ownership of resources is valuable, rare, difficult to emulate and can not be substituted. The theory suggests that companies position themselves in a way based on their resources and capabilities rather than their products and services. The resource-based theory goes on to propose that companies should look inside the company to find the sources of competitive advantage through the use of their resources. Resources may be considered as inputs that assist organisations to carry out its activities. There are three key terms in the resource-based theory namely tangible resources, intangible resources, and capabilities. Figure 4.5 explains the RBV and emphasizes these key points.

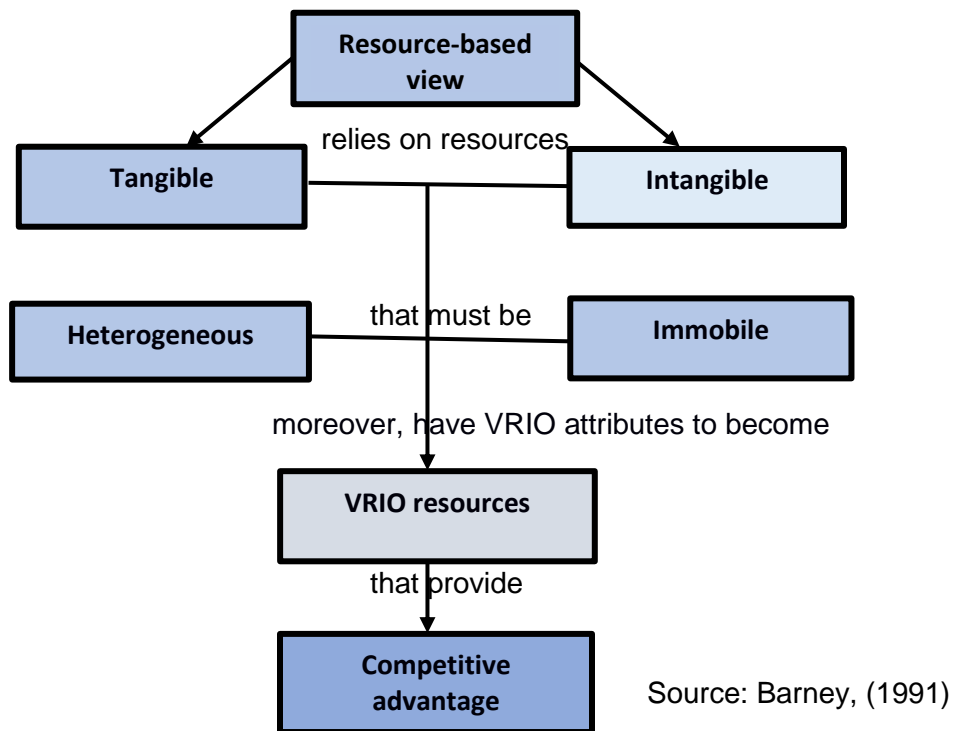


Figure 4.5: Resource-based Theory

Resources are either tangible or intangible in nature. They are inputs which are owned by a company such as all assets, capabilities, employees skills, patents, company attributes, knowledge, information, etc. (Barney, 1991).

Tangible resources: Tangible resources are physical things that can be seen, touched, and quantified. For example, tangible resources can include the company's buildings, equipment, goods, and even cash. These resources can easily be purchased by other rival shops, so in the long run, the physical resources have little advantage to the company. In other words, these resources are not unique to the company but are still valuable for the company to achieve its goals.

Intangible resources: Intangible resources are all those assets that have no physical presence but can still be owned by the company. In other words, they are difficult to see, you can not touch, feel or quantify them. For example, tangible resources would be the employees' skills, the company's reputation, brand names, patents, trade marks and customer loyalty. Unlike tangible assets company reputation is built over a long period.

Capabilities: Competitive advantage is an advantage that a firm has over its rival companies that allows it to generate sales, margins and or retain more customers. A company's competitive advantage evolves from the resources that the company has. In this theory model, resources are given the important position to help companies achieve higher organisational performance and competitive advantage.

4.3 Research Design

The research design adopted for this project consists of two studies, and it employs a mixed method approach to answer the research questions. Collis and Hussey (2007) consider research design as the science and art of planning procedures for conducting studies to get the most valid findings. In Study One, a survey was conducted using a questionnaire which was made up of four sections. The questionnaire was based on research instrument used in previous studies (Sorice et al., 2005; Vuori & Holmlund-Rytönen, 2005; McCloskey, 2006; Lepper & McCloskey, 2010) plus personal insights into the topic. Study One also tested hypotheses relating to the fourth research objective. Study One yielded quantitative data and Study Two yielded qualitative data from conducting an online shopping task and

carrying out interviews. The interviews were a follow up from Study One where some further questions were unanswered or needed further clarification. An interview is a practically flexible tool for research which can encompass other techniques.

The summary shown in Figure 4.6 gives an outline of the structure and methods used within the two studies.

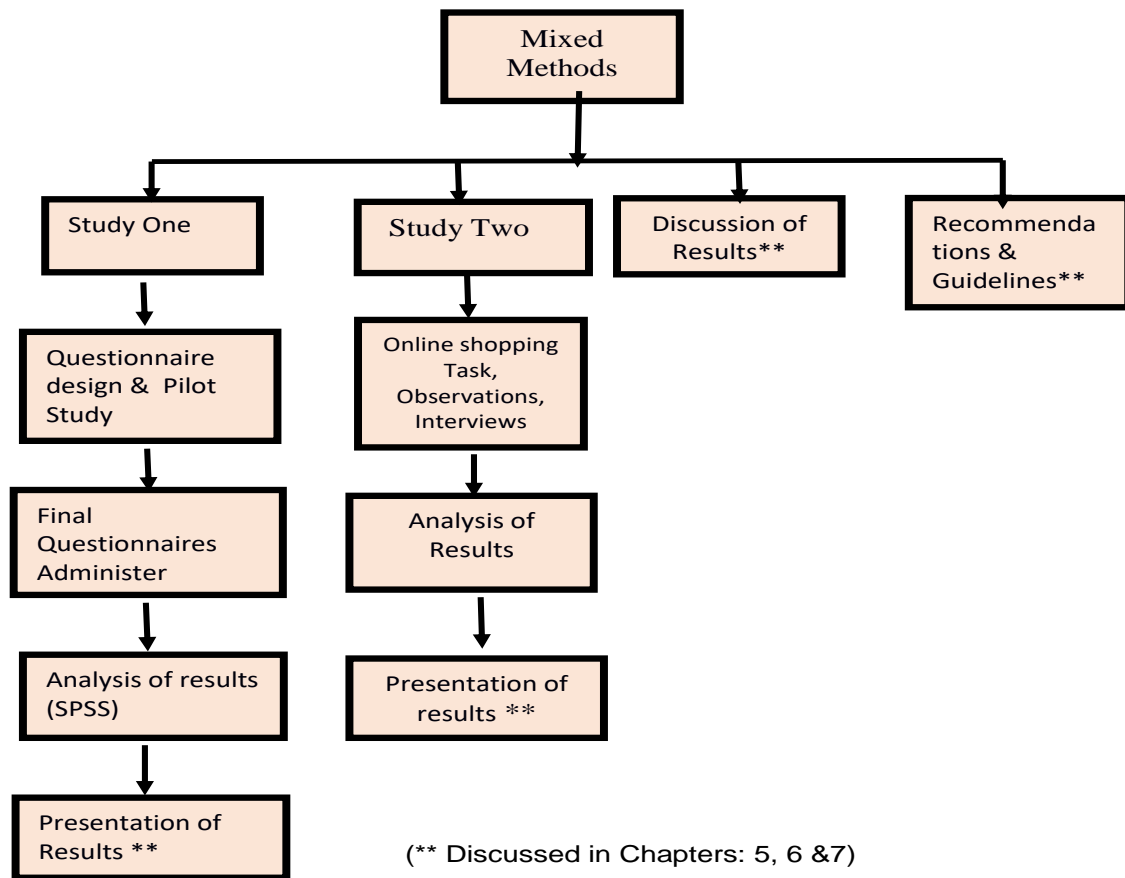


Figure 4.6: Study One and Study Two

4.3.1 Research Methods

There were various kinds of research methods used in this research. A questionnaire survey was used in Study One and observations, thinking allowed method, interviews, were used in Study Two. Bryman and Bell (2007), also suggested that confidence in the findings deriving

from a study using a quantitative research strategy can be enhanced by using more than one way of measuring a concept and that the use of quantitative research to validate qualitative research findings or vice versa is appealing.

By using a survey in this research, the researcher can assess the views and attitudes of the respondents among the older people on how they buy and sell on the internet. Bryman and Bell (2007) suggest that the choice of research strategy, design or method must be dovetailed with the specific research question being investigated. Hence the background to qualitative and quantitative approaches and the justification of the approach adopted in this study was also discussed.

4.3.2 Mixed methods

Mixed methods is a research design with both philosophical assumptions and enquiring methods and it gives guidance to the direction on how to collect and analyse data (Creswell, 2006). It also mixes both quantitative and qualitative data in the many stages of the research process (Creswell, 2006). This research approach employs rigorous quantitative research assessing frequency of constructs and rigorous qualitative research exploring the meaning and understanding of constructs (National Institutes of Health, OBSSR, 2014). Optimally, all studies draw upon one or more theoretical frameworks from the social, behavioral, or biological sciences to satisfy all stages of the study. Mixed methods approach provides opportunities for the integration of a variety of theoretical perspectives e.g. ecological theories, complexity theory, stress theory and critical theories or others.

This type of approach will be applied in this research by merging quantitative data from Study One and qualitative data from Study Two. Quantitative data was yielded by the use of a questionnaire where by the relationship among variables were examined and both theories and hypotheses were tested. On the other hand, qualitative data will be yielded in Study Two by performing an online shopping task followed by some interviews. This will be achieved by using the observation method, the thinking aloud protocol during the online shopping task and conducting interviews there after. In this research, Mixed methods approach enables triangulation which is a technique that facilitates validation of data through cross verification from two or more sources. This means by combining the results from questionnaire, results from observation, thinking aloud protocol method, and from interviews

method the researcher can hope to overcome the intrinsic biases or weakness and problems that come from single method, single-observer and single-theory.

4.3.2.1 Quantitative Study

Key features of many quantitative studies are the use of research instruments such as tests or surveys to collect data, and reliance on probability theory to test statistical hypotheses that correspond to answer research questions of interest (Denzin, 2003). It also involves closed-ended information such as that found on behaviour, performance or attitude instruments (Creswell, 2006). This kind of collecting information might also involves the researcher using closed-ended checklist to tick behaviours actually noted. Quantitative methods are frequently described as deductive in nature, in the sense that inferences from tests of hypotheses lead to general inferences about characteristics of a population (Bryman & Bell, 2010). Quantitative methods are also frequently characterized as assuming that there is a single “truth” that exists, independent of human perception. (Lincoln & Tierney, 2004).

4.3.2.2 Qualitative Study

Qualitative research focus on discovering and understanding the experiences, perspectives, and thoughts of participants (Saunders et al., 2009). In other words, qualitative research explores meaning, purpose, or reality (Saunders et al., 2009). The process of qualitative research is largely inductive, with the researcher generating meaning from the data collected in the field (Denzin, 2003). Central to this inquiry is the presence of multiple “truths” that are socially constructed (Bryman & Bell, 2010). Qualitative research is usually described as to do a detailed exploration of a topic of interest in which information is collected by a researcher through case studies, ethnographic work, interviews, and so on (Johnson & Clark, 2006). It also can be gathered by use of observations on participants or research sites, collecting documents privately (e.g diary) or collection of audiovisual materials such as videotapes or artifacts (Creswell, 2006).

Qualitative method involves open-ended information that is collected by allowing the participants to answer questions in their own words or to put across their own views. Inherent in this approach is the description of the interactions among participants and researchers in natural settings with few boundaries, resulting in a flexible and open research process (Creswell, 2003). These unique interactions imply that different results could be obtained from the same participant depending on who the researcher is because results are created

by a participant and researcher in a given situation (Lincoln & Tierney, 2004). Qualitative research helps in developing theories and could lead to some hypotheses which may be tested quantitatively. On the other hand, some hypotheses may be developed from existing theories and may be tested using quantitative and qualitative methods. This study has concepts that require both qualitative and quantitative approaches in its design, data collection, and data analyses. Hence, the researcher carried out Study two. Bryman and Bell (2003, p. 482) opine that “confidence in the findings deriving from a study using a quantitative research strategy can be enhanced by using more than one way of measuring a concept.”

Mixed Methods research can either be a single study or multiple-study mixed methods, so this research project uses a multiple-study mixed methods approach because two studies were carried out. As a result, a combination of quantitative and qualitative methods are adopted and gives the benefit of enriching this study with the following: building and applying Study one results, then using online shopping task and personal interviews to reinforce the survey result. This also enables the development of hypotheses from the extant literature and pilot test the study, and analyse the results.

In this respect, the research will use primary data collected from questionnaires, observation, thinking aloud protocol and the interviews. Primary data is often undertaken after the researcher has gained some insight into the issue by reviewing secondary research or by analyzing previously collected primary data. It can be accomplished through various methods, including questionnaires, interviews, direct observations, etc., (Johnson & Onwuegbuzie, 2003; Creswell, 2003). Primary data involves generating new data explicitly set for the research problem to its suitability for the study. A questionnaire is used where a study requires data about respondents’ perceptions on a scale of either 5 or 7 ranging from strongly agree to disagree strongly (Saunders et al., 2009).

On the other hand, there is secondary data which is readily available but one that is published for other reasons other than the research in question (Bryman & Bell, 2010). It can also be gathered through different sources including companies’ annual reports, books, government publications, media sources, etc. (Saunders et al., 2009). The nature of secondary data may permit longitudinal analysis (observing the trend over a period) and is also considered to be cost-effective (Bryman & Bell, 2003). In this research, secondary data

was used from literature review where previous studies results helped inform the research design. It is worth mentioning that secondary data may have loopholes, for example, Saunders et al. (2009) highlighted lack of control over data quality, lack of familiarity with data and sometimes the dataset might be incomplete.

4.3.2.3 Validity and Reliability

Validity in quantitative research determines whether the research truly measures that which it was intended to measure or how truthful are the research results (Joppe, 2000). Also, Wainer and Braun (1988) describe the validity in quantitative research to mean “construct validity.” The construct is the initial concept or question or hypothesis that determines which data is gathered and how is it gathered. Thomson (2000) and Zikmund (2000) advised that at the very initial stages of the questionnaire development, the experts in the subject area should assess to comment on both the suitability of the questionnaire to bring required data and structure. In this case, Zikmund (2000) identifies two pre-testing procedures that can be done, i.e. the screening of the questionnaire with other experts and also have a trial run. In this research, both procedures were followed. An initial review of the questionnaire was carried out by the three supervisors. After incorporating their initial recommendations and comments, the draft questionnaire was also inspected by an independent academic with considerable experience in e-commerce. Comments from the reviewers were then considered according to relevance. The draft version was then again reviewed by two of the supervisors involved in the project before the pilot study was carried out to ensure that subject-specific contents have not been relegated with advice obtained from all the reviewers.

According to Breakwell et al. (2000), reliability can be defined as the consistency or stability of any experimental effect. It refers to the extent to which data collection techniques or analysis procedures yield consistent findings. It can be assessed by posing three questions as indicated by Smith et al. (2008). Will the measures yield the same results on other occasions? Will other observers reach similar observations? If the same experimental design leads to the same results on subsequent occasions and using different samples, then the experiment is said to be reliable.

4.3.3 Hypotheses Development

This research seeks not only to determine the extent, uses and barriers of e-commerce adoption by older people in the United Kingdom but also aims to ascertain whether variations in the adoption of e-commerce by older people can be attributed to individual factors. This section draws on the theoretical frameworks discussed earlier in this chapter to develop hypotheses on why specific factors may explain the variation in the extent of e-commerce adoption by the elderly. According to Zimmerman (1987), research must be based on a theoretical framework or model to direct the researcher to those facts that are considered exotic or relevant to collect and report on. Baiman (1990) shares this view and argues that applying a theoretical framework to the research question or problem underlying the study helps to direct and sharpen the focus of the inquiry. Further, Gibbins et al. (1992) also suggest that theoretical structures assist in organising the researcher's thinking and provide a more systematic guide to understanding the phenomena under consideration than does the unguided intuition alone. In addition to the theoretical frameworks, the section will also draw on existing empirical evidence in advancing reason why older people individual characteristics may explain the extent of their e-commerce adoption.

4.3.3.1 Gender

There are many reasons that can be advanced to explain why gender matters when it comes to the propensity to adopt the adoption of e-commerce among the elderly. For example, a study by Sangran, Siguaw, and Guan (2009) suggest that men and woman have different motivations for online shopping. Specifically, Van Slyke, Belenger, Johnson and Hightower (2010) found that men like to shop online more than woman do. Further, it has also been suggested that men have a significantly more positive perception regarding compatibility, complexity, relative advantage, result demonstrability, and trust than women (Lian & Yen, 2014). These positive perceptions are drawn from Diffusion of innovations theory (DIT) which seeks to explain how, why, and at what rate new ideas and technology spread through cultures (Rogers, 1992). Women have also been found to have higher levels of perceived risk regarding online shopping than man. This has led to the suggestion that women are likely to wait for a recommendation from a friend before attempting online shopping. This is because a recommendation from a friend is likely to reduce the perceived risk of online shopping for women.

Further, the fact that men and women differ in the way they adopt technology are due to differences in biological characteristics between men and women. For example, it has been suggested that men possess greater analytical, logical and problem-solving abilities than women and thus are more suited to technical fields than women. Women are ruled by the body instead of the mind and possess too much emotion to excel in technical fields. The lack of women in maths and science is offered as evidence to support the women's inability to engage in mathematical analysis (Meraz, 2008). It can, therefore, be argued men are more likely to adopt e-commerce than women on the basis that men are better at information related tasks than women.

Existing empirical evidence seems to support the expectation that men are more likely to adopt e-commerce compared to women. For example, Michie and Nelson (2006) show that compared to men, women are less likely to adopt and use new technology, have less confidence in their ability to use new technology, and are less likely to choose a career in information technology. Lian and Yen (2014) found that men have significantly higher online shopping drivers and lower barriers compared with women. Slyke et al. (2002) found that male older consumers liked to shop over the internet more compared to their women counterparts. The study by Mattila and Karjaluoto (2003) found that mature men banked more often over the internet than mature women. Consistent with men being more likely to adopt e-commerce, Hashim, Ghani and Said, (2009) found that there was a higher rate of shopping online among men compared to women. Finally, Fallows (2005)'s study found men who are not married are more likely to use the internet than unmarried women. Based on the above arguments, it can, therefore, be hypothesised that:

H₁ Gender is a significant positive predictor of e-commerce adoption by older people

4.3.3.2 Age

Many reasons can be advanced why e-commerce adoption may differ by age. For example, since complexity is a factor that has been linked to the adoption of e-commerce under the diffusion of innovation theory, many older people may be reluctant to adopt e-commerce as they perceive internet buying and selling as being relatively difficult to do compared to sending emails, social networking or playing games. This is on the basis that the introduction of this type of innovation can be intimidating for the older people especially if this requires them to change their normal practices (for example, visiting the bank or shopping at a grocery shop).

This is consistent with McCloskey and Lepper (2010) who found older people find it difficult to access the information making them less likely to participate in buying and selling on the internet. Another reason for expecting younger people to be more likely to adopt e-commerce is security related. According to McCloskey (2011) mature respondents are more likely than young respondents to worry about providing financial information and personal information when shopping on the internet. The study also found out that younger people agreed that online shops have sufficient security controls to protect their personal and financial data. Lepper and McCloskey (2011) also found out that even though the older people aged 70 and older seek information on products and services they rarely made any purchases. These findings suggest that older people are less likely their younger counter-parts to engage in e-commerce for security reasons.

Previous research studies generally found evidence that younger people are more likely to adopt e-commerce than the older ones. For example, Karjaluo et al. (2002) found that the younger group of people wanted to shop more on the internet compared to the older group. Wu (2003)'s study found out that the younger group had a more positive attitude towards shopping on the internet compared to the older age group. McCloskey and Lepper (2010) who investigated the effect of age on e-commerce participation taking into consideration the usefulness, trust, and ease of information access, found that older people participants aged 70 and above were less likely to participate in electronic commerce. McCloskey and Lepper (2006) found out that older respondents were less likely to buy something on the internet and participate in electronic commerce transactions compared to their younger rivals. Erickson and Johnson (2011) found that age was negatively associated with almost every measure of Internet use. Further, Peacock and Kunemund (2007) found that as soon as older adults retire, their propensity to access the internet is considerably reduced. Finally, Eastman and Iyer (2004) study found out that the older people aged 65-85 years were less likely to participate in electronic commerce regardless of their education qualifications. Based on the above arguments and empirical evidence, it can, therefore, be hypothesised that:

H₂ Age is a significant positive predictor of e-commerce adoption by the elderly

4.3.3.3 Marital status

The likelihood of e-commerce adoption according to marital status may be explained regarding Diffusion of Innovation Theory. Diffusion is the method by which a new idea is communicated through specific channels over time among the members of a social system, and innovation is an idea, practice, or object perceived as new by an individual or another element of adoption (Rogers, 2003). The implication of the theory regarding e-commerce adoption is that married people are more likely to adopt e-commerce because one partner is likely to adopt first and then the other partner will follow suit realizing the benefits of using e-commerce. However, for the single persons, the adoption may take longer because since they do not have anyone living with them who can easily show them how to engage in e-commerce. This argument is consistent with Taylor et al. (2003) who found that compared to those participants who were married, single people showed a lower level of internet use.

Existing empirical evidence is, however, conflicting. For example, Yi (2005)'s study found that the respondents who are single are negatively correlated with using the internet other than email. Mattila et al. (2003)'s study found that married mature customers were more likely to use internet banking compared to those customers who were not married or those who were widowed. compared to those not married. Wilson et al. (2003)'s study found out that those respondents who were married were more likely to own home computers compared to the those not married. However, Yi (2005)'s study contradicts the various studies.

However, on the other and, Hashim et al. (2009)'s study found that the respondents who are divorced or widowed have a higher rate of engaging in electronic commerce followed by the respondents who are single and the lest are those respondents who are married. Also, Taylor et al. (2003) found out that people who live alone had a higher level of using home internet for education purposes, for entertainment, and for email. A possible explanation of why married people would use the internet less is that they have many things to take care of when they are at home such as children and also the fear of ignoring their partner. Based on the above arguments, it can, therefore, be hypothesised that:

H₃ Marital status is a significant positive predictor of e-commerce adoption by older people

4.3.3.4 Residential Status

Taylor et al. (2003)'s study found that people who live alone had a higher level of using home internet for education purposes, for entertainment, and for email. People who live with other people (for example, married people, people who live with families) are more likely to use computers and adopt e-commerce because they can teach each other, ask each other if they are stranded with a particular task. This will act as part of training where the trainer is always there to show you or answer questions. This would be entirely different to someone who lives alone. Although in another study, Taylor et al. (2003) found that people who live alone had a higher level of using home internet for education purposes, for entertainment, and for email, this was contradicted by Culen (2015)'s study. Culen (2015)'s study found out that the participants valued to communicate face-to-face with people more than to communicate through some technologies. The study went to discuss that the relative disinterest in technology did not come from any difficulty in trying to figure out how these technologies work. This would, therefore, make it almost impossible to adopt any technology and then adopt e-commerce. Based on the above arguments, it can, therefore, be hypothesised that:

H₄ Residential status is a significant positive predictor of e-commerce adoption by older people

4.3.3.5 School type

Someone who went to a private school should have more resources such as computers and have experience in using technologies. So the people are more likely to use the internet and hence will adopt electronic commerce. Private schools are associated with more resources because parents pay much money in fees to send their children to these types of school. Someone who went to a private school should have more resources such as computers and have experience in using technologies. So the people are more likely to use the internet and hence will adopt electronic commerce. So when we are looking at computing, we would expect a private school to have more computing resources versus public schools or any other school.

Those older people who went to private school have more exposure to computing resources than those who went to public school so it would be easier for them to use the internet and adopt e-commerce. Moreover, also those parents who send their children to private school would be wealthy enough to afford to buy a computer at home. So when growing up these

children from wealth families are learning these technologies both from home and school. This was supported by Maitlo (2015)'s study when he found out that those bank customers who attended private school adapted online banking services in Hyderabad compared to the other school types. Based on the above arguments, it can, therefore, be hypothesised that:

H₅ School type is a significant positive predictor of e-commerce adoption by older people

4.3.3.6 Education

According to Burke (2002), older consumers with higher levels of education were more comfortable shopping online compared to those with none or less education qualification. This is consistent with Lepper and McCloskey (2011) whose study found that among those aged 50 to 69 and 70 and over, the percentage with at least some college education was higher among participants than among non-participants. Also, Eastman and Iyer (2004) found that the seniors with higher education levels were more likely to use the internet compared to those without. Sum et al. (2009) found out that participants with higher education were more likely to have used the internet longer thereby engaging in e-commerce.

Nathan (2009)'s study found how knowledge as the most critical factor that contributes to e-commerce adoption, and it mediates consumers' perception of risk and trust in contributing to their e-commerce adoption. Also according to Mattila et al. (2003), more-educated mature consumers were more likely to use internet banking than less-educated mature consumers. A study by Ajuwon and Popoola (2014) found that doctors who have higher educational qualifications used internet resources more compared to their younger colleagues. Wilson et al. (2003) found that those respondents with more education were more likely to own home computers compared to the those with less education. Werner et al. (2011) found that the respondents with higher education levels were more likely to be computer users compared to those with no education. Perrin and Duggan (2015) report that the respondents who are highly educated are more likely to use the internet than those who are educated less. Sar et al. (2012) found that when the level of education increased the rate of internet use also increased.

Further, Mattilla et al. (2007) found that more than 30% of well-educated mature males in Finland used electronic-banking as their main method of making payments. Taylor et al. (2003)

found that the respondents who had higher education levels showed significant levels of home Internet usage for work at home, education, information search, and online purchasing when compared to those with lower education levels. These differences revealed highly educated people have jobs which make use of computers in the workplace thus increasing their application knowledge, skill levels and computer-skills support networks. Werner et al. (2011) found that high levels of education level indicated more use of the internet. However, others including Yi (2005) and Eastman and Iyer (2004) found evidence to the contrary in their studies. For example, Yi (2005) found that the educated older people were less likely to use the internet than the uneducated ones. This might indicate that people who had high levels of education might have considered or thought about security issues and safety of buying over the internet and hence were cautious in their participation. Based on the above arguments, it can, therefore, be hypothesised that:

H₆ Education type is a significant positive predictor of e-commerce adoption by older people

4.3.3.7 Information Technology qualification (IT)

Corbitt et al. (2003) found out that older people were more likely to purchase from the internet if they have more experience in using the internet thus leaving those inexperienced ones not likely to engage in using the internet. In another study by Karjaluoto et al. (2009), the experience of computers and technology were found to influence online banking. Specifically, a high correlation was found between prior computer experience, computer attitude, and prior computer experience. In another words, a person who has some knowledge of using computers generally will more likely participate in using the online facilities more compared to those with less knowledge. When Grimes et al. (2014) carried out a study on the housing authority residents, prior experience on the use of computers was found to be the most important factor associated with higher knowledge and awareness of security hazards and threats. Sulaiman et al. (2008) also found out that the younger generation was more likely to shop online because of their knowledge of computer technology as opposed to the older generation. Based on the above arguments, it can, therefore, be hypothesized that:

H₇ Information technology qualification is a significant positive predictor of e-commerce adoption by older people

4.3.3.8 Employment status

Wilson et al. (2003)'s study found out that those respondents who were employed full-time were more likely to own home computers compared to the those who were not employed. Peacock and Kunemund (2007) at an advanced age, employment, and occupational status positively influence people's odds to use the Internet. As soon as older adults retire, their propensity to access the Internet is considerably reduced. Given the widespread of internet application in workplaces those older people who are still employed are more exposed or have more opportunities to interact with computers and hence are in a position to adopt the technology, use the internet and adopt e-commerce. This was supported by Ameme (2015)'s study which found a strong correlation between employment status and customer adoption and usage of internet banking services in Ghana.

In another study, Wilson et al. (2003) found out that those respondents who were employed full-time were more likely to own home computers compared to the those who were not employed. Further more, Peacock (2007)'s study also found that at an advanced age, employment, and occupational status positively influence people's odds to use the Internet. This shows that as soon as older adults retire, their propensity to access the internet is considerably reduced. Based on the above arguments, it can, therefore, be hypothesised that:

H₈ Employment status is a significant positive predictor of e-commerce adoption by older people

4.3.3.9 Annual Income

Eastman and Iyer (2004) found that older people who have higher levels of income were more willing to both use the internet and buy products over the internet. This finding is consistent with Rogers (1995) who indicated that people with higher income levels would be willing to try new things, which could be in this case adopting electronic commerce. Sum et al. (2009)'s study explores how Australian older adults use the internet and found out that participants with higher income levels were more likely to have used the internet longer thereby engaging in e-commerce. Also, a study carried out by Katz and Aspen (1997) found out that the participants who use the internet were wealthier compared to the ones who were nonusers. Wu (2003)'s study found that the internet users who had a monthly income of US\$1,151 to US\$1,700 have higher scores compared to the ones who earned less income.

In Finland, Mattila et al. (2003) found out that internet banking was more common among higher-income mature customers than among lower-income who were 65 years and above. More than 30 percent of wealthy mature males in Finland used e-banking as their primary method of making payments. Another study by Bucy (2000) found that income was an essential determinant for an individual to use the internet and engage in shopping online. Wilson et al. (2003) also found out that those respondents with higher income were more likely to own home computers compared to the those with less income. Martin and Robinson (2007)'s study found that there is less internet use among low-income groups. Hashim et al. (2009)'s study showed that the respondents who earned a higher salary engage in more online shopping compared to those who earned a low salary. In another study by Erickson and Johnson (2011) income was found to be positively correlated with all aspects of internet use and four measures of well-being namely, life satisfaction, self-efficacy, social support, and depression. Jansen (2010)'s study found out that those people who had higher levels of income are more likely to use the internet, engage in online banking, own various internet-ready devices and read news on the internet.

Werner et al. (2011)'s study found out that the respondents with higher levels of income were more likely to be computer users compared to those with low income. Perrin and Duggan (2015)'s study found out that homeowners with income more than \$75,000 use the internet more than those living in households with income less than \$30,000. However, in contradiction Yi (2005)'s study found out that the relationship between family income and internet usage among the older people is negatively supported. Erickson and Johnson (2011)'s study found out that income was positively correlated with all aspects of Internet use. Karjaluoto et al. (2002)'s study found out that the bank customers were among the middle-aged wealthy, segments of that bank. Based on the above arguments, it can, therefore, be hypothesised that:

H₉ Annual Income is a significant positive predictor of e-commerce adoption by older people

4.3.3.10 Ethnic origin

Wilson et al. (2003)'s study found out that black respondents were significantly less likely to own home computers compared to their white counterparts. Yi (2005)'s study found that respondents who were African-Americans were more likely to use the internet for activities other than email compared to their white counterparts. Perrin and Duggan (2015) found that the respondents who were African-Americans are less likely to use the internet than their

counterparts white Americans. Taylor et al. (2004) findings revealed that demographics (such as age and race) and socio-economic status variables (such as education level and household income) play significant roles in predicting the patterns of internet use. The respondents who were African-Americans were more likely to use the internet for activities other than e-mail. As regards to ethnicity, African-Americans and Hispanics have been found to be less likely than whites to engage in using the internet. Wilson et al. (2016)'s study found that for socioeconomic variables, African Americans were still less likely to have home computers or internet access. Katz & Aspen (1997) did a study and found out that more blacks and Hispanics did not use the internet and most of them were unaware of the internet's existence compared to their white counterparts. Werner et al. (2011)'s study found that the white respondents recorded the highest computer usage compared to Hispanic elderly adults. Based on the above arguments, it can, therefore, be hypothesised that:

H₁₀ Ethnicity is a significant positive predictor of e-commerce adoption by older people

The following table (see Table 4.1) gives a general overview of the hypotheses that will be tested.

Table 4.1: Hypotheses Summary

No	Hypothesis Name	Hypothesis
H ₁	Gender	Gender is a significant positive predictor of e-commerce adoption by older people
H ₂	Age	Age is a significant positive predictor of e-commerce adoption by older people
H ₃	Marital Status	Marital status is a significant positive predictor of e-commerce adoption by older people
H ₄	Residential Status	Residential status is a significant positive predictor of e-commerce adoption
H ₅	School type	School type is a significant positive predictor of e-commerce adoption by older people
H ₆	Education type	Education type is a significant positive predictor of e-commerce adoption by older people
H ₇	Information Technology Qualification	Information technology qualification is a significant positive predictor of e-commerce adoption by older people
H ₈	Employment status	Employment status is a significant positive predictor of e-commerce adoption by older people
H ₉	Annual income	Annual Income is a significant positive predictor of e-commerce adoption by older people
H ₁₀	Ethnic origin	Ethnicity is a significant positive predictor of e-commerce adoption by older people

4.4 Research Method 1: Study One

The most appropriate method chosen to collect data in Study One is the questionnaire and it is discussed in the following sections. These sections also discuss how it is developed, implemented and then how data is analysed.

4.4.1 Design of Questionnaire

The researcher will develop the questionnaire with the aim of answering the research questions stated earlier in this research. The outline of the final questionnaire can be viewed in Appendix B. Since a questionnaire is an important instrument of research which is used for data collection (Oppenheim, 1998), it can be thought of as a kind of written interview (McLeod, 2014).

The questionnaire is chosen to be the most appropriate method for this research for a number of reasons. Firstly, questionnaires are the most widely used data collection technique in attitudinal research (Oppenheim, 1998; McLeod, 2014) and are also familiar to most people. Secondly, the objective of the survey was to obtain an overall picture of the adoption of e-commerce among the older people and therefore the questionnaire method provides an efficient way of creating the data required for weighting the extent of e-commerce adoption. Furthermore, this is useful for large populations when interviews would be impractical (McLeod, 2014) providing a relatively cheap, quicker and efficient way of obtaining large amounts of information. Finally, the questions are identical to all respondents and therefore the findings are generalised to a large extent.

Other design issues such as the length of the questionnaire can also influence response rate. For example, the longer the questionnaire, the less likely respondents are to respond (Yammarino et al., 1991; Steele et al., 1992). However, all these limitations can be mitigated by good techniques in questionnaire design and mailing out procedures. Also, it has been suggested that pre-notifying the respondents before-hand may increase the response rate in a mail questionnaire survey (Fox et al., 1988). Murphy et al., (1991) report that in two cases, the use of a postcard pre-notifying potential respondents of the survey increased response rates from 10.67 per cent to 16.51 per cent, and from 19.54 per cent to 27.60 per cent. Several other studies including Taylor and Lynn, (1998) found response speed was faster for pre-notified respondents than for those who were not pre-notified.

In addition, Dillman (1991) suggested that personalising cover letters could also increase response rates in mail questionnaire surveys. The researcher will include personalised letter addressed to a specific people because it shows the respondent that he or she is important (Schaefer & Dillman, 1998). Help will be offered to those who need it in some cases but the

researcher would not necessarily need to be present when the questionnaires are completed.

4.4.1.1 Question Types

There are widely two forms of questionnaire construction methods namely; open answer and closed-answer questions (Dillman, 2000). Open-answer format allows and encourages respondents to give their opinion fully and with as much nuance as they are capable (Sudman & Bradburn, 1982). However, this approach will appear inapplicable in this research where the intention is to calculate the mean ratings of adoption of various aspects of e-commerce. The alternative approach is to use a closed-answer format. Whilst closed-answer questions are more difficult to construct, they are easier to analyse, particularly in the statistical sense (Sudman & Bradburn, 1982). There is also less likelihood of researcher bias in summarising the responses. Also closed-answer questions provide many alternative answers from which a respondent can choose (Saunders et al., 2009; Dillman, 2000). The researcher has to consider the type of the respondents which is the target group, the older people, such questions are deemed easier to answer and convenient for them which may increase the response rate. Thus, closed-answer approach is considered most appropriate for this study.

However, there are disadvantages associated with closed-answer questions. There is the denial of response variety from the respondents the loss of spontaneity and the ability to express themselves. Also, such questions may tend to have a likelihood of the researcher bias which emerges when the researcher includes the only response options they are comfortable with (De Vaus, 2002). However, the limitations of the closed-ended questions are minimised by the fact that the researcher uses response options that have been tried, tested and used before. Apart from the responses, the researcher also provides a space under each question to those respondents with alternative answer or explanation to responses already provided.

On the other hand, the open-ended questions are the ones which are designed to elicit information on questions which are known to the respondents but are not stated in the questionnaire. There is no chance or room for the researcher to provide or suggest any answers. The respondents are provided with questions and some blank lines to answer. In this case, the space provided or a number of lines provided will determine the length and

fullness of the response to be obtained. The main advantage of the open-ended questions is the freedom which is given to the respondent. This allows the respondent thoughts to roam freely without the researcher interrupting in any way. The answers, views, opinions, and ideas are obtained in the respondents' language. This usually happens spontaneously, and this spontaneous manner is often significant as a basis for new hypotheses (Oppenheim, 1998).

Also, there is an opportunity for the researcher to probe the respondent for an answer and hypotheses can be tested for ideas or awareness. This open-format will be the most appropriate for the Study two where interviews are carried out. However, there are some limitations of open-ended questions which are time-consuming, and it cost the interviewer much time if they are personal interviews. Also, the respondents are compelled to put in more effort; the coding can also be costly and slow to process and reliability might be questionable. Dichotomous questions are the simplest of closed questions which have only two possible answers 'Yes or No'. In this study, dichotomous questions are asked where there is a need to ask questions such as these (see Questionnaire in Appendix B).

- Do you shop for groceries on the internet? Yes or No
- Do you buy goods or items on the internet? Yes or No
- Do you pay household bills on the internet? Yes or No

In such cases, further questions are asked if the answer is yes. Questions such as this are easy to write and easy to ask but are essential because complex pieces of information can often be broken down into a series of dichotomous questions that respondents can be led through, with a higher expectation of accuracy than would be achieved with a single question. In such cases, further questions are asked if the answer is yes.

4.4.1.2 Use of Likert scale

It is also considered essential to establish not only the direction of the responses but also the intensity degree with which the views or opinions or attitudes on the different criteria. Therefore, an intensity scale is built into the response categories. This will take the form of a five-point Likert Scale, which Bryman and Bell (2007) described as an approach to attitude measurement. This allows the respondents to tick the degree of importance they attach to the e-commerce adoption criteria in question. The Likert scale technique presents

respondents with a series of attitude dimensions using one of many positions on a five-point scale. The respondents must agree or disagree with each of the statements by ticking a number from 1 (strongly disagree) to 5 (strongly agree). The grading scale utilizes whole numbers only, hence it provides no allowances for numbers falling in between actual numbers on the scale (i.e., this scale comprises discrete variables where decimals and fractions do not apply in this case).

There are four interrelated issues concerning questionnaires that I, as a researcher must be aware of when using the Likert Scale (Brace, (2004). These issues are the order effect, acquiescence, central tendency and pattern answering. The order effect arises from the order in which the response codes are presented. It has been shown that there is a bias to the left on a self-completion scale and acquiescence is the tendency for respondents to agree rather than disagree with statements (Kalton & Schuman, 1982), also known as 'yea-saying'. When considering the layout of the questionnaire in this study the negative end of the scale is placed to the left, to be read first because, with the 'Agree' response to the left, the order effect and acquiescence would compound each other (Brace, 2004). So by placing the 'disagree' response to the left, there is a possibility of the biases going some way to canceling each other (Brace, 2004). Central tendency is the reluctance of respondents to use extreme positions and Pattern answering occurs when a respondent is likely to keep ticking boxes in a pattern (Brace, 2004). The questionnaire will also request respondents to indicate if they wished to receive a summary of the study results.

4.4.1.3 Questionnaire Structure

The questionnaire starts with the introductory letter which is shown in Appendix B, and indicates that the gathered information will be used solely for academic purposes and it ensures confidentiality of data given by respondents. Dillman (2000) outlined some factors which the letter accompanying the questionnaire should cover to improve the response rate. Such factors include what the study is about and its usefulness, why the respondent is essential, a promise of confidentiality and being grateful to the respondents for their help. The respondents are advised that the survey is entirely voluntary and are free to withdraw at any time. The introductory letter addressed these points and was kept to only one page as suggested by Sudman and Bradburn (1982).

The questionnaire consists of four sections. The questions in Section A (questions 1 to 10) are structured to elicit information regarding the respondents' demographic background such as age, gender, educational qualification and marital status, etc. Section B (questions 11 to 16), asks questions on information about the respondents shopping patterns and behaviour such as how often, on average do you buy or sell products or services on the internet, how much on average are the sales you make online each month, etc. Section C (questions 17 to 26) asks questions on information about the products, items, goods, activities and services the respondents perform or buy and sell on the internet and also what they use e-commerce for. Also Question 27, in section C asks the respondents if they have any disability which they think would prevent them from buying/selling on the internet. The last section D (questions 28 to 58) asks the respondents' attitude on how they feel when they perform different activities on the internet, towards various aspects like usefulness, ease of use, security, trust. It also requested respondents to indicate if they wished to receive a summary of the survey results or willing to participate in Study Two.

Table 4.2 Questionnaire Structure Summary

Section	Questions	Comments
A	Q1 to Q10	Questions to elicit respondents' background information on age, gender, education etc
B	Q11 to Q16	Questions to elicit information on information on respondents shopping patterns and behaviour of shopping online
C	Q17 to Q26 Q27	Questions to elicit information on respondents' list of products, items, goods, activities, and services they perform or buy and sell on the internet Question for the respondents to indicate if they have a disability that would prohibit them from engaging in e-commerce
D	Q28 to Q58	Questions to elicit information on respondents' perceived attitude on how they feel when they would perform different activities on the internet such as ease of use, security, trust.

4.4.1.4 Questionnaire Rationale

The Questionnaire Rationale table which illustrates the justification of the questions asked in the questionnaire can be viewed in Appendix B.

4.4.1.5 Questionnaire Administration

There are different ways used to administer a questionnaire namely: face to face, telephone and by post (Mcleod, 2014) and online. However, there are advantages and disadvantages for each technique which can be compared regarding the response rate, ability to produce a representative sample, limitations on questionnaire design, quality of responses and implementation problems (Sekaran, 2000). Mail questionnaires are particularly criticised on poor response rates and the quality of responses (Dillman, 2000). While it is accepted that there are disadvantages associated with the mail questionnaire, there are some advantages to using this method. Firstly, by using the mail questionnaire, it is possible to obtain a large enough sample to reduce sampling error to acceptable levels (Roberts, 1999; Dillman, 1991; Sekaran, 2000). Secondly, the costs usually are considerably less for a mail questionnaire than the face-to-face interview (Sekaran, 2000), and finally, the mail questionnaire does not introduce interviewer bias that is a potential problem for both face-to-face and telephone interviews. In this study, the questionnaire was administered by face-to-face, post and online.

4.4.2 Ethical Considerations

An application will be submitted to the Faculty of Technology Research Ethics Committee because as a researcher, one has to understand, abide by and follow the Research Ethics Policy and procedures of the University of Portsmouth. The researcher will undertake the training, 'Designing Ethical research and preparing for ethical review' delivered by the Graduate school. The respondents are provided with information before completion of the questionnaire. The act of completing the questionnaire and submitting is also considered to be informed consent. Due to the nature of the target group involved in this research, i.e. older people, no recruitment of participants or data collection could commence until an ethical review had been undertaken. This is done because human participants are involved (including data that is not in the public domain), and the research involved topics which some

older people might consider sensitive due to their vulnerable nature. The researcher is mindful of the position they take (see Appendix A), and also asking respondents about the adoption of e-commerce could potentially be a sensitive issue because some of the questions asks them about their financial status, age, and emails. In this regard, the researcher will observe applicable ethical codes of conduct at all times throughout the study.

4.4.2.1 Recruitment Strategy

Data will be collected from older people who attend community day centers and through snow-balling and also online. Snow-ball or referral sampling is a technique where existing participants recruit future participants from among their acquaintances. Thus, the sample group appears to grow while gathering enough data to be useful for the research. The researcher choose this sampling technique because it is often used in hidden populations which are difficult for researchers to access, e.g., older people who are one of those populations.

This was also supported by Breakwell, Hammon, and Fife-Schaw (2003) who pointed out that older people were among some categories of people who are particularly difficult to interview. Nachmias and Nachmias (1976) suggest that the drawing of conclusions from a sample of a population derives from the need for researchers to be pragmatic and parsimonious because it may be too expensive or impossible or impractical for all targeted respondents to take part. However, inferences based on a sample may be precise because a well-selected sample may reflect the characteristics of the population accurately. In a survey, it is impractical to interview all possible respondents in a controlled experiment, it is not possible to test the hypotheses on all potential subjects. Likewise, in this research project, it was not easy to find the respondents who are among the 'hidden population' and because of their nature and vulnerability.

4.4.2.2 Participants

The participants who are involved in this Study are those who can speak English and have adopted e-commerce. The definition of e-commerce adopted for this research was discussed earlier in Chapter 1. The exclusion criteria included the participants who can not speak English, have not shopped online before. The participants are required to answer the questionnaire which is divided into four sections and takes between 25 to 30 minutes. The information provided by the respondents will not be released to anyone which will allow the

data to be identified with any individual. The participants are advised that the survey is entirely voluntary and are free to withdraw. Confidentiality and privacy of respondents are observed, as code relating to data protection. When the participants have completed section D of the questionnaire, they are given an option to write down their emails if they would like to receive the results of the research project.

4.4.2.3 Equipment and Materials

Before commencing the pilot study, the researcher should carry out the preceding checks on subject availability and access, the availability of materials, equipment, and funds which are needed to cover the consumable costs, the travel and subsistence costs (Breakwell et al., 2003). In this current study, minimal amounts of funds were needed for petrol when the researcher needed to travel to various places. These places included day care centers and residential homes and also money to purchase printing paper, ink cartilages, stationery and also when dealing with an online survey and posting the questionnaires. The researcher provided all the funds need.

4.4.3 Data Management Plan

The Data Protection Act 1998 (the DPA) _originated from an EC Directive and came into effect on 1st March 2000. The legislation was created to protect the rights and freedoms of individuals, with emphasis on their privacy concerning how personal data is processed. Personal data can be described as any information that can identify a living person either by itself or by a person's name or address.

There are Data Protection Principles to be adhered to when processing personal data:

- process personal data for the purpose for which it was collected and not for any other purpose.
- Keep personal data as accurate and kept to date
- Process personal data fairly and lawfully.
- Personal data not be kept for longer than necessary.
- Personal data shall be adequate, relevant and not excessive about the purpose for which it is intended.
- Personal data shall be processed according to to the rights of data subjects under DPA.

4.4.3.1 Data storage

The policy outlined by the University of Portsmouth on data management should be adhered to and will be followed. The researcher will ensure that 'active' Research Data is stored securely and protected from loss, unlawful or unethical access, and by all other applicable requirements of the Regulatory Environment. Only the named researcher has access to this. This data will be accessed only via a password-protected computer. No participant is going to be identified by their name or any information such as address. The risks are minimised for respondents in the study because the only personal data to be stored are emails. The other collected data for this study will be saved and stored on secure sites using passwords which are handled by the researcher only. All collected data will be held securely for a minimum of 4 years following the publication of reports or articles resulting from the generated data and then will be then securely destroyed. Electronic files will be deleted from computer hard-drives and servers when required.

4.4.3.2 Personal Sensitive Data

As regards to sensitive personal data, the respondents are not required to enter any names or their addresses. A unique number is used to identify each respondent. The respondents are then asked to enter sensitive personal data (for example, ethnic origin, age, gender). The respondents who wish to receive the study results are asked to give their emails or any other method of contact. This sensitive data must be processed more carefully concerning the purposes for which it is collected and who have access to the information and other data collected.

4.4.3.3 Destruction, Retention, and Reuse of Data

The research data will be retained for ten years by the University of Portsmouth Retention Schedule for Research Data. According to Data Protection Act 1998, it goes on to explain that data must be retained for the same period from whichever is the latest of completion of the research, the publication date of the research findings based upon the research data or the date upon which access to the research data was last requested by a third party. Paper records may be scanned and originals destroyed. University Departments will be responsible for retaining the data when the researcher leaves the University.

4.4.3.4 Pilot Study

A pilot study will be carried out before the full-scale study will be undertaken as suggested by Dillman, (2000) and Bell and Bryman, (2010), that before the questionnaire is used in the field, it should be pilot tested. A summary of the pilot study can be viewed in Appendix C. This pre-testing of a particular research instrument such as a questionnaire can make a crucial element of an excellent study (Van Teijlingen & Hundley, 2001). A pilot study is conducted to allow for an evaluation regarding the acceptance and understanding of the questionnaire by the respondents. It helps to make a note of any ambiguity, confusing questions or instructions leading to modifications to the final draft of the questionnaire. The pilot testing is meant to enhance the questionnaire so that older people will have no problems answering and also reduce data recording errors. Question-wording is also, but one of many aspects of pilot study and layout is of paramount importance. Conducting a pilot study does not guarantee success in the primary study, but it does increase the likelihood (Van Teijlingen & Hundley, 2001). Once developed, the questionnaire will be put through two tests for comprehensiveness and understandability. First, initial reviews will be made by the two supervisors of this research and one member of staff in the Department of Technology. This is to make a note of any ambiguous or confusing questions or instructions.

4.4.4 Data Analysis

SPSS Statistics package will be used to analyse the quantitative data in this study.

4.4.4.1 Descriptive Statistics of e-commerce adoption

Data analysis will be undertaken in two stages. The first stage will use descriptive statistics to discuss the demographics and the extent of e-commerce adoption. In the second stage of data analysis, the cross-sectional analysis will be employed to investigate the research hypotheses. The descriptive analysis will involve looking at the means and ranges of the extent of e-commerce adoption. The reason is to determine whether there are any significant differences in the extent of e-commerce adoption due to different individual characteristics. To determine if significant differences exist, the independent sample t-test (parametric tests) will be conducted to ensure triangulation of the results.

To gain a better understanding of the extent of e-commerce adoption than that gained by examining e-commerce adoption index alone, a detailed item-wise analysis will also be conducted. However, it will not be possible to analyse and discuss all the 45 items included in the e-commerce adoption table and therefore, the discussion will concentrate on both the most and least adopted e-commerce applications.

4.4.4.2 Measurement of the dependent variable

While previous studies have measured, e-commerce adoption based on either adoption (yes) or non-adoption (no), the rapid development of e-commerce over the recent years means that almost everyone in developed countries such as the UK has now adopted e-commerce. For example, all benefits and pensions for older people are now paid in their bank accounts and to access the funds they will need to use a debit card through cash dispensers. This means that it is now not a question of whether an individual has adopted e-commerce but to what extent have they adopted e-commerce. The extent of e-commerce adoption, therefore, refers to the extent to which an individual uses e-commerce in their daily lives. This means the more e-commerce applications an individual uses the greater the extent to which they have adopted e-commerce.

To measure the extent of e-commerce adoption this study uses an Index of E-commerce Adoption (IEA). The Index of E-commerce Adoption was developed through a rigorous strategy which drew all the possible activities and uses involved in e-commerce from the previous studies who have investigated these e-commerce activities before (Iyer & Eastman, 2006; Martinez-Pecino et al., 2013; McCloskey & Lepper, 2010; McCloskey, 2006; Ryu et al., 2008; Sorce et al., 2005; Smith, 2008). This means the more e-commerce activities or uses an individual uses the greater the extent to which they have adopted e-commerce. The formation of IEA is illustrated in Figure 4.7. The list consists of (1) devices individuals use (2) activities individuals usually perform (3) products and services which individuals usually buy (4) household bills individuals usually bought on the internet (5) activities or transactions individuals usually perform online (6) Goods or items individuals usually sold on the internet? In total these six categories of activities amounted to 45 activities. These activities were asked as part of the questionnaire administered to the older people and the formation of this index is illustrated in Figure 4.7.

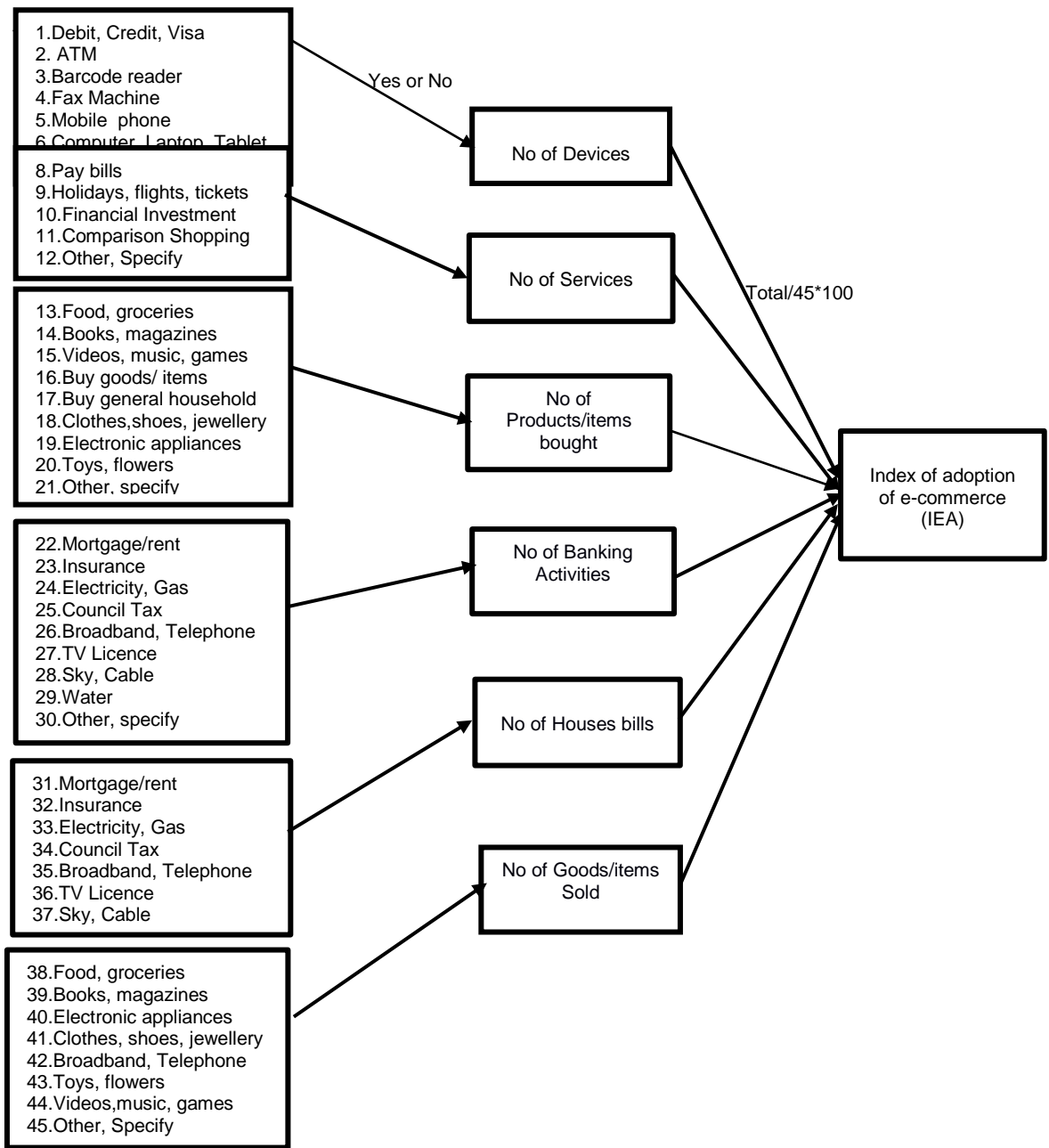


Figure 4.7 Index of adoption of e-commerce formation

The IEA was developed by adapting the UK Consumer Price Index (CPI), which measures the prices in these areas for example, food and beverages (breakfast, cereal, milk, chicken, wine, full service meals, snacks), Housing or rent of primary residence, fuel/oil, bedroom furniture and clothes). The CPI focusses on products that are bought and used by consumers on daily basis. It is the measure of the average change overtime in the prices

paid by consumers for a market basket of consumer goods and services. In other words it is the official measure of inflation of consumer prices of the UK. The novelty about the index of e-commerce adoption is since everybody have adopted e-commerce, it is no longer a case of whether someone has adopted or not. Its now a case of, to what extend have they adopted e-commerce? It is a more comprehensive way of combining all the possible e-commerce activities and uses and this has never been done before. For example, if you ask about food shopping or online banking, you are limited to only 1 or 2 aspects of e-commerce compared to the holistic approach used in this study. The assessment of whether some of the activities or uses were applicable or not applicable was not relevant because the UK Consumer Price Index computes on the things that people commonly use rather than things that everybody uses. For example, there is bread or wine but not everybody eat bread or drink wine etc. Thus, the assessment is done on the possible things that the general consumers buys or uses.

To quantify the extent of e-commerce adoption an individual was awarded one mark depending on whether they used the devices, perform certain activities online, buy products or services etc. The mark or extent of e-commerce adoption for an individual was arrived at by summing up all the marks awarded expressing the total out of 45. For example, if the total for an individual was 27 out of 45, then the extent of adoption for that individual would be $27/45 = 60\%$ or 0.6.

Table 4.3: Extent of e-commerce adoption

Item No.	Items	Yes(=1 mark); No (=0 mark)
	Which of the devices do you use?	
1	Debit, Credit, Visa Cards	
2	Automated Teller Machine(ATM)	
3	Barcode reader	
4	Fax machine	
5	Mobile phone	
6	Computer, Laptop, Tablet	
7	Other (please specify)	
	What services do you usually perform on the internet?	
8	Pay bills	
9	Book holidays, flights, tickets	
10	Financial investments	
11	Comparison shopping	
12	Other (please specify)	
	Which of these goods/items do you usually buy on the internet?	
13	Food, groceries	
14	Books, magazines	
15	Videos, music, games	
16	Buy goods/items	
17	Buy general household goods	
18	Clothes, shoes, jewelry, cosmetics	
19	Electronic appliances	
20	Toys, flowers	
21	Other (please specify)	
	Which household bills do you pay on the internet	
22	Mortgage/rent	
23	Insurance	
24	Electricity/Gas	
25	Council Tax	
26	Broadband, Telephone/Mobile	
27	TV licence	
28	Sky/Cable	
29	Water	
30	Other (please specify)	
	Which of the following bank transactions do you perform online?	
31	Transfer money between different accounts within a bank.	
32	Transfer money between different bank accounts	
33	Pay individuals	
34	Mobile banking	
35	Telephone banking	
36	None of the above	
37	Other (please specify)	
	Do you sell goods or items on the internet?	
38	Food groceries	
39	Books, magazines	
40	Electronic appliances	

41	Clothes, shoes, jewelry, cosmetics,	
42	Toys, flowers	
43	Videos, Music, games	
44	Computer programmes, games	
45	Other (please specify)	

4.4.4.3 Measurement of independent variables

The measurement of independent variables are shown in Table 4.4. and also illustrates the way each variable were coded.

Table 4.4: Measurement of individual characteristics		
Individual characteristic	Operationalisation	Acronym
Gender	Men coded '1', '0' otherwise	GEN
Age	Number of years since birth	AGE
Marital status	Being single coded '1', '0' otherwise	MAS
Residential status	Living with family coded '1', '0' otherwise	RES
School Type	Attended private school coded '1', '0' otherwise	SCT
Education	Primary education coded '1', '0' otherwise	EDU
IT qualification	Have IT Certificate coded '1', '0' otherwise	ITQ
Employment status	Self-employed coded '1', '0' otherwise	EMS
Annual income	Income less than £1500 coded '1', '0' otherwise	ANI
Ethnical origin	Origin White British coded '1', '0' otherwise	ETO

4.4.5 Hypotheses Testing

The main hypothesis tested in the study is:

H₀: There is a significant association between the extent of e-commerce adoption individual characteristics [gender, age, marital status, residential status, school type, education, IT qualification, employment status, annual income, ethnic origin]

4.4.5.1 Hypotheses Testing Approach

The choice of the approach to testing the hypotheses is determined by the purpose of the research. In this study, the objective is to investigate the relationships between the extent of e-commerce adoption and to determine the incremental explanatory power of the individual characteristics to explain the extent of e-commerce adoption. As such, both univariate and multivariate analyses are undertaken. The approach will be adopted because, on one hand, the univariate analysis indicates only the relationship between the dependent variable and each of the independent variables. On the other hand, multivariate analysis indicates the collective and separate contributions of two or more independent variables to the dependent variable. Thus not only is attention paid to the univariate relationships between the independent variables and the dependent variable, but also to the potential incremental information an independent variable could contribute to explaining the variations in the extent of e-commerce adoption.

4.4.5.2 Univariate Analysis

In this study, parametric tests will be conducted on the dependent and independent variables. To use parametric statistical methods, the following assumptions underlying their application must be met (e.g., Siegel & Castellan, 1988):

- i) The observations must be independent
- ii) The observations must be drawn from normally distributed populations
- iii) The variables must have been measured on at least an interval scale. When these conditions are satisfied, then parametric tests are considered the most powerful tests for rejecting the null hypothesis (H_0) when it is false.

4.4.5.3 Multivariate Analysis

To examine the incremental explanatory power of the independent variables (individual characteristics) on the extent of e-commerce adoption, multiple regression techniques will be used. Before proceeding with the multivariate analysis, however, it is important first to establish that the assumptions underlying the technique are not seriously violated (e.g., Field, 2000). These assumptions include multicollinearity, normality, linearity, and homoscedasticity (e.g., Coakes & Steed, 2001).

4.4.5.4 Assumption Testing

i. Multicollinearity

Multicollinearity exists when there is a strong correlation between two or more predictors in a regression model (e.g., Koutsoyiannis, 1972). High levels of collinearity increased the probability that a good predictor of the outcome will be found non-significant and rejected from the model (e.g., Wright, 1997; Field, 2000). To identify the problem of multicollinearity, three tests will be conducted. The first will involve an examination of the correlation matrix to determine whether the independent variables are significantly correlated. It is suggested (e.g., Judge et al., 1985; Gujarati, 1995; Field, 2000; Pallant, 2001) that multicollinearity problems are considered harmful only when they exceed 0.8 or 0.9.

According to Myers (1990), a certain degree of multicollinearity can still exist even when none of the bivariate correlation coefficients is substantial. This is because one independent variable may be an approximately linear function of a set of several independent variables (e.g., Field, 2000). Therefore other diagnostics involving an examination of the Variance Inflation Factor (VIF) and Tolerance values will also be conducted. The VIF indicates whether a predictor has a strong linear relationship with other predictors (Field, 2000). Neter et al. (1983) and Myers (1990) suggest that VIF values should create a problem only when they reach values of 10. Another statistic examined is the tolerance statistic which is the reciprocal of the VIF. Values below 0.1 indicate serious problems (Norusis, 1993; Field, 2000), although Menard (1995) suggests that values below 0.2 are worthy of concern.

ii. Normality

To assess the magnitude of the problems associated with the normality of the data in this study, histograms, stem-and-leaf plots, and normality probability plots will be constructed for each continuous dependent and independent variable. Standard tests on skewness and kurtosis and Kolmogorov-Smirnov tests of normality will also be used to determine whether the sample came from a healthy population. Where the assumptions of normality are not met, data will be transformed into natural logarithms.

iii. Linearity

To check the assumption of linearity, the scatter plots of the residuals produced by SPSS are examined. It is assumed that the residuals have a linear relationship with the predicted dependent variable scores and that the variance of the residuals is the same for all predicted

scores (Field, 2000; Coakes & Steed, 2001; Pallant, 2001). If the funnel pattern is observed, then the linearity assumption is violated, and where there are extreme deviations, the problem is overcome by transforming that data (Norusis, 1993). Mild deviations from linearity are not considered severe (Coakes & Steed, 2001; de Vaus, 2002).

iv. Homoscedasticity

Homoscedasticity refers to a situation where the variability in the scores for one variable is roughly the same with all values of the other variable (Coakes & Steed, 2001). It is concerned with how the scores cluster uniformly about the regression line. The assumption of homoscedasticity is checked by a visual examination of the standardised residual scatterplots produced by the SPSS. If the residuals appear to be randomly scattered around the regression line, then the equal variance assumption is satisfied (Norusis, 1995; Field, 2000; Coakes & Steed, 2001). If this assumption is violated, data may be transformed (Norusis, 1995).

4.4.6 Selection of the Method of Regression

There are some model selection criteria and procedures that can be used in multiple regression analysis to select independent variables to include in the model. The main three types are standard or forced method, the block wise entry method, and the stepwise method (Field, 2000, Pallant, 2001). In the forced entry method, all the independent variables are forced into the regression model simultaneously. Each independent variable is evaluated regarding its predictive power, over and above that offered by all the other independent variables. This approach also reveals how much unique variance in the dependent variable is explained by each of the independent variables (Pallant, 2001, p.135). In the block wise entry method, independent variables are entered in order of their importance based on prior research (Field, 2000; Pallant, 2001). Any new variables can either be entered on a forced entry basis or use the stepwise method of entry.

In the stepwise method, the independent variable that is most correlated with the dependent variable is introduced in the model first. Subsequently, the other exogenous variables are included one by one, by the partial correlation coefficients. The value of the t-statistics gives the decision rule about including or not a new variable in the model. A new variable is included in the model only if its t-statistic is not smaller than a critical value, and the t-statistics of the other

variables that are already in the model do not diminish below that value after the inclusion of the new variable.

It was decided to use the standard multiple regression method to determine how much of the variance in the dependent variable (extent of e-commerce adoption) is explained by each independent variable (individual characteristic). Also, this method enables one to determine the explanatory power of the selected independent variables as a group (Pallant, 2001). It is that which the experimenter manipulates or controls, and such is the variable in whose effect the researcher is interested. Independent variables can be classified into two groups; quantitative and categorical. Quantitative variables are those which can be quantified in some way in that the researcher can be able to determine the amount or levels presented in the research study; for example, the number of bricks needed to build a house or time needed to finish a certain task. On the other hand, the categorical variables are those which include sex of people chosen and race. In this research study, the independent variable used is the extent of adoption of e-commerce.

4.4.7 The Multiple Regression Model

The Ordinary Least Squares Regression (OLS) model was used to test the hypothesised relationships. The OLS regression is considered appropriate because the dependent variables (extent of e-commerce adoption) are measured on an interval scale.

$$ECA = \beta_0 + \beta_1 \text{Gen} + \beta_2 \text{Age} + \beta_3 \text{Mas} + \beta_4 \text{Res} + \beta_5 \text{Sct} + \beta_6 \text{Edu} + \beta_7 \text{ltq} + \beta_8 \text{Ems} + \beta_9 \text{Ani} + \beta_{10} \text{Eto} + e_j \quad [1]$$

Where;

- ECA = Extent of e-commerce adoption
- $\beta_0 \dots \dots \dots \beta_{10}$ = Regression coefficients as defined in Table 4.5
- e_j = Error term

4.5 Research Method 2: Study Two

The aim of Study Two is to supplement the results of Study One by exploring accessibility and usability issues of online grocery shops. The results yielded from the first phase of the research (Study One) indicated that there was less tendency for older people to shop for online food groceries compared to other e-commerce activities. Given that there is much research indicating that accessibility and usability are some of the issues in older people using websites (Nielsen, 2001; Tatnall & Lepa, 2003; Dickson-Swift et al., 2007; Good &

Jerrams-Smith, 2007; De Lara et al., 2010, Darvish & Good, 2013). Study Two will explore these issues specifically in relation to grocery websites. Thus, this particular study aims to provide a better understanding of some of the issues faced by older people when performing an online shopping task and also to gain a better understanding of their attitudes and motivation with regards to the online grocery shopping.

The objectives are:

- To investigate whether there are usability issues with the design of the websites of two online grocery shops.
- To investigate whether the two websites of the online food grocery shops are accessible to those with age-related impairments
- To gather qualitative data on user centered design recommendations for grocery websites
- To identify whether there are any other barriers for older people using grocery websites

The purpose of the qualitative study will be to investigate the user experience from the participant's point of view (Orb et al., 2000; DiCicco-Bloom & Crabtree, 2006). The study will be carried out in a quiet environment within the community day center (Poole Day Centre). The methods used in the study are the thinking aloud protocol, as well as the observation method which will be to evaluate the participant's behaviour.

4.5.1 Observation Method

The Observation method involves the participant being observed and .specific outcomes measured with the researcher having no control over the outcome (Oppenheim, 1998). To clarify further, the participant will be in a controlled environment (i.e., day centre) in which conditions are not variable. This methodology has the potential to yield more accurate data than other approaches. For example, in an interview, a subject may describe ideal behaviour rather than actual habits. The advantage of observations is the possibility of observing what people do or say, rather than what they say they do.

Although, there are other types of observation method namely: Indirect, Structured/unstructured and Participant/non-Participant, the researcher will use the direct method for this particular study. The direct method will be used because it allows collecting

evaluative information in which the researcher will observe the participant's behaviour as it happens or record it for analysis later (Kawulich, 2005). During the online shopping task, observations will be made, and Camtasia software will be used to capture the screen interactions which will help with the analysis of data later.

4.5.1.1 Direct / Indirect Method

Direct observation is a method when the researcher will observe the participant in their usual environment without altering that environment. Thus, the researcher may observe the participant's behaviour as it happens or records it for analysis later on. However, in indirect observation the researcher may not be present, but would do the analysis later from observations done by others. Structured observation, also known as systematic observation is a method for collecting data in which researchers gather data without direct involvement with the subjects (the researchers watch from afar) and the collection technique is structured in a well defined and procedural manner. For example, a structured observation would likely be a checklist. The researcher would look for specific patterns of behaviour and note them accordingly. Unstructured observation would not try to record or anticipate specific patterns but would aim to record the entire experience.

4.5.1.2 Structured/Unstructured

Structured observation, also known as systematic observation is method for collecting data in which researchers gather data without direct involvement with the subjects (the researchers watch from afar) and the collection technique is structured in a well defined and procedural manner. For example, a structured observation would likely be a checklist. The researcher would look for specific patterns of behaviour and note them accordingly. Unstructured observation would not try to record or anticipate specific patterns but would aim to record the entire experience. This method will not be used in this study.

4.5.1.3 Participant/Non-Participant

Participant observation, as the name implies the researcher will be part of the events under study. That is the researcher takes an active role alongside the participants, participating and observing at the same time. The main criticisms are the influence the dual role taken by

the researcher and also the possibility of role conflict. Alternatively, a non-participant observer only watches and does not get involved with the activity or the participants.

4.5.2 Thinking Aloud Method

Thinking aloud method shares many of the characteristics of the above-noted observation study. It provides the opportunity to gather important insight into the experience of the participants who have different abilities (Shneiderman, 2000; Preece, et al., 1994). This protocol was developed by researchers at IBM for the purpose of usability testing and has since been adopted by researchers aiming to improve accessibility for impaired users (Lewis & Reiman, 1993). In this study, the participants will be asked to verbalise their thoughts as they complete the online shopping task providing the opportunity to gather important insight into the experience of users as they perform the task. The participants will be given some tasks, each involving specific search queries then the participants are asked to verbalise their thoughts as they complete each task.

Any audible sound will be recorded on Camtasia recorder, any comments uttered while performing or words which signify that someone is stressed or doing something with difficulty. For example, gosh, Oh my God, Sounds like ummmm, ahhhhh were recorded. "Talking to one self. I can not do this, what the hell is this, this is hard, blood hell." This was noted and recorded on the Observation Data Collection Sheet form shown in Appendix A.3. After the task the participants will be interviewed by the researcher on their online shopping experience with regards to the overall accessibility and usability of the two websites. During the interview all answers were recorded on the Post Task Interview questions form and can be viewed in Appendix A.3.

4.5.3 Interviews

Interviews are used to discover shared comprehension of a particular group of people (DiCicco-Bloom & Crabtree, 2006), i.e. the older people. In fact, interviews are generally used as a means of gathering quantifiable and qualitative data and they occur on a one-to-one basis either in person or on the phone. In this study, interviews are chosen to be the most appropriate method of data collection because they will provide information which could not be obtained from a questionnaire. It is suggested that researchers obtain improved

response rates by using interviews and have a much better response rate than questionnaires, which may produce a response rate of less than 40 percent (Oppenheim, 1998). While the interview itself is a reasonably straightforward process, preparing for a successful interview requires careful planning. For example, the researcher must correctly identify appropriate subjects for study. Also, when devising the questions, it is essential to phrase them correctly to avoid influencing the responses received. Additionally, the interviewer's attitude may also affect the proceedings. It is important for the interviewer to remain neutral throughout the meeting to ensure an accurate and unguarded response from the subject. Interviews There are two types of interviews namely structured and open-ended. A description of both along with the advantages and disadvantages will be provided in the following sections.

4.5.3.1 Structured

As the name implies, a structured interview has a definite shape and pattern. It is organised and controlled with the interview asking some prepared questions. In general, a structured interview is ideally suited to gathering quantifiable data, for example, statistical information about the individual or information regarding their habits and preferences. This type of interview can be designed to avoid bias and is useful for eliciting information; however, it can be said that this type of information could also be obtained through other methods, including surveys and questionnaires. It should be noted that these methods often produce unsatisfactory results since response rates are sometimes low and the forms may not be fully completed. The researcher must decide whether the time spent interviewing justifies the results.

4.5.3.2 Open-Ended

In contrast to the structured interview, the open-ended interview is flexible and unrestricted. In general, an open-ended interview is ideally suited to gathering qualitative data. While questions asked in a structured interview may have a simple yes or no answer, the types of questions asked in an open-ended interview encourage a broader range of responses. For example, a subject may be asked to describe their feelings or perceptions about an issue. Often there is no set agenda for an open-ended interview. The interviewer may have some warm-up questions ready to ask the subject, but he or she is free to explore issues as they emerge during the course of the discussion.

The chief strength of this approach is its exploratory nature. This can be particularly useful when researching accessibility issues. In this instance, the project examines four different types of disabilities. Input from participants can help increase the accuracy and effectiveness, as the broad-ranging nature of the research makes it a challenge to identify all the issues. Open-ended interviews are very useful in the early stages of research as they can help define the problem and identify areas needing change. There are, however, some weaknesses with this approach. Unlike the structured interviews, it is more difficult to guard against bias. As well, it is frequently challenging to analyse the data gathered through open-ended interviews, due in part to the sheer volume and variety of responses. Also, it may be difficult to accurately categorise responses.

4.5.4 Online Shopping Task

The proposed task is to shop for food groceries online for five items from two supermarkets. Apart from observation by the researcher, each participant's behavior (i.e., computer interactions) is also recorded using Camtasia to analyse the participant's behaviour. The participants are asked to engage in online grocery shopping from two supermarkets which are Tesco and Asda. The reason for selecting these particular two supermarkets was because when the respondents were asked which online shops they use for their food groceries in Study One, Asda and Tesco were the two most popular shops. The participants were given a list of five items to shop for, from each supermarket.

The shopping list was as follows:

- Semi Skimmed Milk
- Porridge Oats
- 12 Free Range Eggs
- Chicken Breast Fillets
- Medium Wholemeal Bread

These items are selected because they could be said to be standard groceries shopped for on a frequent basis which most people are likely to shop for more frequently. In other words, this can be termed as a staple diet. Observations and comments were noted. After completing the task, participants were asked to specify which elements of the two websites they liked or disliked with regards to ease of use. They are interviewed on how accessible the websites are and sharing their experience of interacting with the websites. Particular

attention is noted so that there should be no bias (for example participants should start with Tesco then Asda and vice versa).

4.5.4.1 Ethical Considerations

From an ethical viewpoint, this research has been reviewed by the Faculty of Technology Research Ethics Committee and a favourable opinion was awarded and can be viewed in Appendix A.2. All participants will be provided with information before taking part in the task performance and followed by the post-task interviews. Participants are provided with the opportunity to withdraw from the study at any time during the online shopping task and interviews. The researcher does not foresee any significant ethical issues in conducting this study. However, there are potential areas that need addressing which include:

- The participants have the right to receive information about the study, the purpose of the study, their involvement in the study, the right to withdraw from the study at any time (Jokinen et al., 2002), during the online grocery task and the interview. In this study the researcher will need to introduce themselves to the participants individually, then the participants will be provided with sufficient information about the study including the aim and objectives of the study.
- Those older people who suffer from conditions such as High blood pressure, Anxiety, Depression, and Dementia will potentially be excluded because of the stress or anxiety that may be caused by carrying out the grocery shopping task. The Manager will be able to give guidance on which participants to involve because the day center keeps a record of the medical history of all the older people who attend the day center including the conditions they suffer from and all the issues.
- There are no direct benefits to participants, but an enormous contribution is made to the research which will influence the future development of websites so that the lives of older people can be transformed.

4.5.4.2 Instructions

The participants are asked to shop online for the selected items from two online supermarkets. The participants are not being tested, but only the website will be tested. They are allowed to ask any questions only if they were a stack. They are allowed to just shop as far as they reach the stage for payment then they would stop. No final purchase of

any food item is done under this task. After completing the task, the participants are interviewed by the researcher on the overall accessibility and usability of each website.

4.5.4.3 Recruitment Strategy

The researcher will carry out the study at Poole Day Centre (Poole Day Centre, 12A Commercial Rd, Poole BH14 0JW). Firstly, the participants are handed the Participant Invitation Form with the information inviting the participant to take part in the study. Secondly, the Participant Information Sheet will be handed out which discusses why and how the study is going to be carried out. Then the participant will be given a Consent form to sign. On this form, the participant is asked about their medical fitness to take part in the online shopping task. Otherwise, if they suffer from any medical problem which would impact their participation, the researcher would instruct them that they could not take part. The Ethics Issues and Survey Questionnaire form which can be viewed in Appendix A.3, will follow, which discusses how the study will be done voluntarily and that all information should be confidentially treated. The questions to be asked are listed in the Post Task Interview questions form shown in Appendix A.3. The researcher will use the Observation Data Collection Form, see Appendix A, to write down and note all observations for analysis later. The task involves shopping online for the selected items from two online supermarkets, Asda and Tesco.

4.5.4.4 Participants

The participants have the right to withdraw from the study at any time during the completion of the task and interview. They will be provided with sufficient information of the study using the Participant Information Sheet which is shown in Appendix A. Participants who do not complete the interview will be eliminated from the study during the data analysis stage. Those participants with fully completed interviews have up to 2 months from the date of interview to withdraw from the study then the data will be removed from the study. The Inclusion criteria included participants who are aged 55 and older, can speak English, can use the internet but never shopped online for food groceries and have no health issues that might cause an impact on them performing. The exclusion criteria included the participants who can not speak English, have done online grocery shopping before and those who suffer from conditions that would increase the stress levels such as high blood pressure, anxiety and depression.

Usability studies can be carried out with a relatively small sample, for example, eight participants took part in Mellor et al. (2008)'s study. Another study by Munusamy and Ismail (2009) was completed with a sample of five participants, and also 12 participants took part in Trocchia and Janda (2000)'s study. It was also noted that testing with 5 participants lets you find almost as many usability problems as you did find when using many more test participants (Nielsen, 2000; Nielsen, 2013). Therefore, 5-10 participants will be an appropriate sample for this study.

4.5.4.5 Organisational Consent

Firstly, the researcher will contact Poole Day Centre and talk to the manager over the phone to introduce themselves, and then discusses part two of the research. The researcher then asks for permission to approach the clients who attend the day center for assistance in the research. After the initial communication the researcher then visits the day centre to see the manager in person and discuss further about Study Two, so that the manager could get a better understanding. Since this is a follow-up study from Study One, the researcher asks the manager's assistance on the clients who indicated in Study One, that they would like to participant in Study Two. Then the participants will be contacted individually through their emails or any other contact details they had given. Apart from that the manager would have a record of which residents visit the day center, on which days and the times.

4.5.4.6 Participant Consent

To gain consent, each participant is approached separately by the researcher. The researcher will then introduce themselves and ask for their permission to talk to them. Israel and Hay (2006) pointed out that informed consent can be made if sufficient information, understanding of the risks and benefit associated with participating in the research are provided. The participants should be given adequate information before they can decide to take part because informed consent process provides respect for them (Walsh, 2009). Therefore, in this study the researcher will discuss the research and ask for the participant's permission to take part in the online shopping task and interview. The Participant Consent Form can be viewed in Appendix A.3. If they agree the researcher will arrange to come back on the agreed date and time to carry out the study.

4.5.4.7 Participant Withdrawal

Participants have the right to withdraw from the study at any time during the completion of the task and interview. They will be provided with sufficient details of the study using the information sheet, and participants who do not complete the interview will be eliminated from the study during the data analysis stage. The participants who fully complete the task and the interviews will have up to 3 months from the date of interview to withdraw from the study then the data will be removed from the study.

4.6.4.8 The Environment Setting

Research which involves direct observation can be carried out in a range of possible environmental settings. This can take place in a natural setting or a controlled environment depending on considerations such as the degree of environmental control needed or the sampling method chosen. For example, a controlled environment may involve the participant being observed using a computer at work or home and a controlled setting would involve the participant experimenting in a laboratory or research setting. The advantages and disadvantages of each method vary depending on which environmental setting is chosen. Participants may be more at ease and relaxed at home, resulting in a more accurate assessment of their capabilities and skills. Where as in a laboratory setting, the researcher is allowed to standardise the experience for all participants. Also, certain resources available in a controlled setting such as data recording devices may not be available in a natural setting. In this particular study, the environmental setting will be the day center.

4.5.4.9 Equipment and Materials

The materials needed for the task is a laptop which was provided by the researcher, Camtasia recorder, task materials, consent forms, paper, and pens.

4.5.4.10 Pilot Study

It is important to carry out a pilot study before the full- scale study (Dillman, 2000; Bell & Bryman, 2010). Once the study has received a favourable opinion from the Faculty of technology the online grocery task and interview questions will be piloted. This pre-testing of a particular research instrument such as the observation method can make a crucial element of a good study (Dickson-Swift et al., 2007; Hashim et al., 2009). The pilot testing

will ensure the observation and interview method are designed properly so that older people will have no issues carrying out this task. Hence in this study, a pilot study will be done with three older participants.

4.5.5 Data Analysis

The Statistical Package for Social Sciences (SPSS) and NVivo 11 package will be used to analyse data. Descriptive statistics will be used to analyse quantitative data including frequency counts and percentages (Field, 2000).

4.6 Summary and Conclusion

The chapter explained the methodology which will be employed in the research study. Firstly, the chapter discussed the research framework and research philosophy, and this was followed by the theories that are used to explain why specific factors may be influential in technology/e-commerce adoption. Then, section 4.3 examined the research design which includes, mixed methods, data management plan and hypotheses development. Section 4.4 explained the first research method that will be used in Study One, which is a questionnaire. The penultimate section 4.5 discussed Study Two and how data will be analysed. Finally, in section 4.6 a summary and conclusion of the methodology chapter are presented.

CHAPTER 5: STUDY ONE RESULTS AND DISCUSSION

5.1 Introduction

The purpose of this chapter is to present and discuss Study one results of the research project in order to address the objectives set out in Chapter 1. As outlined in the methodology, Chapter 4, the main aim of the study is to investigate the adoption of e-commerce among older people in the South West region of England. Specifically, the research has the following objectives:

- (1) To examine the extent to which older people have adopted e-commerce
- (2) To determine the uses of e-commerce (i.e. what goods, items and services older people buy and sell)
- (3) To investigate the barriers to adoption or fully utilisation of e-commerce by older people
- (4) To determine individual characteristics associated with the extent of adoption of e-commerce among older people.

The rest of the chapter is organised as follows. The next section discusses the demographic data of the study followed by the discussion of the extent to which older people have adopted e-commerce in Section 5.3. Section 5.4 presents and discusses the findings of the uses of e-commerce by older people specifically explaining what goods or services they use e-commerce for. In Section 5.5, the study findings on the barriers to adoption of e-commerce are presented and discussed. Results on how individual characteristics determine the extent of e-commerce adoption are discussed in Section 5.6. The final section presents the summary and conclusion of Study One.

5.2 Demographic Data

Questionnaire responses from 164 respondents were received and 17 responses were eliminated due to incomplete answers. This resulted in 147 useable responses. The respondents' background information are presented in Table 5.1. The results show that of the 147 people who responded, 47 (32.0%) were male and 100 (68.0 %) were female. The fact that a majority of the respondents are female is not surprising given that research has shown that women live longer than men (Smith, 2009). Smith (2009)'s study found that in

Britain, women live longer than men by four years. The study went on to say that the reason might be because of lower rates of cancer in women and lifestyles which are more healthier, safer jobs and also the fact that women are more likely to visit their doctors more than men with health problems. In addition, in terms of mortality rates, men are likely to die, on average three to four years earlier than women according to the UK Office of National Statistics (2016). In terms of the age of the respondents, the average (mean) age of the respondents is 64.5 years and the median is 64 years which means that there are no major differences in terms of the age distribution of the respondents. The minimum age among the respondents was 55 and the maximum was 82.

In terms of the marital status of the respondents, the results in Table 5.1 show that the highest percentage (46.94%) are married, followed by widowed at (21.09%), separated or divorced (17.69%), single (12.93%) and the other constituting 1.35%. The results also show that 44.90%, 34.01%, and 18.37% of the respondents are living with a spouse/partner, living alone and with family respectively. The remaining respondents are either living in a nursing home (0.68%) or with friends (2.04%). The results regarding the schooling attended show that just over three-quarters of the respondents were educated at a public school (75.51%) while 22 (or 14.97%) went to private school. The rest were either home schooled (3.40%), did not go to school (4.08%) and other (2.04%).

With regards to the highest academic achievement, the results in Table 5.1 show that the highest percentage of the respondents terminated their education at secondary school level (35.38%), followed by primary school (31.29%) while 14.29% had college education, 8.84% had undergraduate education and only 4.76% obtained post graduate education. The low number of respondents who achieved undergraduate education is perhaps an indication of the changing times as very few people entered university education before the 1960s. This compares sharply with the situation whereby the government set a target of 50% students going to university (The Guardian, 2010).

Table 5.1 Demographic Data							
		Freq	%			Freq	%
Gender	Male	47	32.00	Information Technology	Certificate	16	10.89
	Female	100	68.00		Degree	1	0.68
	Total	147	100.00		Experience	12	8.16
Age	Mean	64.5		Employment Status	None	115	78.23
	Median	64			Other	3	2.04
	Minimum	55			Total	147	100.00
	Maximum	82			Employed	76	51.70
Marital Status	Married	69	46.94	SelfEmployed	13	8.85	
	Widow	31	21.09	Volunteed	6	4.08	
	Separated/ Divorced	26	17.69	Retired	45	30.61	
	Other	2	1.35	Other	1	0.68	
	Total	147	100.00	Total	147	100.00	
Residential Status	Living alone	50	34.01	Yearly Income	Less than £15000	57	38.78
	Living with spouse/partner	66	44.90		£16000 to £25000	36	24.49
	Friend/s	3	2.04		£26000 to £35000	10	6.80
	Residential/ nursinghome	1	0.68		N/A	40	27.21
	Other	0	0.00		Total	147	100.00
	Private	22	14.97		Indian	4	2.72
	HomeSchool	5	3.40		White Irish	29	19.73
	NoSchool	6	4.08		Caribbean	1	0.68
	Other	3	2.04		African	6	4.08
	Total	147	100.00		Chinese	0	0.00
Education Qualification	Primary	46	31.29	Asian	5	3.40	
	Secondary	52	35.38	Other	3	2.04	
	College	21	14.29	Total	147	100.00	
	UnderGraduat	13	8.84				
	PostGraduate	7	4.76				
	Other	8	5.44				
	Total	147	100.00				

Regarding information technology background, the results also show that a majority of the respondents, 115 out of the 147 (or 78.23%) did not have an information technology(IT) qualification. However, 16 or 10.89% hold a certificate in IT, and 8.16% have some IT experience. The results further reveal that just over half of the respondents (51.70%) are employed while 30.61% are retired and 8.85% self-employed. The fact that 51.70% of the respondents are employed is perhaps a sign of the changing times in the sense that most

people used to be expected to retire at 60 years old especially women. The annual income statistics of the respondents show that 38.78% of the respondents have an income of less than £15,000 annually, while 24.49% in the region of £16,000 to £25,000. Finally, the results in Table 5.1 show that the majority of the respondents are White British (61.23%). The only other significant group is the White Irish which account for 19.73% of the respondents.

5.3 The extent of e-commerce adoption among older people

The extent of adoption of e-commerce adoption as explained in the previous chapter was measured by the extent to which older people undertook e-commerce activities. Figure 5.1 illustrates the extent of adoption of each e-commerce activity. Specifically, it was discussed that an index of e-commerce adoption was used. The index of e-commerce developed in this study consisted of six sections (devices used, services performed online, products or items bought, household bills paid online, banking transactions performed, products or items sold online) as depicted in Table 5.2. Some of these categories were adopted from the studies which have investigated the uses of e-commerce in the past (Iyer & Eastman, 2006; Martinez-Pecino et al., 2013; McCloskey & Lepper, 2010; McCloskey, 2006; Ryu et al., 2008; Sorce et al., 2005; Smith, 2008) and some are self-explanatory such as the devices used in e-commerce, household bills and bank transactions performed online.

When comparing the six sections, the results shows that the first section which deals with devices used has the highest sub- index of 0.55 and the last section which shows the products or items sold has the lowest sub -index of 0.13, which meant that the older people who took part in this particular study were not involved in selling as much as the buying side of e-commerce. The findings of this study suggests that the grand index of 0.32 (32%) is the average extent of e-commerce adoption among the older people who took part. This indicates that the extent of adoption is lower side, which is slightly below 50 %.

Table 5.2 Extent of adoption of e-commerce

Item No	Items	Mean	Std Dev	Min	Max
	Which of the devices do you use?				
1	Debit,Credit,Visa Cards	1.00	.00	1.00	1.00
2	Automated Teller Machine(ATM)	.82	.38	.00	1.00
3	Barcode reader	.27	.44	.00	1.00
4	Fax machine	.16	.36	.00	1.00
5	Mobile phone	.78	.42	.00	1.00
6	Computer, Laptop, Tablet	.77	.42	.00	1.00
7	Other (please specify)	.02	.14	.00	1.00
	Sub-index	0.55	.31	.00	1.00
	Which of these services do you usually perform on the internet?				
8	Pay bills	.65	.48	.00	1.00
9	Holidays, flights, tickets	.59	.49	.00	1.00
10	Financial investments	.15	.36	.00	1.00
11	Comparison shopping	.47	.50	.00	1.00
12	Other (please specify)	.00	.00	.00	1.00
	Sub-index	0.38	.37	.00	1.00
	Which of these products or items do you usually buy on the internet?				
13	Food, groceries	.14	.34	.00	1.00
14	Books, magazines	.35	.48	.00	1.00
15	Videos, music, games	.32	.47	.00	1.00
16	Buy goods/ items	.57	.50	.00	1.00
17	Buy general household goods	.17	.38	.00	1.00
18	Clothes, shoes, jewellery, cosmetics	.46	.50	.00	1.00
19	Electronic appliances	.20	.40	.00	1.00
20	Toys, flowers	.21	.41	.00	1.00
21	Other (please specify)	.05	.23	.00	1.00
	Sub-index	0.27	.41	.00	1.00
	Which of these household bills do you pay on the internet				
22	Mortgage/rent	.46	.50	.00	1.00
23	Insurance	.29	.45	.00	1.00
24	Electricity/Gas	.36	.48	.00	1.00
25	Council Tax	.31	.46	.00	1.00
26	Broadband, Telephone/Mobile	.29	.46	.00	1.00
27	TV licence	.31	.47	.00	1.00
28	Sky/Cable	.17	.38	.00	1.00
29	Water	.18	.39	.00	1.00
30	Other (please specify)	.02	.14	.00	1.00
	Sub-index	0.27	.41	.00	1.00
	Which of the following banking transactions do you perform online?				
31	Transfer money between different accounts within a bank.	.44	.50	.00	1.00
32	Transfer money between different bank accounts	.33	.47	.00	1.00
33	Pay individuals	.52	.50	.00	1.00
34	Mobile banking	.55	.50	.00	1.00
35	Telephone banking	.42	.50	.00	1.00
36	None of the above	.03	.00	1.00	.068
37	Other (please specify)	.00	.08	.00	1.00

		0.33	0.39	.00	1.00
		Mean	Std Dev	Min	Max
	Which of these goods or items do you sell on the internet?				
38	Food groceries	.00	.00	.00	.00
39	Books, magazines	.03	.18	.00	1.00
40	Electronic appliances	.06	.24	.00	1.00
41	Clothes, shoes, jewellery, cosmetics,	.12	.32	.00	1.00
42	Toys, flowers	.02	.14	.00	1.00
43	Videos, Music, games	.03	.16	.00	1.00
44	Computer programmes, games	.01	.08	.00	1.00
45	Other (please specify)	.79	.41	.00	1.00
	Sub-index	0.13	.19	.00	1.00
	Grand Index	0.32	.35	.00	1.00

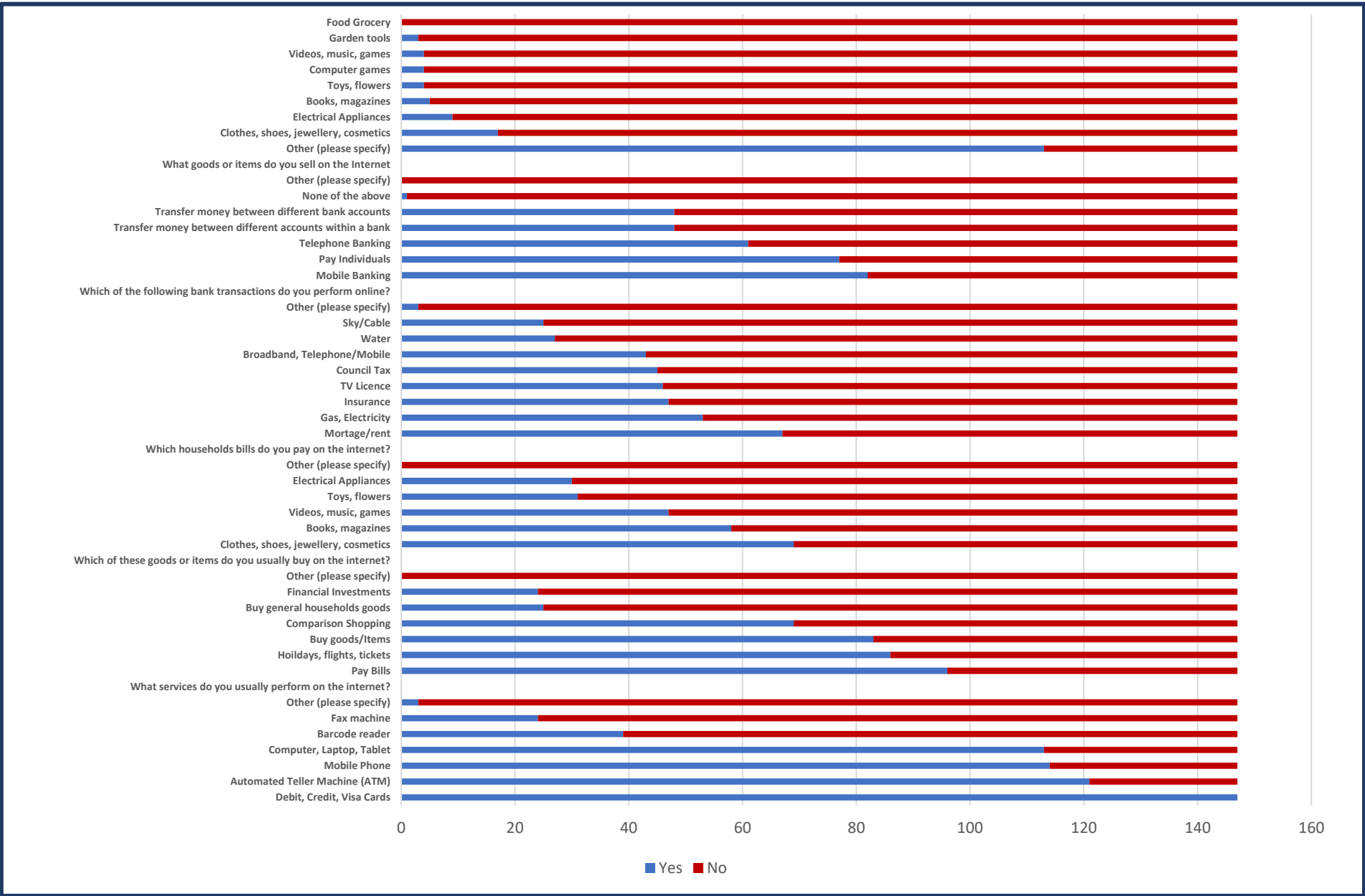


Figure 5.1 Extent of Adoption of e-commerce

5.4 The uses of e-commerce among older people

The second objective of the research is to determine the uses of e-commerce by older people and is illustrated in Figure 5.1. The results in Table 5.3, Group A results show that 72.11% of the respondents use e-commerce for booking holidays, while 65.31% of the respondents use e-commerce for paying bills and 64.63% use e-commerce to buy products/items. Further, the results also show that booking of flights is not far behind with 86 respondents or 58.50% and 57.14% use used e-commerce for buying tickets. This is not perhaps surprising given that these people retired or still working part-time and they also have some disposable income (Eastman & Iyer, 2004) and they want to travel to see parts of the world that they never got to see when there were growing up or raising up young families. This was consistent with (Sum et al., 2009) studies who found higher percentages on booking holidays. In their study, Sum et al. (2009) found 68% to have booked for frights and holidays.

Regarding the use of e-commerce by items, the results in Table 5.3, Group B suggest that 83 out of the 147 (or 56.46%) use e-commerce to buy clothes, shoes and jewelry. Another 44.22% of older people also use e-commerce to buy books and magazines. This is perhaps surprising given that these older people grew up in an era where there was not internet and they were used going into the shops and try the clothes before they made a purchase. However, this may be due to the allure of cheap prices on the internet that may tempt older people to use the e-commerce for items they were used to go to the shops to try before they buy. The surprising thing, however, is that only 16.33% of older people said that they used e-commerce to buy grocery. With older people's mobility problems and also the fact that groceries are a daily need one might have thought that a much higher percentage would use e-commerce to shop for groceries and get their grocery delivered. The low level of uptake of online grocery shopping may be explained by a number of factors. For example, it may be that older people are lonely and may see the going to buy grocery as a chance to mix with others and relieve boredom. Also, it may be that older people are wearier of using their debit or credit cards online and it might be the minimum age of the sample in this study which is 55, would have influenced this because some of them were still working .

Finally, it is also possible that older people find online shopping too complicated and therefore prefer having to go into the shop. The results in Table 5.3, Group C indicates that

when it comes to the use of e-commerce in paying household bills, the mortgage or rent is the most popular with nearly 45.58% of the respondents having done so online. The next most popular is the payment of electricity and gas (36.05%), followed by TV license (31.29%) and council tax at 30.61%. The least percentage of e-commerce uses among older people were shopping for groceries and financial investments.

Table 5. 3 - The Uses of e-commerce among older people

	Uses (No)	Percentage (%)
Group A – Uses by category		
Book holidays	106	72.11
Pay bills	96	65.31
Buy products, items	95	64.63
Book flights	86	58.50
Buy tickets	84	57.14
Comparison shopping	80	54.42
Financial Investment	24	16.33
Group B- Uses by Items		
Clothes, shoes, jewelry	83	56.46
Books, Magazines	65	44.22
Videos, music, games	58	39.46
Toys, flowers	38	25.85
Electrical appliances	36	24.49
Household goods	25	17.01
Food grocery	24	16.33
Group C – Use by Household bill		
Mortgage/Rent	67	45.58
Electricity, Gas	53	36.05
TV License	46	31.29
Council Tax	45	30.61
Broadband, Telephone, Mobile	43	29.25
Insurances	42	28.57
Water	27	18.37
Sky, Cable	25	17.01

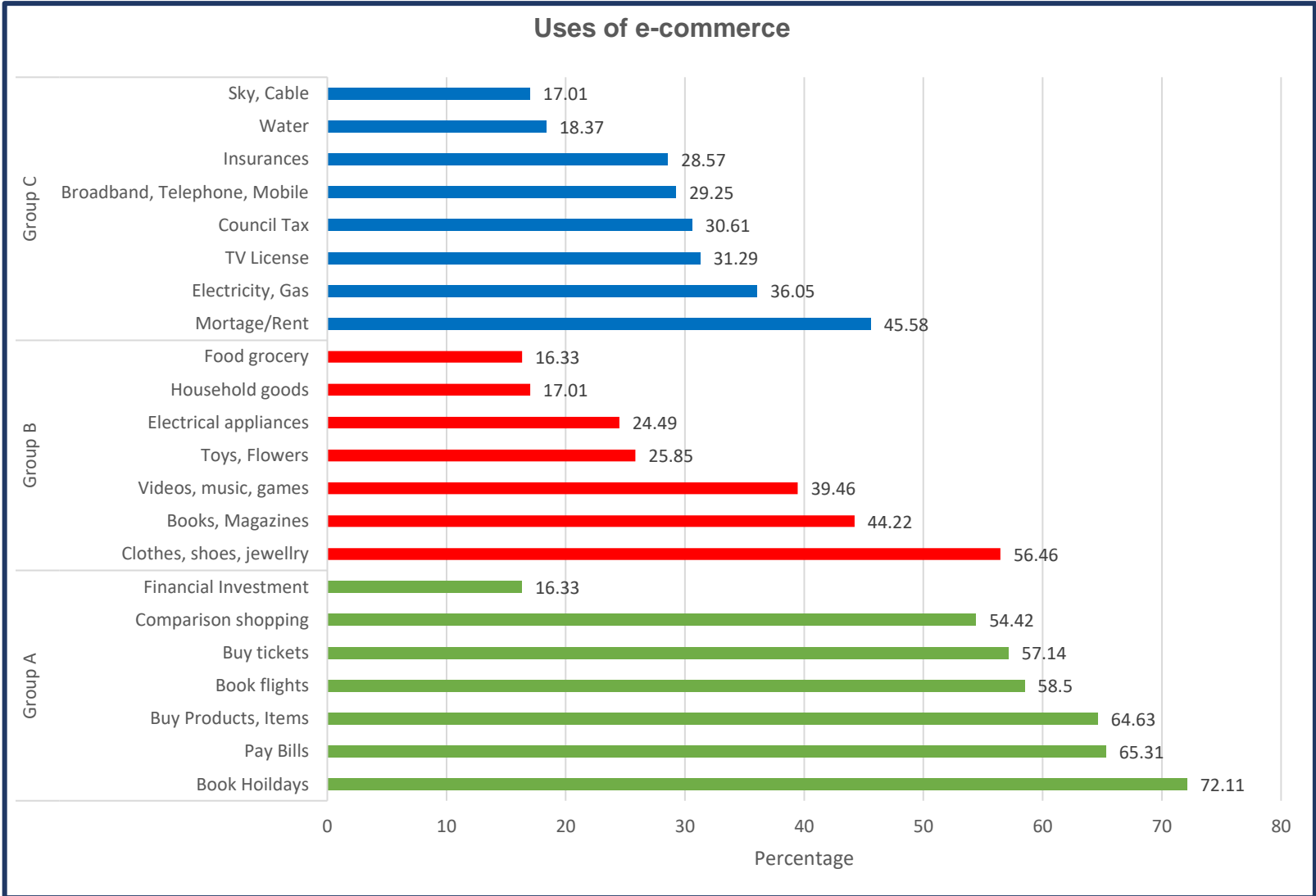


Figure 5.2 Graph showing uses of e-commerce adoption among older people

5.5 The barriers to e-commerce among older people

5.5.1 Perceived ease of use (PEOU)

Table 5.4 presents the results of the issues of the 15 statements put to the respondents to assess their perception of perceived ease of use as a barrier to e-commerce adoption and is based on Technology Adoption Model. According to the mean statistics, the results show that the most significant barrier among PEOU is that older people 'find the information on the website difficult to understand' since there is, on average, 2.2653 out of a possible 5 with this statement. This is followed by the difficulty in reading and navigating the e-commerce website. The third significant aspect of ease of use as a barrier is that older people find it difficult to search for goods when shopping online. Regarding the insignificant barriers relating to ease of use are the transfer of money between different accounts followed by buying books online and then buying clothes, shoes, jewelry online. The fact that the movement of money between different accounts, buying of books and clothes online are rated as less of barriers under ease of use is not surprising given that these are the sort of activities that most older people would be expected to do more frequently. For example, as pensioners they are likely to have the need to move money from current accounts to savings accounts each time they receive their pensions. This is supported by by Mattila et al. (2003) who found that the most popular mode of payment among older people was bill payment service with 37%. Also, older people are more likely to have interest in reading books to occupy their time. Finally, given the mobility issue that comes with age discussed in Chapter 3, it is also likely that older people would benefit from shopping for clothes and jewelry online.

This can be also explained by the Motivation Theory. Older people's behaviour may be influenced by the extrinsic factor (usefulness) in their acceptance of the activity of transferring money between bank accounts. This was consistent with previous studies which indicated online shopping to be the most common e-commerce activity performed (Eastman & Iyer, 2004; Hill et al., 2008; Marston et al., 2016). Hence the more often they undertake the same activities, the less they perceive it to be a barrier.

Table 5.4 Perceived ease of use					
	N	Mean	Std Dev	Min	Max
E.1. I find the information on websites easy to understand	147	2.2653	.93871	1.00	5.00
E.2. I find it easy to read and navigate e-commerce web sites/ pages.	147	2.5306	.91641	1.00	5.00
E.3. I find it easy to search for goods when I shop online	145	2.5724	.91093	1.00	5.00
E.4. I find it easy to do comparisons shopping online	146	2.6849	.93774	1.00	5.00
E.5. I find it easy to buy a car on the internet.	30	2.7333	1.33735	1.00	5.00
E.6. I find it easy to sell books online?	22	2.7727	.92231	1.00	5.00
E.7. I find it easy to sell household goods or appliances online	29	3.1379	.99010	1.00	5.00
E.8. I find it easy to sell clothes/ shoes online?	27	3.1481	.71810	1.00	5.00
E.9. I find it easy to buy household goods or appliances on the internet.	91	3.1538	.95363	1.00	5.00
E.10. I find it easy to pay bills on the internet.	111	3.1712	1.08606	1.00	5.00
E.11. I find it easy to buy general groceries on the internet	44	3.2955	1.00185	1.00	5.00
E.12. I find it easy to buy insurances/ services on the internet.	55	3.3273	1.05505	1.00	5.00
E.13. I find it easy to buy clothes/shoes /jewelry online?	86	3.3488	.87807	1.00	5.00
E.14. I find it easy to buy books online?	80	3.4875	.79546	1.00	5.00
E.15. I find it easy to transfer money between accounts from different banks	74	3.6892	1.01934	1.00	5.00

5.5.2 Perceived Usefulness

The results of the perceived usefulness as a barrier to e-commerce adoption are presented in Table 5.5 and are based on Technology Adoption Model. These results show that the most significant barrier among usefulness is that the older people do not necessarily think that there are more advantages/ benefits of e-commerce than disadvantages as indicated with a mean agreement rating of 2.4514 with that statement. It could be explained by the theory of reasoned action that older people's perception that most people who are important to them or who are around them for example, friends, think they should or should not buy or sell on the internet. This is influenced by their perception of the beliefs of those people who are around them.

Table 5.5 Perceived Usefulness					
	N	Mean	Std Dev	Min	Max
U.1. There are more advantages/ benefits of e-commerce than disadvantages	144	2.4514	.89153	1.00	.89153
U.2. I feel e-commerce helps me make better purchase decisions.	143	2.6434	.93752	1.00	.93752
U.3. I find products and services cheaper online than from shops.	146	2.6438	.95945	1.00	.95945
U.4. I can shop for products online that are not available or difficult to find in the shops	145	2.7379	1.04762	1.00	1.04762
U.5. I feel that online transactions are quicker and saves time	146	2.8219	1.04178	1.00	1.04178
U.6. I find it convenient to shop online	139	2.8921	.97572	1.00	.97572
U.7. I like being able to compare products	146	3.0000	.96847	1.00	.96847
U.8. I feel it is important to make shopping a social event	146	3.0000	.96132	1.00	.96132

Older people also did not necessarily think that e-commerce helps them to make better purchase decisions and that product and services are cheaper online than from traditional shops. This is consistent with Olphert et al. (2005)'s study which found that older people did not think internet would be beneficial to them and they made a conscious decision not to engage so that they preserve their traditional habits. This may be also an indication perhaps that older people are not very good at searching for products on the internet using different search engines or words to find cheaper deals. The fourth significant barrier under 'usefulness' is that older people also do not think that shopping online avoids the problems of going to traditional shops, since to them its not a hassle but they actually enjoy the social aspect of it. Regarding the less significant barriers under 'usefulness' are the fact that older people like being able to compare products and feeling that shopping is a social event (Chakraborty et al., 2016). The third insignificant barrier is that older people find it convenient to shop online. This shows that older people value going to shop in person and touching or trying the products before they buy them (Berry, 2011; Knowles & Hanson, 2018).

5.5.3 Security and Privacy

The four statements put to the respondents to measure privacy and security issues as a barrier to e-commerce adoption and the results are presented in Table 5.6. The results indicate older people are very concerned about security and privacy issues. In particular the

results suggest that they fundamentally disagree with the statements that (1) I am not concerned with personal information being shared (1.00), (2) I am not concerned about unauthorized use of my credit card cards (1.00) and (3) I am not concerned about transactions and shipping errors (1.00). These results suggest that these issues are the most significant barriers among security and privacy issues. The findings are consistent with Gatto and Tak (2008) and Morris et al. (2007) studies. The studies found that many older people avoid online activities that could put their personal details at risk for identity fraud. The findings of this study were also supported by previous studies who found security and private issues to be significant barriers to adoption of technology and e-commerce by older people (Chakraborty et al., 2016; Teo, 2006) and Olphert et al. (2005)'s study found out that security issues were seen to be the most significant barrier of internet use among the older generation with 56% and privacy issues were ranked fourth with 35 %. The aspect of security which is seen to be insignificant barrier is the concern about transaction and shipping errors.

Table 5.6 Security and Privacy (SP)					
	N	Mean	Std Dev	Min	Max
SP.1. I am not concerned about my personal information being shared.	146	1.5411	.63384	1.00	3.00
SP.2. I am not concerned about unauthorised use of my credit card	146	1.1233	.38757	1.00	3.00
SP.3. I am not concerned about transaction and shipping errors.	146	1.4041	.59398	1.00	4.00
SP.4. I am not concerned the products do not perform as intended	146	1.6438	.69222	1.00	3.00

5.5.4 Lack of Trust

From Table 5.7 it can be seen that the most significant barrier to e-commerce adoption under 'trust' is the quality of the products that are sold online. It can also be seen that the respondents ranked the 'trust in the information presented on e-commerce websites' as a second significant barrier and the 'trust on online delivery service system' as a third barrier. The least significant barrier is the 'trust when buying from a website they have used in the

past'. It appears there was a big variation in disagreement on the trust on the quality of the products sold online' with a standard variation of 0.65216.

Trust is a major factor in facilitating customer intention to buy. Overall, the results which suggest that lack of trust is a significant barrier to e-commerce adoption by older people is consistent with previous studies who also found trust to be more of a barrier to e-commerce. The findings of this study is also supported by Gefen (2000)'s study who found that trust was an important factor on the intentions to inquire about books and their intention to buy them. Other studies such as McCloskey and Lepper (2010) found trust to be a significant barrier to e-commerce participation for mature adults aged between 50 to 69 years old. They also found that trust had a positive impact on ease of information accesss and usefulness. This is also supported by Chakraborty et al. (2016)'s study which found that trust is a significant barrier towards e-commerce when their study examined people's intentions to engage in e-commerce in the context of a significant data breach in an online shop.

Table 5.7 Trust					
	N	Mean	Std Dev	Min	Max
T.1. I trust the quality of the products sold online.	146	2.5753	.65216	1.00	4.00
T.2. I trust the information presented on e-commerce websites.	144	2.6111	.71067	1.00	5.00
T.3. I trust online delivery service system	146	2.7808	.74735	1.00	5.00
T.4. I trust buying from a website I have used in the past.	145	3.3724	.99265	1.00	5.00

Slyke et al. (2004)' s study found that trust in e-commerce websites is significantly related to intentions of customers to make purchase from the website even when other more traditional perceptions are considered such as compatibility, complexity and relative advantage. Gefen et al. (2000)'s study also found out that one of the factors which influences the consumers' s intensions to enact with the last website vendor from whom they purchased before rest on trust. McCloskey (2006)'s study found out trust to have a positive directly affected on frequency of use meaning that if the website is not trustworthy this will affect how often the customer shop there. Gatto and Tak (2008)'s study found out that some respondents did not trust the information they retrieved from the internet.

5.6 Determinants of e-commerce adoption by older people

Table 5.8 Descriptive Statistics on determinants

Section A	Variable	No	Percentage (%)	Coded
EcomAdopt	N/A	N/A	N/A	N/A
Gender	Male	47	31.97	1
	Female	100	68.03	0
Age	N/A	N/A	N/A	N/A
School	Sch Private	22	14.97	1
	Other	125	85.03	0
Marital Status	MSSingle	19	12.93	1
	MSOther	128	87.07	0
Residential Status	Family	27	18.37	1
	Other	120	81.63	0
Education Qualification	Primary	47	31.97	1
	Other	100	68.23	0
IT Qualification	ITCertificate	16	10.88	1
	Other	131	89.12	0
Employment Status	Self	13	8.84	0
	Other	134	91.16	1
Yearly Income	Less than £1500	57	38.78	1
	Other	90	61.22	0
Ethnic Origin	White British	90	61.22	1
	Other	57	38.78	0
Section B	Mean	Std	Min	Max
EcomAdopt	.3152	.09279	.13	.38
Gender	0.3197	.46797	.00	1.00
Age	64.4558	6.67364	55.00	82.00
MSSingle	.1293	.33663	.00	1.00
ReStaFamily	.1837	.38854	.00	1.00
SchPrivate	.1497	.35796	.00	1.00
EduQuPrim	.3197	.46797	.00	1.00
ITCertificate	.1088	.31251	.00	1.00
EmpStaSelf	.0884	.28490	.00	1.00
YrlyInc1	.3878	.48890	.00	1.00
EthnOrig1	.6122	.48890	.00	1.00

5.6.1 Correlation Analysis

To determine if there is no multicollinearity problems among the explanatory variables (individual characteristics), an analysis of the pair-wise correlations was carried out. Table 5.9 indicates the Pearson Product correlation coefficient among the individual characteristics (independent variables). The highest correlation of 0.262 was between age and education. The next highest correlation is between education and IT certificate of -0.193. It has been suggested (e.g., Field, 2000, Pallant, 2001) that multicollinearity problems in multiple regression analysis are considered harmful only when they exceed 0.8 or 0.9. Therefore given that the correlations are far below prescribed level it was concluded that there are no multicollinearity problems. Field (2000, p. 132) points out that the absence of high pair-wise correlations among the explanatory variables does not rule out the presence of multicollinearity. Therefore, further multicollinearity diagnostics involving variance inflation factor (VIF) and tolerance values were conducted. A VIF value of 10 is considered a large enough value at which to worry (Myers, 1990). The diagnostics carried out suggest that in each case, multicollinearity did not appear to meaningfully affect the results of this study. As Tables 5.9 indicates, the highest VIF value is 1.253.

Table 5.9 – Correlation analysis between dependent and independent variables											
Variable	Adopt OLS	Gender	Age	MS Single	ReSta Family	Sch Private	EduQuPrim	IT Certifite	EmpSta Self	Yrly Inc1	Ethn Orig1
AdoptOLS	1.000										
Gender	.090	1.000									
Age	.311**	-.032	1.000								
MSSingle	-.226**	-.003	-.106	1.000							
ReStaFamily	.130	-.062	-.030	-.026	1.000						
SchPrivate	.291**	-.165*	-.135	.009	-.101	1.000					
EduQuPrim	-.244**	-.032	.262**	.084	.165*	-.247**	1.000				
ITCertifite	-.101	-.005	-.040	-.070	-.053	.098	-.193*	1.000			
EmpStaSelf	-.079	.043	-.065	.094	-.024	.071	.095	.045	1.000		
YrlyInc1	-.030	-.067	-.134	.068	.019	-.060	-.067	-.054	.047	1.000	
EthnOrig1	.106	.037	.139	-.151	-.055	-.1762*	-.053	.054	-.047	.146	1.000

** . Correlation significant at the 1% level (2-tailed)

* . Correlation significant at the 5% level (2-ta

5.6.2 Multiple Regression Results

As noted in before, to examine the effect of individual characteristics on the extent of e-commerce adoption, the ordinary least square (OLS) multiple regression model was estimated (using the SPSS for windows) for the extent of e-commerce adoption. The model in Table 5.10 shows that the adjusted coefficient of determination (Adjusted R²) of 26.6% which suggests that the extent of adoption of e-commerce variations is explained by the applied independent variables (individual characteristics).

Table 5.10 Regression Results for E-Commerce Adoption						
R ²	.563		F-ratio			6.295
Adjusted R ²	.266		F Significance			.000
Standard error	.07949		Durbin-Watson			1.937
	β	Std. Error	Beta	t-value	Sig.	VIF
Variables						
(Constant)	.546	.069		7.860	.000	
Gender	-.018	.014	-.090	-1.235	.219	1.054
Age	-.004	.001	-.271	-3.562	.001	1.156
MSSingle	.064	.020	.233	3.191	.002	1.060
ReStaFamily	-.019	.017	-.080	-1.095	.275	1.052
SchPrivate	.061	.020	.237	3.086	.002	1.174
EduQuPrim	-.032	.016	-.160	-2.020	.045	1.253
ITCertifite	-.053	.022	-.178	-2.444	.016	1.058
EmpStaSelf	.021	.024	.066	.906	.367	1.046
YrlyInc1	-.025	.014	-.132	-1.792	.075	1.078
EthnOrig1	.046	.014	.243	3.233	.002	1.120

5.7 Discussion

Gender

The results in Table 5.12 which shows that gender does not significantly influence the extent of e-commerce adoption by older people are inconsistent with the arguments advanced in the hypotheses development. For example, it had been suggested that according to Lian and Yen (2014) men want to shop online more than women because they have a more positive perception regarding compatibility, complexity, relative advantage. The negative co-efficient of -.018 in respect of gender means that women are more likely to adopt e-commerce than men although the difference is not significant. These results showing a statistically insignificant

influence of gender on the extent of e-commerce adoption contradict the findings by Hashim et al. (2009) who reported that gender plays an important role in influencing attitude towards online shopping behaviour. The results also contradict those reported by Gupta et al. (1995).

Further, it can also be argued that the differences between men and women in adoption technology are due to differences in biological characteristics between men and women. For example, it has been suggested that men possess greater analytical, logical and problem-solving abilities than women and thus are more suited to technical fields than women. Women are ruled by the body instead of the mind, and possess too much emotion to excel in technical fields. It can therefore be argued men are more likely to adopt e-commerce than women on the basis that men are better at information related tasks than women. Existing empirical evidence seems to support the expectation that men are more likely to adopt e-commerce compared to women. For example, Michie and Nelson (2006) show that compared to men, women are less likely to adopt and use new technology, have less confidence in their ability to use new technology, and are less likely to choose a career in information technology. Lian and Yen (2014) found that men have significantly higher online shopping drivers and lower barriers compared with women. Slyke et al. (2002) found that male older consumers liked to shop over the internet more compared to their women counterparts. The study by Mattila et al. (2003) found that mature men banked more often over the internet than mature women.

Age

The current study found out age to be a significant negative predictor of e-commerce adoption by older people. This is consistent with both McCloskey (2006) and McCloskey and Lepper (2010). The two studies found out that respondents over the age of 70 were less likely to have shopped on line and were more negative concerning how easy it is to access information compared to the younger ones. Ajuwon and Popoola (2014)'s younger doctors use Internet resources than their older colleagues. This finding confirms that of a previous study in which the majority of Internet users tend to be younger adults

Many reasons can be advanced why e-commerce adoption may differ by age. For example, since complexity is a factor that has been linked to the adoption of e-commerce under the diffusion of innovation theory, many older people may be reluctant to adopt e-commerce as they perceive internet buying and selling as being relatively difficult to do compared to sending emails, social networking or playing games. This is on the basis that the introduction of this type of innovation

can be intimidating for older people especially if this requires them to change their normal practices (for example, visiting the bank or shopping at a grocery shop). This is consistent with McCloskey and Lepper (2010) who found older people find it difficult to access the information making them less likely to participate in buying and selling on the internet. Another reason for expecting younger people to be more likely to adopt e-commerce is security related. According to McCloskey (2011) mature respondents are more likely than young respondents to worry about providing financial information and personal information when shopping on the internet. The study also found out that younger people agreed that online shops have sufficient security controls to protect their personal and financial data. Lepper and McCloskey (2011) also found out that even though older people aged 70 and older seek information on products and services they rarely made any purchases. Taken together these findings suggest that older people are less likely than younger people to engage in e-commerce for security reasons.

Marital status

Regarding marital status, the findings show that there is a positive and significant relationship between being single and adoption of e-commerce. The finding is consistent with Hashim et al. (2009) who found that the respondents who are divorced or widowed have a higher rate of engaging in electronic commerce followed by the respondents who are single and the least are those respondents who are married. The findings is also consistent with Taylor et al. (2003) finding that people who live alone had a higher level of using home internet for education purposes, for entertainment, and for email. A possible explanation of the finding that single people are more likely to adopt e-commerce compared to married people is that the later have a lot of things to take care of when they are at home such as children and also the fear of ignoring their partner. However, the finding is contradictory to the argument that single people were less likely to adopt e-commerce or take longer to adopt because they do not have anyone living with them who can easily show them how to engage in e-commerce. However, with married couple there were more likely to adopt e-commerce because if one partner adopted e-commerce first then the other partner was also likely to adopt realising the benefits of using e-commerce. The finding is also contrary to Taylor et al. (2003) who found that compared to those participants who were married, single people showed a lower level of internet use.

Residential Status

The findings relating to residential status show that it has not significant impact on the extent of e-commerce adoption. Although the relationship is not significant, the negative sign suggests that

people who live with the family are less likely to adopt e-commerce. This is because the respondents who lived with the family were coded '1' and the rest '0' in the study. The negative relationship between computer use and living with the family is consistent with Taylor et al. (2003) who found that people who live alone had a higher level of internet use. The finding that respondents who live with family are less likely to adopt e-commerce may be explained by the fact that using the internet when living with family may be regarded as anti-social. This contrast with people who live alone who may regard being on the internet as a way of occupying themselves.

School type

The results of the school type show a significant and positive relationship between school type and e-commerce adoption. In the context of this study, the results suggest that those who went to a private school are more likely to adopt e-commerce. Although there are no specific studies on the relationship between school type and e-commerce adoption, Maitlo et al. (2015) found that those bank customers who attended private school adapted online banking services in Hyderabad compared to the other school types. The possible explanation of why those who attend private school are likely to adopt e-commerce is that private school have more resources compared to state and other schools. This means that they are likely to teach computing than other schools. The exposure to computing by those who went to private school could then influence them to adopt e-commerce in their lives. Moreover, also those parents who send their children to private school would be wealthy enough to afford to buy a computer at home. As a result, when growing up these children from wealth families are learning these technologies both from home and school.

Education

The findings suggest that education is negatively associated with e-commerce adoption. In the context of this study, it means that those respondents who had primary education as their highest qualification were less likely to adopt e-commerce than those who had achieved higher qualifications. In other words, the finding suggest that the higher education attainment is positively associated with e-commerce adoption. This is consistent with Burke (2002) who report that older people consumers with higher levels of education were more comfortable shopping online compared to those with none or less education qualification. The results also support those by Eastman & Iyer (2004) who found that the seniors with higher education levels were more likely to use the internet compared to those without. Similarly, the results are also consistent with Sum et al. (2009) who also found out that participants with higher education were more likely to have used the internet longer thereby engaging in e-commerce. The finding may be due to the fact that those

with higher education attainment are likely to own a computer (Wilson et al., 2003). Werner et al. (2011) found that the respondents with higher education levels were more likely to be computer users compared to those with no education. However, the findings contradict those by Harold (2006) who found that older people who were educated were less likely to use the internet than those who were not educated.

IT Certificate

The findings which suggest that those with IT certificate were more likely to adopt e-commerce are consistent with the suggestion that the more IT knowledge one has is positively associated with e-commerce adoption. Specifically, the results suggest that those with higher IT education that a certificate are more likely to adopt e-commerce. This finding appears to be consistent with Corbitt et al. (2003) who found that older people were more likely to purchase from the internet if they have more experience in using the internet thus leaving those inexperienced ones not likely to engage in using the internet. The findings are also consistent with Karjaluo et al. (2009) who report that experience of computers and technology were found to influence online banking. In that study they found a high correlation between prior computer experience, computer attitude and prior computer experience. In another words a person who have some knowledge of using computers generally, will more likely participate in using the online facilities more compared to those with less knowledge. Also Grimes et al. (2014) found that housing authority residents with prior experience on the use of computers were found to be the most important factor associated with higher knowledge and awareness of security hazards and threats. Finally, the finding also support Sulaiman et al. (2008) who report that younger generation were more likely to shop online because of their knowledge in computer technology as opposed to the older generation.

Employment status

The findings for employment status show that there is not significant relationship with the extent of e-commerce adoption. The finding contradicts Peacock (2007) who suggest that occupational status among other characteristics, positively influence people's odds to use the Internet. The finding is also inconsistent with the argument that given the widespread of internet application in workplaces, older people who are still employed are more exposed or have more opportunities to interact with computers and hence are in a position to adopt the technology, use the internet and adopt e-commerce. This view was empirically supported by Ameme (2015) who report a strong correlation between employment status and customer adoption and usage of internet banking services in Ghana. Lastly, the findings also appear not to lend support to the argument that those

employed full-time are likely to adopt e-commerce because they are likely to own a computer. For example, Wilson et al. (2003) found out that those respondents who were employed full-time were more likely to own home computers compared to the those who were not employed.

Annual income

The result relating to the association between annual income and e-commerce adoption shows that there is no significant association. This contradicts the finding by Eastman and Iyer (2004) that older people who have higher levels of income were more willing to both use the internet and buy products over the internet. Similarly, the finding contradicts the notion that people with higher income levels would be willing to try new things, which could be in this case adopting e-commerce. Further, the findings also does not support the findings by Sum et al. (2009) that participants with higher income levels were more likely to have used the internet longer thereby engaging in e-commerce. In addition, the findings is also contradictory to Mattila et al. (2003), Bucy (2000), Martin and Robinson (2007), Hashim et al. (2009) and Erickson (2011) who similarly found that income is a significant determinant of e-commerce use. However, the finding is consistent with Yi (2008) who report a negative relationship between income and computer usage.

Ethnic origin

The findings relating to ethnicity suggest that English people were more likely to adopt e-commerce than any other nationalities. This is consistent with the results reported by Wilson et al. (2003) which suggest that black respondents were significantly less likely to own home computers compared to their white counterparts. Similarly, the results by Perrin and Duggan (2015) suggest that African-Americans are less likely to use the internet than their counterparts white Americans. The results are also consistent with Wilson et al. (2016) who after controlling for socioeconomic variables, reported that African Americans were still less likely to have home computers or Internet access. Similarly, the results are consistent with Katz & Aspen (1997) who found that more blacks and Hispanics did not use the internet and most of them were unaware of the internet's existence compared to their white counter parts. Finally, the results support the findings by Werner et al. (2011) that the white respondents recorded the highest computer usage compared to Hispanic older people adults.

5.7 Summary and Conclusion

The purpose of this chapter was to present and discuss the results of Study One. The chapter started by a discussion of the respondents' background followed by the extent of e-commerce adoption by older people. The results suggest that on average the extent of adoption among the older people who took part was 32.0%. The uses of e-commerce by older people specifically explaining what goods or services they use e-commerce were outlined and the most popular use was booking holidays with 72.1%, paying bills with 65.3% and buying goods/items with 64.6%. The lowest score was among online food grocery and financial investments with 16.33%. The barriers to adoption of e-commerce were then presented and the study found the most significant barriers were older people find it difficult to understand the information on websites and to read and navigate the websites pages. The study also found age, marital status, school type, education qualification and IT to be significant determinants of the extent of e-commerce adoption. However, gender, residential status, income and employment status were found to be insignificant determinants. Finally summary and conclusion were presented.

CHAPTER 6: STUDY TWO RESULTS AND DISCUSSION

6.1 Introduction

This thesis examines factors and barriers in relation to the adoption of e-commerce in older people. Study One examined the extent of e-commerce adoption using an innovative extent of adoption index. The Study also investigated what older people use e-commerce for, the barriers to e-commerce adoption and the individual characteristics associated with the extent of e-commerce adoption. Some of the results yielded from Study One indicated that there was less tendency for older people shopping for food online compared to other e-commerce activities such as online banking. This is surprising given that grocery shopping is a regular task given that food items such as vegetables, milk and bread can only last a few days and therefore we can assume there is a need to buy such items perhaps on a weekly basis.

Thus, Study Two was carried out to explore the accessibility and usability issues of two online grocery shops, Asda and Tesco, in order to provide a better understanding of some of the issues faced by older people when they shop for food online. The study also focussed on gaining some information on the participants' attitudes and motivation with regards to online shopping in general. The two particular websites were chosen because during Study One participants were asked which online grocery shops they use, and Tesco and Asda came at the top compared to other grocery websites. The objectives of this study were outlined earlier in Chapter 4, Section 4.5.

The rest of the chapter will discuss the following: Section 6.2 discusses the online shopping task which includes participants demographics, then participant consent, followed by the task procedure. Section 6.3 presents the results of the grocery shopping task 6.3. which also discusses observation, thinking aloud methods and interviews conducted. The chapter also discusses the analysis of the interview results using NVivo 11 software package. The final section discusses the summary and conclusion.

6.2 Online Shopping Task

6.2.1 Participants

Ten older participants who satisfy the inclusion and exclusion criteria as discussed earlier in Chapter 4 took part in the online shopping task. Unlike Study One, this Study was based on practical observation of 10 older people shopping for food items from Tesco and Asda websites. The people had indicated earlier their willingness to take part in Study Two when they completed the questionnaire which was the primary data gathering instrument for Study One. They were contacted individually through their emails or any other preferred contact details they had given. The ten older participants who took part consisted of six women and four men. The age range was 58 to 70 years old. The sample size of ten was adequate because this was a supplementary study to Study One. Study One was the main study of the research and was completed with a sample size of 147 respondents whereas usability studies can be carried out with a relatively small sample (for example, Mellor et al., 2008; Munusamy & Ismail, 2009; Trocchia & Janda 2000). The Study Two was completed in two months from December, 2017 to January, 2018.

6.2.2 Participant Consent

To gain consent, each participant was approached separately by the researcher as a follow-up from Study One. The researcher then introduced themselves and asked for their permission to talk to them. Israel and Hay (2006) pointed out that informed consent can be made if there are sufficient information and understanding of the risks and benefit associated with participating in the research. The participants were given adequate information before they decided to take part because informed consent process provides respect for people (Walsh, 2009). So in this case, the researcher would ask the participant if they still wanted to take part in the study. If they agreed the researcher carried out the procedure or arranged to come back on the agreed day and time to carry out the procedure. All the forms with the information given to the participant are discussed in the Online Task Procedure, Section 6.2.6.

6.2.3 Venue

Poole day centre was chosen to be the most appropriate venue to carry out the online shopping task for the following reasons:

- Had agreed to facilitate Study two
- Had good Wi-Fi connection
- Could provide a quiet room to carry out the task
- Had access to some of the participants who had shown a willingness to take part in Study two.

6.2.4 Pilot Study

Before the Study was conducted a pilot study was carried out with three older participants and the observation Think Aloud form (see Appendix A.3) was used. After data analysis of the 3 participants a “Set time” was calculated by finding the average time taken among the three participants which was 25 minutes. Some amendments were made which includes the method of how the participants were interviewed. The researcher decided to ask all the questions and wrote the answers down instead of the participants writing down the answers on a form. Also the researcher recorded the interview and did the analysis later after each interview. Thus, in Study Two, three older participants took part in the pilot study and ten participants took part in the main study.

6.2.5 Task Procedure

As outlined in Chapter 4, all the Ethical Considerations were followed before, during and after the online shopping task (see Appendix A. Ethics Paperwork). Before the commencement of the task the participants were given the Participant Invitation Form (see Appendix A.3) with the information inviting the participant to take part in the study. Secondly, the Participant Information Sheet (see Appendix A.3) was handed out which discusses why and how the study is going to be carried out. Then the participant was given a Consent form (see Appendix A.3) to sign. On this form the participant was asked about their medical fitness to take part in the online shopping task. Otherwise if they suffer from any medical problems which would impact their participation, the researcher would ask them not to take part. The participant was then handed the Ethics Issues & Survey Questionnaire form (see

Appendix A.3) with all the details and procedure of the online shopping task. Then the participants were asked to carry out the online shopping task for some food groceries from Asda (www.asda.com/groceries/) and Tesco (www.tesco.com/groceries/). These particular food items were chosen because these are among the daily staple food items bought on a regular basis in most households among older people. They were asked to shop for the following items:

- Semi Skimmed Milk 1 litre
- Porridge oats 1kg
- Free Range Eggs 6 pack
- Chicken Breast Fillets 500g
- Wholemeal Bread 800g

To assist the participants to accomplish the task some instructions were given to the participants: Go on the internet and type: (www.asda.com/groceries/)

1. You should open an account by registering first
2. Search for the five items and place them in the online basket
3. Once you have put all five items in the basket STOP and exit
4. Go on the internet and type: (www.tesco.com/groceries/)
5. Repeat steps 2 to 4 above
6. Then you have finished EXIT

The following Figure 6.1 illustrates the task procedure.

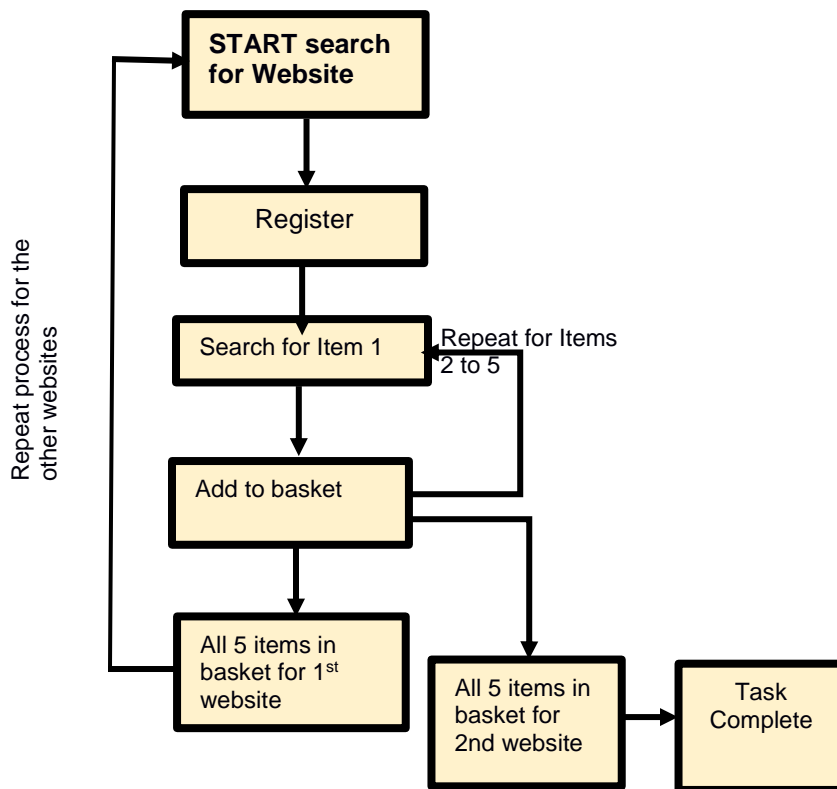


Figure 6.1 Online Shopping Task flow diagram

The participants were required to do as much as they could on their own although they could ask the researcher for assistance only if there were unable to proceed. The researcher was present throughout to observe as they carried out the task. Apart from the researcher observing them, their interactions with the websites were recorded using Camtasia Recorder Software (which records keyboard interactions) for analysis later. The participants were instructed to shop for the listed items until they reached the stage for payment. That meant that there were required to only search for these items and add them to the shopping basket. The task did not require them to enter any credit card or debit card details and the task took about 25-30 minutes to complete. This time scale was chosen because during the pilot stage, three older participants took part and the average time spent was calculated. The researcher used the Observation Data Collection form (see Appendix A.3.5) to write down time started and time finished and all the other observation. During the task the researcher observed the participants and noted all the body movements such as facial expressions, restlessness, changing sitting positions sweating and recorded them on the Observation Think Aloud form (see Appendix A.3.6). After the online shopping task the participants were

interviewed by the researcher on their online shopping experience about the overall accessibility and usability of the two websites. The outline of the questions asked can be viewed in Table 6.3. The researcher wrote all the answers for analysis later.

6.3 Results of Online shopping task

6.3.1 Observation/Think Aloud Method

Table 6.1 illustrates a summary of all the activities observed on the 10 participants. Each category was observed for example: *Q1. Vocalisation*= a grade was allocated between 0=Absent to 3=Severe. (according to the key on the form). This grading method was adopted from the (Abbey et al.,1998)'s Abbey Pain Scale which is used to measure pain in patients who can not verbalise. The form was amended to suit the experience participants feel when interacting with websites. To get the overall experience of all the ten participants: The total score of all 10 participants was 64, and the average score was 6.4 (71.1%) which means the average level of discomfort of each participant was 71.1 %. This indicates that on average the score was between moderate and severe, which might indicate that participants experienced some difficulties whilst performing the task. Most of the participants were seen to be not at ease with themselves. Once they started the task they appeared as if they were not comfortable doing the task and some appeared restless.

The results of the online grocery shopping and the information captured on Camtasia are presented in Table 6.2. The results in Table 6.2 Group A shows that 5 out of 10 participants (or 50%) did not carry out the task properly as indicated by the fact that participant 1,6,8, 9 and 10 all ended up with more than the five items in the basket which mean they failed the task. The results in Table 6.2 Group B show that out of the 10 participants the minimum age is 58 and the maximum age is 70. The average age is 64 years. Regarding time taken, the results show that the minimum time taken is 22 minutes which is slightly below the set time of 25 minutes. The results also show that the maximum time taken was 52 minutes and the average time taken was 36 minutes

Table 6.1 Observation/Think Aloud Summary

KEY: Measure level of discomfort										
1. Vocalisation (e.g utter words, whimpering, groaning)										
Absent=0			Mild=1			Moderate=2			Severe=3	
2. Facial Expression (e.g looking tense, frowning, grimacing, looking frightened)										
Absent=0			Mild=1			Moderate=2			Severe=3	
3. Change in body language (e.g fidgeting, rocking, guarding part of body)										
Absent=0			Mild=1			Moderate=2			Severe=3	
Participant No	1	2	3	4	5	6	7	8	9	10
Vocalisation	3	3	2	1	1	2	1	3	2	3
Facial Expression	3	2	2	2	0	3	1	2	3	3
Change in body language	2	2	3	2	1	3	1	3	2	3
Total Score	8	7	7	5	2	8	3	8	7	9

Source: Abbey et al. (1996)

Table 6.2 Camtasia Recorder Results

Results and descriptive statistics of the online grocery shopping Group A- Results								
Part Number	Gender	Age	Set Time (mins)	Actual Time taken (mins)	Total items in basket	Total correct items in basket	No of clicks	No of times ask for help
1	F	70	25	37	6	5	121	19
2	F	67	25	36	5	5	113	21
3	F	61	25	29	5	5	88	12
4	F	65	25	35	5	5	132	5
5	M	58	25	28	5	5	83	9
6	F	69	25	43	8	4	101	3
7	M	59	25	22	5	5	75	2
8	M	61	25	38	7	5	89	3
9	F	65	25	39	6	5	124	6
10	M	68	25	52	8	4	116	11
Group B- Descriptive statistics								
Variable	Min	Max	Mean	Std Dev				
Times	22.00	52.00	36.2000	7.84290				
Clicks	75.00	132.00	130.0000	14.46836				
Age	58.00	70.00	64.3000	4.29599				
No of items in basket	5.00	8.00	6.0000	1.24722				
No of correct items	4.00	5.00	4.8000	.42164				
Times ask help	2.00	21.00						

6.3.2 Interview Procedure

After completing the task the participants were interviewed by the researcher. This qualitative method of inquiry took the format of a semi-structured interview whereby the researcher will have a set of open-ended questions. The list of the questions can be viewed in Table 6.3. This allowed the researcher to explore particular aspects of the participants' online shopping experience prompting the participants for further responses. The interview allowed the participants to also discuss about e-commerce in general. All the questions asked in the interview were open-ended to encourage a range of responses. For example, the participant was asked to describe their feelings or perceptions about an issue or task they had performed. Since there is no set agenda for an open-ended interview, the researcher had to ask the participants depending on their responses. The open-ended interviews can be particularly useful when researching accessibility issues. The responses were recorded using the Post Task Interview form (see Appendix A.3.6).

Table 6.3 Post Task Interview questions

Question	Interview Questions
Q1	Can you comment on the overall online shopping experience?
Q2	What did you like or dislike about the overall design or layout of each website?
Q3	How easy was it to search for the items and add them to the basket?
Q4	Where there any aspects of the websites that were difficult to deal with?
Q5	Which website did you prefer and why?
Q6	What do you think are the advantages of online shopping for food or in general?
Q7	What do you think are the disadvantages of online shopping for food or in general?
Q8	Do you think in future you might consider online shopping for food ? Please give reason to your answer
Q9	What do you think online shops should do to entice or persuade you to do more online shopping?
Q10	What are the barriers of online shopping for food or online shopping in general?

6.3.3 Interview Results

Figure 6.2 shows the results of the interview as a 'word cloud'. The word cloud helps in familiarising with the what the participants' responses. The bigger the word the more the participant talked about that word. So in this instance, "Online and Shopping" were discussed the most followed by "think and website" and then "food"



Figure 6.2 Chart showing Interview results as 'word cloud'

Figure 6.3 illustrates the responses which the participants gave about 'Websites' as a 'word tree'. This helps the researcher to visualise the answers provided by participants', for example on the word, Websites.

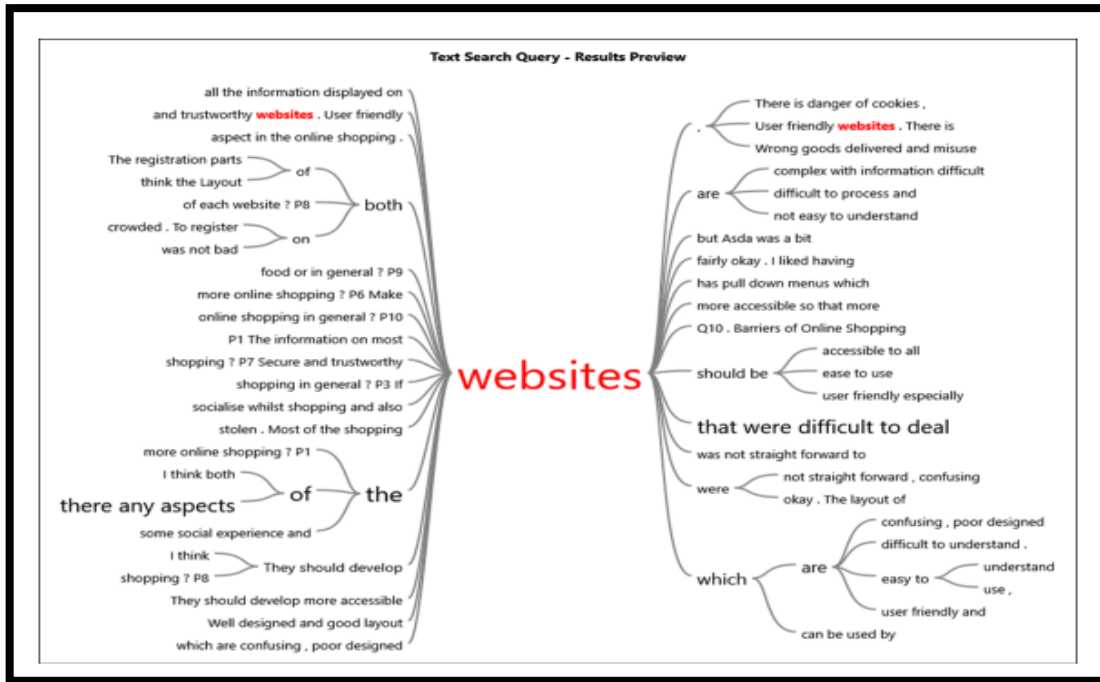


Figure 6.3 Chart showing search query results on ‘Websites’

Question 1. *Can you comment on the overall online food shopping experience.*

The first question that the participants were asked was: Could you comment on the overall online shopping experience for food groceries? According to the results it seems that the participants had mixed feeling about the experience. For example, Participant 1 used words like ‘Experience not good. Was not comfortable because not done that before’, while Participant 2 said that ‘I felt stressed. I hated it’. This view was also shared by Participant 4 who described it also as a stressful experience as she had found registration on the website not straightforward. However, others found the experience relatively straight forward. For example, participant 9 said that the ‘overall experience was a positive one’ and Participant 5 said that ‘...otherwise the experience is ok for someone with computer skills and owning a computer at home’. There was also the tendency for the participant to compare the experience on the two websites. According to Participant 5 “Asda seemed user-friendly in item selection choice but Tesco gave a limited choice’. Similarly, Participant 4 remarked that ‘Both Registration parts not straight forward, confusing. Tesco needing more information than Asda just to register’. Figure 6.4 illustrates some of the different answers from some of the participants and visualisation and comparison can be made on the graph presented.

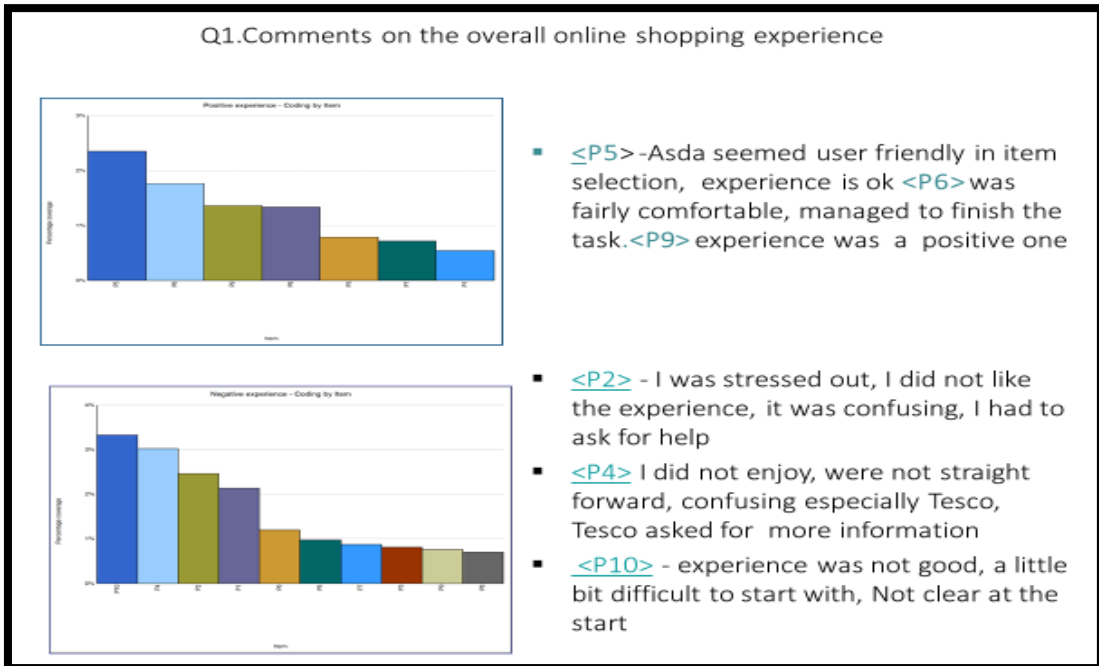


Figure 6.4 Chart showing some of the answers to Q1

Question 2. *What did you like or dislike about the overall design or layout of each website?*

Question 2 sought to find out what the participants liked or disliked about the overall design or layout of each of the websites. Overall, 7 out of 10 participants indicated that they liked the white background, dropdown menus on both websites, but went on to describe Tesco's website as brighter and had bigger font size compared to Asda. This is reflected in the following direct quotes from Participant 2 who stated that 'Asda layout appears to be not bright because the pull-down menus bring many options to choose from and the font is small. Could not see properly. Tesco brings fewer options and font is good, bigger'. Participant 2 also remarked that 'both websites were okay. However, Tesco layout is clearer and well-spaced out. Asda lots of information and smaller font'. One participant went on to say they disliked Asda because there was more information on the web pages. In another, words it appeared crowded. When searching for the items the drop-down menu showed more information and it was tiring to try and look for the specific item wanted. Tesco drop-down menu showed fewer items or information in each search which I found to be less burden when trying to search for the information needed.

Question 3. How easy was it to search for the items and add them to the basket?

Asked how easy it was to search for the items and add them to the basket (Q3), 50% of the participants (5 out of 10 participants) said it was easy once they realised they could search for the required item by typing the item they require. Three participants indicated it was difficult but needed help at the beginning. On registering Asda was quicker and easier did not require or ask for much information. For example, Participant 1 said that 'it took me some time to figure out to type item on the search bar. Also, it took some time to realise where the basket was'. The view was shared by Participant 2 who indicated that It was difficult to start but got easier. 'Noticed that I had to input the item on the search bar when I was half way through'. Two participants indicated it was difficult so much they had to ask for help throughout. One male participant indicated that the Asda website seemed user-friendly in item selection choices but Tesco gave a limited choice. Asda appeared easy to use whereas the Tesco website required more information on registration which means several attempts were made before one started shopping. Figure 6.5 illustrates some of the answers given by the participants.

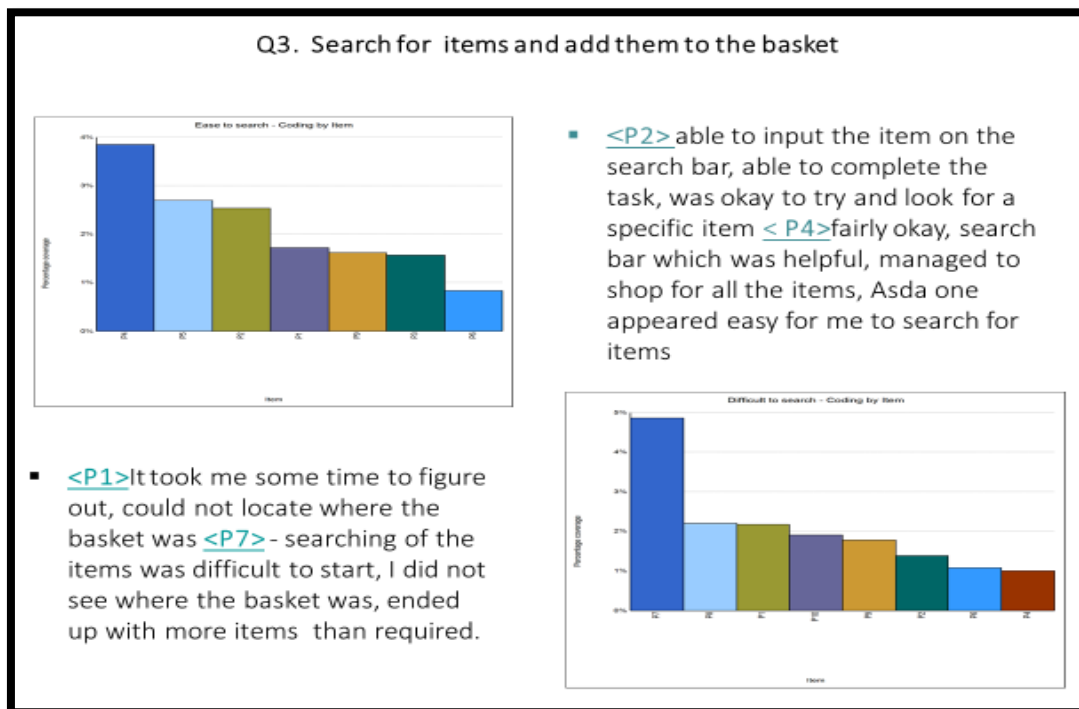


Figure 6.5 Chart showing some of the answers to Q3

Question 4. *Were there any aspects of the websites that were difficult to deal with?*

Regarding any aspects of the websites that were difficult to deal with (Q4), 8 participants indicated that the registration part of both websites was not clear with 5 participants asking for help before they proceeded. One participant indicated that the Tesco website seemed confusing when entering the password on the registration stage. The view of the participant was that she kept being blocked and could not see what they were inputting especially the password. The problems with registration is illustrated from the quotes obtained from the participants during the interviews. For example, Participant 8 stated that 'Registration part was a problem. To have a membership no. first before you start buying. You do not do that with traditional shopping'. This view was also shared with Participant 4 who indicated that 'I had difficulty with registration, had to do several attempts with Tesco but Asda was a little easier hence quicker'. Participant 7 also suggested that 'the part for searching the items and putting them in the basket was not easy. I struggled in the beginning but I managed to complete the task'.

Question 5. *Which website did you prefer and why?*

Question 5 asked the participants to indicate which of the two websites they preferred and why. Two out of the 10 participants preferred Asda on registering because it appeared quicker and easier and did not require or ask for much information to complete the registration. However, the majority of the participant thought Tesco's website was preferable. For example Participants 9 and 1 said that they like Tesco because it had bigger font size which was easier to read. Participant 4 who also preferred Tesco's website to add that 'I liked Tesco even though it was difficult to register. Tesco website font was bigger and appeared brighter'. The two participants that thought Asda was better was on the basis that it gave them many choices on items, and was user-friendly (Participant 5) and that the website 'comes out with many options to choose from which make it faster to pick items' (Participant 6).

Question 6. *What do you think are the advantages of online shopping for food or in general?*

The participants were also asked about what they consider to be the main advantages of online shopping (Q6). Most of them pointed out that the main advantage is that it helps those older people who have mobility problems. For example, Participant 9 stated that 'For older people or disabled who are unable to drive or catch a bus to go and shop it is convenient' while Participant 10 added that 'Cheaper prices but not always the case when you have to pay for returns. Useful for those who unable to go to shops physically'. Similarly Participant 3 indicated that "Older people can live a good quality of life. Can manage to buy groceries and others". According to Participant 8, 'Online shopping is useful for older people who can not drive or have poor mobility. Can buy groceries and goods without bothering family and friends. Can manage their own finances'.

Question 7. *What do you think are the disadvantages of online shopping for food or in general?*

In terms of Q8 relating to the main disadvantages of online shopping participants were mainly concerned with the misuse of personal information, lack of social aspect, poor quality of goods delivered compared to the one shown online, Credit/Debit cards fraud, Returns procedure tiring, confusing and troublesome having to pay charges for the returns at times. For example, Participant 3 pointed out risk of fraud, risk of lack of knowledge on how to be secure when shopping on line, lack of social enjoyment found in traditional shopping. Similarly, Participant 5 stated that " My concerns are on choice, if the item you require is not among the selection. In general it is ok but personally I feel happy with physically being there shopping in person in the shop than online." Participant 6 was also concerned about 'poor quality food, items delivered, miss out on real bargains, sharing personal details which might be shared without my consent to third parties'. The issue of confusing website, poor designed websites and wrong goods delivered' raised by Participant 7. Participant 10 also indicated that 'it may take longer to be delivered. Wrong items, different design, cut, delivered. Not good for vegetables and perishables'. 'Shopping in person enables the choice of selecting a replacement which one wants rather than what the shop chooses and able to see goods which are new or on offer'.

Question 8. Do you think in future you might consider online shopping for food ? Please give reason to your answer?

The participants were also asked if in future they might consider shopping online for food (Q8) giving their reason(s). Four of the participants said 'No' while the other three also said 'No' but that was on the basis that they would ask relatives and friends to do shopping for them. Another three said they could only consider online shopping if they were unable to drive and walk as they prefer to see, feel or touch fruits, vegetables before choosing. Among those who said they would not consider online shopping also stated that the other reason was that they consider shopping in person as a social outing enjoyment, being able to chat, shopping in person enables the choice of selecting a replacement which one wants rather than what the shop chooses and able to see goods which are new or on offer. Figure 6.6 illustrates some of the answers given by the participants.

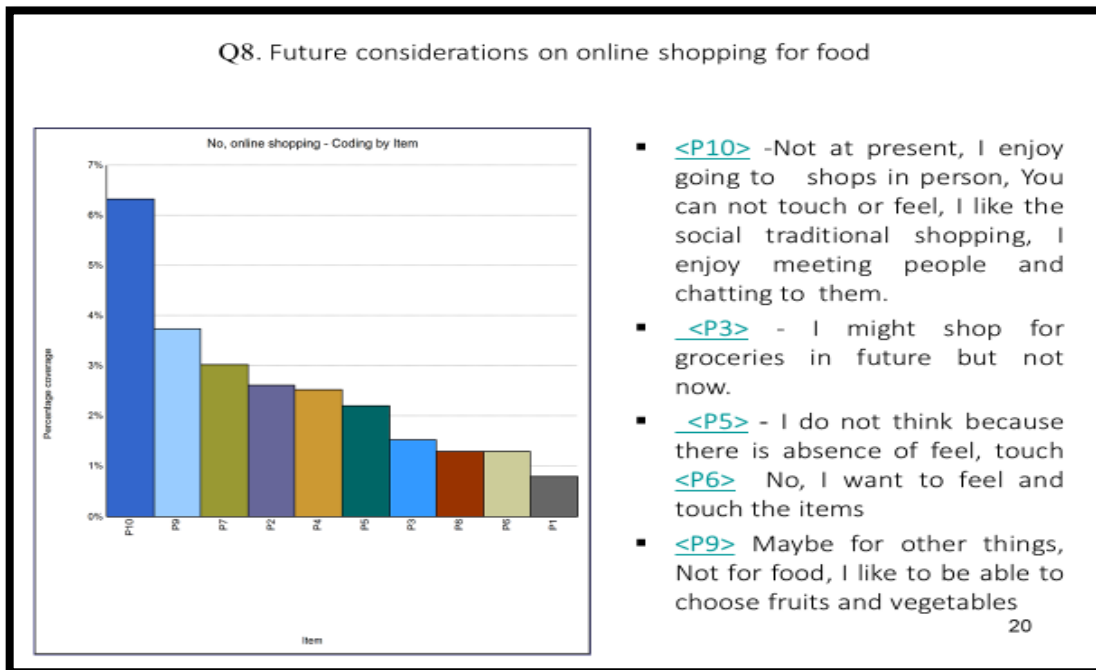


Figure 6.6 Chart showing some of the answers to Q8

Question 9. *What do you think online shops should do to entice or persuade you to do more online shopping?*

The penultimate question (Q9) asked participants what they think online shops should do to entice or persuade you to shop online. The general feeling was that the development of websites which are easier with online shopping assistants to provide social aspect and easier returns procedure with website businesses paying for the returns could help. These views were captured in some of the things the participants said. For example, website developers should encourage older people to shop online by training them and developing workshops (Participant 3), A lot of discounts. Well designed and good layout websites (Participant 10), Introduce an element where older people can socialise whilst shopping. Websites which are user friendly. Easy returns procedure (Participant 9). Participant 6 also indicated that 'they should make websites more accessible so that more people with disabilities can use them'.

Question 10. *What are the barriers of online shopping for food or online shopping in general?*

Finally, the last question asked (Q10), was concerned about barriers to online food shopping or in general. Four participants out of 10 mentioned barrier of websites having re difficult information to understand. Another barrier discussed was absence of social aspect, with three participants sharing the same view. One participant said 'Shopping online is not interesting as traditional (Participant 4). Participant 3 and Participant 5 thought that the risk of fraud is a major barrier to online shopping. There was also the barrier of misuse of personal information shared by Participants 1, 2 and 6. Participant 3 and 9 shared the view that lack of training and knowledge on how to shop online safely was among barriers to online shopping. Poor quality of goods delivered at times was also discussed by Participant 2 and 6 as a barrier to online shopping and one participant voiced that "dealing with cookies is a problem' (Participant 3).

-6.4 Discussion

As indicated in the findings of this research the two websites were found to be inaccessible and not user friendly. This is consistent with the accessibility and usability tests which was carried out using SortSite. SortSite is a web site accessibility testing tool used by Federal agencies, the Fortune 100 and independent consultancies. The Accessibility tests done included: checking sites comply with W3C WCAG1, WCAG2 (WAI) and Section 508 accessibility guidelines, checking against research based Usability.gov guidelines

The Violations of accessibility standards were scanned for the following problems:

- WCAG 2.0 110 checkpoints covering A, AA and AAA W3 accessibility guidelines
- WCAG 1.0 85 checkpoints covering A, AA and AAA W3 accessibility guidelines
- Section 508 15 US federal guidelines covered by 47 accessibility checkpoints

These problems prevent older people and disabled people from using the websites. The results of the tests carried on Tesco and Asda websites can be viewed in Figure 6.7 and Figure 6.8. respectively.

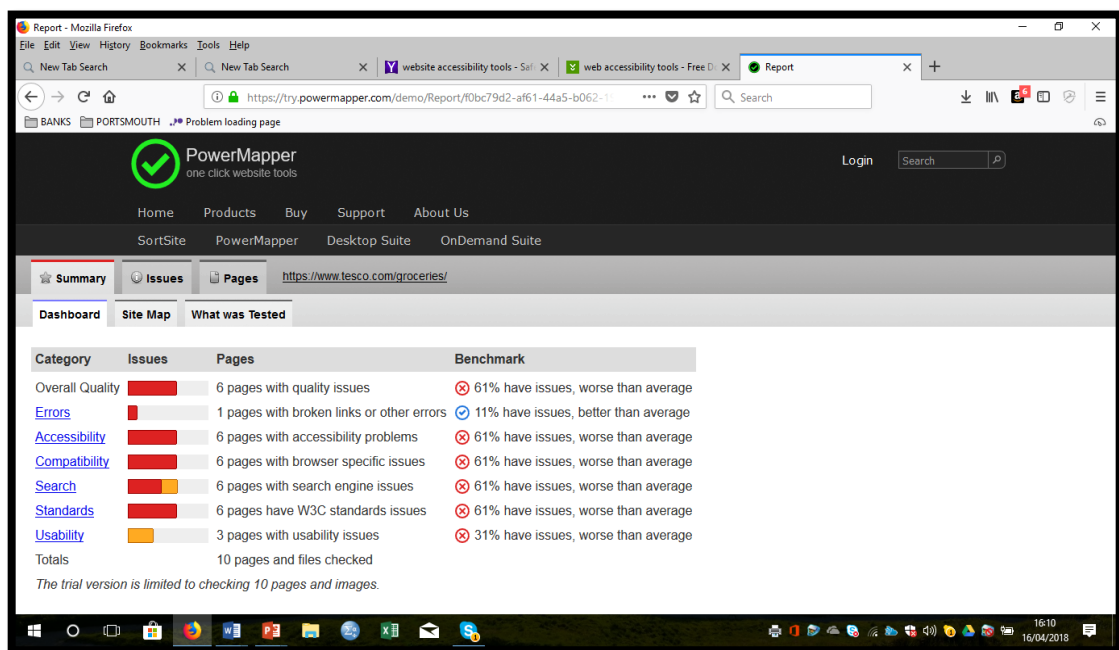


Figure 6.7 Chart showing Tesco's Accessibility and Usability Test results

With regards to accessibility Tesco website (see Figure 6.7) had 6 pages with accessibility problems compared to Asda (Figure 6.8) with 4 pages of accessibility problems. Tesco website was found to have 3 pages of usability issues and Asda was found with 4 pages of usability issues. This findings of this study, which also found most participants saying Tesco website was difficult to register (6 pages with accessibility issues) compared to Asda, are supported by the SortSite tests. Furthermore, previous studies have shared the same view that websites suffer from bad design and poor usability (Darvishy & Zehnder, 2013; Olphert et al., 2005; SOCITM, 2004; Tatnall & Lepa, 2003; W3C, WAI, 2018). The findings of this study were also consistent with Gatto and Tak, (2008) who found that users were frustrated by spams, pop-ups, advertisements and unwanted e-mails.

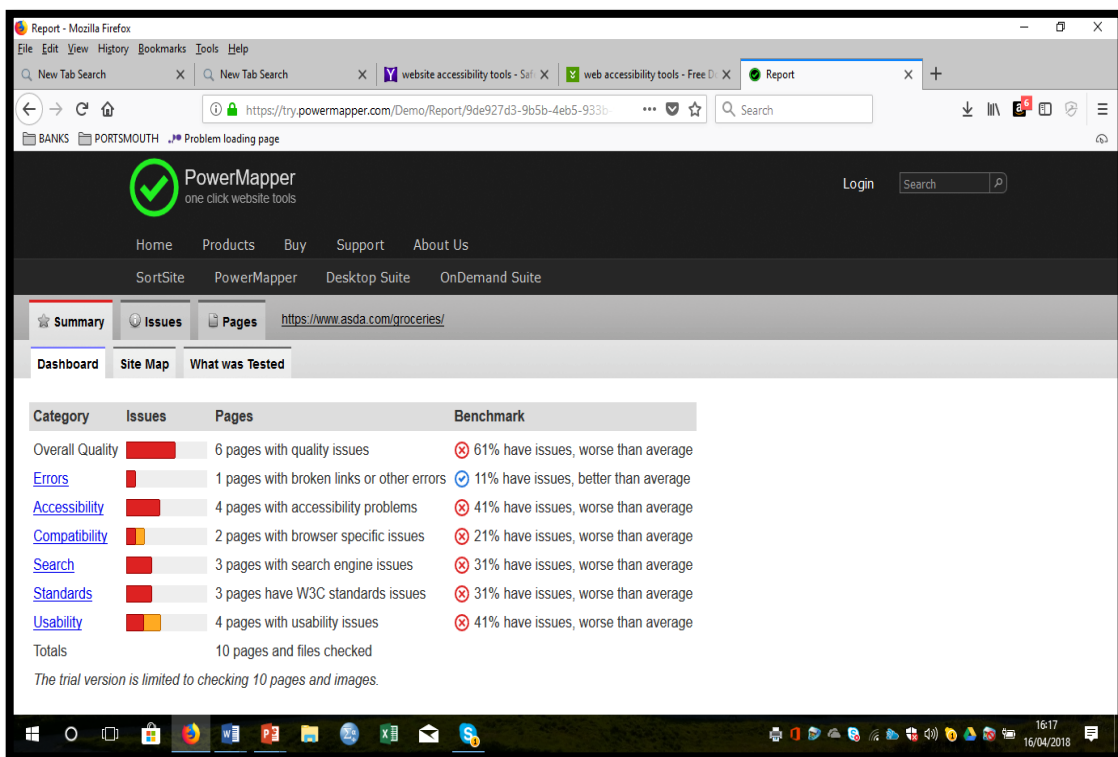


Figure 6.8 Chart showing Asda's Accessibility and usability tests

6.5 Summary and Conclusion

The purpose of this chapter was to present and discuss the findings of Study Two. The chapter started by a discussion of the online shopping task then followed by participants who took part in the study and the task procedure. The findings of the study were outlined with the discussion of the results of the online shopping task including the results from observations made, thinking aloud and interviews methods. The main findings of Study Two were that most of the participants found the two websites had issues with regards to navigation, layout and a complicated registration system. The study went on to carry out accessibility and usability tests using SortSite (Accessibility Testing tool) and the findings shared a similar view with Study Two results.

CHAPTER 7: RECOMMENDATIONS AND GUIDELINES

7.1 Introduction

This chapter focusses on the formulation of recommendations and guidelines for the design of accessible websites for older people. Based on the current research findings several areas are highlighted to help website developers develop accessible websites for older people. The chapter also discusses the recommendations developed for older people, for online businesses and for governments. The following sections discuss each area and the suggested recommendations made.

The rest of the chapter is organised as follows: Section 7.2 recommends website designers to attend training and workshops on inclusion and accessibility followed by Section 7.3 which outlines that need for online businesses to provide training to older people and introduce social aspect to online shopping. Section 7.4 gave recommendations for governments to promote better awareness of the importance of user friendly websites for older people. Finally, Section 7.5, outlines the conclusion of the chapter.

7.2 Website designers should attend training and workshops on inclusion and accessibility

Website designers should know what constitutes universally, accessible websites and the varying characteristics of their end users. It is important for website designers to attend training and workshops. Therefore, these recommendations were formulated:

- Website designers should be able to understand and implement the guidelines put in place by WAI and WCAG for them to develop accessible websites for older people.
- Website designers should seek training on accessibility and usability as well as understanding older people's needs and the effects that age-related impairments have on accessibility.
- Study Two results suggest that when participants were asked, what they think online shops should do to entice or persuade them to do more online shopping? Most of

the participants, 60% answered, “the websites should be easy to use, more accessible, secure and trustworthy, user friendly, well designed and have good layout.” All these comments were on accessibility and usability of the websites, therefore, the following recommendations were formulated to help website developers design accessible websites for older people. Table 7.1 illustrates the identified areas and the recommendations for each of those particular areas.

Table 7.1 Usability and Accessibility Recommendations

Area	Recommendations
Clarity and Structure	Website layout should be easy to follow, have a logical structure and should have well structured navigation areas. Consistent use of chosen layout must be used across all the web pages and longer texts should be separated in a sensible way.
User guidance and navigation	Simple steps to move self explanatory, icons or symbols should be easily and readily identified, Information about user's current position on website and the path the user took to get there should be clear to the user. A copy of keyboard with a description of function keys that assist the navigation process, should be provided. Function keys that help the user to go back to home page are important.
Links	Navigation features to have same design, links should be identified easily and clearly and should be self-explanatory. Links should be presented in a uniform manner throughout the entire website.
Text and Language	Website users must be able to follow and understand the information easily. Text design (for example, line length, line spacing) should have legibility and compatibility with different terminal devices. Tools such as text enlargements are useful but should not impair the layout. Complementary colour combinations should be avoided.
Search	Search fields are positioned where they are easy to see and search process should be transparent. The ability to sort displayed search results with a range of options, for example, by date and place is desirable.
Currentness, consistency and robustness	Content should be up-to-date and different users using all kinds of terminal devices should be able to access the website on all such devices. It is vital for users to quickly get to grips with the website or else, the users will lose the motivation to use the website.

Graphics, animated features and multi media	The proportion of text to images should be balanced. The hearing function and the ability to concentrate on audio and text simultaneously are affected by aging. Therefore, sound effects should be avoided unless their use is needed by a specific application. In case of downloads, additional information regarding the content, the size and the loading times to be expected is helpful.
Contact Information and support	Contact information and the masthead should be displayed in a prominent position on the site. Besides web forms and emails, traditional contact options such as telephone and face-to-face contact at the counter are important for older people. Other tools namely, text enlargement, read-out function, glossary and FAQs, etc should be provided.
Registration and forms	Registrations and online forms require a self-explanatory design. The meaning and purpose of personal data when entering it and the steps must be visible to users before data input. Meaningful advice and a targeted correction function should be provided, if errors occurs. Older people find it difficult to read captchas and also for many people with “normal” vision. Other alternative security methods should be offered.

7.3 Online businesses should provide training to older people

One of the findings of Study One indicated that many older people have not adopted e-commerce.

- It is recommended that online businesses need to take some responsibility for providing education and training to older people, to assist them in acquiring the internet skills needed for them to engage in various e-commerce activities. This may include how to stay safe on the internet and assistive technologies, security and privacy.
- Banks should organise workshops and training sessions to educate older people on basic skills required to adopt e-banking, e benefits, and privacy and security of their accounts.

- Online businesses have a huge part to play in assisting older people to engage in e-commerce and enable their shops to be inclusive to all, regardless of whether anyone living with them who can easily show them how to engage in e-commerce.
- However, with married couples they were more likely to adopt e-commerce, possibly because if one partner adopted e-commerce first then the other partner was also likely to adopt. The finding is however, contrary to Taylor et al. (2003) who found that compared to those participants who were married, single people showed a lower level of internet use. Further research with larger and wider sample groups is needed.

7.4 Governments should promote better awareness of the importance of inclusive websites for older people

It was found that during the interview results, nearly half of the participants stated that governments should formulate policies and enforce guidelines with regards to website development and implementation for older people in relation to making them more accessible.

The government has an important role to play in enforcing guidelines for the design of websites suitable for older people including the disabled. There is the potential to provide positive contribution in initiating policies which could guide website designers to develop accessible websites for older people. Even though guidelines have been existence for several years, they cannot guarantee success unless they are properly utilised in the design of accessible websites. One of the current research finding was that some participants mentioned the government having an important role to play. This was consistent with Simpson and Docherty (2004) and Yaseen, Dingley and Adams, (2015). These studies found that some of the e-commerce challenges among older people could not be addressed without the government's intervention.

7.5 Summary and Conclusion

The purpose of this chapter was to present recommendations that this thesis proposes, in order to address some of the challenges and barriers around e-commerce adoption among older people. These recommendations were formulated from the findings of the research presented in this thesis. The recommendations proposed includes the online businesses being responsible for providing training to older people, website designers should attend training and workshops, online shops should introduce social aspect to online shopping, more research to focus on e-commerce and older people and governments should enforce guidelines on website development and implementation.

CHAPTER 8: RESEARCH SUMMARY AND CONCLUSION

8.1 Introduction

This chapter presents the summary of the research findings. It also presents the theoretical and practical contribution of the research. Research limitations are critically reviewed and a proposal for further research is provided.

The rest of the chapter is organised as follows: Section 8.2 outlines the summary of research findings and Section 8.3 discussed the contribution made to existing research. Section 8.4 presented the impact of the research. Section 8.5 discussed research limitations and Section 8.6 presents the strengths of the research and finally potential extendability of the further research. Finally overall conclusions are presented.

8.2 Summary of research findings

This research set out to investigate the extent of adoption of e-commerce among older people. Within this context, the study also investigated the uses of e-commerce among older people, the barriers to adoption of e-commerce among older people and the determinants of e-commerce adoption among older people were examined. To answer the research question and achieve the aim of this research, several objectives were met:

Objective 1: To what extent have older people adopted e-commerce

Study One, with its methodology approach outlined in Chapter 4 and results discussed in Chapter 5, was conducted to achieve the first objective. A quantitative study was conducted using a questionnaire as the main method to gather data. The questionnaire captured the activities involved in adoption of e-commerce among older people. This was done through a systematic literature review conducted in Chapter 2. The extent of adoption of e-commerce as explained in Chapter 4 was measured by the extent to which older people undertook e-commerce activities. Specifically, an index of e-commerce adoption was developed and used. The formation of this index can be viewed in Chapter 4. The findings of the study suggest that the average extent of e-commerce adoption among older respondents (147

older people) who participated in the study was 30 %. That means the extent of e-commerce adoption was below 50 % which showed that older people within this study were not involved in most of the e-commerce activities.

Objective 2: To determine the uses of e-commerce among older people

This second objective was achieved by conducting a survey using the same questionnaire, but particularly from the responses from Section C in Questionnaire (see Appendix B). The results suggested that older people use e-commerce for various activities such as pay household bills, book holidays, comparison shopping, books magazines, financial investments, grocery shopping etc. Particularly, the research found that the highest percentage of the respondents (72.11%), used e-commerce for booking holidays, followed by 65.31% of the respondents using e-commerce for paying bills. Among the least uses of e-commerce were online grocery shopping and online financial investments both with 16.33% each.

Objective 3: To investigate the barriers to adoption of e-commerce among older people

Section C of the questionnaire in Chapter 4 was developed to satisfy the third objective. The results showed that older people 'find the information on the website difficult to understand as well as difficult to navigate the website pages. Chapter 3 which discussed age-related impairments was also developed to provide understanding on the barriers faced by older people (Charness & Boot, 2009; Kuo et al., 2012; Wallace et al., 2013). The discussion showed how each of the age-related impairments can be used to explain the changes which affect the human body causing older people immense limitations in interacting with the e-commerce websites and engaging themselves in e-commerce adoption. It also revealed that older people thought there were less advantages and benefits of e-commerce compared to disadvantages and were more concerned about personal information, unauthorised use of credit cards and about transaction and shipping errors. Furthermore, there was lack of trust (Chakraborty, 2016; Gatto & Tak, 2008) relating to the quality of products sold online. Besides the age-related impairments, a section on accessibility issues faced by older people was also discussed. This raised concerns on the accessibility and usability issues encountered by older people regarding accessing the website pages (Darwisy & Zehnder, 2013; Milne et al,2006;Nielsen, 2013).

Objective 4: To investigate the determinants of e-commerce of among older people

The fourth objective was achieved by conducting Study One, specifically ten hypotheses were formulated (see Chapter 4) and tested to establish the relationships between the individual characteristics and the index of e-commerce adoption.

Gender

The results of the current research shows that gender does not significantly influence the extent of e-commerce adoption by older people. This is inconsistent with the arguments advanced in the hypotheses development Chapter 4. For example, men want to shop online more than women because it is suggested they have a more positive perception regarding compatibility, complexity, relative advantage (Lian & Yen, 2014). The negative co-efficient of -0.018 in respect of gender means that women are more likely to adopt e-commerce than men although the difference is not significant. These results showing a statistically insignificant influence of gender on the extent of e-commerce adoption contradict the findings by Hashim et al. (2009) who reported that gender plays an important role in influencing attitude towards online shopping behaviour. The results also contradict those reported by Gupta et al. (1995) and Haque et al. (2007).

Further, it can also be argued that the differences between men and women in adoption technology could be due to differences in biological characteristics between men and women. For example, it has been suggested that men possess greater analytical, logical and problem-solving abilities than women and thus are more suited to technical fields than women. It could be argued men are more likely to adopt e-commerce than women on the basis that men are better at information related tasks than women. Existing empirical evidence seems to support the expectation that men are more likely to adopt e-commerce compared to women. For example, Wood and Li (2005) and Michie and Nelson (2006) show that compared to men, women are less likely to adopt and use new technology, have less confidence in their ability to use new technology, and are less likely to choose a career in information technology. Lian and Yen (2014) found that men have significantly higher online shopping drivers and lower barriers compared with women. Slyke et al. (2002) found that male older consumers liked to shop over the internet more compared to their women

counterparts. The study by Mattila et al. (2003) found that older men conducted banking more often over the internet than older women.

Age

The current study found age to be a significant negative predictor of e-commerce adoption by older people. This was consistent with both McCloskey (2006) and McCloskey and Lepper (2010). Both studies found that respondents over the age of 70 were less likely to have shopped online and they found it difficult to access the information compared to the younger ones. On the issue of security older people were concerned more than the young. However, this was inconsistent with Sorce et al., (2005)'s study who found older respondents were more likely to adopt e-commerce than their younger counterparts, older people having 56.9 % compared to 42.3 % for younger respondents.

Many reasons can be offered as to why e-commerce adoption may differ by age. For example, since complexity is a factor that has been linked to the adoption of e-commerce under the diffusion of innovation theory, many older people may be reluctant to adopt e-commerce as they perceive internet buying and selling as being relatively difficult to do compared to sending emails, social networking or playing games. This is on the basis that the introduction of this type of innovation can be intimidating for older people especially if this requires them to change their normal practices (for example, visiting the bank or shopping at a grocery shop). This is consistent with McCloskey and Lepper (2010) who found older people find it difficult to access the information making them less likely to participate in buying and selling on the internet. Another reason for expecting younger people to be more likely to adopt e-commerce is security related. Older respondents are more likely than young respondents to worry about providing financial information and personal information when shopping on the internet (McCloskey, 2011). The study also found out that younger people agreed that online shops have sufficient security controls to protect their personal and financial data. Lepper and McCloskey (2011) also found out that even though older people aged 70 and older seek information on products and services they rarely made any purchases. Taken together these findings suggest that older people are less likely than younger people to engage in e-commerce for security reasons.

Marital status

Regarding marital status, the findings show that there is a positive and significant relationship between being single and adoption of e-commerce. The finding is consistent with Hashim et al. (2009) who found that the respondents who are divorced or widowed have a higher rate of engaging in electronic commerce followed by the respondents who are single and the least are those respondents who are married. The findings are also consistent with Taylor et al. (2003) research showing that people who live alone had a higher level of using home internet for education purposes, for entertainment, and for email. A possible explanation of the finding that single people are more likely to adopt e-commerce compared to married people is that the latter have a lot of things to take care of when they are at home such as children and also the fear of ignoring their partner. However, the finding is contradictory to the argument that single people were less likely to adopt e-commerce or take longer to adopt because they do not have anyone living with them who can easily show them how to engage in e-commerce. However, with married couples they were more likely to adopt e-commerce, possibly because if one partner adopted e-commerce first then the other partner was also likely to adopt. The finding is however, contrary to Taylor et al. (2003) who found that compared to those participants who were married, single people showed a lower level of internet use. Further research with larger and wider sample groups is needed.

Residential Status

The findings relating to residential status show that this has no significant impact on the extent of e-commerce adoption. Although the relationship is not significant, the negative sign suggests that people who live with the family are less likely to adopt e-commerce. This is because the respondents who lived with the family were coded '1' and the rest '0' in the study. The negative relationship between computer use and living with the family is consistent with Taylor et al. (2003) who found that people who live alone had a higher level of internet use. The finding that respondents who live with family are less likely to adopt e-commerce may be explained by the fact that using the internet when living with family may be regarded as anti-social. This contrast with people who live alone who may regard being on the internet as a way of occupying themselves.

Education

The findings suggest that education was found to be insignificant associated with e-commerce adoption. In the context of this study, it means that those respondents who had primary education as their highest qualification were less likely to adopt e-commerce than those who had achieved higher qualifications. In other words, the finding suggest that the higher education attainment is positively associated with e-commerce adoption. This is consistent with Burke (2002) who report that older people consumers with higher levels of education were more comfortable shopping online compared to those with none or less education qualification. The results also support those by Eastman & Iyer (2004) who found that the seniors with higher education levels were more likely to use the internet compared to those without. Similarly, the results are also consistent with Sum et al. (2009) who also found out that participants with higher education were more likely to have used the internet longer thereby engaging in e-commerce. The finding may be due to the fact that those with higher education attainment are likely to own a computer (Wilson et al., 2003). Werner et al. (2011) found that the respondents with higher education levels were more likely to be computer users compared to those with no education. However, the findings contradict those by Yi (2005) who found that older people who were educated were less likely to use the internet than those who were not educated. On close examination of the study results the older people who were classified as highly educated had an average of 13.4 years schooling, which seems low, and implies that some respondents were not well-educated. Futhermore, the results of the school type show a significant and positive relationship between school type and e-commerce adoption. In the context of this study, the results suggest that those who went to a private school are more likely to adopt e-commerce. Although there are no specific studies on the relationship between school type and e-commerce adoption, Maitlo (2015) found that those bank customers who attended private school adapted online banking services in Hyderabad compared to the other school types. The possible explanation of why those who attend private school are likely to adopt e-commerce is that private school have more resources compared to state and other schools.

IT Certificate

The findings which suggest that those with IT certificate were less likely to adopt e-commerce are consistent with the suggestion that the more IT specific knowledge one has is positively associated with e-commerce adoption. Specifically, the results suggest that those with higher

IT education that a certificate are more likely to adopt e-commerce. This finding appears to be consistent with Corbitt et al. (2003) who found that older people were more likely to purchase from the internet if they have more experience in using the internet thus leaving those inexperienced ones not likely to engage in using the internet. The findings are also consistent with Karjaluoto et al. (2009) who report that experience of computers and technology were found to influence online banking. In that study they found a high correlation between prior computer experience, computer attitude and prior computer experience. In another words a person who have some knowledge of using computers generally, will more likely participate in using the online facilities more compared to those with less knowledge. Also Grimes et al. (2014) found that housing authority residents with prior experience on the use of computers were found to be the most important factor associated with higher knowledge and awareness of security hazards and threats. Finally, the finding also support Sulaiman et al. (2008) who report that younger generation were more likely to shop online because of their knowledge in computer technology as opposed to the older generation.

Employment status

The findings for employment status show that there is not significant relationship with the extent of e-commerce adoption. The finding contradicts Peacock (2007) who suggest that occupational status among other characteristics, positively influence people's odds to use the Internet. The finding is also inconsistent with the argument that given the widespread of internet application in workplaces, older people who are still employed are more exposed or have more opportunities to interact with computers and hence are in a position to adopt the technology, use the internet and adopt e-commerce. This view was empirically supported by Ameme (2015) who report a strong correlation between employment status and customer adoption and usage of internet banking services in Ghana. Lastly, the findings also appear not to lend support to the argument that those employed full-time are likely to adopt e-commerce because they are likely to own a computer. For example, Wilson et al. (2003) found that those respondents who were employed full-time were more likely to own home computers compared to the those who were not employed. The insignificant relationship between e-commerce adoption and employment in this research, could be attributed to the small number of older people employed and the sample size.

Annual Income

Results relating to the association between annual income and e-commerce adoption shows that there is no significance. This contradicts the finding by Eastman and Iyer (2004) that older people who have higher levels of income were more willing to both use the internet and buy products over the internet. Similarly, the finding contradicts the notion that people with higher income levels would be willing to try new things, which could be in this case adopting e-commerce. Further, the findings also does not support the findings by Sum et al. (2009) that participants with higher income levels were more likely to have used the internet longer thereby engaging in e-commerce. In addition, the findings is also contradictory to Mattila et al. (2003), Bucy (2000), Martin and Robinson (2007), Hashim et al. (2009) and Erickson (2011) who similarly found that income is a significant determinant of e-commerce use. However, the finding is consistent with Yi (2008) who reported the relationship between income and computer usage to be insignificant. The insignificant relationship between e-commerce adoption and income in this research, could be attributed to 38 out of 147 older people who had an income of less than £1,500 and also 40 out of 147 who mentioned that income was not applicable to them. So this shows that the average individual income was low and implies that the older people who took part in the survey were not rich.

Ethnic origin

The findings relating to ethnicity suggest that English people were more likely to adopt e-commerce than any other nationalities. This is consistent with the results reported by Wilson et al. (2003) which suggest that black respondents were significantly less likely to own home computers compared to their white counterparts. Similarly, the results by Perrin and Duggan (2015) suggest that African-Americans are less likely to use the internet than their counterparts white Americans. The results are also consistent with Wilson et al. (2016) who after controlling for socioeconomic variables, reported that African Americans were still less likely to have home computers or Internet access. Similarly, the results are consistent with Katz & Aspen (1997) who found that more blacks and Hispanics did not use the internet and most of them were unaware of the internet's existence compared to their white counter parts. Finally, the results support the findings by Werner et al. (2011) that the white respondents recorded the highest computer usage compared to Hispanic older people adults. This can be highlighted by the

following proportions of ethnic minority in the research sample: (6.13%=Black or black british; 2.72%=Indian; 0.68%=Caribbean; 4.08%=African; 3.40%=Asian).

Objective 5: To investigate whether there are usability and accessibility issues with the two online grocery shops.

Study Two was carried out to supplement Study One, which meant it was informed by Study One results. The results in Study One indicated that very few older people participated in online grocery shopping. The research sought to investigate this further. Consequently, the aim of Study Two was to examine the accessibility and usability of the two online grocery shops, Tesco and Asda. The methods used in this study were observations and interviews. The main findings of Study Two were that most of the participants found the two websites had issues with regards to: navigation, layout and a complicated registration system.

8.3 Research Contribution

The research contributed to existing literature in several ways as well as highlighting the importance of knowledge of the current state of adoption of e-commerce among older people. First, its original contribution is centered around the development of an Index of E-commerce Adoption (IEA) which enabled the quantifiability of the extent of e-commerce adoption for the first time. The index contributes to practice and has huge potential to be used in future to measure the extent of e-commerce adoption among different user groups and to assess the adoption trends.

Second, this research was the first one to conduct a thorough examination of the individual characteristics that influence the extent of e-commerce adoption as well as using several theories to test their applicability among older people. Additionally, among the limited evidence of studies which has investigated the determinants of e-commerce adoption, the focus has been on 1 or 2 or 3 at most 4 individual characteristics but not 10 as found in this research. The systemic and holistic approach used in this research will make a difference because it used a comprehensive list of individual characteristics. Also, the applicability of theories such as TAM and DIT were tested. Our understanding of individual characteristics that influence e-commerce adoption were enhanced hence the contribution

of new insights because its tested the theories that have been tested using younger people with older people.

Third, a framework of recommendations and guidelines was developed and have the potential impact to be used by website designers, online businesses, government and researchers to develop websites which are accessible to older people. The research findings provided insightful knowledge from which others in the same field will benefit immensely.

8.4 Research Impact

The development of a tool (IEA) to measure the extent of e-commerce adoption among older people (for the first time) has a huge impact. This could be used in future to measure extent of e-commerce among different user groups.

There is potential to improve the quality of lives of older people by enabling them to adopt e-commerce through empowerment, maintaining independence and reduction on reliance on other people.

The recommendations and guidelines developed from Study Two have the potential impact to be used by website designers, online businesses, governments to develop websites accessible to older people.

8.5 Limitations of the research

A critical evaluation of the research has highlighted some limitations. The findings reported and the conclusions to be withdrawn must be interpreted in the light of such limitations.

The research used a questionnaire survey in Study One of this research to investigate bias. However, efforts were made to assure the respondents that their privacy and contribution were valued and their personal details were confidentially treated.

Although the questionnaire was relatively long, questions were designed to be simple and short for easy of completion. A pilot study was also carried out which highlighted several issues which lend to some amendments.

Another limitation was sample size. Although Study Two used a small sample size and it may be perceived to be a lack of representativeness in the sample for generalisation to a

broader population of older people. However, there is justification for usability studies using small sample groups, as discussed in Chapter 4. Nielsen and Landauer (1993) also assert that it is possible to achieve excellent results using small sample groups in usability studies. As in previous other studies this study was cross-sectional . As argued, this approach may have results bias, thus the situation may provide different results if another time frame had been chosen (Levin, 2006). A longitudinal design might have been more fruitful in uncovering more opinions and feelings regarding e-commerce adoption but it was impossible considering the target sample who are among hidden population. The research was limited to one region of the country, which is the south east of England but mainly in Bournemouth and Poole area. To generalise the findings of this research is needed to cover other regions and cities and rural areas as this study was also conducted within urban setting.

Furthermore, snowball sampling was another limitation of the study. Whilst a problem of selection bias limits the validity of the sample (Van Meter, 1990), this sampling method provided a means of accessing the older people among the vulnerable and more impenetrable social groups. This was supported by Breakwell, et al. (2000) who pointed out that older people are among some categories of people particularly difficult to interview. However, the problem of selection bias may be partially addressed through the production of large samples and also by the duplication of results to strengthen any generalisations (Atkinson & Flint, 2001).

8.6 Strengths of the Research

The strength of this research include its methodology. The research used mixed methods approach which merged quantitative data and qualitative data to develop a complete understanding of e-commerce adoption among older people. The research gathered descriptive information and examined relationships among variables, test theories and hypotheses and also focussed on the contexts and meaning of experiences. Multiple methods such as questionnaires, interviews and observations were utilised and combined to draw on the strengths of each other. Validation of data through cross verification from two or more sources was achieved through triangulation technique through the two studies.

The research developed an Index of E-commerce Adoption (IEA), which is a tool to measure

the extent of e-commerce adoption among older people for the first time. This tool could be used in future to measure the extent of e-commerce adoption among different user groups.

8.7 Further research

While the project has resulted in significant gains, there is some scope for future research. There are many directions this research can be extended upon. More research on adoption of e-commerce by older people with focus on different aspects of e-commerce can be explored. For example, e-mobile, e-banking, holiday websites, grocery websites, accessibility and usability. Very little research on adoption of e-commerce by older people exists. Future research is required on the following areas: effects of age-related impairments on accessibility, adoption of e-commerce among older people with different demographics and barriers to adoption of e-commerce among older people.

To address the limitation already mentioned in section 8.6. that snowballing sampling causes a problem of selection bias, future research can be done using large samples and also by the duplication of results to strengthen any generalisations.

More research is also needed to include a bigger sample size and to cover a wider region in the UK.

8.8 Conclusion

Finally, this research investigated the adoption of e-commerce among older people. The results provide useful insights into the uses of e-commerce among older people, the barriers faced by older people and the factors that influence the adoption of e-commerce by older people. Inaccessible websites continue to create barriers for older people as evidenced by the findings of this research. This shows that although there are guidelines for website designers and online businesses to follow, them alone are not enough. Older people could benefit in many ways when they adopt e-commerce. They could continue to live independent lives. This calls for recognition and support for opportunities to enable them to engage in e-commerce, while addressing the lack of awareness of the importance of inclusive websites. There is also need for a participative approach from the people involved so that older people will not continue to be disadvantaged. Governments together with website designers and online businesses should take charge and commit themselves

to developing inclusive websites. Furthermore, they need to gain an increased understanding of the issues that older people face when interacting with these e-commerce websites and should treat this as a matter of urgency.

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APPENDICES


Appendix A

A.1 Form UPR16 1

A.1 Form UPR16 2

A. Ethics Approval

A.2.1 Study One Favourable Opinion



University of
Portsmouth

Certificate of Fast Track Ethics Review

Project Title:	ECommerce Adoption for the elderly
Student Number:	55556 676078
Application Date:	22/09/2014 16:36:07

You must download your referral certificate, print a copy and keep it as a record of this review.

You should **submit your certificate to the chair person of your Faculty Ethics Committee for further review.**

The chair person of the Technology Faculty Ethics Committee is John Williams.

It is your responsibility to follow the University Code of Practice on Ethical Standards and any Department/School or professional guidelines in the conduct of your study including relevant guidelines regarding health and safety of researchers including the following:

- University Policy
- Safety on Geological Fieldwork

It is also your responsibility to follow University guidance on Data Protection Policy:

- General guidance for all data protection issues
- University Data Protection Policy

Any changes in the answers to the questions reflecting the design, management or conduct of the research over the course of the project must be notified to the Faculty Ethics Committee. Any subsequent changes that affect the answers given in the questionnaire, not reported to the Faculty Ethics Committee, will invalidate this certificate.

This ethical review should not be used to infer any comment on the academic merits or methodology of the project. If you have not already done so, you are advised to develop a clear protocol/proposal and ensure that it is independently reviewed by peers or others of appropriate standing. A favourable ethical opinion should not be perceived as permission to proceed with the research; there might be other matters of governance which require further consideration.

ProjectTitle:
ECommerce Adoption for the elderly

A2-Faculty:
Technology

A3-PrimaryRole:
Other

Certificate Code: A77C-3E50-B537-FED4-C55E-5D46-AC7A-DCEF Page 1 / 3

A4-RespondentsName:

Memory Tauringana

A5-AlreadyExternallyReviewed:

No

B1-HumanParticipants:

Yes

B4-InvolvesNHSPatients:

No

B5-NoConsentOrDeception:

No

B7-InvolvesUninformedOrDependents:

No

B9-FinancialInducements:

No

C1-DrugsPlacebosOrOtherSubstances:

No

C2-BloodOrTissueSamples:

No

C3-PainOrMildDiscomfort:

No

C4-PsychologicalStressOrAnxiety:

No

C5-ProlongedOrRepetitiveTesting:

No

C6-SafetyRisksBeyondAssessment:

No

D2-PhysicalEcologicalDamage:

No

D4-HistoricalOrCulturalDamage:

No

E1-ContentiousOrIllegal:

No

E2-SociallySensitiveIssues:

No

F1-HarmToAnimal:

No

F2-HarmfulToThirdParties:

No

G1-ConfirmReadEthicsPolicy:

Confirmed

G2-ConfirmReadUKRIOfPractice:

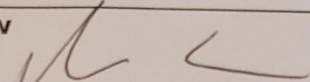
Confirmed

G3-ConfirmedCorrectInformation:
Confirmed

Supervisor Review

Supervisor signature:

Date:


28th Sept 14

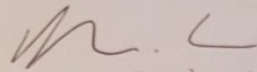
Review by FEC Representative

Name of representative:

Comments:

Representative signature:

Date:

Dr. ALICE SOON

28th Sept. 14.

A.2.2 Letter of Confirmation



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+44 (0)23 9284 6364

23rd September 2015

To whom it may concern

RE: Research conducted by Mrs Memory Taurigana

I am writing to confirm that Mrs Taurigana is carrying out doctoral research, which has been approved the ethical committee at the University of Portsmouth. We expect all our students to seek ethical approval prior to carrying out research. This application is then reviewed by the ethics committee. Mrs Taurigana has a certificate of ethical approval, which she can provide as documentation. I am supervising her research and as Vice Chair of the University Ethics committee, I can confirm she has designed her study in accordance with our ethical guidelines

Please feel free to contact me should you require more information

Regards

Alice Good

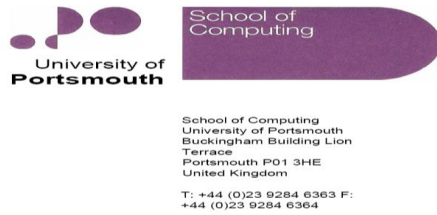
Dr Alice Good PhD, MSc, PGCE, BSc, FHEA
Vive Chair of the Faculty of Technology Ethics Committee

A.2.3 Positionality

Since the researcher have a nursing background and have worked with older people for a long tome, they were mindful of the position they take in carrying out the research. The researcher's position did not interfere with the recruitment, the collection of data and the analysis of data so as to manipulate the outcome. All the ethical procedures were adhered to.

A.2.4 Study Two Favourable Opinion

Technology Faculty Ethics Committee
ethics-tech@port.ac.uk



Date 14/12/17

Memory Taurigana

School of Computing

Dear Memory,

Study Title:	ADOPTION OF ELECTRONIC COMMERCE AMONG THE OLDER PEOPLE
Ethics Committee reference:	MT2

The Ethics Committee reviewed the above application by an email discussion between the dates of 13/11/17 and 11/12/17.

Ethical opinion

The members of the Committee present gave a favourable ethical opinion of the survey on the basis described in the application and supporting documentation.

Conditions of the favourable opinion

- The favourable ethical opinion for the first part of the study it cited when this is part of the study is mentioned.
- Inconsistencies in the participant withdrawal sections are made good.
- Further details are included about how the older people participants will be recruited.

Recommendations: (You should give these due consideration but there is no obligation to comply or respond)

- Consider reducing the withdrawal period to two weeks.
- Use Harvard APH 6th referencing style.
- Grammar and typos should be addressed to make the forms neater and more professional.

The favourable opinion of the EC does not grant permission or approval to undertake the research. Management permission or approval must be obtained from any host organisation, including University of Portsmouth, prior to the start of the study.

Summary of discussion at the meeting

The application was given a favourable opinion by the reviewers, the application was generally well received by the reviewers and previous feedback had been incorporated with a helpful explanation table.

Documents reviewed

The documents reviewed at the meeting were:

<i>Document</i>	<i>Version</i>	<i>Date</i>
Application	V2	23/11/17
Participant Information Sheet	V1	23/11/17
Consent Form	V1	23/11/17
Ethics issues & survey questionnaire form	V1	23/11/17
Observation data collection sheet	V1	23/11/17
Post task interview questions	V1	23/11/17

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements set out by the University of Portsmouth

After ethical review

Reporting requirements

The attached document acts as a reminder that research should be conducted with integrity and gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Notification of serious breaches of the protocol
- Progress reports
- Notifying the end of the study

Feedback

You are invited to give your view of the service that you have received from the Faculty Ethics Committee. If you wish to make your views known please contact the administrator ethics-tech@port.ac.uk

Please quote this number on all correspondence: MT2

Yours sincerely and wishing you every success in your research

A handwritten signature in black ink, appearing to read 'J Williams', with a stylized flourish at the end.

Professor John Williams

Chair Technology FEC

Email: ethics-tech@port.ac.uk

After ethical review – guidance for researchers

This document sets out important guidance for researchers with a favourable opinion from a University of Portsmouth Ethics Committee. Please read the guidance carefully. A failure to follow the guidance could lead to the committee reviewing and possibly revoking its opinion on the research.

It is assumed that the research will commence within 3 months of the date of the favourable ethical opinion or the start date stated in the application, whichever is the latest.

The research must not commence until the researcher has obtained any necessary management permissions or approvals – this is particularly pertinent in cases of research hosted by external organisations. The appropriate head of department should be aware of a member of staff's research plans.

If it is proposed to extend the duration of the study beyond that stated in the application, the Ethics Committee must be informed.

If the research extends beyond a year then an annual progress report must be submitted to the Ethics Committee.

When the study has been completed the Ethics Committee must be notified.

Any proposed substantial amendments must be submitted to the Ethics Committee for review. A substantial amendment is any amendment to the terms of the application for ethical review, or to the protocol or other supporting documentation approved by the Committee that is likely to affect to a significant degree:

- (a) the safety or physical or mental integrity of participants
- (b) the scientific value of the study
- (c) the conduct or management of the study.

A substantial amendment should not be implemented until a favourable ethical opinion has been given by the Committee

A.3.1 Participant Invitation Form



School of Computing
University of Portsmouth
Buckingham Building Lion
Terrace
Portsmouth P01 3HE
United Kingdom

T: +44 (0)23 9284 6363 F:
+44 (0)23 9284 6364

Study Title: Adoption of Electronic Commerce by the older people

REC Ref No:

Name of Researcher: Memory Tauringana

Contact Details:

Address: School of Computing

University of Portsmouth

Buckingham Building

Lion Terrace

Portsmouth

Hampshire

PO1 3HE

UK

Telephone: 023 9284 6460

Email: memory.tauringana@port.ac.uk

Invitation

Dear Potential Participant

I would like to invite you to participate in Study Two of this research. I am a PhD student, at the School of Computing, University of Portsmouth. The research I am undertaking is on Adoption of electronic commerce (buying and selling on the internet) among the older people. Study two of the research involves participants performing online shopping and then interviewed afterwards on their user experience and satisfaction.

There is an information sheet and consent form attached to this invitation letter for you to read also. Your participation is voluntary and you can withdrawal at any time. I would like to take this opportunity to thank you for taking your time to read this.

A.3.2 Participant Information Sheet



School of Computing
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Portsmouth P01 3HE
United Kingdom

T: +44 (0)23 9284 6363 F:
+44 (0)23 9284 6364

<p>Name of Researcher: Memory Tauringana Emails: memory.tauringana@port.ac.uk Name of Supervisor: Dr Alice Good Email: alice.good@port.ac.uk</p>

Title of Project: Adoption of Electronic Commerce by the older people

Ethics Committee Ref Number: (to be inserted)

Invitation

I would like to invite you to take part in Study two of my research study. Joining the study is entirely up to you, before you decide I would like you to understand why the research is being done and what it would involve for you. I will go through this information sheet with you, to help you decide whether or not you would like to take part and answer any questions you may have. I would suggest this should take about 10 minutes. Please feel free to talk to others about the study if you wish. Do ask if anything is unclear. I am PhD student at the University of Portsmouth.

Study Summary

This study is concerned with online shopping for food groceries from two online shops. In other words, e-commerce has something useful to offer to the older people thereby enhancing the quality of their lives. This has also a potential benefit for online businesses when they attract this lucrative market. I am seeking participants who are mature adults and have never shopped online. It will take approximately 30 minutes of your time.

What is the purpose of the study?

The purpose of the study is to investigate the accessibility of two websites and user experience of the participants after performing the shopping task. The task involves shopping online for food groceries focussing mainly on the accessibility and usability of two websites, Asda and Tesco. The results of the study will make a contribution in helping both the website developers and the government to seek effective ways to better serve the older people and to do so efficiently.

Why have I been invited?

As you have been identified as a mature adult you have been chosen to take part in this study. If you are taking part in the task, your participation is of most value and your views and opinions in the interviews are very important in driving future research in designing friendly accessible websites for mature people.

Do I have to take part?

This is a voluntary study and as such it is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep, together with a copy of the attached consent form. You are still free to withdraw at any time and without giving a reason.

What will it involve?

The task will involve searching for 5 food items on line from Asda and Tesco supermarkets then put them in a basket. That means you are required to just shop as far as you reach the stage when all five items are in the basket then you stop. During the procedure you can ask any questions only if you are stuck. No final purchase of any food item is required in this task. So you are not required to input any of your personal details.

Will I be recorded, and how will the recorded media be used?

The researcher will use a recording equipment called Camtasia recorder. This type of equipment will record your interactions with the computer or laptop whilst you perform the online task. The recordings of your activities made during this research will only be used for analysis. No other use will be made of them without your written permission, and no one outside the study will be allowed access to the original recordings. No recordings of your appearance are seen at all, only your voice and the movement of the mouse is recorded. This will help the researcher to analyse the movements you perform whilst doing the task.

What will happen to the results of this research study?

The results of this research will be included within the supporting documentation for a PhD thesis and also submitted for publication within relevant journals and conference proceedings. We will be more than happy to supply you with a printout of any publications upon request.

What are the possible disadvantages, burdens and risks of taking part?

Since it is your first experience to shop on line, you might feel apprehensive or anxious performing the task. Should you feel unable to cope at any time with the procedure, please stop and inform the researcher immediately.

What are the possible benefits of taking part?

By taking part in this research, your opinions and views will be analysed and the results will contribute in helping the website developers and government formulate policies which enable the designing of easily, accessible and friendly websites for the older people.

What if there is a problem?

If you have a query or concern about any aspect of this study, if appropriate, in the first instance, you should contact the researcher. If the researcher can not help you, you can contact the Supervisor who will be willing to help you. If your concern is not resolved by the researcher and their supervisor, you should contact the Head of the department.

The Head of Department: Nick Savage 02392848484 nick.savage@port.ac.uk	University of Portsmouth School of Computing Buckingham Building Lion Terrace	Lion Terrace Portsmouth PO1 3HE
------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------	---------------------------------------

If the complaint remains unresolved, please contact:

The University Complaints Officer: 023 9284 3642 (complaintsadvice@port.ac.uk)

Who is organising and funding the research?

The research is funded and organised by the researcher. No one among the researchers or the University staff will receive any financial reward for conducting this study.

Who has reviewed the study?

This study has been reviewed by Faculty of Technology Research Ethics Committee at University of Portsmouth.

Thank you for taking time to read this information sheet and for considering volunteering for this research. If you do agree to participate your consent will be sought; please see the accompanying consent form. You will then be given a copy of this information sheet and your signed consent form, to keep.

A.3.3 Participant Consent Form

Study Activity: Task and Interview
Participant Identification Number.....

Title of Project: Adoption of Electronic Commerce among the older people
Name of researcher: Memory Taurigana
Name of Supervisor: Dr Alice Good

Ethics Committee Reference Number.....

1.I confirm that I have read and understood the information sheet dated 20 July 2017. (version 1) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2.I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason.

3. I understand that the results of this study may be published and / or presented at meetings or academic conferences. I give my permission for my anonymous data, which does not identify me, to be disseminated in this way.

4. I agree to the data I contribute being retained for any future research that has been approved by a Research Ethics Committee.

5.I agree to take part in the above study.

Please confirm/delete as required: **I am/not disabled / have a medical problem of which the researcher should be aware.**

Please specify:

Name of Participant:

Date:

Signature:

Name of Person taking Consent:

Date:

Signature:

A.3.4 Ethics Issues & Survey Questionnaire Form

Study Title: Adoption of Electronic Commerce by the older people

Name of Researcher: Memory Tauringana

Name of Supervisor: Dr. Alice Good

Contact Details:

Address: School of Computing

University of Portsmouth

Buckingham Building

Lion Terrace

Portsmouth

Hampshire

PO1 3HE

UK

Telephone: 023 9284 6460

Email: memory.tauringana@port.ac.uk

Invitation

Thank you for reading this. I would like to invite you to take part in this research study by performing an online task and taking part in the interview. Your participation is voluntary and your responses will be most valued. The research is on buying and selling on the internet among mature adults. The task involves shopping online for food groceries focussing mainly on the accessibility and usability of two websites, Asda and Tesco.

I will not ask your name or any identifying details. The task will be completed anonymously and all reasonable steps will be taken to ensure confidentiality. Responses from completed tasks and interviews will be collated for analysis. Once this is complete the original answers will be retained until successful completion of the research and may be used as part of future research. Up to this stage, completed responses will be stored in a locked cabinet.

You are free to withdraw your participation at any point during the completion of this task and the results will be discarded. Should you later reconsider, or wish to withdraw your participation in this research after completion, please contact the researcher up to a week after completing the questionnaire.

There are two parts to this study. Firstly, you will be asked to carry out an online shopping task. You will be observed during this task. The second part will involve you being interviewed on your experience after carrying out the task.

Online Shopping Task

Instructions:

You are required to carry out an online shopping task for some food groceries from Asda and Tesco supermarket websites. You are required to do as much as you can by yourself although you may ask me for assistance only if you are really stuck at any stage. I will be present only to observe you as you carry out the exercise. Apart from me observing you, your website interactions are also recorded using Camtasia (software which records computer interactions) for analysis to better understand how user friendly the websites are. The task will require you to shop as far as you reach the stage for payment then you stop. That means you are required to only search for these items and add them to the shopping basket. The task does not need you to enter any of your credit card or debit card details and will take no more than 20 minutes to complete. After the exercise you are required to answer some questions about your online shopping experience on the overall accessibility and usability of the websites.

The links for the two shopping websites are shown below and you need to open an account first with them before you start shopping:

Asda Supermarket -> <https://www.groceries.asda.com/>

Tesco Supermarke-> <https://www.tesco.com/groceries/>

A list of the items to shop for are listed below:

- Semi Skimmed Milk 2pint
- Oats Porridge
- Large Free Range Eggs One dozen
- Chicken Breast Fillets
- Kingsmill Wholemeal Bread

These are the steps you need to take:

1. Open an account with the online supermarket
2. Search for the shopping item
3. Add shopping item to basket
4. Repeat process until you shop for all items.
5. Then STOP

Thank you for completing the task.

A.3.5 Observation Data Collection Sheet

Record all information as observed

Participant No.....

1. Online Shopping Task

Time Start.....

Time Finish.....

Total No of items in the basket:

Total No of correct items in the basket:

2. Camtasia Recorder

Cursor movement.....

No of clicks.....

No of errors.....

No ask for help.....

3. Comments.....

.....

.....

A.3.6 Observation/Think Aloud Form

Participant No: _____ Date: _____								
Key								
How to Use the Scale: While observing the participant, Score questions 1-3								
Q1. Vocalisation eg. Whimpering, groaning, vocalise words								
Absent 0	Mild 1	Moderate 2	Severe 3	<input type="checkbox"/>				
Q2. Facial expression eg. Looking tense, frowning, grimacing, eyes expression								
Absent 0	Mild 1	Moderate 2	Severe 3	<input type="checkbox"/>				
Q3. Change in body language eg. Fidgeting, rocking, guarding part of body, withdrawn								
Absent 0	Mild 1	Moderate 2	Severe 3	<input type="checkbox"/>				
Add scores for Q1-Q3 and record here				<input style="width: 20px; height: 20px;" type="text"/>				
Now tick the box that matches the total score				<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px; text-align: center;">0-1 No pain</td> <td style="padding: 2px 5px; text-align: center;">2-3 Mild</td> <td style="padding: 2px 5px; text-align: center;">4-5 Moderate</td> <td style="padding: 2px 5px; text-align: center;">6+ Severe</td> </tr> </table>	0-1 No pain	2-3 Mild	4-5 Moderate	6+ Severe
0-1 No pain	2-3 Mild	4-5 Moderate	6+ Severe					



A.3.7 Post Task Interview Questions

Participant No.....

1. Can you comment on your overall online shopping experience.

2. What did you like or dislike about the overall design or layout of each of the websites?

3. How easy was it to search for the items needed and add them to the basket?

4. Were there any aspects of the websites that were difficult to deal with?

5. Which shopping website did you prefer and why?

6. What do you think are the advantages of shopping online for food or in general?

7. What do you think are the disadvantages of shopping online for food or in general?

8. Do you think in future you might consider shopping online for food? Please give reasons for your answer.

9. What do you think online shops should do to entice or persuade you to do more online shopping.

10. What do you think are the barriers of online shopping for food or in general?

Thank you very much for taking part in this exercise and interview. If you have any concerns regarding this research please contact me or my supervisor in the first instance. If you are not entirely happy with their response, please contact the Chair of Faculty of Technology Research Ethics Committee in confidence by writing to:

Chair of Faculty of Technology Research Ethics Committee
School of Computing,
Buckingham Building,
Lion Terrace,
Portsmouth,
Hampshire,
PO1 3HE,
UK.

B.1 Search Strategy History Table

No	Type of Item search	Papers for each search
1	"electronic commerce" or e-commerce or ecommerce AND "older people" AND barrier*	754
2	"electronic commerce" or e-commerce or ecommerce AND "older people" or older people AND barrier*	464
3	"electronic commerce" or e-commerce or ecommerce AND "older people" or "older people" or older people AND barrier*	2,718
4	"electronic commerce" or e-commerce or ecommerce or "online shopping" AND "older people" or "older people" or older people AND barrier*	3,210
5	"electronic commerce" or e-commerce or ecommerce or "online shopping" or e-shopping AND "older people" or "older people" or older people AND barrier*	1,251
6	"electronic commerce" or e-commerce or ecommerce or "online shopping" or e-shopping AND "older adults" or "older people" or "older people" or older people AND barrier*	578
7	"older people" or "older people" or older people AND "electronic commerce" AND barrier*	1,086
8	"older people" or "older people" or older people AND "online shopping" AND barrier*	1,352
9	"older people" or "older people" or older people AND "online shopping"	919
10	"older people" or "older people" or older people AND "online shopping" or "electronic commerce"	1,490
11	e-commerce or ecommerce or "electronic commerce" or "online shopping" or e-shopping AND "older people" or "older people persons" or "older people" or "old people" or "older people users" or "older adults"	937
12	e-commerce or ecommerce or "electronic commerce" or "online shopping" or e-shopping AND "older people" or "older people persons" or "older people" or "old people" or "older people users" or "older adults" or pensioner*	1,596
13	e-commerce or ecommerce or "electronic commerce" or "online shopping" or e-shopping AND "older people" or "older people persons" or "older people" or "old people" or "older people users" or "older adults" or pensioner* or senior*	1,271
14	e-commerce or ecommerce or "electronic commerce" or "online shopping" or e-shopping AND "older people" or "older people persons" or "older people" or "old people" or "older people users" or "older adults" or pensioner* or senior* AND barrier*	595
15	e-commerce or ecommerce or "electronic commerce" or "online shopping" or e-shopping AND "older people" or "older people persons" or "older people" or "old people" or "older people users" or "older adults" or pensioner* or senior* AND barrier* or obstacle*	913

16	e-commerce or ecommerce or “electronic commerce” or “online shopping” or e-shopping AND “older people” or “older people persons” or “older people” or “old people” or “older people users” or “older adults” or pensioner* or senior* AND barrier* or obstacle* or hindrance*	1,097
17	e-commerce or ecommerce or “electronic commerce” or “online shopping” or e-shopping AND “older people” or “older people persons” or “older people” or “old people” or “older people users” or “older adults” or pensioner* or senior* AND barrier* or obstacle* or hindrance* AND “digital divide”	839
18	e-commerce or ecommerce or “electronic commerce” or “online shopping” or e-shopping AND “older people” or “older people persons” or “older people” or “old people” or “older people users” or “older adults” or pensioner* or senior* AND barrier* or obstacle* or hindrance* AND “digital divide” or “digital inequality”	770
19	e-commerce or ecommerce or “electronic commerce” or “online shopping” or e-shopping or “internet use” AND “older people” or “older people persons” or “older people” or “old people” or “older people users” or “older adults” or pensioner* or senior* AND barrier* or obstacle* or hindrance* AND “digital divide” or “digital inequality”	7,324
20	e-commerce or ecommerce or “electronic commerce” or “online shopping” or e-shopping or “internet use” AND “older people” or “older people persons” or “older people” or “old people” or “older people users” or “older adults” or pensioner* or senior*	2,930
21	“electronic commerce” AND “older people” or “older people persons” or older people AND barrier* or disability AND “internet use”	737
22	“electronic commerce” AND “older people” or “older people persons” or older people AND barrier* or disability AND “internet use”	
23	e-commerce or “electronic commerce” or “e-shopping” AND “senior citizens” or pensioner* AND barrier*	819
24	e-commerce or “electronic commerce” or “e-shopping” AND “senior citizens” or pensioner* or “silver surfers” AND barrier*	1,088
25	e-commerce or ecommerce or “electronic commerce” or technology AND “senior citizens” or pensioner* AND barrier*	2,121
26	e-commerce or ecommerce or “electronic commerce” or “online shopping” or “websites” or web or technology AND “senior citizens” or pensioner* or “older people persons” or “baby boomers” AND barrier*	1,090
29	“e-commerce adoption” AND older people	382
30	“e-commerce adoption” AND older people AND barrier*	227
31	“e-commerce adoption” AND older people or “older people”	1,305
32	“e-commerce adoption” AND older people or “older people” or “older people”	126
33	“e-commerce adoption” AND older people or “older people” or “older people” or senior*	9,345
34	“e-commerce adoption” AND older people or “older people” or “older people” or senior* AND barrier*	9,381

35	"e-commerce adoption" or "electronic commerce adoption" AND older people	488
36	"e-commerce adoption" or "electronic commerce adoption" AND older people AND barrier*	512



B.2 Letter accompanying Questionnaire

Dear Sir/Madam,

My name is Memory Tauringana. I am a PhD student at the University of Portsmouth. As part of my research I am investigating adoption of e-commerce among mature people. E-commerce is defined as the buying and selling of products, services and information using the internet. The aims of the study are (1) To investigate the extent which older people buy and sell using the internet, (2) For what purpose older people use e-commerce, (3) What are the barriers to adoption of e-commerce (4) To determine what individual characteristics are associated with the extent adoption of e-commerce.

Completing the questionnaire should take no longer than 30 minutes. Your response is of the utmost importance to me, although your participation in this survey is entirely voluntary. The information gathered will be used solely for academic and professional purposes by the University. It will be handled and treated confidentially, and will not be released to anyone in a format which would enable any individual to be identified. Please read the questionnaire carefully and respond honestly to its contents. Should you have any queries or comments regarding this survey, you are welcome to contact me.

Thank you very much for your cooperation.

Sincerely,
Memory Tauringana

Mobile: 07727982227

B.3 Final Questionnaire

Section A

***Please tick in the appropriate box and fill in the blank spaces.**

1. What is your gender?

- Male Female

2. What is your age?

3. Marital status

- Married Single Widowed Separated/divorced
Other (please specify).....

4. What is your residential status?

- Living alone Living with spouse/partner Living with friends
 Living with family Living in a Nursing/Residential Home
Other (please specify).....

5. What type of school did you attend?

- Public Private Home schooling No school
Other (please specify).....

6. Education qualifications

- Primary Education Secondary Education College Diploma
 Undergraduate degree Postgraduate degree
Other (please specify).....

7. Information Technology (IT) highest qualification

- Certificate Degree
 Post graduate None
Other (please specify).....

8. What is your current employment status?

- Employed Self-employed Unemployed
 Volunteer Retired
Other (please specify).....

9. What is your yearly income?

- Less than £15000 £16 000 to £25 000 £26 000 to £35 000
 Above £36000 N/A

10. How would you describe your ethnic origin?

- White British Black or Black British Indian
 White Irish Caribbean African

If Yes, which online store/shop do you use?

- Tesco Asda Ocado/Waitrose
 Morrisons Iceland Sainsburys

Other (please specify).....

21. Do you buy goods or items on the internet? Yes or No

If Yes which sites or market places do you normally use?

- Amazon ebay Gumtree Car site

Other (please specify).....

22. Do you pay household bills on the internet? Yes or No

If Yes which of the following do you pay?

- Mortgage/rent Insurance Electricity/Gas Council Tax
 Broadband/Telephone/Mobile TV licence Sky/Cable Water

Other (please specify).....

23. Have you ever booked a holiday? Yes or No

If Yes how did you usually pay for the service?

- Online Telephone Travel Agents Post/Cheque

Other (please specify).....

24. Do you involve yourself in any kind of entertainment? (e.g. Cinemas, restaurants, sports activities, theatres, gym?) Yes or No

If Yes how do you usually pay for the services?

- Online Telephone/Mobile In person/In shop
 Direct Debit Post/Cheque

Other (please specify).....

25. Which of the following activities do you perform?

- Transfer money between different accounts within a bank.
 Transfer money between different bank accounts Pay individuals
 Online banking Telephone banking None of the above

Other (please specify).....

26. Which of these products or services do you sell online?

- Food stuff Books, magazines Electronic appliances
 Clothes, shoes Toys, games Videos, Music, CDs
 Jewellery, toys Shares Computer programmes/games

Other (please specify).....

27. Do you have any disability which you think would prevent you from buying/selling on the internet? (Please specify)

Section C

Important Instruction. The numbers equal the following:

1=Strongly disagree

2=Disagree

3=Neither agree or disagree

4=Agree

5=Strongly agree

N/A= Not Applicable

*** Please tick the box which most applies to you.**

	1	2	3	4	5	n/a
28. I find it easy to pay bills on the internet.						
29. I find it easy to transfer money between different banks accounts						
30. I find it easy to buy groceries on the Internet						
31. I find it easy to buy clothes, shoes, jewellery online?						
32. I find it easy to buy insurances, services on the internet.						
33. I find it easy to buy a car on the internet.						
34. I find it easy to buy household goods or appliances on the internet.						
35. I find it easy to buy books online?						
36. I find it easy to sell clothes, shoes online?						
37. I find it easy to sell household goods or appliances online						
38. I find it easy to sell books online?						
39. I find it easy to navigate e-commerce websites pages.						
40. I find it easy to search for goods when I shop online.						
41. I find it easy to do comparison shopping online.						
42. I find the information on websites easy to understand.						

	1	2	3	4	5	N/A
43. I find it convenient to shop online.						
44. I feel that online transactions are quick and saves time.						
45. I like being able to compare products.						
46. I feel e-commerce helps me make better purchase decisions.						
47. I find products and services cheaper online than traditional shops.						
48. I can shop for products online that are not available or difficult to find in shops.						
49. There are more advantages of shopping online than disadvantages.						
50. I feel it is important to make shopping a social event.						
51. I am not concerned about my personal information being shared.						
52. I am not concerned about unauthorised use of my credit or visa card.						
53. I am not concerned about transaction and shipping errors.						
54. I am not concerned if products do not perform as intended.						
55. I trust the quality of the products sold online.						
56. I trust buying from a website I have used in the past.						
57. I trust the information presented on e-commerce websites.						
58. I trust online delivery service system.						

Thank you for your help and participation

If you have any concerns regarding this research, please contact Memory Taurigana in the first instance. If you are not entirely happy with her response, please contact the Chair of the

School of Computing Research Ethics Committee, in confidence, by writing to:

Chair of School of Computing Research Ethics Committee,

School of Computing,

University of Portsmouth,

Buckingham Building,

Lion Terrace,

Portsmouth

PO1 3HE

Hampshire

UK

THE END

B.3 Questionnaire Rationale

Question	Rationale
<p>1. What is your gender? Options: Male Female</p>	<p>Input Type - Tick one answer</p> <p>Rationale: This question allows the respondent to input their gender and to test the hypothesis that gender is positive predictor of e-commerce adoption by the older people. <i>Selwyn et al.(2003); Mattilla et al.,(2003);Wilson et al.,(2003); Slyke et al., (2002); Wood and Li, (2005); Fallow,(2005); Jokisuu et al.(2007); Opalinski (2008);Ryu et al.(2008); Sangran et al.,(2009); Van Slyke et al.,(2010); Lian and Yean, (2014); Lepper and McCloskey(2011); Martinez-Pecino et al.,(2013)</i></p> <p>Hypothesis 1</p>
<p>2. What is your age? Options: Number of years since birth</p>	<p>Input Type- numeric</p> <p>Rationale: This question allows the respondent to input their age and to test the hypothesis that age is positive predictor of e-commerce adoption by the older people. <i>Selwyn et al.(2003); Eastman and Iyer (2004); Wu, (2003); Sorce(2005); Porter and Donthu(2005);McCloskey and Lepper (2006); Peacock, (2007); Opalinski (2008); Ryu et al.(2008); Erickson and Johnson (2011); McCloskey, (2011); McCloskey (2011); McCloskey and Lepper (2010); Mitzner et al.(2010) ;Lepper and McCloskey(2011); Affonso de Lara (2010); Beneke et al.,(2011)</i></p> <p>Hypothesis 2</p>
<p>3. Marital status? Options: MSMarried MSSingle MSWidow MSSepDor MSOther</p>	<p>Input Type- tick one answer</p> <p>Rationale: This question will allow the respondent to choose their marital status and to test the hypothesis that marital status can determine the adoption of e-commerce adoption by older people. <i>Karjaluoto et al., (2002); Selwyn et al.(2003); Wilson et al.,(2003); Yi,(2005); Jokisuu et al.(2007); Hashim et al., (2009); Taylor et al.(2003; Mattila et al.(2003)</i></p> <p>Hypothesis 3</p>
<p>4. What is your residential status? Options: ResStaAlone ResStaSpoPat ResStaFriend ResStaFamily ResStaNHome ResStaOther</p>	<p>Input Type- tick one answer</p> <p>Rationale: This question will allow the respondent to choose their residential status and to test the hypothesis that residential status can determine the adoption of e-commerce adoption by older people. Taylor et al.,(2003)</p> <p>Hypothesis 4</p>
<p>5. What type of school did you attend? Options: SchPub SchPriv SchHmeSch SchNoSch SchOther</p>	<p>Input Type- tick one answer</p> <p>Rationale: This question will allow the respondent to choose what type of school they attended and to test the hypothesis that school type can be a determinant of e-commerce adoption.</p> <p>Hypothesis 5</p>

<p>6. Education qualifications</p> <p>Options EduQuPrim EduQuPrim EduQuCollege EduQuUndGra EdQuPostGra EduQuOther</p>	<p>Input Type- tick one answer</p> <p>Rationale:This question will allow the respondent to choose their education qualification and to test the hypothesis that education can determine the adoption of e-commerce adoption by the older people. <i>Selwyn et al.(2003); Porter and Donthu(2005); Wilson et al.,(2003); Jokisuu et al.(2007); Ryu et al.(2008); McCloskey and Lepper (2010); Lepper and McCloskey(2011;)</i> Mattila et al.(2003)</p> <p>Hypothesis 6</p>
<p>7. Information Technology (IT) highest qualification.</p> <p>Options: ITDegree ITCertificate ITExperi ITNone ITOther</p>	<p>Input Type- tick one answer</p> <p>Rationale: This question will allow the respondent to choose the highest IT qualification they have and to test the hypothesis that IT qualification can be a positive predictor of e-commerce adoption.</p> <p>Hypothesis 7</p>
<p>8. What is your current employment status?</p> <p>Options: EmpStaEmp EmpStaSelf EmpStaUnEmp EmpStaVol EmpStaRet EmpStaOther</p>	<p>Input Type- tick one answer</p> <p>Rationale: This question will allow the respondent to choose their current employment status and to test the hypothesis that employment status can determine the adoption of e-commerce adoption by the older people. <i>Wilson et al.,(2003)</i></p> <p>Hypothesis 8</p>
<p>9. What is your yearly income?</p> <p>Options: YrlyInc1 YrlyInc2 YrlyInc3 YrlyInc4 YrlyInc5</p>	<p>Input Type- tick one answer</p> <p>Rationale: This question will allow the respondents to choose their yearly income and also to test the hypothesis that income can determine the adoption of e-commerce adoption by the older people <i>Porter and Donthu(2005); Wilson et al.,(2003); Ryu et al.(2008); Beneke et al.,(2011); Mattila et al.(2003)</i></p> <p>Hypothesis 9</p>
<p>10. How would you describe your ethnic origin?</p> <p>Options: EthnOri1 EthnOri2 EthnOri3 EthnOri4 EthnOri5 EthnOri6 EthnOri7 EthnOri8 EthnOri9</p>	<p>Input Type- tick one answer</p> <p>Rationale: This question will allow the respondents to choose their ethnic origin and testing of the hypothesis that the ethnic origin status can determine the adoption of e-commerce adoption by the older people <i>Porter and Donthu(2005); Wilson et al.,(2003); Opalinski (2008)</i></p> <p>Hypothesis 10</p>
<p>11. How often, on average, do you buy products or services on the internet?</p>	<p>Input Type- tick one answer</p>

	Rationale: This question will allow the respondents to state the amount of money spent on average on products or services adoption of e-commerce adoption by the older people
12. How often, on average, do you sell products or services on the internet? Options: Daily Once in a week Once a month A couple of times a year Other (please specify)	Input Type- tick one answer Rationale: This question will allow the respondents to state the amount of money spent on average on products or services adoption of e-commerce adoption by the older people.
13. How much, on average, are the purchases you make online each month? Options: £1 to £99 £100 to £199 £200 to £299 £300 to £399 Above £400	Input Type- tick one answer Rationale: This question will allow the respondents to state the amount of money spent on average on products or services adoption of e-commerce adoption by the older people.
14. How much, on average, are the sales you make online each month? Options: £1 to £99 £100 to £199 £200 to £299 £300 to £399 Above £400	Input Type- tick one answer Rationale: This question will allow the respondents to choose the amount of money they think they spent on average on products or services.
15. To what extent do you think you buy on the internet? Options: less than 10% 10% to 25% 26% to 50% 51% to 75% 76% to 100%	Input Type- tick one answer Rationale: This question will allow the respondents to tick the extent (%) to what they think they buy on the internet.
16. To what extent do you think you sell on the internet? Options: less than 10% 10% to 25% 26% to 50% 51% to 75% 76% to 100%	Input Type- tick one answer Rationale: This question will allow the respondents to tick the extent (%) to what they think they sell on the internet.
17. Which of these devices do you use? Options: Credit/Visa Card Automated teller machine (ATM) Barcode reader Fax machine Mobile phone	Input Type- tick one answer/s Rationale: This question will allow the respondents to tick which devices they use.

Computer/Laptop/Table (please specify) Other	Index of adoption of e-commerce (IAE)
<p>18. Which activities do you usually perform on the internet? Options: Pay bills Book Holidays, flights, tickets Books, magazines, newspaper Financial investments Comparison shopping Other (please specify)</p>	<p>Input Type- tick one answer/s Rationale: This question will allow the respondents to tick which activities they usually perform on the internet. (IAE)</p>
<p>19. Which of these products or services do you usually buy on the internet? Options: Food groceries Buy household groceries Electronic appliances Clothes, shoes, jewellery, cosmetics Videos, music, games Toys, flowers None of above Other (please specify)</p>	<p>Input Type- tick one answer/s Rationale: This question will allow the respondents to tick which of the products or services they usually buy on the internet. (IAE)</p>
<p>20. Do you shop for groceries on the internet? Yes or No, If Yes, which online store/shop do you use? Options: Tesco Asda Ocado/Waitrose Morrisons Iceland Sainsburys Other (please specify)</p>	<p>Input Type- tick one answer/s Rationale: This question will allow the respondents to tick Yes or No and then tick the name of the shop they shop from. (IAE)</p>
<p>21. Do you buy goods or items on the internet? If Yes which sites or market places do you normally use? Amazon Ebay Gumtree Car site Other (please specify)</p>	<p>Input Type- tick one answer/s Rationale: This question will allow the respondents to tick Yes or No and then tick the name of the website they use. (IAE)</p>

<p>22. Do you pay household bills on the internet? Yes or No If Yes which of the following do you pay? Mortgage/rent Insurance Electricity/Gas Council Tax Broadband/Telephone/Mobile TV licence Sky/Cable Water Other (please specify)</p>	<p>Input Type- tick one answer/s</p> <p>Rationale: This question will allow the respondents to tick Yes or No and then tick the household bill/s they pay on the internet.</p> <p>(IAE)</p>
<p>23. Have you ever booked a holiday? Options: Online Telephone Travel Agents Post/Cheque Other (please specify)</p>	<p>Input Type- tick one answer/s</p> <p>Rationale: The question will allow the respondents to tick Yes or No and then tick the means how the holiday is paid?</p>
<p>24. Do you involve yourself in any kind of entertainment? (e.g. Cinemas, restaurants, sports activities, theatres, gym?) Yes or No If Yes how do you usually pay for the services? Online Telephone/Mobile In person/In shop Direct Debit Post/Cheque Other (please specify)</p>	<p>Input Type- tick one answer/s</p> <p>Rationale: This question will allow the respondents to tick Yes or No and then tick the means how the holiday is paid?</p> <p>(IAE)</p>
<p>25. Which of the following activities do you perform? Transfer money between different accounts within a bank. Transfer money between different bank accounts Pay individuals Online banking Telephone banking None of the above</p>	<p>Input Type/tick one answer/s</p> <p>Input Rationale: This question will allow the respondents to tick Yes or No and then tick the means how the holiday is paid?</p> <p>(IAE)</p>
<p>26. Which of these products or services do you sell online? Food stuff Books, magazines Electronic appliances Clothes, shoes</p>	<p>Input Type- tick one answer/s</p> <p>Rationale: This question will allow the respondents to tick Yes or No and then tick the means how the holiday is paid?</p>

<p>Toys, games Videos, Music, CDs Jewellery, toys Shares Computer programmes/games Other (please specify)</p>	<p>(IAE)</p>
<p>27. Do you have any disability which you think would prevent you from buying/selling on the internet? (Please specify)</p>	<p>Input Type- Enter what disability type</p> <p>Rationale: This question will allow the respondents to tick Yes or No and then tick the means how the holiday is paid?</p> <p>Disability Status</p>
<p>28. I find it easy to pay bills on the internet.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - tick one for each event</p> <p>Rationale: These question will allow the respondents to say if they find it easy paying bills online? Ryu et al.(2008); <i>Martinez-Pecino et al., (2013)</i></p> <p>EOU</p>
<p>29. I find it easy to transfer money between different banks accounts</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - tick one box for each event</p> <p>Rationale: These question will allow the respondents to say if they find it easy to transfer money between banks? McCloskey (2006); Smith (2008); Ryu et al.(2008); <i>Martinez-Pecino et al.,(2013)</i></p> <p>EOU</p>
<p>30. I find it easy to buy groceries on the Internet.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - tick one box for each event</p> <p>Rationale: This question will allow the respondents to say if they find it easy to buy groceries on the Internet. McCloskey (2006); Smith (2008); Ryu et al.(2008); <i>Martinez-Pecino et al.,(2013)</i></p> <p>PEOU</p>
<p>31. I find it easy to buy clothes, shoes, jewellery online</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - tick one for each event</p> <p>Rationale: Rationale: This question will allow the respondents to say if they find it easy to buy clothes, shoes, jewellery online McCloskey (2006); Ryu et al.(2008); Smith (2008); <i>Martinez-Pecino et al.,(2013)</i></p> <p>PEOU</p>
<p>32. I find it easy to buy insurances, services on the internet.</p>	<p>Input Type Likert scale - tick one for each event</p>

<p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Rationale: This question will allow the respondents to say if they find it easy to buy insurances, services on the internet. McCloskey (2006); Ryu et al.(2008); Smith (2008); <i>Martinez-Pecino et al.,(2013)</i></p> <p>PEOU</p>
<p>33. I find it easy to buy a car on the internet. Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale – please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find it easy to buy a car on the internet. McCloskey (2006); Ryu et al.(2008); Smith (2008); <i>Martinez-Pecino et al.,(2013)</i></p> <p>PEOU</p>
<p>34. I find it easy to buy household goods or appliances on the internet. Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale – please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find it easy to buy household goods or appliances on the internet</p> <p><i>Sorce(2005);</i> McCloskey (2006); Iyer and Eastman (2006); Ryu et al.(2008); Smith (2008); <i>McCloskey and Lepper (2010); Martinez-Pecino et al.,(2013)</i></p> <p>PEOU</p>
<p>35. I find it easy to buy books online? Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale – please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find it easy to buy books online McCloskey (2006); Iyer and Eastman (2006); Ryu et al.(2008); Smith (2008); <i>McCloskey and Lepper (2010); Martinez-Pecino et al.,(2013)</i></p> <p>PEOU</p>
<p>36. I find it easy to sell clothes, shoes online. Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale – please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find it easy to sell clothes, shoes online.</p> <p>PEOU</p>
<p>37. I find it easy to sell household goods or appliances online. Options</p>	<p>Input Type Likert scale – please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find it easy to sell any household goods online.</p>

<p>1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>PEOU</p>
<p>38. I find it easy to sell books online? Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale – please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find it easy to sell books online</p> <p>PEOU</p>
<p>39. I find it easy to read and navigate e-commerce websites and pages. Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find it easy to read and navigate e-commerce web sites, pages. McCloskey (2006); Iyer and Eastman (2006); Mallenius et al.,(2007); Martinez-Pecino et al. (2013); Ryu et al.(2008); Smith (2008); <i>McCloskey and Lepper (2010)</i>; <i>Martinez-Pecino et al.,(2013)</i>;</p> <p>PEOU</p>
<p>40. I find it easy to search for goods when I shop online. Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find it easy to search for goods goods online. <i>Sorce(2005)</i>; McCloskey (2006); Ryu et al.(2008); Smith (2008); <i>McCloskey and Lepper (2010)</i>; <i>Martinez-Pecino et al.,(2013)</i></p> <p>PEOU</p>
<p>41. I find it easy to do comparison shopping online. Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they like being able to compare products <i>Sorce(2005)</i>; McCloskey (2006); Ryu et al.(2008); Smith (2008); <i>McCloskey and Lepper (2010)</i>; <i>Martinez-Pecino et al.,(2013)</i></p> <p>PEOU</p>
<p>42. I find the information on websites easy to understand. Options</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find the information on websites easy to understand</p>

<p>1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Iyer and Eastman (2006); McCloskey (2006); Martinez-Pecino et al. (2013); Smith (2008); <i>McCloskey and Lepper (2010); Martinez-Pecino et al.,(2013)</i></p> <p>PEOU</p>
<p>43. I find it convenient to shop online. Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find it convenient to shop online. <i>Sorce(2005); McCloskey (2006); Smith (2008); Ryu et al.(2008); McCloskey and Lepper (2010); Martinez-Pecino et al.,(2013)</i></p> <p>PU</p>
<p>44. I feel that online transactions are quicker and saves time. Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find it easy to search for goods when they shop online. <i>McCloskey (2006); Iyer and Eastman (2006); Martinez-Pecino et al. (2013); Ryu et al.(2008); Smith (2008); McCloskey and Lepper (2010); Martinez-Pecino et al.,(2013)</i></p> <p>PU</p>
<p>45. I like being able to compare products Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find it easy to do comparisons shopping online <i>Iyer and Eastman (2006); McCloskey (2006); Martinez-Pecino et al. (2013); Smith (2008); McCloskey and Lepper (2010); Martinez-Pecino et al.,(2013)</i></p> <p>PU</p>
<p>46. I feel e-commerce helps me make better purchase decisions. Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they feel e-commerce helps me make better purchase decisions. <i>Sorce(2005); McCloskey (2006); Smith (2008) Ryu et al.(2008); McCloskey and Lepper (2010)</i></p> <p>PU</p>

<p>47. I find products and services cheaper online than from shops.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find products and services cheaper online than from shops. <i>Sorce(2005); McCloskey (2006); Ryu et al.(2008); Smith (2008); McCloskey and Lepper (2010)</i></p> <p>PU</p>
<p>48. I can shop for products online that are not available in shops or difficult to find.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they find products online that are not available in shops or difficult to find. Sorce et al. (2005); McCloskey (2006); Ryu et al. (2008); Smith (2008); McCloskey & Lepper (2010)</p> <p>PU</p>
<p>49. There are more advantages of shopping online than disadvantages.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if there are more advantages of shopping online than disadvantages. <i>Sorce(2005); McCloskey (2006); Ryu et al.(2008); Smith (2008); McCloskey and Lepper (2010)</i></p> <p>PU</p>
<p>50. I feel it important to make shopping a social event.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they can shop for products online that are not available or difficult to find in the shops McCloskey (2006); Ryu et al.(2008); Smith (2008); <i>McCloskey and Lepper, (2010)</i></p> <p>PU</p>
<p>51. 53. I am not concerned about my personal information being shared.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they are not concerned about their personal information being shared.</p> <p>Security and Privacy</p>

<p>52. I am not concerned about unauthorized use of my credit, visa card.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable I find the information on websites easy to understand.</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they are not concerned about unauthorized use of my credit, visa card.</p> <p>Security and Privacy</p>
<p>53. I am not concerned about transactions errors.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they are not concerned about transaction and shipping errors.</p> <p>Security and Privacy</p>
<p>54. I am not concerned if products do not perform as intended.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to pick the option which correspond to how would they feel if products do not as intended.</p> <p>Security and Privacy</p>
<p>55. I trust the quality of the products sold online.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they trust the products sold online.</p> <p>McCloskey (2006); McCloskey and Lepper (2010)</p> <p>Trust</p>
<p>56. I trust buying on websites I have used in the past.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A= Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to say if they trust buying on websites they have used in the past.</p> <p>McCloskey (2006); McCloskey and Lepper (2010)</p> <p>Trust</p>

<p>57. I trust the information presented on e-commerce websites.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A=Not Applicable</p>	<p>Input Type Likert scale - please tick one answer</p> <p>Rationale: This question will allow the respondents to view how they trust the information presented on e-commerce McCloskey (2006); McCloskey and Lepper (2010)</p> <p>Trust</p>
<p>58. I trust online delivery service system.</p> <p>Options 1=Strongly disagree 2=Disagree 3=Neither agree or disagree 4=Agree 5=Strongly agree N/A=Not Applicable</p>	<p>Input Type Likert scale - tick one box for each event</p> <p>Rationale: : This question will allow the respondents to view how they trust online delivery service system McCloskey (2006); McCloskey and Lepper (2010)</p> <p>Trust</p>

C.1: Summary of Pilot studies

This Section provides an overview of the two pilot studies which were carried out in Study One and Study Two. The purpose and importance of the pilot studies were discussed earlier in the research in Chapter 4. The pilot study (Study One) was conducted at various locations through snow- balling, post and online. The following tables presents the pilot study summaries.

C.1.1 Pilot Study One

Study One	1
Study Title	Quantitative Study on Adoption of e-commerce among older people
Period of study	Oct 2014 to Jun 2015
Objectives of study	<ul style="list-style-type: none"> -To investigate to what extent older people have adopted e-commerce. -To find out the uses of e-commerce among older people. -To investigate the barriers to the adoption of e-commerce by older people. -To determine the individual characteristics associated with the extent of e-commerce adoption among older people.
Question to be addressed	What are the factors surrounding the adoption of e-commerce among older people and the barriers to adoption.
Study Strategy	<p>During the study the data was collected through a questionnaire From Oct 2014 to Dec 2014. The questionnaire consists of 5 sections. Section A (questions 1 to 10) are structured to elicit information regarding the respondents' demographic background such as age, gender, educational qualification and marital status, etc. Section B (questions 11 to 16), asks questions on information about the respondents shopping patterns and behaviour such as how often, on average do you buy or sell products or services on the internet.</p> <p>Section C (questions 17 to 26) asks questions on information about the products, items, goods, activities and services the respondents perform or buy and sell on the internet and also what they use e-commerce for. Also Question 27, in section C asks the respondents if they have any disability which they think would prevent them from buying/selling on the internet. Section D (questions 28 to 58) asks the respondents' attitude on how they feel when they perform different activities on the internet, towards various aspects like usefulness, ease of use, security, trust. Last section E asks about their trust and EOU and usefulness when using the internet. Data was analysed using SPSS package.</p>
Respondents	The respondents who are involved in this Study are those who can speak English and have adopted e-commerce. The definition of e-commerce adopted for this research was discussed earlier in Chapter 1. The exclusion criteria included the participants who can not speak English, have not shopped online before. When the participants have completed section E of the questionnaire, they are given an option to write down their emails if they would like to receive the results of the research project.
Method	The Questionnaire consists of 5 sections.

The questionnaire had 5 sections (Sections A- E). In Section A, respondents were first asked some demographic questions including gender, age, education, school attended, education qualifications and employment status. All respondents were asked to fill in Section A then after that they were asked if they have adopted e-commerce or not in question 11. Those respondents who indicated they have not adopted e-commerce were then asked to fill in Section B only. Those who indicated that they have adopted e-commerce were asked to fill in sections C, D and E. Age was grouped into four categories 55 to 59 years, 60 to 64 years , 65 to 70 years and above 70 years. The average age was 55 years and age range was from 55 to 80 years. Usable and completed questionnaires were received from 61 respondents and descriptive statistics are presented in Table C1.2. 11 respondents (18.03 %) were male, 50 respondents (81.97 %) were female.

It was found that the results indicated all the respondents had a credit card or visa. There amendment were made which included changing the structure of the questionnaire by reducing the questions from 75 to 58, sections reduced from 5 to 4 sections. The layout was amended to allow the respondents less time to complete. Also, the final questionnaire was then developed in a way that all sections were to be completed by all respondents.

C.1.2 Demographic Data

Study Two	Pilot Study	Results	
Gender	Male	11	18.03
	Female	50	81.97
Age	55-59	21	34.43
	60-64	12	19.67
	65-70	18	29.51
	>70	10	16.40
		61	100
Marital Status	Married	26	42.62
	Single	7	9.84
	Widowed	13	21.31
	Separated/Divorce	14	22.95
	Other	1	1.64
	61	100	
Residential Status	Alone	21	34.43
	Spouse/Partner	28	45.90
	Friends	1	1.64
	Family	8	13.11
	Nursing/Res/home	2	3.28
		1	1.63
	Other	61	100
School Attended	Public	47	77.05
	Private	8	13.11
	Home schooling	0	0
	No School	2	3.28
	Other	4	6.56
	61	100	
Educational Qualification	Primary	13	21.31
	Secondary	25	40.98
	College	10	16.39
	Undergraduate	6	9.84
	Postgraduate	3	4.92
	Other	3	4.92
	61	100	
IT Qualification	Certificate	8	13.11
	Degree	1	1.64
	Post graduate	1	1.64
	None	49	80.33
	Other	2	3.28
	61	100	
Employment Status	Employed	23	37.7
	Self-employed	9	14.8
	Unemployed	5	8.2
	Volunteer	6	9.8
	Retired	18	29.5
	Other	0	0

		61	
Yearly Income	<£15000	25	41.0
	£16000-£25000	16	26.2
	£26000-£35000	4	6.6
	£36000-£50000	1	1.6
	>50000	0	0
	N/A	15	24.6
		61	
Ethnic Origin	White british	45	73.77
	Black/black	3	4.92
	British	0	0
	Indian	6	9.84
	White Irish	1	1.64
	Caribbean	3	4.92
	African	0	0
	Chinese	0	0
	Asian	3	4.92
	Other	61	

C.2 Pilot Study Two Summary

C.2.1 Pilot Study Two

Study Two	2
Study Title	Qualitative study on the usability and accessibility issues of Tesco and Asda grocery websites.
Period of Study	Dec 2017 to Jan 2018
Objectives of the study	<ul style="list-style-type: none"> -To investigate whether there are usability issues with the design of the websites of two online grocery shops. -To investigate whether the two websites of the online food grocery shops are accessible to those with age-related impairments -To gather qualitative data on user centered design recommendations for grocery websites -To identify whether there are any other barriers for older people using grocery websites
Question to be addressed	What are the usability and accessibility issues with the grocery websites for Tesco and Asda.
Approach	During the study the participants performed an online shopping task whilst the researcher observe them, then interviews were carried out. The online task was recorded on Camcorder recorder. Data was analysed using NVivo 11.
Participants	Three participants took part in the task, and 2 were male, 1 female. The age range was from 59 to 73 years.
Method	Interviews, Observations, Thinking aloud

C.2 .2 Observation/Think Aloud Form

Participant No:					Date:								
Key													
How to Use the Scale: While observing the participant, Score questions 1-3													
Q1. Vocalisation													
eg. Whimpering, groaning, crying, utter words													
Absent 0		Mild 1		Moderate 2		Severe 3		<input type="checkbox"/>					
Q2. Facial expression													
eg. Looking tense, frowning grimacing, looking frightened, eye movement													
Absent 0		Mild 1		Moderate 2		Severe 3		<input type="checkbox"/>					
Q3. Change in body language													
eg. Fidgeting, rocking, guarding part of body, withdrawn													
Absent 0		Mild 1		Moderate 2		Severe 3		<input type="checkbox"/>					
Add scores for 1-3 and record here										<input type="checkbox"/>			
Now tick the box that matches the total score					<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">0-1 No pain</td> <td style="padding: 2px;">2-3 Mild</td> <td style="padding: 2px;">4-5 Moderate</td> <td style="padding: 2px;">6+ Severe</td> </tr> </table>					0-1 No pain	2-3 Mild	4-5 Moderate	6+ Severe
0-1 No pain	2-3 Mild	4-5 Moderate	6+ Severe										

C.2.3 Camtasia Recorder Results: Pilot Study

Group A Results and descriptive statistics of the online grocery shopping - Results							
Participant No	Gender	Age	Actual Time taken (mins)	Total items in basket	Total correct items in basket	No of clicks	No of times ask for help
1	M	56	24	5	5	87	7
2	M	62	23	6	4	69	21
3	F	55	29	7	5	101	13
Group B Descriptive Statistics							
Variable		Min	Max	Mean			
Times taken		23.00	29.00	26.00			
Clicks		69.00	101.00	85.00			
Age		55.00	62.00	58.500			
No of items in basket		4.00	7.00	5.500			
No of correct items		4.00	5.00	4.500			
Times ask help		7.00	21.00	14.00			

C.2.4 Observation/Think Aloud Summary

KEY: Measure level of discomfort									
4. Vocalisation (e.g utter words, whimpering, groaning)									
Absent=0			Mild=1		Moderate=2			Severe=3	
5. Facial Expression (e.g looking tense, frowning, grimacing, looking frightened)									
Absent=0			Mild=1		Moderate=2			Severe=3	
6. Change in body language (e.g fidgeting, rocking, guarding part of body)									
Absent=0			Mild=1		Moderate=2			Severe=3	
Participant No	1	2	3						
Vocalisation	2	3	3						
Facial Expression	1	2	3						
Change in body language	2	2	3						
Total Score	5	7	9						

Source: Abbey et al. (1996)