Enabling the Digital Fashion Consumer through Gamified
Fit and Sizing Experience Technologies

A thesis submitted to The University of Manchester for the degree of
Doctor of Philosophy in Textiles Design, Fashion & Management in the
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Abstract

The aim of this study is to investigate consumer responses to emerging digital fit and sizing tools in online fashion retailing. Digital fit and sizing tools are assumed to reduce returns, increase sales conversions (Dacko 2016) and bridge physical and digital assessment in online retailing contexts (Pantano and Timmermans 2016, Roy et al. 2016). However little is understood regarding their impact on consumer behaviour. Research is required to gain a holistic understanding of how the tools aid consumer decisions and to deduce whether they can assist with key retailer metrics.

This research is split into three stages: stage 1 which investigates the responses of 400 females aged 18-24 to pre-purchase virtual fit website Metail.com. Stage 2 explores the garment fit evaluation of 20 females, aged 18-34 to physical garments purchased using size and style recommender tools on Very.co.uk or Topshop.com. Stage 3 explores the opinions of 6 industry experts from top UK online fashion retailers through semi-structured interviews.

Existing research in digital fit and sizing technology has been approached by garment technologists (Kim and LaBat 2012, Song and Ashdown 2015) or experiential marketers (Pantano and Servidio 2012, Beck and Crie 2016). This research aims to provide cohesion between the distinct areas of approach. The study reviews existing literature on experiential fashion technology, consumer behaviour and garment fit and sizing, and makes links between the approaches of each discipline. The research follows the consumer shopping journey framework proposed by Lemon and Verhoef (2016). Existing studies have often not captured consumer responses beyond online purchase intention (Huang and Liao 2015, Kim et al. 2016), and the shopping journey model recognises the importance of consumer experience pre and post-purchase. In addition, consumer fit evaluation is under-explored in extant research (Kasambala et al. 2016, deKlerk and Tselepis 2007).

The study adopts the Technology Acceptance Model (TAM) (Davis 1989) to theoretically underpin the conclusive research on pre-purchase consumer evaluations using Metail. The TAM has been used in extant virtual fit or augmented reality fashion research (Perry 2016, Huang and Liao 2015). However, this study builds from existing research and extends the TAM to include the user trait: technology confidence and the experiential state: playfulness. The constructs measured in the post-purchase fit evaluation were derived through existing consumer behaviour research and the evaluation of garment fit and sizing (Kasambala et al. 2016, Eckman et al. 1990, McKinney and Shin 2016).

Results of the study provide a guide to understanding the end-to-end processes behind consumer use of fit and sizing tools. The results of the research are conclusive (stage 1) and exploratory (stage 2 and 3) and were triangulated in the discussion to validate each approach.
Declaration

No portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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When one thinks of those to thank for longstanding support, firstly gratitude should duly be extended to my supervisors. I would therefore like to thank Dr. Delia Vazquez and Dr. Simeon Gill for your diligence in guiding me through. I do hope that this is not the end of our research trio.

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And to anyone else who has helped me throughout this process, thank you.

Open the dawn in the open sky
the laboratory - open the book, open the challenge, with open eyes. Open. Out. Look.
Open all minds, open all dreams, research, question. Open all doors, open all senses
Open all defences, ask: What were these closed for? In the possibilities of light,
the nature of trust, the strength of unassailable us.
How strong the night lies as light aeriates the dark and atomic dreams multiply from
a graphene heart.
We who have walked the world in the name of here and where we came from
stand in this great city and say: I belong here, I belong.
I bring my past, I bring my future, I bring my rights and I bring my song.
I stand atop The University of Manchester - we belong here, we belong.

~Lemm Sissay
Publications

List of Terms

**Virtual Fit**: Online clothing try-on and size recommendation technology that is used by consumers in fashion retailing contexts.

**Virtual Fitting Room**: Online clothing try-on technology that uses a digital model, mannequin or avatar to allow consumers to try on a virtual garment.

**E-Size Technology**: An online clothing retailing technology that uses input measurements to predict and recommend a suitable sized garment for a consumer to purchase online.

**Personalised Recommender System**: An online retailing system that recommends products to consumers based on algorithms. Inputs to the system include consumer browsing history, purchase history, product likes and dislikes.

**Metall**: A virtual try-on website that uses height, weight and bra-size inputs to create a 3D visualisation of a garment on an avatar of the user. Size recommendation is also provided.

**Dressipi**: A personalised recommender system and e-size technology located in a window on a retailer’s website. Dressipi uses user body measurements, colour, body shape, lifestyle information and likes and dislikes to recommend a personalised selection of clothing sizes and styles of garments.

**Very.co.uk Style Adviser**: Dressipi solution located on the Very.co.uk website.

**Topshop Style Quiz**: Dressipi solution located on the Topshop.co.uk website.

**Fit recommendation**: A type of virtual fit interface that provides information on how a garment may fit through online textual descriptions.

**Fit visualisation**: A virtual fit interface that uses avatars or virtual fitting room mannequins to provide the user with a digital visualisation of how a garment may fit prior to online purchase.

**Style and size recommendation**: A virtual fit interface that provides online sizes and/or style recommendations to a user based on body measurements and preferences.
Chapter 1. Introduction

1.1. Introduction

Online retailing environments can lack the experiential information that is available to a consumer when shopping in a bricks-and-mortar store, often making tactile assessments of clothing problematic (Merle et al. 2012). The online shopping journey has been impacted heavily through the evolution of technology through the use of multiple channels and harmonious retailing touchpoints (Lewis et al. 2014, Verhoef et al. 2015). Web 2.0 enabled consumers to gather information and form opinions on products online in diverse ways, including through social media, product comments and reviews (Wang and Zhang 2012). Now, the way in which products are presented and communicated to consumers online has begun to evolve from traditional retailing formats to seamless innovative visual presentation technology on retailer websites (Grewal et al. 2017, Brynjolfsson et al. 2013). Retailers are now leveraging personalised online experiences (Piotrowicz and Cuthbertson 2014) and immersive retailing technologies to engage with consumers and remain competitive (Pantano and Servidio 2012). Results of such innovation can be recognised through the success of the pure-play (online only) retailing model (Mintel 2017a).

1.2. Research Context

The online fashion market has continued to see double digit year-on-year growth and is estimated to reach £30m in the UK by 2022 (Mintel 2017a). However, this growth is said to be reaching maturation. Retailers will need to position their focus on technological innovation (Grewal et al. 2017), whilst retaining customer loyalty and satisfaction (Verdict 2015). Online clothing returns due to poor fit remain a barrier to consumer online shopping satisfaction, with around 50% of online sales resulting in returns (Mintel 2017a). 32% of shoppers purchase specifically with the intention to return unwanted sizes (Mintel 2017a). Online returns are an emerging facet of online shopping providing convenience and flexibility to the consumer’s decisions about garments. 39% of consumers are interested in a digital measuring service such as 3D body scanning and 55% of British consumers are willing to pay more for clothes that will fit and suit them (Mintel 2015). These statistics indicate an evident need for further research into fit and sizing technologies and product recommendation in online fashion retailing environments.

1.3. Gap in Extant Research

Research has suggested the promise of virtual fit technologies, including through the emergence of 3D body scanning, however much research is based from technical, design or manufacturing perspectives (Loker et al. 2004, Bye and Labat 2005, Song and Ashdown 2012,
Kim and LaBat 2013, Gültepe and Güdükbay 2014). Virtual fitting room tools have been posited to enhance key metrics for retailers such as increased conversions and reduced returns (Dacko 2016). The influence of virtual try-on technology as a form of image interactivity technology (IIT) in online shopping has been explored (Fiore et al. 2005, Lee et al. 2010, Yang and Wu 2009, Merle et al. 2012). However there is little empirical evidence of how digital fit and sizing platforms are being developed and understood by consumers, retailers and marketers (Apeagyei 2010, Shim and Lee 2011, Merle et al. 2012). Studies have often measured the behavioural outcome of consumer online purchase intention using fit tools (Merle et al. 2012, Pantano and Servidio 2012, Huang and Liao 2015, Beck and Crie 2016), with few studies investigating responses before and after using a technology (Perry 2016). Therefore, there is a distinct need to evaluate the online experience of fit tools, garment fit post-purchase, and the impact of fit tools on consumer behaviour.

1.4. Research Overview

To capture pre- and post-purchase evaluation, the research will be framed by the consumer shopping journey (Lemon and Verhoef 2016), which develops from existing consumer decision making theory (Howard and Sheth 1969). The study will use the Technology Acceptance Model (TAM) (Davis 1989) to theoretically underpin consumer responses to the virtual fit interface (Kim and Forsythe 2010, Beck and Crie 2016), and will additionally measure garment fit constructs in post-purchase analysis. Playful experience of virtual try-on is measured which extends the TAM model and has not been investigated in extant research using virtual fit and sizing technology stimuli. In addition, consumer technology confidence is investigated. Exploratory industry interviews are also undertaken to frame the research with an additional business based perspective to the area of online fashion, fit and sizing.
Chapter One: Introduction

1.5. Research Focus

1. Computers and mobile devices are the medium by which digital garment fit and sizing websites are assessed by the consumer. Therefore, a direct outcome will be the development of a human-computer interaction (HCI) online fit and sizing consumer process model. The model will help retailers, consumers, marketers and academics to better understand how to build profitable online retail fit tools based on consumer technology acceptance. The model will also provide a theoretical understanding of HCI evaluated online fit and sizing stimuli.

2. There is substantial academic interest in using technology evaluative models pertaining to the use of the Technology Acceptance Model framework to digital fit and sizing stimuli, with a consideration of functional and experiential motivations to use the technology.

3. Existing research into the field has not focussed on consumer responses to fit and sizing through digital interfaces. Interpretation of fit and sizing in online retail environments will provide innovative insight into the usefulness of fit and sizing tools as a digital interface. In addition, the post-purchase product and interface analysis will provide novel insight into a consumer’s experience using fit and sizing technology, and the impact on consumer intentions to re-use the tool. Furthermore, the perspectives of industry will offer an additional dimension to the research that extant studies in the area have not explored.

4. The findings can enhance the online experience by conceptualising consumer perceptions to garment fit and sizing technologies in an online setting. Many fit and sizing tools are still at the research and testing stage and have been for the last decade (Loker et al. 2008). The success of the entire field and end-user acceptance will strongly depend on two factors: consumer acceptance of the digital fit and sizing interface (stage 1), and the interface and garment evaluation compared with the physical product (stage 2).

1.6. Research Aim

The aim of the research is to measure consumer responses to fit and sizing stimuli in online fashion retailing. Specifically, through: 3D try-on avatars (Metail virtual fitting room) and personalised recommender systems (Dressipi size and style recommendations). The technologies will be measured against consumer experiential (playfulness) and functional motivations on technology acceptance. In addition, consumer responses to the offline product (post-purchase performance and aesthetic evaluation) and interface evaluation will be captured. The findings will depict consumer intended use and post-use evaluations, which could be used in future development and use of fit and sizing technology.
1.7. Research Objectives

The research objectives for this study are:

1. To define and understand fit and sizing technologies featured in online fashion retailing environments.
2. To review the literature on fit and sizing technologies in online fashion retailing, including playfulness, attitude and intended use.
3. To review the literature on garment fit and sizing, product recommendations, clothing, body and fit satisfaction.
4. To explore the overarching theories of online experience, consumer behaviour, garment fit and technology acceptance in online fashion retailing.
5. To hypothesize a fit and sizing technology acceptance framework based on relationships found in the aforementioned literature reviews.
6. To test the hypothesized model and provide recommendations for how the interfaces may be adapted or refined to better match consumer expectations of fit and clothing assessment pre- and post-purchase.

1.8. Research Outcomes

1. A literature review of the current UK fashion retail market, experiential fashion technology, consumer behaviour, product evaluation, garment fit and sizing and existing theoretical frameworks.
2. The identification of variables pertaining to consumer pre-purchase technology confidence, playfulness, attitude, intended use, and post-purchase fit, sizing and interface evaluation.
3. To establish hypotheses based on the relationships from the literature review and to test them using structural equation modelling.
4. To draw conclusions from:
   a.) The analysis of the framework relating to the effects of fit and sizing technologies in retailing websites and how the tools may influence online (pre-purchase) and physical consumer garment fit (post-purchase) assessment in the future.
   b.) How retailers can best utilise insights for garment fit and sizing derived from the consumer experience and evaluation of fit in both pre-purchase and post-purchase phases of the consumer shopping journey.

1.9. Research Method

The research will use a mixed-methods approach: structural equation modelling (SEM) analysis of quantitative data, thematic analysis of qualitative data and triangulation. Due to
using a large sample of quantitative responses, the ontological approach will be mostly aligned to realism. A virtual try-on website (Metail) will be assessed in an online survey by a sample of 400 female participants aged 18-24 who make frequent online fashion purchases. The SEM will analyse the online survey data, including perceptions of fit and sizing technology, technology confidence, playfulness, attitude and intended use. In a secondary qualitative study, a sample of 20 female participants aged 18-35 are guided through a garment purchase using a size and style recommendation tool situated on either Very.co.uk or Topshop.co.uk. Qualitative interviews and thematic analysis are conducted to explore real garment fit against the size recommendation tool. Finally, 5 industry stakeholders pertinent to the area of fashion, fit and sizing are interviewed to gain a unique industry perspective to the research. This approach, despite the need for raised awareness of the impact of industry on research (Kumar 2017), has not been used in conjunction with both consumer evaluations in fit and sizing research. The research method is summarised into three stages:

1.9.1. Stage 1. Data collection method: Quantitative

Online questionnaire with a task to use a virtual try-on website called Metail, which measures consumer technology acceptance of virtual fit experiences, distributed to a sample of 400 female participants aged 18-24.

1.9.2. Stage 2. Data collection method: Qualitative

A purchase of a dress by a sample of 20 participants aged 18-34 using a size recommendation website called Dressipi in a collaboration with Very.co.uk or on Topshop.co.uk’s website. Subsequent post-purchase exploratory interviews (including physical clothing try-ons) are also conducted.

1.9.3. Stage 3. Data collection method: Qualitative

5 interviews are conducted with key industry stakeholders exploring perspectives on personalisation, virtual fit, consumer confidence and virtual reality. The insights of industry are used to draw developments for the future of digital fit and sizing technology.

1.10. Literature

The literature review in the study demonstrates the multi-disciplinary area of fit and sizing fashion technology. Therefore, the distinct areas are related through aspects of the technology through consumer’s shopping journey (Lemon and Verhoef 2016), pre-purchase, purchase and post-purchase phases. The literature will be presented in this thesis firstly with an overview of experiential fashion technologies which relates to attributes of the interfaces available.
Secondly, consumer behaviour and decision making is discussed. Thirdly, evaluations of literature in garment fit and sizing are made which underpin consumer fit and sizing decisions.

1.11. Experiential fashion technology literature

Experience technology has developed significantly since fashion retailing took to the online channel. Product experience technologies that often use a high level of image interactivity technology are emerging (Blázquez 2014). The aim of new experiential technologies is to emulate the offline, physical experience (Kawaf and Tagg 2017). Augmented and Virtual Reality are key areas of innovation in retailing identified in research and may have the potential to guide the future of fit and sizing fashion technology (Perry 2016, Javornik 2016, Pantano and Servidio 2012). Shobeiri et al. (2014) recognised that much existing research has focussed on offline experiential marketing, or the specific attributes of antecedent and consequential experience (Rose et al. 2012, Bilgihan et al. 2016). Despite being an intrinsic factor to experiential value of technology, playfulness and gamification elements have not been measured in the context of digital fit and sizing technology. Scarpi et al (2014) found that the fun element of the consumer experience is essential to online consumer engagement. Further, gamification can provide enhanced consumer experience and interactivity (Berger et al. 2017). Virtual fitting rooms can increase product curiosity (a facet of experiential value) in both the offline and online shopping environment (Beck and Crie 2016). Playfulness is measured within stage 1 of the research to quantify consumer’s experiential states when using virtual fit technology. Understanding how existing fit and sizing technologies influence experience in multiple stages of the shopping journey (Kawaf and Tagg 2017, Stein and Ramaseshan 2016) can provide a trajectory for future experiential research.

1.12. Consumer behaviour literature

Consumer behaviour theory denotes how consumer decision making and resulting behaviour are influenced by internal and external stimuli (Foxall 2009). Existing research in digital fit and sizing technology has not explored consumer responses to products beyond online purchase intention (Kim and Forsythe 2008, Perry 2016). Consumer responses to pre-purchase information and their resulting post-purchase behaviours such as returning a product can assist to understand the impact of fit and sizing technology on consumer decision making. This research uses the consumer shopping journey as a research framework (Lemon and Verhoef 2016) to assess responses to garments pre- and post-purchase.

1.13. Garment fit and sizing literature

Fit is highly subjective and the modern consumer’s body shape and size are changing, which creates challenges for today’s retailers and clothing manufacturers. There has been little
Chapter One: Introduction

retailer investment in improving fit and sizing systems for the modern population fashion (Petrova and Ashdown 2012). Clothing patterns are also often developed on fit models which do not represent the consumer population (Daanan and Byvoet 2011) and as a result consumers often purchase poorly fitted clothing (Cornell 2011). Thus, high levels of returns from online purchases are a key concern for today’s retailers.

3D body scanning and fit visualisation methods are being developed by technologists to provide representations or guidance to product fit and size prior to purchase (Apeagyei 2010). 3D body scanning has held much promise for the development of fit visualisation, due to the generation of measurements which are more precise than traditional human measurement methods (Apeagyei 2010). Body scanning can give a realistic view of the user’s body (Grogan et al. 2013) but can often result in negative user responses due to viewing the body in 3D. Interfaces that use 3D body scanning inputs which enable consumer or retailer use are limited and under-developed. Moreover, complex areas of fit remain difficult to depict in 3D (Kim and LaBat 2012, Song and Ashdown 2015), which alludes to the current limitations in fit visualisation in consumer use. Fit research has often analysed the technology available in manufacturing contexts that include garments measured in 3D using professional fit judges and fit Likert scales (Loker et al. 2004). However, there is an evident difference between the technical assessments of fit and consumer (or wearer) assessments of fit. Therefore, exploration of a framework of fit that can be used by both consumer and retailer is required.

1.14. Summary

The research aims to measure online and offline consumer technology acceptance of emerging fit and sizing interfaces. The quantitative survey (stage 1) will test consumer’s human-computer responses to the virtual fit stimuli, Metail. The quantitative responses will be analysed through structural equation modelling techniques to produce a hypothesized, causal consumer technology acceptance model. Fashion retailers and fit and sizing companies can use these models to examine the effectiveness of fit and sizing tools for the future.

The qualitative study (stage 2) will explore consumers’ responses during post-purchase try-on of a dress purchased using a size recommendation website. The responses will be analysed using thematic analysis and grounded theory. The results will provide a novel perspective of consumer evaluation of both the interface and garment beyond purchase intention.

The industry study (stage 3) will present industry perspectives to the area of fit, sizing and fashion technology. The results will be analysed thematically as with stage 2. The industry perspectives provide a unique aspect to the research combining industry with consumer and academic responses.
Chapter 2. The Online Fashion Retail Market

2.1. Introduction

The online fashion retail market can be defined by internet users, market sales, retail channels and the burgeoning technological influences in the area. This chapter delivers an overview of the online fashion retail market which provides the commercial background to the research. Firstly, the evolution of wireless networks and global internet usage are defined. Then an overview of the online fashion market is explained. Retailing formats and common retailing channels are also outlined. Finally, the influence of technology and personalisation is discussed which defines the contribution of these aspects to the future of online fashion retailing.

2.2. Internet technology and use

This section outlines the technology that facilitates consumer browsing of retail websites. In addition, global internet statistics are discussed to frame the growth of the online fashion retail market and evaluate the impact of technology.

2.2.1. Evolution of wireless networks

Gaining consumer trust in a digital setting (online, mobile and tablet retailing) is inherent on consumer satisfaction of the browsing experience (Yeh and Li 2009). One way this is facilitated is by fast wireless browsing and the facility for fault resolution (Tontini 2016). Online shopping service quality measurement was developed by Parasuraman et al. (2005) and has since evolved with technological developments to include aspects which include ease of navigability, user friendliness, responsiveness and fast connectivity (Tontini 2016). Understanding the wireless networks that enable consumers to connect with retailers can provide insight into how consumer expectations of online shopping will continue to develop with technology. Wireless networks are categorised by generations. 1G (1st generation) is termed the first generation of connectivity which was designed to convey voice signals wirelessly. 2G (2nd generation) was used for voice signals and data, and 3G (3rd generation) carries voice signals, media and multi-media (Ahamed 2013). 4G (4th generation) is the newest innovation in wireless networking which allows for connectivity situated around the globe (Ahamed 2013). Website quality is a key consideration for consumers when shopping online or on mobile and has a significant impact on pre-purchase shopping motivations (Sohn 2017). Due to technological advances in browsing experiences, retailers can now provide enhanced digital shopping experiences and meet demands of international markets with ease.
2.2.2. Web 1.0 and Web 2.0

The evolution of the web has been categorised through eras named Web 1.0 and 2.0. Web 1.0 was accepted as the dawn of the internet era, characterised by retailers such as eBay and Amazon, where text was “flat” and images were “static” (Goodfellow and Maino 2010 p.1). Web 1.0 enabled script on a website to be accessed and read. Web 2.0 dawned around 2005 where users could access a highly interactive web experience, communicate with companies and with other groups of online users (Goodfellow and Maino 2010). Web 2.0 was also known as the social web (O’Reilly 2005) where vast amounts of social data was captured (Berners-Lee 2010). Web 2.0 also enabled empowerment of the user through the creation of blogs, wikis and multi-media content (Kim and Kuljis 2010, O’Reilly 2007). Web 2.0 had a significant effect on the way in which retailers communicated with consumers, but also in the way in which consumers could access content and information through interactive websites, social media and video platforms. This chapter will further discuss the influences of web 2.0 technologies in Section 2.8.

2.2.3. Internet usage

Since the introduction of the world-wide web, internet usage has steadily increased. According to e-Marketer (2017), around 47% of the world’s population will access the internet in 2017. E-Marketer predicts that by 2019, over half of the world’s population will use the internet on a monthly basis. The growth of internet usage is attributed to the availability of 3/4G (fast, wireless technology) and the lowering cost of data (e-Marketer 2017). Ever-increasing global statistics on internet use demonstrates how the capabilities of the consumer are becoming global. Retailers who use the internet to sell products have increasing access to global markets and the opportunity to develop new interfaces that ease consumer purchase decisions for product categories such as fashion.

2.3. The globalised fashion retail market

The fashion retail market is complex and global, therefore understanding aspects such as the effect of globalisation can provide insights into the effects of having international supply chains. In the next section, the online UK fashion market is summarised and the nature of the UK online fashion consumer is discussed. Globalisation is the expansion of businesses and supply chains to overseas markets. Globalisation has affected online fashion retailing in a number of ways including through the availability of fast fashion retailing and in globalised garment manufacture. The clothing industry has arguably been affected by the pressures of globalisation more than other industries due to consumer demand for low cost fashionable products (Tyler 2003). Reinartz et al. (2011) state how the globalisation of retail has emerged through maturing domestic markets. Such market decline has resulted in strategic efforts to
seek lower production and labour costs through off-shore production, often in countries with emerging economic growth. Fast fashion has consequently arisen through the effects of globalisation and the rapid creation of low-wage jobs. Fast fashion is the most prevalent business model in retailing due to its strong economic performance in the past decade (Kim et al. 2012). Due to lowered production costs, modern consumers have learnt to expect low prices and frequently updated trends (Bruce and Daly 2006). While retailers are achieving lower costs in attempt to satisfy the needs of the modern consumer, skills in manufacturing have been transferred abroad (Wren and Gill 2010) in order to keep labour costs low and profit margins high. Fashion and textiles purchased in the UK are now predominantly manufactured abroad. However, supply chains, product development and the manufacturing processes still remain technologically undeveloped (Power et al. 2011). Such globalised production can create issues including the breakdown of communication between the retailer and manufacturer resulting in poor product specifications and prototypes where quality regarding consumer garment fit may be sacrificed (Power et al. 2011).

2.4. Online retailing market

The online retailing industry has seen prolific growth since launch in the 2000s. In western Europe the online retail market is set to grow by 11.3% per year until 2022 (Forrester 2017a). Mintel (2017a) estimate that fashion online in the UK will reach £16.2bn in 2017, and £28.9m by 2022 (Mintel 2017a). Fashion purchased online now represents just under a quarter of total fashion sales in the industry (Mintel 2017a). However, despite several years of double digit growth, the online fashion market is forecast to steady (Mintel 2017a). With the pace of growth slowing, retailers should ensure they can provide technologically advanced browsing experiences with enhanced methods for online product evaluation in order to encourage repeat consumer purchase. Pure-play retailers (online only) are doing especially well in terms of sales and are outperforming multi-channel retailers (Mintel 2017a), potentially due to their digital expertise and simplified product distribution through the use of one, online retail channel.

2.5. Online fashion consumers

Millennials or generation Y (consumers who are born between 1980 and 1995), are now guiding the online fashion market growth, with 81% having purchased fashion online between June 2016 and June 2017 (Mintel 2017). A key consumer within this segment are females aged between 16-24, who represent the main driver for online fashion sales (Mintel 2017). Millennials are therefore a central, innovative user of online fashion retailing channels. Generation Y consumers operate a high level of fashion consciousness and are financially powerful (Williams and Page 2011, Valaei and Nikhashemi 2017). Generation Y are electronically connected to a global network of consumers and seek experiences through retailing transactions (Sullivan et al. 2012, Moroz 2008). Retailers are targeting generation Y...
as a lucrative consumer segment by offering unique experiences and value propositions attempting to sustain their engagement to encourage repatronage (Valentine and Powers 2013). This study focuses on generation Y consumers to understand how they respond to innovative fit and sizing fashion technologies.

2.6. Retailing channels

Retailers adopt numerous channels such as online, mobile, click and collect and bricks and mortar retailing formats to target the modern, digital consumer. This section will discuss the channels that are typical in fashion retailing.

2.6.1. Bricks-and-mortar-fashion retailing

Traditional fashion retailing stores known as bricks-and-mortar fashion stores, merchandise and sell fashion garments in a physical store. Siddiqui et al. (2003) denote that retailers who have established bricks-and-mortar stores are able to create consumer trust through the presence of a physical store. It may be argued that established retailers have developed considerable trust through inherent experience in delivering to customer demands in physical formats (Siddiqui et al. 2003). Both pleasure and practicality seeking attributes are found to be motives for consumers when shopping in traditional stores (Childers et al. 2001). Consumers claim to feel more confident in the leisure activity of shopping when faced with a physical product (Dennis, et al. 2002). The role of theatrics and sensory stimulation, also referred to as store atmospherics in bricks-and-mortar stores is yet to be paralleled in quite the same way online. Although e-commerce may be overtaking traditional retailing in terms of growth, in comparison to bricks-and-mortar formats, online stores can be seen to lack the personal, social and haptic benefits found within the physical store retailing environment (Dennis et al. 2002). However, the role of the bricks-and-mortar store is changing due to the increasingly digital retail landscape (Piotrowicz and Cuthbertson 2014). Forbes (2017b) claim that with the growth of online, bricks and mortar stores are increasingly becoming distribution hubs for online orders. With the migration of consumers to digital shopping channels, the store is becoming a “showroom” for retailers to display products to inspire and satisfy the sensory nature of shopping (Brynjolfsson et al. 2013). In the same way, the online channel is fast becoming the enabler of the purchase with the store acting as a “concierge” to facilitate Omni-channel experiences (Brynjolfsson et al. 2013).

2.6.2. Online fashion retailing

Since the dawn of the internet era, online retailing has been recognised as a key channel for retailers to target consumers (Goldsmith and Goldsmith 2002). As previously discussed, the convenience of online shopping has resulted in three in ten consumers rarely visiting stores
anymore (Mintel 2014c). Convenience combined with a wide and deep availability of products are motivating factors for consumers when comparing traditional to online retailing formats (Dennis, et al. 2002). Additionally lower costs, wider consumer reach and increased loyalty all offer competitive benefits to retailers trading online (Ashworth et al. 2006). It has become imperative through the emergence of online retailing research and marketing theory, that successful online marketing strategy should be implemented with a careful approach in order complement the in-store environment (Dennis, et al 2002). This synergistic approach has sparked the rise of Omni-channel retail, where multiple channels are available to the consumer, delivering the retail experience in a harmonised and consistent way. Leveraging the benefits of online retail whilst maintaining exceptional customer experiences are therefore crucial for retailer success.

2.6.3. Pure-play fashion retailing

Pure-play retailers are those based solely online with no physical store presence. Pure-play retailers are often newer retail entrants to the market such as Pretty Little Thing, and Little Mistress. Continued losses seen at mid-market retailers such as M&S and Next, may be attributed to gains received by pure-play retailers and cheaper online operating models (Mintel, 2014b). Ashworth et al. (2009) denote that pure-play retailers may gain advantage when the retail market requires redefinition or redirection, for example where there is a significant demand for apparel, presented in a unique format that is advantageous to some offline formats, such as offering “unique customer value” (Ashworth et al. 2009 p. 296). This was the case when ASOS launched in 2000 (ASOS.com 2017), and have since aimed to become the “world’s number one online fashion destination for twenty somethings” (ASOS.com 2017). However, in contrast to developing a strong online presence, ASOS has since stated that it now offers a unique multi-channel strategy, due to recognising the benefits of using multiple consumer touch points (Retail Week 2014).

Due to the lack of a physical store in pure-play retailing, an additional level of security and trust is required for consumers to transact with the retailer. Toufaily et al. (2013) state that the lack of tangible cues will have an important impact the consumer and their purchasing decisions. This is because there are no physical stores to facilitate product experiences prior to purchase (McGoldrick et al. 2008). Pure-play retailers must also communicate their product offering seamlessly (Ashman and Vazquez 2012) due to the lack of physical store image, merchandising and sales assistants. Ashman and Vazquez (2012) state the importance of understanding a consumer’s response to online media communications to deliver retail offerings faultlessly. Toufaily et al. (2013) found that the impact of social presence through web assistants or product reviews can be an essential method to build consumer trust in pure-play formats. This is additionally supported by the work of McGoldrick et al. (2008) through
anthropometric avatars and virtual web-chat. Keeling et al. (Keeling et al. 2010) state that social presence is increasingly valuable to consumer trust when it is imparted through interactivity. As human computer interactions do not include face to face human interactions, this can be perceived by the consumer as a form of weak social experience. Therefore, the introduction of social cues, such as avatars, web chat and personalised service delivery will enhance trust.

2.7. Web 2.0 fashion product viewing technology

Fashion product viewing and service technologies have evolved significantly since fashion joined the online channel. Acknowledging web 2.0 fashion product viewing technologies available online provides a basis for understanding how digital fashion technology has developed through towards the emerging innovative fit and sizing technologies that are becoming available for consumer use. Web 2.0 fashion product viewing technologies are summarised in Table 2.1.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Definition</th>
<th>Reference to study</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D Image</td>
<td>Provides the user with static image view of products. Products can be presented on a mannequin, model or as an outfit.</td>
<td>Kim and Forsythe (2008)</td>
</tr>
<tr>
<td>-Product view</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Model view</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Outfit view</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front, side and back view</td>
<td>The user can view multiple image of the product by selecting either front, side and back view.</td>
<td>Song and Kim (2012)</td>
</tr>
<tr>
<td>Angled viewing</td>
<td>The user can view the product from a range of angles to view products in more detail.</td>
<td>Huang and Liao (2015)</td>
</tr>
<tr>
<td>Zoom/close up</td>
<td>Allows viewing of specific areas of the product by zooming in.</td>
<td>Kim et al. (2007), Cases (2002), Ashman and Vazquez (2012)</td>
</tr>
<tr>
<td>360° product rotation</td>
<td>The image can be rotated to view the product in 360’s</td>
<td>Pentina et al. (2011), Verhagen et al. (2014)</td>
</tr>
<tr>
<td>Catwalk video</td>
<td>The product is styled on a model who is presented walking down a catwalk. This enables the user to view the product on a moving model, to see how the item would look on and how the fabric would drape.</td>
<td>McCormick and Livett (2012), Ashman and Vazquez (2012)</td>
</tr>
</tbody>
</table>

Product viewing technology are any media that provide the consumer with information about the product they are viewing in an online fashion retailing context. Online product viewing is also described as a form of online visual merchandising (Khakimdjanova and Park 2005). Product viewing provides the consumer with key information regarding the product and can assist purchase by providing image related information (Kim and Lennon 2008). Yu et al. (2012) claim that retailers are aiming to address the tactile gap in online retailing for consumers. They are doing so through more interactive and engaging technologies such as 360° product viewing, product video, product zoom, avatars and virtual dressing rooms (Yu et al. 2012). Yu et al. (2012) claim that this technology can support consumer decision making when looking to purchase online, however the technology may not provide accurate information regarding physical qualities of the garments such as texture, weight, drape and fit.
Such qualities are may only be gained through direct interaction (Yu et al. 2012). The following section provides an overview of the technologies often available in ecommerce to view fashion online. The technologies are summarised in Table 2.1.

2.7.1. 2D image viewing

2D images in online fashion retailing are common and usually feature the product, a model view or an outfit view. Providing users with imagery prior to purchase is found to increase attitudes towards a website (Kim and Lennon 2008). 2D images are non-dynamic which can be less engaging than more in-depth viewing techniques such as zoom (Song and Kim 2012) and video (McCormick and Livett 2012). Model and outfit viewing techniques provide the user with styling inspiration. Furthermore, the user can imagine wearing the product by seeing it on a model. Dynamic media such as video provides a richer sensory visualisation of the product attributes than 2D images (Peck and Childers 2003, Park et al. 2011). Park et al. (2011) claim that the more sensory attributes that are presented in online formats the more likely a user is to impulse purchase, therefore, use of dynamic media can enhance consumer engagement and likelihood of purchase.

2.7.2. Front, side and back viewing

An increased number of product images and opportunities for consumers to view a fashion product provides the user with more information to assess the product suitability prior to purchase. Multiple image viewing provides the user with more sensory enabling qualifications to attempt to overcome the lack of tangibility in online retailing (Peck and Childers 2003). Song and Kim (2012) found that mental intangibility (ability to imagine the item) was increased when users of a website were exposed to numerous product views (4 images). Therefore, risk is reduced and the user is more likely to purchase.

2.7.3. Angled viewing

Angled viewing provides the user with a range of viewing perspectives to increase the quality and detail of viewing information. Viewing products at numerous angles can provide further interactivity and engagement with the product, simulating how the product will look in reality (Huang and Liao 2015). Angled viewing provides the consumer with an opportunity to manipulate the image they are viewing (Kim and Forsythe 2010) providing the consumer a greater level of product involvement and providing more attributes for decision making.

2.7.4. Zoom (close-up view)

Klein (2003) described zoom as an opportunity for immersion within the environment. Providing the user with more task related information and product presentation can facilitate
purchasing (Ha and Lennon 2010). However, due to the range of different viewing technologies, the level of interactivity of each is difficult to define in terms of the most effective method. Zoom is described as a low-level image interactivity technology (Merle et al. 2012). Cases (2002) denotes that by using zoom features, users can gain image related information which is similar to the external qualities of the product.

2.7.5. 360° product rotation

Product rotation can increase the interactivity of the in-direct product experience in online shopping environments (Li et al. 2001). Indeed, product rotation has been found to reduce cognitive load, increase information provided and enhance purchase decisions (Park et al. 2009).

2.7.6. Catwalk video

Catwalk video provides the user with an opportunity to view the garment on a moving model. Catwalk videos are highly sensorial as they combine moving images, sound and utilise image interactivity (Magrath and McCormick 2013). Aspects such as drape, movement and how the product will look on the body can be assessed using catwalk video (McCormick and Livett 2012) and can enhance hedonic enjoyment when shopping online (McCormick and Livett 2012). Despite being highly sensory, catwalk video does not influence consumer purchase intention (Ashman and Vazquez 2012). Indeed, Kawaf and Tagg (2017) denote that catwalks have now become an essential part of online fashion product experience and are no longer a novelty to the product presentation environment.

Online fashion product viewing technologies are summarised in Table 2.1. The online fashion shopping environment is not only concerned with product viewing technologies. The introduction of web 2.0 has provided the opportunity for service-oriented technologies (not directly related to the online transaction or specific product) which provide users with increased information, convenience and access to related services and content (Labrecque et al. 2013).

2.8. Web 2.0 fashion service technology

Online fashion service technology is defined in this research as the retailer website offerings other than product viewing. The following section outlines the main service technologies that are relevant to the study. The service technologies that are discussed in the next section are summarised in Table 2.2.
Chapter Two: The Online Fashion Retail Market

### Table 2.2 Web 2.0 online fashion service technology

<table>
<thead>
<tr>
<th>Technology</th>
<th>Definition</th>
<th>Retailer example</th>
<th>Reference to study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendation ‘You might also like’ and ‘Other customers also bought’</td>
<td>Usually presented as a toolbar at the bottom of a product viewing page. Provides users with recommendations based on the product they are viewing or on items that other customers also purchased.</td>
<td>Topshop, ASOS</td>
<td>Ashman and Vazquez (2012) Benlian et al. (2012)</td>
</tr>
<tr>
<td>Wishlist, Save for Later</td>
<td>Provides the user with an opportunity to save items they like or have been previously viewing. This saves the product to a separate wishlist which they can access again in future.</td>
<td>Topshop, ASOS</td>
<td>Gonçalves, Curty and Zhang (2013)</td>
</tr>
<tr>
<td>Lookbooks, Moodboards</td>
<td>Used as an inspirational medium to communicate a trend, new season launch or particular product promotion. Often include short moving images (GIFs), videos or slideshows with product hyperlinks.</td>
<td>Mango, Zara, Marks and Spencer</td>
<td>Magrath and McCormick (2013)</td>
</tr>
<tr>
<td>Online Magazine</td>
<td>Provides the user with an opportunity to view items set within an inspirational theme, feature or trend which links to product purchase.</td>
<td>Next, Net-a-Porter</td>
<td>Rowley (2009)</td>
</tr>
<tr>
<td>Blog</td>
<td>Typically provides an overview of trends, new brands, collaborations or product launches and a linked to a shoppable site.</td>
<td>ASOS, Missguided</td>
<td>Keller (2010)</td>
</tr>
<tr>
<td># inspiration</td>
<td>A social media tool which collates images (instagram) and tweets (twitter) of users wearing products into one digital space by use of a company hashtag.</td>
<td>#MYKM #Asseeconomme</td>
<td>Auinger et al. (2016) Hsieh et al. (2014)</td>
</tr>
</tbody>
</table>

#### 2.8.1. Product recommendations

Online fashion retailers can recommend products to users based on the content they have been browsing or purchasing online which can drive increased online conversions (Vogiatzis et al. 2012) and product satisfaction. Recommendations offer alternative or additional products that may be suited to the customer (Baier and Stuber 2010). Recommendations are facilitated by cookies placed on the user’s browser, or algorithms based within the website. Recommendations can be based from the retailer to target a specific customer, or through collectively using similar customers’ preferences from shopping on the same website (Benlian et al. 2012). There are distinct perspectives on the value of product recommendations, as their success is dependent on delivering accurate, personalised recommendations that lead to satisfied purchases (Vogiatzis et al. 2012). There are also inherent issues with recommending products online without specific means of unique personalisation, such as if a product was purchased as a gift and similar items were subsequently recommended on future visits to the...
site. In addition, data regulations introduced in the future regarding consumer browsing privacy and rights to collecting online data may inhibit product recommendations.

2.8.2. Wish lists

Wish lists are a form of product bookmarking (Wang and Zang 2012). Wish lists provide the user with space on a retailer website or app to save products that they may like to purchase in the future. Often wishlists are created through an account made with the retailer. Wish lists can also allow users to share items with other users on a social network (Hsaio et al. 2010). The ability to share products of interest with other users empowers the user, assists with product decision making online and enables a customised shopping experience.

2.8.3. Lookbooks

Lookbooks are an online fashion campaign that use graphics to show products that can influence purchase intention and enjoyment (Magrath and McCormick 2013, Fiore 2002). Lookbooks can also provide inspiration to users during key seasons when new fashion product collections are typically launched by retailers.

2.8.4. Online magazine

Retailers may use online magazines or e-magazines to provide users with fashion solutions, articles and top tips (Rowley 2009). Online magazines can enhance the level of “fashion consciousness” of a website (McCormick and Livett 2012 p. 26). Online magazines are a highly aesthetic method of digital fashion product presentation that can provide fashion inspiration (McCormick and Livett 2012) and portray atmospheric themes regarding a product or trend.

2.8.5. Blogs

Fashion blogs are a method of conveying cultural and political identity with fashion and styling and practice (Titton 2015). Fashion blogs can be authored by the retailer or a specific user. Blogs on retailer websites are often used as a form of product promotion. Retailer blogs tend to focus on product promotion and inspiration for the user but may lack personality. Blogs are often themed with product ranges, seasons, or collaborations that a retailer may be part of. Blogs form a key part of the content that retailers can use to engage with a user or audience and are particularly useful in facilitating online sales and traffic to the website if authored by a guest blogger or stylist. Blogs are often used by pure-play fashion retailers such as ASOS and Missguided (Kaplan and Haenlein 2010).
2.8.6. Hashtags

Hashtags provide a means to grouping a type of image by tagging them with a phrase and the hashtag symbol. This method of fashion service technology groups words, images or phrases on visual and textual social media platforms. Social media platforms that utilise the hashtag format such as Twitter and Instagram feature millions of hashtags daily. Retailer specific hashtags such as #Asseenonme from ASOS are posited to produce positive body imagery associated with a retailer (Auinger et al. 2016). Followers of a retailer can interact with each other and the brand by using a hashtag and create an online ‘tribe’ which represents distinctive styles from the retailer’s product offering. Likewise, Hashtags can be an effective method for retailers to collect and monitor follower engagement with the website through social media channels.

2.9. Mobile commerce

Forrester (2016) state that mobile retail sales are growing at twice the rate of tablet sales, with 53% of all UK retail transactions now taking place via mobile channels (IMRG 2017). Clothing continues to be the most popular product purchased through mobile devices (Forrester 2016) thus emphasising how m-commerce should be integrated into online fashion retail delivery strategies as a crucial mode to reaching consumers. Around 80% of the UK population own a smartphone (Mintel 2017b) and shopping via a mobile device will overtake desktop computer shopping by 2019 (Forrester 2017b). Such growth in mobile ownership and it’s central use in online retailing means that online retailers should concentrate on investing marketing efforts to the development of the mobile channel (Brynjolfsson et al. 2013).

Wang et al. (2015) state that mobile marketers can benefit from connecting with consumers frequently on a personal level. Mobiles have become a cultural norm and retailers can gain from building relationships with consumers who use the channel (Wang et al. 2015). Wang et al. (2015) suggest that through the convenience of mobile, consumers feel there is less psychological distance between them and the brand, and feel that they are in an “experiential state of being in a relationship with the firm.” (p.2). Wang et al. (2015) also posit that this relationship leads to the creation of repeat purchase intentions and therefore “habitual behaviours” in online decisions (p.2). The mobile is now being posited as “the extended self” (Belk 2013) providing an opportunity for retailers to target the ever-connected consumer. A major advantage of mobile browsing for consumers is through the unparalleled convenience (IMRG 2014) offered through the ease and speed of use.

(Chen and Wang 2011) identified four differential factors which benefit m-commerce channels over traditional retailing formats:

1.) Always on
Chapter Two: The Online Fashion Retail Market

The small and portable nature of modern smartphones and their increased connectivity result in consumers who are constantly connected to a network, meaning marketing messages can reach the consumer directly and at all times.

2.) Location-centric

The introduction of geo-location enabled devices, allows retailers to target consumers through location facilities. Additionally, this information can benefit the consumer in their search for information on stock levels or store locations when on the move.

3.) Convenience

Omni- and multi-channel retailing signal a trend towards the convenience of mobile and tablet commerce. Consumers can purchase products from the comfort of their homes, 24 hours of the day and reduce their time-spent queuing in store by alternatively purchasing online, using click and collect or reserving items.

4.) Identifiability

As mobiles and tablets are owned and used by individual consumers, practitioners can offer more streamlined and personalised marketing activities. Consumers can also customise their browsing experience through opting out of marketing activities and there is a lower prominence of intrusive advertising such as banners.

2.10. Multi-channel retailing

Levy and Weitz (2009) define multi-channel retailing as the selling of products through more than one channel. According to Sopadjieva et al. (2017) shoppers that use more than one channel were proven to spend more at a retailer. The authors attribute this to “webrooming” behaviour, which is where the consumer researches and purchases products using both online and in-store channels (Neslin et al. 2014). Multi-channel retailers can also monitor customer relationship management and return on investment through a combination of channels (Brynjolfsson et al. 2013), providing long term strategic advantage. Multi-channel convenience also enables consumer fulfilment access to a greater availability of products: with multiple options to collect, deliver or reserve items (Brynjolfsson et al. 2013). This is due to exploiting pitfalls of channels through other complementary methods (Zhang et al. 2010, Verhoef et al. 2015). For example, having an online store where the consumer cannot try garments on but providing an option to click and collect where the consumer can try on and return the garment and return it immediately if it’s unsuitable. In addition to this, is the increase of online technology usage in bricks-and-mortar stores through digital screens that can provide customer ordering where stock may not be immediately available. It is therefore important for retailers to understand the buying habits of their target consumer segments and how this unique integration of channels can affect sales performance (Rangaswamy and Van Bruggen 2005,
Zhang et al. 2010). It is also widely understood that consumers use different channels at varying stages of their purchasing journey (Dholakia et al. 2010) and therefore understanding the level of suitable channel combinations and channel migration is important to optimising successful multichannel strategies (Verhoef et al. 2009, Verhoef et al. 2015).

Berman and Thelen (2004), state that retailers can portray both tangible and intangible brand assets through multi-channel formats (Berman and Thelen 2004). Indeed, retailers can leverage assets that they would not normally be able to portray through a single channel. Methods include ‘web integration’ where retailers attempt to bridge the gap between traditional and online shopping methods (Koontz and Gibson 2002). Similarly, providing mixed reality experiences where a user is immersed in a store whilst having access to virtual and augmented browsing experiences (Koontz and Gibson, 2002). All aspects of engagement with multi-channel retailing formats will depend on the retailer’s target consumer segment. Konus et al. (2008) defined three types of multi-channel consumers:

1.) Multi-channel enthusiasts

Those which are highly innovative in their use of technology and have positive perceptions of multi-channel modes to shop (Dholakia et al. 2010).

2.) Store-focussed consumers

Consumers who engage with bricks-and-mortar stores with high loyalty but do not utilise other channels (Dholakia et al. 2010).

3.) Uninvolved shoppers

Uninvolved shoppers have low levels of interest and loyalty in any of the present retailing channels (Dholakia et al. 2010).

In contrast to multi-channel retailing models, strong value proposition-led retailers such as Primark have shown success can be achieved through mono-channel retailing (Mintel 2014c). If Primark were to launch an online platform, they would see reduced profits through expenditure on order fulfilment alongside capital costs of warehouses, additional staffing and logistics would also be needed.

2.10.1. Bricks and clicks

The rise of the Internet and wireless networks has enabled clear competitive advantage to retailing models. Bernstein et al. (2008) define bricks and click retailing as the integration of the internet retailing channel with the physical store format. Both in-store and online can complement one another with regards to offering information about products to increase purchase intention (Herhausen et al. 2015). Risks associated with online delivery can also be decreased through delivery to a physical store (Bezes 2016). Extending the physical touch
points that the consumer has with the retailer in conjunction with technological innovations, the consumer can seek more flexible convenience in their options for delivery. Retailers can provide deeper assortments and utilise unprofitable floor space through offering a click and collect channel (Bhatnagar and Syam 2014, Piotrowicz and Cuthbertson 2014). This channel therefore combines the advantages of using the physical touch point of the bricks-and-mortar channel, with the low cost of carrying inventory online (Bhatnagar and Syam 2014).

Other than a conjunctive store and website, bricks and clicks retailing allows retailers to offer further services. Benefits of this service are that the consumer does not pay delivery costs, consumers can order products when out of stock through either channel and they are notified on the receipt of the item in store (Chopra 2016, Neslin et al. 2014). To compete in this multi-channel arena, agile click and collect service delivery can enable further advantages through increased convenience therefore making it an essential mode of merging the offline and online retail formats. Click and collect can also enhance customer loyalty relationships, create value through physical interaction and sell further merchandise (Beck and Rygl 2015, Chatterjee 2010). Click and collect is used by one in four women and is advantageous to retailers as shoppers integrate two channels in one transaction (Mintel, 2014b). As retailers must make channels convenient for maximum consumer satisfaction, blending the channels in which they trade is of primary importance to success.

2.11. Omni-channel retailing

As discussed, there has been an evident shift in consumer purchasing behaviour from traditional retailing formats such as the bricks-and-mortar store to a more complex network of channels (Straker et al. 2015). Brynjolfsson et al. (2013) state that soon the walls of retailing will disappear, striking emphasis on the blurred lines between retailing channels i.e. the bricks-and-mortar store, mobile, and click and collect channels. This is emphasised by channels being strategically integrated to provide harmonious shopping experiences and benefits to the consumer (Piotrowicz and Cuthbertson 2014). Omni-channel utilisation is key for retailer growth with a common aim to reduce prices, increase revenues and encourage consumer patronage (Siddiqui et al. 2003). Omni-channel offers increased convenience of marketing and selling fashion garments to consumers at multiple touch-points in their shopping journey. Bezes (2013) states that if two retail channels are congruent this will assist to creating a memorable experience which facilitates consumer decision making in the process of purchasing.

Omni-channel retailing is the use of touch points to reach the consumer but more importantly is the harmonisation of channels to portray the brand, that work succinctly alongside one another in a seamless way. Indeed, Omni-channel is achieved through utilising technologies such as tablets, phablets (phone-tablet hybrid devices) and mobile within marketing strategies
Chapter Two: The Online Fashion Retail Market

in the most effective, inter-communicated way (Brynjolfsson et al. 2013, Verhoef et al. 2015). It may be argued that the growth of Omni-channel strategy design has been influenced through the amount of mobile and tablet users having grown incrementally in the past decade, and therefore the investment within these channels has brought sufficient profitable gains. However, similar to multi-channel retailing, Van Baal (2014) states that the utilisation of cross channel strategies can enhance customer loyalty but strategies must be designed holistically in order to address the needs of varying consumers that have differing experience and propensity to adapt to technology. Further channel synergy is stated by Neslin et al. (2014) is essential to Omni-channel retailing as consumers may gather information regarding products and brands through multiple sources, including online, in-store and on social media. Considering levels of technology readiness of the consumer market is a key factor in designing Omni-channel strategy.

As the online market for fashion is continually growing, there are now multiple dimensions to e-marketing strategies. The challenge is for retailers to implement strategies to target consumers in the most optimum way (Siddiqui, et al. 2003). It is also important to consider the effects of e-marketing strategies from both consumer and retailer perspectives (Siddiqui, et al. 2003). The retailer side involves the selling side of goods and services although there may be different forms of e-marketing activities providing differing competitive advantage for the firm. Chaffey et al. (2006) define four types of online websites:

1.) Transactional e-commerce site
2.) Services-orientated relationship building website
3.) Brand-building website
4.) Portal or media site

With regards to online fashion retailing, transaction e-commerce website formats and layouts have proven to be most profitable are more commonly used. This is by providing the consumer with the means to purchase garments from online stores. Profit is obtained directly through the exchange of payment on a secure website.

Additionally, retailers also have brand building web sites. This is often referred to as a Digital Flagship, which can enhance consumer interaction often used by strong luxury brands. One example of this is Burberry’s sister site- ‘The Art of the Trench’, where consumers are depicted wearing iconic trench coats casted in different English-themed settings. Such brand building websites provide additional consumer loyalty, stronger customer relationships, increased sales and attitudinal benefits for the brand (Baldus et al. 2015, Brodie et al. 2013).
2.12. Retailing technology

Technologies that are driving innovation and growth in the online fashion market include chatbots (instant messaging) pioneered by brands such as Very.co.uk, which is powered by artificial intelligence (Mintel 2017b). Virtual and augmented reality fitting rooms to try on clothes online used by Gap (Mintel 2017b) and personalised styling advice and voice activated styling through the Amazon Echo (Mintel 2017b). These emerging technologies are at the forefront of fashion consumer technology and whilst demonstrating a rich customer offering, in-depth understanding remains to be explored.

Technology is now enabling the consumption and production processes to intertwine (Dholakia et al. 2010). The level of fantasy and fun in online worlds can also be attributed to the gamification of retail environments (Insley and Nunan 2014). Gamification provides consumers with a playful, vivid and unique online experience which enhances engagement and interactivity with an online interface (Pantano and Servidio 2012, Javornik et al. 2016, Rese et al. 2016). Gamification is the introduction of game-related elements to non-gaming contexts (Hofacker et al. 2016). Such methods can provide online retailers and interface developers with increased consumer adoption of new and innovative technologies. Consumers are introduced to a novel concept or idea through a reward or playful interaction with the interface (Muller-Stewens et al. 2017). Kozinets (2008) states that the consumption process has also been combined with technology in problem-solving. This is because technology enables solutions to most consumer wants and needs. Due to the extensive nature of information on the internet, without direction, consumers may be overwhelmed (Dholakia et al. 2010). Marketers have therefore devised targeted techniques to consumer segments through functional and inspirational tools such as digital fit and size recommendation to guide consumers through the online buying experience (Dholakia et al. 2010).

2.13. Summary

It is evident the online fashion market is growing year-on-year with many retailing website formats and channels available. Retailers must remain competitive utilising both online and offline channels to successfully meet the demands of the modern Omni-channel consumer and consider the influence of new emerging technologies to ease consumer choice in a crowded market. Fit and sizing tools provide consumers with a gamified method of exploring products and a guide to online decision making. The next section of the research will discuss the application of experiential marketing to fit and sizing tools. As the area of fit and sizing is under-explored, marketing-led approaches have defined the tools as a form of experiential marketing. The following chapter will discuss how fit and sizing technology relates to experiential marketing theory and the impact of how experiential aspects can be measured.
Chapter 3. Experiential Fashion Technology

3.1. Introduction

This chapter discusses what experiential marketing is and introduces the theoretical approaches. Secondly, the role of online retailing with experiential marketing as the focus of the study is presented. Thirdly, the related aspects of play and gamification which are key to fit and sizing technology are discussed. Fourthly virtual and augmented reality technology in retailing are introduced which are an aspect of fit and sizing technology future development. This chapter concludes with an overview of fit and sizing experiential research stimuli considered for use in the study.

3.2. Consumer experience

Holbrook and Hirschman (1982) stated that consumption is related to experiences and emotion. Holbrook and Hirschman (1982) marked a new movement in consumer behaviour, advocating a school of thought that had previously overlooked the role of fantasy and hedonistic consumer motivations. Existing consumer behaviour theory had focussed on the consumer as a rational thinker, whereas Holbrook and Hirschman (1982) claimed that consumers are actually experience seekers (Szmigin and Piacentini 2015). Consumer value was subsequently re-analysed in terms of the impact of utility and hedonism within the consumption experience (Maclaran et al. 2009). This chapter discusses the aspects of customer experience through literature and links this with fit, sizing and play.

3.3. The experience economy

Schmitt (1999) identified that the experience economy is associated with three factors (a.) the omnipresence of information, (b.) brands, and (c.) ubiquitous communication and entertainment. Schmitt (1999) denotes that experiences replace functional values, that humans are both rational and emotional, and experiences can be both holistic and unconventional. This perspective contrasts heavily with existing concepts regarding marketing theory. Schmitt (1999) argues that there is limited information on how to employ experiential marketing within modern businesses. Schmitt (1999) divides experiences into strategic experiential modules (SEMs) or experience providers (ExPros). SEMs relate to the sensory and experiential aspects of the human mind, whereas ExPros refer to how SEMs are implemented. This research will focus on the stimuli of digital fit and sizing technology and therefore sits between SEMs and ExPros.

Schmitt (1999) states that experience is multi-dimensional and that there are five types of sensory experience: sensory, affective, cognitive, physical and social identity. Experiential
marketing is widely recognised as a key opportunity for product and brand differentiation through engaging consumers within the facets of experience (Schmitt 2010).

Experience is linked to philosophy and sociology which hold perspectives on defining what experience entails. Schmitt (2010) describes these perspectives through philosophical contributions. Firstly, Kierkegaard an existentialist, stated that experiences are subjective and are related to negative emotions. Secondly, phenomenologists perceive experience as an induced intention that results from something, referring to the ‘of’ an experience (Husserl 1931, Brentano 1973). Thirdly, Schmitt (2010) considers the perspective of the pragmatist, John Dewey (1925), who claimed that experience contains classifying, analysing and reasoning which led research to develop the attributes of experience. Table 3.1 summarises these philosophical movements and their perspectives.

<table>
<thead>
<tr>
<th>Philosopher</th>
<th>Movement</th>
<th>Perspective of Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kierkegaard</td>
<td>Existentionalist</td>
<td>Experience is linked to negative emotions. Experience is subjective.</td>
</tr>
<tr>
<td>Husserl (1931) and</td>
<td>Phenomonology</td>
<td>Experience is concerned with the intention, the ‘of’. Experiences are induced by stimuli.</td>
</tr>
<tr>
<td>Brentano (1973)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>John Dewey (1925)</td>
<td>Pragmatism</td>
<td>Knowledge forms only one part of experience (classifying, analysing and reasoning), sensory is a key part of experience.</td>
</tr>
</tbody>
</table>

Adapted from: Schmitt (2010)

Similar to Schmitt (2010), Carù and Cova (2003) also defined definitions of experience with regards to philosophy, science, sociology, psychology, anthropology and ethnology. In addition, definitions of experience are given from a management science perspective (Table 3.2).

<table>
<thead>
<tr>
<th>School of thought</th>
<th>Definition of Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>Experience is linked to facts and generalisable data providing universal knowledge for all.</td>
</tr>
<tr>
<td>Philosophy</td>
<td>Experience of something, which leads to the accumulation of experience which is transferred into knowledge.</td>
</tr>
<tr>
<td>Sociology and Psychology</td>
<td>Subjective and cognitive which allows for individual development.</td>
</tr>
<tr>
<td>Post-modernism</td>
<td>Experience can alienate the individual through peak play or flow.</td>
</tr>
<tr>
<td>Anthropology and Ethnology</td>
<td>How events are received by consciousness.</td>
</tr>
<tr>
<td>Management Science</td>
<td>Experiences are personal and evoke emotion. Experiences are extraordinary and immersive.</td>
</tr>
<tr>
<td>Sociology</td>
<td>Experience is central to consumer lives.</td>
</tr>
</tbody>
</table>

Adapted from: Carù and Cova (2003)

Carù and Cova (2003) stress that experience should not be viewed as solely related to the pre-purchase experience, instead they state that experience is holistic. They support this notion with the work of Arnould et al. (2002) who link experience to four stages of consumption. Developing Holbrook and Hirschman’s (1982) ideas, Arnould et al. (2002) state that there are four parts that make up experiences that are shown in Table 3.3.
Chapter Three: Experiential Fashion Technology

Table 3.3 The consumption experience

<table>
<thead>
<tr>
<th>Stage</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-consumption experience</td>
<td>Searching, planning and imagining</td>
</tr>
<tr>
<td>Purchase experience</td>
<td>Choice process and interaction with service</td>
</tr>
<tr>
<td>Core consumption</td>
<td>Sensation of consumption and feelings towards it</td>
</tr>
<tr>
<td>Remembered consumption and nostalgia</td>
<td>Reliving past experience</td>
</tr>
</tbody>
</table>

Source: Arnould et al. (2002)

Carù and Cova (2003) denote that experiential marketing as described by Holbrook and Hirschman (1982) and Pine and Gilmore (1999) is limited, as it does not accurately define experience. They state that existing experiential marketing definitions are rooted in relationship marketing. Extant literature defines experiences through five aspects: sensory, emotional, pragmatic, lifestyle and relational factors (Gentile et al. 2007), which are often used in experiential marketing studies.

3.4. Customer experience in marketing

From the marketer’s perspective, experiential marketing is a crucial method to increasing profits, if executed successfully. On the other hand, negative experiences and emotions can be damaging to the company or retailer due to the long-lasting impression of negative emotions. This concept may be attributed to the pleasure, arousal and dominance theory posited by Mehrabian and Russell (1974). It may be argued that the online retailing experience is more suited to goal-orientated shopping motivations as it lacks the tangible interactions available to the consumer in the offline environment (Childers et al. 2001). However, sensory and emotive factors can be evoked through both physical and digital experiences, which may create experiences that are retained by the consumer (Rose et al. 2012).

3.4.1. Retail experiential marketing

The paradigm shift from retailer controlled marketing to consumer controlled marketing has been facilitated by the multitude of experiential opportunities available to consumers through the internet (Braun 2017, Lemon and Verhoef 2016). This section focuses on the effects of experiential marketing from both retailer and consumer perspectives. Practitioners and researchers have identified the success of offering consumers with experience alongside tangible goods and services. Pine and Gilmore (1999) and consequently Schmitt et al. (2013) emphasise the importance of value creation that can be achieved through memorable consumer experiences.

Consumers can have direct or indirect experiences (Schmitt and Zarantello, 2013). Novak et al. (2003) states that there are two types of consumers: goal orientated and experiential. However, research into experiential marketing has since progressed from this polarised perspective of utilitarian and hedonic experiences. Consumer experiences may additionally
involve multiple channels and factors such as atmospherics, social community and involvement (Verhoef et al. 2009). Pine and Gilmore’s (1999) four realms of experience depicts the paradigm of consumer experience shown in Figure 3.1.

Pine and Gilmore (1999) distinguish between commodities, goods and services and experiences. They state that the consumer moves through the “progression of economic value” (Pine and Gilmore 1999, p.29), stressing the importance of offering consumers engaging experiences. Further, Brodie et al. (2013) state how consumer engagement develops at differing experiential levels, which impart a range of interactions due to being immersed within cognitive, behavioural and emotional dimensions. The level of engagement experienced may be dictated by the consumer’s need for acquisition of information. This may be already inherent, or discovered in a hedonic nature, which if resulting in a positive outcome, can therefore contribute to a memorable experience.

![Figure 3.1 Experiential marketing paradigm](source: Pine and Gilmore (1999))

The horizontal line in Figure 3.1 defines the level at which the consumer is a guest within the experience which does not change or affect the occurrence of the experience. The vertical line depicts the level of involvement to the experience.

1.) Educational

Consumers are absorbing information whilst actively participating in the experience such as a student in a classroom (Pine and Gilmore 1999).

2.) Escapist

The consumer is immersed within the experience whilst remaining actively involved. Pine and Gilmore (1999) liken this to a theme park experience.

3.) Aesthetic
The consumer is immersed yet passive, therefore they do not contribute or take away from, the experience itself. Pine and Gilmore (1999) liken this to viewing the Grand Canyon.

4.) Entertainment

Experiences where the consumer is passive yet absorbed usually through the senses likened to viewing a performance.

Many consumer behaviour theories emphasise how experiential marketing activities can result in acquisition of a wider consumer following through continued growth (Verhoef et al. 2009). Carù and Cova (2003) reject the operational nature of Pine and Gilmore (1999) by claiming that the consumer is either highly involved in the experience or passive. Additionally, the authors claim that the connection of the consumer is rated equally as either weak or strong. This polarised view of experiences can be attributed to the definition of experience by social sciences and philosophy as shown in Table 3.1, and demonstrates the complexities involved in defining experience.

Retailers must determine which experiential factors are enjoyable for the consumer but also contribute to profits (Pentina et al. 2011). Weathers et al. (2007) state that the more sensory qualifications required on a product prior to purchase the more experiential qualities the good can hold. Further, the levels of vividness of images or videos of the product the consumer is engaging with can provide rich product information (Fiore et al. 2005). Thus, offering higher levels of media and telepresence could assist the consumer to address the lack of haptic interactions online (Eroglu et al. 2001). Kwortnik and Ross (2007) in their study on consumer decision making in experiential consumption found there were two types of decision emotion: fantasy feelings and facilitative feelings. Fantasy feelings are those that occur prior and after the experience, hedonistic in nature and often play in the mind in expectation. Facilitative feelings come with the processing of thoughts, they act in the background and may be comforting or help information sink in (Kwortnik and Ross 2007).

3.5. Emerging customer experience

Consumers are often dissatisfied with mass customised products and seek unique, personalised experiences (Pine and Gilmore 2016). Emerging customer experience focuses less on traditional marketing media (Pine and Gilmore 1999) and leverages new real or virtual experiences that engage consumers (Pine and Gilmore 2016). Lemon and Verhoef (2016) state that emerging customer experience literature is associated with creating compelling and engaging consumer experiences (Brodie et al. 2013). User experience is a facet of the new experiential marketing phenomena, and it is concerned with delivering seamless, hassle-free experiences up to and beyond consumer satisfaction (Pine and Gilmore 2016). Pine and Gilmore (1999) posited the experience pyramid, which has now been developed to reflect an
additional stage to economic history. This stage is named the ‘transformation economy’ where business models can assist to change the lives of consumers (Pine and Gilmore 2016).

The rise of the digital economy has resulted in almost all consumer transactions involving digital experience (Kawaf and Tagg 2017). Understanding consumer experience in digital shopping environments has been measured using a number of dimensions. Factors that have been measured in online shopping experience according to Kawaf and Tagg (2017) include, hedonic and emotional (Holbrook and Hirschman 1982), emotional, rational or behavioural (Schmitt 1999), are associated with the effect of environment on experience (Pine and Gilmore 1999, Childers et al. 2001) and often adopt psychological theory frameworks (Mehrabian and Russell 1974).

It is clear that consumer experiences are multi-dimensional (Carù and Cova 2003). Kawaf and Tagg (2017) claim that existing research has not synthesised the elements of online customer experience, instead focusing on the antecedents or consequences of customer experience (Bilgihan 2016, Kawaf and Tagg 2017). Existing research that has segmented customer experience (Rose et al. 2012) does not consider the influences of experience beyond the immediate environment. This approach has been deemed restrictive in its lack of understanding of experiences gained throughout the customer journey (Stein and Ramaseshan 2016, Lemon and Verhoef 2016, Kawaf and Tagg 2017).

3.5.1. Entertainment

Entertainment has been measured as a key aspect of experience within virtual fit tools in online fashion retailing (Kim and Forsythe 2008, Yaoyuneyong et al. 2014, Pantano and Naccarato 2010). Results from such studies show that consumers perceive virtual fit as highly entertaining and therefore this is established as a key construct in the development of virtual fit for wider consumer audiences. Entertainment virtual fit studies and the measured constructs from literature are described in Table 3.4.

<table>
<thead>
<tr>
<th>Author</th>
<th>Stimuli</th>
<th>Measured constructs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kim and Forsythe (2008)</td>
<td>Virtual try-on</td>
<td>Technology anxiety, Innovativeness, Perceived usefulness, Perceived entertainment value, attitude, intention to use, post-use evaluation</td>
</tr>
<tr>
<td>Yaoyuneyong et al. (2014)</td>
<td>Augmented reality virtual dressing room</td>
<td>Entertainment, informativeness, web irritation</td>
</tr>
<tr>
<td>Pantano and Naccarato (2010)</td>
<td>Advanced retail technologies</td>
<td>Entertainment</td>
</tr>
</tbody>
</table>

3.6. Experiential retailing and playfulness

Technology has enabled experiential spaces to move away from the physical. Molesworth and Denegri-Knott (2008) denote that the key task of marketing in relation to online retail auction
website eBay, is to create a sense of play through reward. Mathwick et al. (2001) devised the experiential value scale (EVS), which can be used to measure four aspects of experience. This typology includes playfulness, aesthetics, customer return on investment and service excellence. The typology of experiential value is shown in Figure 3.2.

Play is considered an integral part of experiential marketing which is particularly distinct from traditional marketing practice. Experiential marketing and experiential consumption is stated by Dholakia et al. (2009) to be built not only into experiences but also within business models (Pine and Gilmore 2016). Digital pioneers such as eBay and Facebook pervaded the initial adoption of playful experiences for consumers and continue to do so, in an aim to profit from playful experiences. Play however, may also be seen as a cannibalism of consumer society and perceived as superficial, according to Barber (2007). Dholakia et al. (2009) stress the importance of creating meaningful community, ensuring play is conveyed in an enjoyable way for consumers. The role of digital within playful experience is central in enabling fantasy-related experiences for consumers online. Thus, creating worlds in which existing marketing has been limited (Pine and Gilmore 1999) and unable to portray.

Digital consumer experiences are distinct from the physical dimension and often seek to produce thrill, excitement over traditional methods of economic exchange (Dholakia et al. 2009). Business models that are based on playful experiences must ensure they do not create apathy and boredom through the creation of profits (Shankar et al. 2006). According to Dholakia et al. (2009 p.505), Play is stated to be “the chief-narrative of consumer culture in the twenty first century” which makes it a key concept for investigation.

![Figure 3.2 Typology of experiential value](image)

**Figure 3.2 Typology of experiential value**

Source: Mathwick et al. (2001).
Mathwick and Rigdon (2004) state that websites fail to portray high levels of telepresence and therefore, play in online shopping experiences are related to escapism. The authors measure the effect of play and flow on attitudes, experience and behaviour. Ahn et al. (2007) identified that consumers perceive the purchasing experience to be satisfying when it is pleasurable. Playfulness is the consumer’s likelihood to interact with a website spontaneously and unsolicited (Ahn et al 2007). As fashion is highly image-orientated, retailers and marketing practitioners should encourage high levels of playfulness in the design of interactive and experiential websites.

Moon and Kim (2001) defined three areas of playfulness: concentration, curiosity and enjoyment (Ahn et al. 2007). Curiosity has been measured as a key attribute for encouraging interest in a product through the use of a virtual fitting room (Beck and Crie 2016). Curiosity is identified to be a factor in the flow experience of technology. Measuring curiosity is a single dimension of the experiential value scale to increase exploratory behaviour. However, the authors do not measure the impact of curiosity on technology acceptance. The concept of play may be likened as a hedonic reward received through the process of purchasing a garment on an interactive site. O’Cass and Carlson (2012) denote that consumers perceive retailers and brands to be more credible and trustworthy when they use innovation in their website design. Further, the authors emphasise the importance of gaining trust in touch points between bricks-and-mortar stores and online retailing. This is due to being the point in which consumers seek brand recognition, safety and trust that would usually be assured through store assistants in the physical store.

Playfulness research focusses on the user in individual playful experiences. However, as shopping inherently involving social interactions and social acceptance, playfulness should be measured with regards to the interactions with product itself, the physical store, peers and sales assistants, product reviews, product recommendations and the ability to share products with friends online. These aspects of interaction influence a consumer to purchase a garment but may also increase satisfaction through a positive reflection of the shopping experience, either online or offline.

Studies have measured playfulness in the context of virtual and augmented technology. Muller-Stewens et al. (2017) measured playfulness using automobile stimuli. Other studies have measured the playful effects of augmented reality technology (Huang and Liao 2015, Dacko 2016). Virtual mirror and virtual glasses research which feature an augmented consumer experience through the layering of a product on an image have also measured playfulness and experiential value (Javornik et al. 2016, Beck and Crie 2016). In addition, the effect of playfulness on mix and match fashion technology has also been assessed (Overmars and Poels 2015). The results of these studies show that playfulness is inherent to virtual and augmented reality technology, in engaging the consumer in the style of online experience.
However, no research has analysed the effect of playfulness on virtual fitting room stimuli. Table 3.5 shows studies that have measured experiential value in augmented technology.

### Table 3.5 Experiential value retail studies

<table>
<thead>
<tr>
<th>Author</th>
<th>Stimuli</th>
<th>Measured constructs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muller-Stewens et al. (2017)</td>
<td>Automobile product website</td>
<td>Playfulness, curiosity, vividness, relative advantage, innovation adoption</td>
</tr>
<tr>
<td>Huang and Liao (2015)</td>
<td>Augmented reality interactive technology</td>
<td>Presence, perceived ease of use, perceived usefulness, service excellence, aesthetics, playfulness, behaviour</td>
</tr>
<tr>
<td>Dacko (2016)</td>
<td>Mobile augmented reality apps</td>
<td>Playfulness, aesthetics, customer return on investment, service excellence</td>
</tr>
<tr>
<td>Javornik et al. (2016)</td>
<td>Virtual mirror make-up try on</td>
<td>Perceived augmentation. Playfulness, convenience, behavioural intentions</td>
</tr>
<tr>
<td>Beck and Crie (2016)</td>
<td>Virtual glasses try-on, e-catalogue</td>
<td>Curiosity, online patronage intention, online purchase intention</td>
</tr>
<tr>
<td>Overmars and Poels (2015)</td>
<td>Mix and match fashion technology vs static images</td>
<td>Mental imagery processing, aesthetics, playfulness, customer return on investment, service excellence, re-patronage intention</td>
</tr>
</tbody>
</table>

### 3.7. Gamified fashion technology

Gamification is the application of gaming elements to non-gaming contexts (Hofacker et al. 2016). A well-known example of gamification is Second Life, an avatar based computer game (Kuntze et al. 2013). Through creating a personalised avatar in Second Life, users are immersed within a virtual reality life, where they are able to interact to with other users and fashion retail stores. An increased level of gamification can contribute to the consumer gaining increased product information (Müller-Stewens et al. 2017). Gamification also enhances entertainment in online product experiences (Insley and Nunan 2014). Consumer motivations to use gamified technology are either intrinsic: for positive feelings such as enjoyment or extrinsic: for reward such as praise (Denny 2014, Yang et al. 2017). Consumers are also more likely to express social motivations such as positive word of mouth after vivid experiences (Hamari and Koivisto 2013). The consumer’s induced gamified state provides grounding for future the integration of virtual reality technology within clothing and product assessment. Hamari and Koivisto (2013) identified the importance of researching the hedonic and utilitarian impacts of gamified experiences. Examples of gamified fashion product experiences include competitions and sponsored games, a method frequently used by pure-play retailers ASOS and Missguided (Insley and Nunan 2014) (Figure 3.3).
3.8. Social interaction and digital technology interfaces

Despite research into product recommendations measuring the level of social presence, there is little research in the area that measures the impact of social on the acceptance of fit and sizing of fashion products. In addition, research in the field of virtual and augmented reality fit technology suggest the benefits of social interaction built in to such technology, but do not sufficiently investigate the effects of social interaction (Yaoyuneyong et al. 2014). Also, there is a need to recognise the limited number of technologies available in the digital fit and sizing arena that facilitate social sharing. Often these technologies are only available in the store (Yaoyuneyong et al. 2014, Pantano and Servidio 2012), where social interactions are inherently always physically present and therefore may override the need for digital social interactions.

Social presence has been measured as the level of interactivity and connection with a computer interface. However no research has extended to the impact of online social sharing, the mediation of peers within fit and sizing, or the use of consumer reviews on algorithmic product recommendations. Consumers may seek face-to-face opinions of friends, peers and shop assistants in stores or digitally seek opinions of others through social media or mobile instant messaging (Pantano and Gandini 2017). Social factors are a pertinent area that need to be addressed as innovative fashion interfaces develop to involve more social two-way communication. Kim et al. (2016) analysed the influence of in-store virtual mirror technology which had the potential for users to share their images on social media. Kim et al. (2016) found that perceived usefulness was more important in socially mediated virtual mirror environments.
than perceived enjoyment. The authors do not investigate the social sharing ability of the technology on the consumer’s acceptance, instead overall technology acceptance of the virtual mirror is measured. Future studies should investigate the impact of social sharing within virtual mirror or virtual fit technologies and the role of consumer-consumer communication. Pantano and Gandini (2017) emphasise that consumers build social interactions into shopping experiences through digital and face-to-face means, however creating trust with the person they are interacting with is crucial. The authors stress the importance of consumer trust situated within digitally-mediated opinions from social networks over communicating with in-store staff. However, the authors do not explore the impact of digital style advisers or fit technology. In addition, the authors do not explore attributes of product or shopping experience, future studies should address the specifics of consumer trust and satisfaction whether it is product related i.e. fit, size and style or environment related i.e. convenience, ease of shopping experience that contribute to the consumer’s decisions to make a purchase.

3.9. Image interactivity technology (IIT)

Image interactivity technology (IIT) is used to enhance the realism of consumer experience dynamically when shopping online (Merle et al. 2012). Fiore et al. (2005) denote that IIT is where consumers can manipulate features of the product or garment in the online environment. This can include the background, context, operation, distance and angle. The authors further claim that by offering higher levels of IIT the consumers personal preferences can be fulfilled by multiple viewing options. The use of IIT in avatar modelling website, My Virtual Model, was stated by Fiore and Jin (2003) to evoke aspects of control, enjoyment and involvement to enable purchase intention. There is an emerging trend towards the use of 'real time' streaming of information (Mintel 2014a). Retailers are using product virtualization technologies to assess the hedonic responses of consumers when shopping online (Kim and Forsythe 2002). Increasing use of interactive technologies is evident in strategic use across the fashion industry, from the ability to rotate an object to the recent innovations of Virtual Reality - Oculus rift and 3D mirrors, which in turn increases engagement consumer motivations to purchase (Kim and Forsythe 2007, Blazquez 2014).

3.10. Metaverse definition

The metaverse is the virtual world in which technology and web-interactions are present. Users of the meta-verse can act as avatars with other users. The meta-verse overcomes locational boundaries by connecting users within the virtual world they are interacting and allows for playfulness, information exchange and transactional commerce (Davis et al. 2009). The following section describes metaverse fashion technologies including augmented and virtual reality and how they are utilised by retailers.
3.11. Augmented reality definition

Augmented reality is the layering of an augmented image onto a real environment in real time (Javornik 2016). AR is different to virtual reality as the person experiencing it can interact in real time (Zhou et al. 2008). The real environment may include a marker such as a QR code or an image. The real environment may also use a user’s face or body such as to allow the augmented product to be projected on top. The user will view the augmented product on their body on a digital screen. The following section will introduce augmented fashion technologies.

Table 3.6 Metaverse fashion technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>Definition</th>
<th>Example</th>
<th>Used by author/reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented 3D product view Try-on</td>
<td>Users can view augmented versions of products on their bodies by using an app and viewing a digital device.</td>
<td>Magic Mirror</td>
<td>Choi and Taylor (2014) Rese et al. (2016)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tseng-Lung and Liu (2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yaoyuneyong et al. (2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Verhagen et al. (2014)</td>
</tr>
<tr>
<td>Virtual Mirror</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Virtual store</td>
<td>Consumers can browse an entire store online or on mobile or using screens or glasses. Offers increased convenience due to ease of access.</td>
<td>Karen Millen</td>
<td>Lau et al. (2014) Fantano and Servidio (2012)</td>
</tr>
</tbody>
</table>

Virtual Technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>Definition</th>
<th>Example</th>
<th>Used by author/reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mix and Match – Dynamic Product view</td>
<td>Users can dynamically view products on a model and change the outfit by mixing and matching products and accessories.</td>
<td>H&amp;M</td>
<td>Overmars and Poels (2015)</td>
</tr>
<tr>
<td>Virtual catwalk</td>
<td>Immersion by Virtual reality headsets within a new season launch. Users are virtually present watching the show.</td>
<td>Burberry, Topshop, Rebecca Minkoff</td>
<td></td>
</tr>
<tr>
<td>Virtual 3D body scan</td>
<td>Users can create a 3D image of their body ‘at home’ using marker variables to gain body measurements for online shopping.</td>
<td>Bodi.me</td>
<td>Kim et al. (2016)</td>
</tr>
</tbody>
</table>

3.12. Augmented 3D product view

Tseng-Lung and Liu (2014) claim that augmented reality (AR) can provide high levels of experiential value when shopping. Javornik (2016) states that augmented reality is a new form of interactive technology. AR is under researched in terms of the way consumers interact with a layered or augmented product over the real image of the user. AR creates a seamless interaction between the person and the product, thus creating opportunity for research to address the opportunities this new level of interaction can provide to retailing experience. AR differs to VR as it is connected to the real world. AR is not disruptive of the real-world, but works in harmony with it (Javornik 2016). However, this optimum level of harmony of
channels and realities may only be supported if the image and rendering is believable. If the product presented through that AR product view is unrealistic, users will not experience this level of seamlessness that Javornik (2016) describes. AR apps can be marker-based or non-marker (Rese et al. 2016). Markers relate to the spatial element of AR, in terms of image recognition or wearable. Marker AR apps include barcodes, QR codes or RFID (Rese et al. 2016). Marker-less AR tracks a real-life object or person e.g. a face and overlay an augmented image, e.g. a pair of sunglasses. Marker-less AR provides higher levels of consumer acceptance due to dynamically enhancing digital image through spatial aspects (Rese et al. 2016). In other words, the user is able to move around wearing the augmented product and view themselves doing so on a screen.

3.12.1. Virtual mirror

Verhagen et al. (2016) have found that virtual mirrors provide higher level of presence than 360° spin and static pictures. They suggest that virtual mirrors should be used by online retailers as a medium to address the gap between the online and offline environment (Verhagen et al. 2016). In addition, virtual mirrors create higher levels of presence which also enhances cognitive and affective responses to products presented and the experience of virtual mirrors. In 2011, Cisco developed their Style Me virtual mirror which layered a consumer’s image onto a screen where they could drag items of clothing onto their bodies and mix and match outfits (Cisco 2011) (Figure 3.4).

![Cisco Virtual Mirror](image)

**Figure 3.4 Cisco Virtual Mirror**

3.12.2. Example: Karen Millen Virtual Store

Karen Millen launched a virtual showroom based on their Regent’s Street Flagship store in 2014. Retail Week (2014) stated that it was the retailers attempt to bring the “in-store
experience online.” Customers can experience convenient browsing for those who are time poor. Consumers can click on specific garments where they are presented with a brief overview of the garment and there is an option directed to the transactional website. Through this form of experiential marketing, the consumer is immersed in the store experience. They would experience high levels of interactivity, flow and company pervasiveness.

It may be argued that the virtual store merely creates excitement and hype however fails to draw in profits equivalent to the physical store. However, if the consumer can be inspired through the store presentation, they may be more likely to make a purchase once presented with the tactile store. This method would also encourage loyal customers to patronage the online store. Consumers would be familiar with the store layout and feel affinity to the virtual showroom, which may increase their likeliness to purchase. Perceived enjoyment, ease of use and new store perception are found to increase consumer satisfaction when using a virtual store (Pantano and Servidio 2012). The use of virtual stores has been suggested to enhance traditional retailing store formats and target wider demographics (Pantano and Servidio 2012).

### 3.13. Virtual reality definition

Virtual reality is related to cyber technology (Steuer 1992). Virtual reality is the experience of virtual presence, moreover not the experience of direct presence but the feeling of being immersed within a virtual environment (Vrechopoulos et al. 2009). Virtual reality is stated to be defined by human perception and the communication of presence (Biocca 1992). It is accepted that virtual reality technology encompasses virtual avatars in virtual fitting room settings (Vrechopoulos et al. 2009, Kim and Forsythe 2008). The following section will introduce virtual reality technologies used in fashion retailing.

#### 3.13.1. Virtual reality shopping

Lau et al. (2014) claim that virtual reality shopping requires further development to improve the simulation of the real environment. In other words, the technology requires furthermore advanced rendering techniques to increase ‘photorealism’ (Lau et al. 2014 p.97). Around a quarter of all online shoppers are interested in virtual reality shopping technology (Mintel 2017b). However, users of virtual headsets often feel dizzy due to the lack of ability to ground oneself. Also, due to being connected to the virtual reality headset, users were unable to move around the virtual store as they would in the real store (Lau et al. 2014). Virtual reality also lacks interaction with other humans which should be built in to virtual shopping environments in the future. Virtual shopping environments can increase telepresence and vividness, which increase engagement and authenticity (Papagiannidis et al. 2017, Papagiannidis et al. 2014).

3D models can influence consumers to revisit a website due to their entertainment qualities (Shim and Lee 2011, Kim and Forsythe 2007). Previously, consumers have had limited information regarding product attributes. The information search stage of the consumer decision-making process has depending heavily on the information provided by the consumer, the state of innovations in technology and device used to browse on. Shim and Lee (2011) state that avatars enable high levels of telepresence, a concept first introduced by Steuer (1992). Telepresence is where the consumer feels the physical environment is portrayed well and effectively they participate in the experience through interactivity. 3D virtual models can increase telepresence is also supported by Fiore et al. (2005). Virtual models can increase perceived ease of use and usefulness of online shopping platforms (Kim and Forsythe 2008). The more congruent the avatar with the user the more likely they are to have confidence in the fit of the product (Merle et al. 2012). Virtual models can increase perceived enjoyment and entertainment in online shopping (Lee et al. 2006, Kim and Forsythe 2008).

3.14.1. Avatars as salespeople

McGoldrick et al. (2008) make the comparison between the uses of sales assistants in the offline shopping environment and avatars as salespeople. It is important to define the factors of consumer spending uncertainties that sales avatars can address in the offline setting in order to translate this to online shopping uncertainties and perceived risks. This is due to the increased lack of consumer confidence apparent in the online shopping environment. Interacting with computers is stated to mediate the social factors that aren’t apparent in the online environment (Reeves and Nass 1998). McGoldrick et al. (2008) state that value can be created through building social relationships with consumers in the online environment (Reynolds and Beatty 1999). Keeling and McGoldrick (2010) also claim that avatars are limited in retail application currently, so the results of their study on avatars as salespeople could be influenced by perceived novelty effect.

3.15. Virtual fitting rooms (virtual try-on)

Virtual fitting rooms increase customer experiences of novelty and curiosity regarding product in comparison to traditional retailing formats (online magazines) (Beck and Crie 2016). Increased curiosity stimulated by the virtual fitting room increases the likelihood of both online and offline store patronage (Beck and Crie 2016). Virtual fitting rooms can also increase retailer targeting strategy through the data collected during the transaction with customers (Beck and Crie 2016). Additionally, the use of virtual fitting rooms can enhance exploratory behaviour. Consumers with high levels of technology anxiety had negative effects on the use of virtual try-on (Kim and Forsythe 2008). Innovative consumers had a positive effect on
usefulness, ease of use and entertainment value of virtual try-on (Kim and Forsythe 2010). Personalised virtual try-on enhances purchase intentions and utilitarian value (Merle et al. 2012).

3.15.1. Virtual catwalk

Virtual catwalks have often been used during a new season launch of technology-focussed fashion retailers. The virtual catwalk experience is delivered through virtual reality headsets. These include the Oculus Rift, Samsung Gear and more recently Google Cardboard. Virtual catwalks have been implemented during fashion week by digital retailers including Topshop (Inition 2014), Burberry and Rebecca Minkoff. Research in virtual catwalks and their influence on consumer behaviour and brand perception is under-explored. Figure 3.5 shows an image of inside Topshop’s virtual catwalk in 2014 (Topshop 2014).

![Figure 3.5 Topshop AW14 Virtual Reality Catwalk Headset View](image)

3.15.2. Virtual body scan

3D body scanning is typically performed using professional body scanning equipment. It has been found to have positive consumer responses when used in a clothing try-on context (Loker et al. 2004). New mobile applications have been devised in light of consumer positivity towards the potential of body scanning. Bodi.me is an example of how scanning principles have fed into mass consumer availability. Using Bodi.me, users can scan their bodies to get their body measurements stored within the app for use in shopping online (Bodi.me 2017). Bodi.me also provides users with product recommendations based on their measurements. The use of body scanning in clothing try-on and product development was introduced due to its accuracy in measurement but is limited in widespread adoption (Apeagyei 2010). Fit and sizing web applications that capture self-reported body measurements will therefore not include the accuracy of a 3D body scanner and will therefore be limited in the precision of fit recommendation.
3.16. Summary of metaverse fashion technologies

Augmented and virtual technologies have been summarised in Table 3.6 These areas have been defined and described in relation to their use and effectiveness in fashion retailing. The following section describes intelligence web fashion technologies including innovative methods of using data to provide personalised services to fashion consumers online.

3.17. Intelligent web definition (Web 3.0)

Intelligent web is the development of advanced IT that enables advanced gathering, storing, processing, personalisation and virtualisation of information. Intelligent web is the basis of artificial intelligence technology and includes web mining and web farming technology (Zhong 2003). Intelligent web is focussed around the collection and utilisation and use of large pools of data and is often associated with the term Web 3.0. Web 3.0 is the stage of internet evolution that enables the integration of latest technologies such as social networks, big data and the internet of things (physical devices that are connected to other apps, services and communications) (Newman et al. 2016). The intelligent web provides a range of fashion technologies to assist consumer decision making. The next section summarises aspects of intelligent web technologies in fashion retailing (Table 3.7).

3.17.1. Big data in retailing

Big data in retailing is collected through a number of sources. With the rise of customer experience technology facilitating transactions, social media and loyalty schemes provide retailers with extensive information regarding their customers (Bradlow et al. 2017). In addition, multiple touch points facilitated by the rise of Omni-channel retailing also provide data that when analysed can be used to gain an understanding of the consumer shopping journey. Retailers can benefit through better utilisation of marketing budgets across channels and profit margins can be optimised (Bradlow et al. 2017). Retailers can now better understand the stages prior to transactions and the underlying causes of trends and customer behaviour (Bradlow et al. 2017, Grewal et al. 2016). Big data is therefore a lucrative method of understanding consumer web behaviour and retailers are now investing in analytics capabilities to remain competitive (Lee 2017). Analytics of big data also includes machine learning, where specific data can be labelled and analysed for a particular purpose (Lee 2017). Aspects of data such as positive evaluations of products or the abandonment of transactions can be understood and used to maximise sales revenue in the future (Grewal et al. 2016).

3.17.2. Personalisation

Pantano and Naccarato (2010) found that personalisation, visualisation and interaction with innovative retail technologies are key factors for consumer loyalty. Data can be collected
through personalised services and offered to customers online. Due to such wide assortments available online, personalised services contribute to ease of navigation and decision making when shopping online (Lee and Cranage 2011, Zhang et al. 2007). The ways in which data can be mined through online interactions with customers used in this study is further described in Section 3.22. According to Pappas et al. (2017), personalised services should be used when a retailer has a clear picture on their customer characteristics in order to target their shopping motivations. Personalisation can offer enhanced customer service and better pricing for consumers (Lee 2017). Personalisation is described by Grewal et al. (2017) as a being both a growth mechanism and a hindrance for retailers. This is due to the convenience of targeted product and marketing offered to consumers, though relies on collecting vast amounts of information about the consumer that they may not be aware of (Grewal et al. 2017). Offering personalised services such as recommendations may reduce purchase intentions if a consumer has privacy concerns (Lee and Cranage 2011), therefore trust in recommendations is vital to their success and future adoption by consumers. The next section will discuss intelligent web fashion technologies available to consumers.
## 3.17.3. Digital styling community

Digital styling communities are becoming more prevalent in the online fashion industry due to the development of web 2.0 and web 3.0. Web 2.0 enables user-generated content and two-way communication between groups of consumers and consumers and retailers (Kaplan and Haenlein 2010) (Section 2.2.2). Web 3.0 enables the collection of data and the production of recommendations intelligent systems and was discussed in Section 3.17. Styling communities are brought together through applications which guide users by their likes and preferences such as the LiketoKnow.it App. In addition, users can view what similar users are liking and buying by being part of the online community. Consumers can share their personal interests and experiences with products collectively and gain recommendations from like-minded users. Tips and advice can be given regarding styling (Park and Cho 2012) and users can ‘follow’ one another to gain style inspiration. Within these consumer communities there are also lead
Chapter Three: Experiential Fashion Technology

consumers, who are highly participative, active and inspire other members of the crowd. A key example of this in online fashion retailing contexts is blogging. Such co-creation harnesses the power of both the crowd and the network (Labrecque et al. 2014) by leveraging feedback from others.

3.18. Personalised digital styling

3.18.1. Digital wardrobe

Digital wardrobes or smart virtual closets enable users to organise their wardrobe via their smartphone or tablet (Perry 2016). Research has proposed that digital wardrobes are a significant opportunity for retailers to provide personalised experiences for consumers. Perry (2016) found that digital wardrobes are perceived easy to use by technology optimistic users.

3.18.2. Online personal stylist

New websites and applications are being launched that provide users with an online personal stylist. The stylist curates collections of garments suited to the user through their online profile. Marks and Spencer’s Try Tuesday app is an example of a retailer custom-built interface which enables Marks and Spencer to not only gain information on their customer’s preferences but promote new items by targeting their customers (Try Tuesday 2017).

3.18.3. Size prediction

Size prediction technologies use consumer height, weight and fit information to group users to produce recommendations on what size to purchase online. This method can offer lowered perceived risk prior to purchase through the use of recommendations. Zara have recently invested in a size prediction tool which is shown in Figure 3.6 (Zara 2017). Size prediction facilitates online purchase decisions by attempting to remove any uncertainty a consumer may have when choosing a garment to buy. In addition, it can assist to reduce consumers purchasing more than one size and returning unsuitable garments, reducing environmental and margin related costs (Powers and Jack 2013).
3.18.4. Size and style recommendation

Size and style recommendation systems are personalised systems that gather information about a consumer based on their preferences, tastes, body shape, measurements and lifestyle. The system provides recommendations based on these factors through user collaboration or content. Content recommendations are based on previous purchases and collaborative recommendations are based on communities of similar users with similar data fingerprints (Vogiatzis et al. 2012). Size and style recommendation interfaces provide users with useful product recommendations produced from a larger selection of products. With online retailers holding large quantities of stock and consumers having limited screen sizes, product recommendations can provide users with a convenient way of refining product selection. In order to gain product recommendations on sizing and style, the interfaces are guided by a combination of recommendation algorithms and stereotypical styling information (Vogiatzis et al. 2012). Personalised technologies provide retailers and consumers mutual benefit (Grewal et al. 2017). However, a central factor to personalised technologies relies on consumers’ sharing data. Data sharing has implications to privacy, and therefore is a key consideration for both consumers and retailers alike in the use and delivery of personalised technologies.

3.19. Artificial intelligence technologies

Artificial intelligence (AI) technologies are concerned with the placement of thought processes and behaviour into computers (Russell and Norvig 1995). AI uses machine learning, natural language processing, knowledge representation and automated reasoning in order to provide convenient, personalised and personified digital interactions.
3.19.1. Image recognition styling

Artificial intelligence (AI) involves the use of algorithms, machine learning and voice activation to provide targeted products and services to customers. AI is a key influence for customers when they shop both online and offline and a prominent example of this within consumer culture is Amazon’s ‘Alexa’, Apple’s ‘Siri’ or IBMs ‘Watson’ (Grewal et al. 2017). AI allows for tailored recommendations and responses through the provision of key information to customers. Mintel (2017c) state that the future of online fashion retailing will be through visual search methods. According to commercial research, 20% of consumers are interested in using visual search methods in online retail and this is likely to grow (Mintel 2017b) Both artificial intelligence and image recognition can be used in conjunction with regards to fashion product choices. These two technologies within online and mobile fashion retailing are a growing phenomenon (Andrews et al. 2016), however there is currently little academic research in the area of image recognition and AI. Building upon the model of Amazon’s Alexa, the system can be paired with the Amazon Echo app which enables users to get smart recommendations using the camera and video function on Alexa to gauge recommendations on their outfit choices. The system uses algorithms and machine learning, along with input from personal stylists and body shape analysis to provide the user with recommendations (Techcrunch 2017). The app is one of the first to combine AI and image recognition in modern clothing consumption.

3.19.2. Summary of intelligent web fashion technology

This section of the chapter has described a range of intelligent fashion technologies that include online personal styling, size recommendation and size prediction. Intelligent web technology is an emerging area of fashion retailing and has been guided significantly by technological developments in retailing such as web 3.0 and Omni-channel retail. In the future, usage of visual and verbal methods to choose, evaluate and purchase fashion will become more prevalent, blurring the lines between the physical and digital consumer interactions with retailers through AI (Mintel 2017b).
The results of the discussion and literature review are shown in Figure 3.7. The inner rings are split into the two areas discussed: metaverse technologies and intelligent web technologies. The upper part of the secondary circle represents metaverse technologies. Metaverse technologies include virtual reality and augmented reality. The lower part of the secondary circle shows intelligent web fashion technology. Intelligent web fashion technology is powered by machine learning, big data, and algorithms as previously described. The outermost circle depicts artificial intelligence (AI) technologies, which sit between metaverse and intelligent web by blurring both physical and digital functions, using image recognition, voice activation digital devices.

![Figure 3.7 Model of Online Fashion Product Viewing and Service Technologies](image)

**Figure 3.7 Model of Online Fashion Product Viewing and Service Technologies**

3.20. Summary

This section has discussed the nature of fashion technologies through the emergent use of the metaverse and intelligent web. The next section will discuss in depth the virtual fit, size and style recommendation technologies used in online retailing that are central to this study.

3.21. Virtual fit and sizing technologies

Virtual fit and sizing differs from virtual product experience, as the user can enter basic information regarding their body morphology to gain fit, sizing and styling related outputs. In avatar related interfaces, basic measurements are taken to create an avatar that the consumer
can use to engage with a garment also known as fit visualisation. Other interfaces include size recommendation based on information on garments that the consumer has already purchased or their body shape. Fit recommendation is concerned with descriptors of how a garment may fit. Three broad areas of virtual fit and sizing technologies are defined by Gill (2015) and summarised in Table 3.8.

Table 3.8 Definition of virtual fit and sizing websites

<table>
<thead>
<tr>
<th>Type of VGF (Gill 2015)</th>
<th>Explanation</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size recommendation</td>
<td>By entering basic measurements and information about previous purchases and garment fit, consumers are given a recommendation of size from a particular retailer.</td>
<td>Dressipi, True fit</td>
</tr>
<tr>
<td>Fit recommendation</td>
<td>Consumers are provided with body matches based on their basic measurements and the other users of the platforms. They are presented with images of other users wearing garments and can comment on fit and size by connecting with one another.</td>
<td>Fitbay, Fits.me</td>
</tr>
<tr>
<td>Fit visualisation</td>
<td>Consumers can view garments on personalised, computer generated 3D avatars. Tightness and looseness of garments is indicated through heat/tension maps. Sheer and colour changes can also be made. Basic measurements such as height, weight and bra size are used.</td>
<td>Metail, My Virtual Model</td>
</tr>
</tbody>
</table>

3.21.1. Size recommendation

Size recommendation relies on the consumer entering basic measurements which are proportionally constructed into a size prediction (Gill 2015). Size recommendation has been described to be a “natural extension to existing online product retail environments” (Gill 2015 p.8). Size recommendations are used by companies that have developed a system for use in conjunction with a partner retailer. Examples of size recommendation companies are listed in Table 3.9. Despite varying company names and company format, each interface requires input measurements of height, weight and bra-size measurements in order to produce a size recommendation for use in online product purchase. Miell et al. (2018) denote this in more detail using content analysis.
Table 3.9 Size recommendation websites

<table>
<thead>
<tr>
<th>Company and Description</th>
<th>Measurement method for size comparison</th>
<th>Platform</th>
<th>Notable Retail Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>dressipi</strong></td>
<td>Questionnaire including height, weight, bra-size, colour preferences, body shape, lifestyle preferences and previous sizes of well-fitted garments</td>
<td>PC and Mobile</td>
<td>BHS, Very, M&amp;S, eBay trial, Debenhams, Boden, Topshop, John Lewis</td>
</tr>
<tr>
<td><strong>FIT ANALYTICS</strong></td>
<td>Height, weight, age, belly shape.</td>
<td>PC</td>
<td>The North Face</td>
</tr>
<tr>
<td><em>Size advisor</em>, offered as an option can use choosing which size to buy. Uses basic measurements and consumer estimates regarding body shape to produce a size recommendation. <strong>Improved conversion rate by 2% during AB testing with North Face.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fitbay</strong></td>
<td>Height, weight and body shape.</td>
<td>PC and Mobile</td>
<td>Multiple retailers dependent on what Fitbay users have purchased. Users are given a size recommendation in a particular retailer e.g. Mango Size 8, then directed to the retailer’s external website.</td>
</tr>
<tr>
<td><strong>meality</strong></td>
<td>Gender, height, weight and birth year, hip point, seat, inner leg length, bust, waist</td>
<td>PC</td>
<td>Bloomingdales</td>
</tr>
<tr>
<td><strong>True Fit</strong></td>
<td>Height, weight, age, bra size, body shape, brand name of previous well-fitted garments.</td>
<td>PC and Mobile</td>
<td>Nordstrom Macy’s, House of Fraser.co.uk, Joe’s, Guess, Kate Spade, Uniqlo, American Eagle, Oscar de la Renta, Zalando, Future: Adidas, Aldo, Footlocker, Brooks Brothers, Dorothy Perkins,</td>
</tr>
</tbody>
</table>
3.21.2. Fit recommendation

Fit recommendation websites are structured in two approaches. One approach is through a crowdsourcing method where users can gain fit recommendation by connecting with users that have similar measurements to him/her. Another method of fit recommendation is through comparing a user’s measurements against size charts and product measurements. Comparing the difference between product and user provides a description of how well or poorly a garment may fit the user. Due to the use of textual description, this method is difficult to standardise. Table 3.10 shows fit recommendation websites and notable retail partners.

**Table 3.10 Fit recommendation websites**

<table>
<thead>
<tr>
<th>Company and Description</th>
<th>Measurement method for prediction</th>
<th>Platform</th>
<th>Retail Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>fitfyle</td>
<td>Size comparison of existing garments</td>
<td>PC and Mobile</td>
<td>Available on shopify app store</td>
</tr>
<tr>
<td>Fits.me</td>
<td>Height, bust, waist, hips and arm length</td>
<td>PC</td>
<td>LK Bennett, Henri Lloyd, Thomas Pink, Hawes and Curtis, Pretty Green, Viyella, T.M. Lewin, QVC, Sangar, Tamar Collection, Twin Set, Wiggle, Hugo Boss, Michaela Jedinak, Muubaa</td>
</tr>
</tbody>
</table>

3.21.3. Fit visualisation

Fit visualisation is the visual representation of how a product may appear and fit on a parametric virtual body or an avatar. Fit visualisation uses basic measurements to compose an avatar of the user and the garment is pictured on the avatar. Fit visualisation enables the consumer to see what the garment may look like on their body dimensions. Interfaces include tension maps where the consumer can assess how tight or loose a garment may be. It is essential that virtual fit technologies are consumer friendly, accurate and realistic in their simulation of garments adopted by the consumer for effective fit assessment (Kim and LaBat 2012). An important concept defined by Merle et al. (2012) is that of self-congruity. This is the influence of confidence in fit, utilitarian value and hedonic value that leads to intent to purchase in online shopping. Merle et al. (2012) also found that “body self-esteem influences self-congruity and confidence in fit.” Table 3.11 provides a summary of fit visualisation websites.
### Table 3.11 Fit visualisation websites

<table>
<thead>
<tr>
<th>Company and Description</th>
<th>Avatar Measurement method</th>
<th>Platform</th>
<th>Retail Partners</th>
<th>Avatar Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GLAMSTORM</strong>&lt;sup&gt;1&lt;/sup&gt; Consumers can design their own outfits and looks on pre-set avatar models or personalised profile models using basic measurements.</td>
<td>Height, shoulders, bust waist and hips</td>
<td>PC</td>
<td>Various, garments are selected by users.</td>
<td>Correction of body and personalisation of fair, hair and make-up</td>
</tr>
<tr>
<td><strong>Metail</strong>&lt;sup&gt;2&lt;/sup&gt; Computer created avatar which can be modified using the consumer’s basic measurements. More accurate measurements can be inputted for a closer representation of the model. Lifelike model, offering ability to rotate the model 360, build outfits and get a size recommendation.</td>
<td>Height, weight and bra size</td>
<td>PC and Mobile</td>
<td>Warehouse, Shop Direct, Evans, House of Holland, Tesco, Dafiti, Little Mistress</td>
<td>Personalisation and measurement correction of avatar, rotated views, outfit building</td>
</tr>
<tr>
<td><strong>MyVirtual Model</strong>&lt;sup&gt;3&lt;/sup&gt; Users can mix and match outfits on the website, creating new garments and looks or selecting current items available in online retailers e.g. Ebay.</td>
<td>Weight, bust size, bust cup, frame, height, body shape</td>
<td>PC</td>
<td>Various, garments are selected by users.</td>
<td>Personalisation, hairstyle, skin colour. Age, nose, lips, eyes.</td>
</tr>
<tr>
<td><strong>QVIT</strong>&lt;sup&gt;4&lt;/sup&gt; Users can create personalised avatars and try on different sizes, colours and see sheer and tension maps (from loose to tight descriptors)</td>
<td>Height, weight, bra size</td>
<td>PC</td>
<td>Various garments from American Retails can be bought from Qvit.com</td>
<td>Users can only edit the outfit not the model, can rotate the model.</td>
</tr>
</tbody>
</table>

---

<sup>1</sup> GLAMSTORM is a platform that allows users to create their own avatars using basic measurements and offers personalisation options such as correction of body and personalisation of fair, hair and make-up.

<sup>2</sup> Metail provides a computer created avatar that can be modified using the consumer’s basic measurements. It offers a lifelike model, ability to rotate the model 360, build outfits and get size recommendations.

<sup>3</sup> MyVirtual Model allows users to mix and match outfits on the website, creating new garments or selecting current items available online.

<sup>4</sup> QVIT enables users to create personalized avatars and try on different sizes, colors, and see tension maps (from loose to tight descriptors). It offers the option to purchase various garments from American retailers that can be bought from Qvit.com.
3.22. Strategic implications

Due to being an online method of assessing garment fit, fit and sizing technologies offer the strategic advantage of allowing the consumer to try on garments that may not be stocked in store. Siddiqui, et al. (2003) comment on how online offerings must parallel the store to deliver consistency, however as researchers and marketers are noticing the increased convenience of online shopping through the growth of consumer adoption of mobile, fit and sizing technologies can offer further advantage to both consumer and retailer.

Fiore (2008 p.178) states that manufacturers can benefit from “partnering with the digital shopper” as they can gain valuable information regarding product design and usability. As this is one of the key factors marketers have to consider when designing a product, the manufacturer essentially skips this step, becoming closer to the consumers’ needs and wants. With the fashion industry, the manufacturer will have a deeper understanding of the garment specification and be able to offer additional products (Fiore 2008), and Fiore (2008) suggests that manufacturers should invest in their websites as a source of information for the consumer. Moreover they claim that “retaining a customer…is much less expensive than acquiring a new customer.” (p. 179). Indeed, in the future there may be a shift towards harbouring mutually beneficial relationships between manufacturer, designer and consumer through methods such as crowdsourcing 3D design through virtual avatars. This way, retailers can gain instant feedback at low cost and better target their fashion ranges based on consumer feedback for optimum success.

3.23. Stimuli for the study

The next section will introduce the stimuli for the study, Metall virtual fitting room and Dressipi Style Adviser and summarised in Table 3.13.

3.24. 3D Avatars in online fashion retailing - Metall

Image interactivity technology (IIT) has influenced the categorisation of rich media which communicate products online and attempt to overcome the haptic gap, intrinsic in computer mediated communications (Merle et al. 2012). Communication of product attributes may be classified into textual and visual information, which may elicit purchase intention (Kim and Lennon 2008). More recently, new technologies are enabling consumers to assess fit, style and size (Nantel 2004). Consumers can now interact directly with 3D avatars of their bodies and try clothing on (Merle et al. 2012). This form of fit visualisation is posited to be an advanced form of IIT (Kim and Forsythe 2008, Merle et al. 2012, Fiore et al. 2005, Fiore et al. 2010) and also classified as a form of augmented and virtual reality (Yaoyuneyong et al. 2014, Javornik 2016). Captivating online experiences elicited through virtual try-on technology are linked with concepts of telepresence, flow, playfulness and interactivity in computer mediated...
environments (Hoffman and Novak 1996). The technologies enable the consumer to experiment with virtual products on their virtual selves (Figure 3.10). A size may also be recommended to the user after they have entered their basic body measurements. As a result of such technological change in retailing, online fashion retailers are developing conversion technologies, as they assist consumers to convert products into purchases. Metail, a virtual fit company have continued to build their commercial visibility having recently acquired a partnership in IBM’s global directory (IBM 2017). Metail requires a user to enter their height, weight and bra-size and generates a 3D avatar to visualise garments. Metail’s user process is depicted in Figure 3.8.

![Figure 3.8 Metail User Process](image)

**Figure 3.8 Metail User Process**

### 3.25. E-size and style recommender system - Dressipi

The influence of the growth of the web and online shopping has inevitably led to greater product availability online, and the need for a more complex understanding of the data produced through human computer interactions in shopping contexts (Gandomi and Haider 2014, Pousttchi and Hufenbach 2014). This has resulted in the creation of machine learning systems, which assist consumers to choose fashion products from recommendations suited to their personal tastes, powered by big data and semantic processing. Recommender systems enable a consumer to purchase products they like and explore new products and styles, similar to a personal shopper in the bricks-and-mortar store (Bye and McKinney 2007). A commercially implemented recommender system is also known as Dressipi. Recommender systems can also produce a size and style recommendation based on the users body shape.
which may enhance online shopping confidence and trust, if accurate recommendations are produced (Choi et al. 2011). Table 3.12 compares content based and collaborative recommendation systems.

### Table 3.12 Content based and collaborative recommendation systems

<table>
<thead>
<tr>
<th>System</th>
<th>Description</th>
<th>Data size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content-based methods</td>
<td>Filters content through statistical analysis calculates the match between user and product</td>
<td>Large data sets</td>
</tr>
<tr>
<td>Collaborative filtering</td>
<td>Collects information from groups of buyers, preferences, ratings, measurements, finds similarities and provides recommendations</td>
<td>Requires large data sets to increase recommendation accuracy</td>
</tr>
</tbody>
</table>

Adapted from: Benlian et al. (2012) and Baier and Stuber (2010).

Recommender systems (RS) assist consumer navigation of products available across fashion websites and examples are discussed in section 3.18.4 (Choi et al. 2011). The technology uses algorithms and one of three methods either, content filtering, collaborative filtering or hybrid techniques. Content filtering uses user profiling and compares product features to create recommendations. Collaborative filtering collects user preferences through filtering social information and hybrid systems use a combination of both content and collaborative methods. Choi et al. (2011) states that collaborative filtering is most relevant system for researching social presence within technology communications, which is the type this study has adopted. The online recommender systems attempts to enhance personalisation, gain consumer trust and patronage of the online retailer by “collective intelligence” (O'Reilly 2007 p.26). Subsequently RS enables retailers to merchandise their product ranges more effectively, due to the data that is produced through customer interactions with the system (Bello-Orgaz et al. 2015). Existing research has indicated how the power of collective consumer information through networks and crowds is proving to be an insightful method of developing retail strategies (Labrecque et al. 2013).

Dressipi is powered by a collaborative filtering algorithm. The user inputs are outlined in Figure 3.9. These include colour preferences, body shape (including measurements), and personality. The style adviser uses questions and basic body information to generate personalised recommendations, situated in a window of the Very.co.uk website. Questions are divided into three areas as shown in Figure 3.9 and outputs are shown in Figure 3.10.
1. Colours
Eye colour, hair colour, skin and colour choice preferences.

2. Body Shape
Bust size, hips, shoulder and waist proportion, height and weight. Dress, top and trouser brands and sizes. Areas of body to reveal and conceal.

3. Personality
Style adventurousness, level of recommendation, shopping confidence, shopping enjoyment, where they like to dress up and how Monday - Friday is spent.

Figure 3.9 Dressipi inputs

The output includes a personalised edit of clothing from the host retailer, recommendations, a style guide, likes and dislikes and a style profile (Figure 3.10).

Figure 3.10 Dressipi outputs on Very and Topshop websites
Table 3.13 Stimuli chosen for study

<table>
<thead>
<tr>
<th>Interface</th>
<th>Features of Interface</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D Avatar (Metail.com)</td>
<td>3D Avatar creation through personal account</td>
<td>Height weight and bust size create a basic parametric avatar</td>
</tr>
<tr>
<td>Host retailers:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little Mistress, House of</td>
<td>Personalisation of avatar</td>
<td>Editing of detailed measurements, skin colour and hair colour of avatar</td>
</tr>
<tr>
<td>of Holland, Evans, Dafiti.</td>
<td>Trying on products and outfits</td>
<td>Users can try on individual products or whole outfits and can mix and match.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The garment is projected onto the user’s avatar enabling them to visualise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>how the garment may look in reality.</td>
</tr>
<tr>
<td>360° Avatar rotation</td>
<td></td>
<td>Users can spin the avatar by 90° turns to view the whole look.</td>
</tr>
<tr>
<td>Size Recommendation</td>
<td></td>
<td>A size recommendation for a selected garment is produced based on the user’s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>measurements triangulated with the retailer’s size chart of the chosen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>product.</td>
</tr>
<tr>
<td>Facilitation of product</td>
<td></td>
<td>User’s can purchase the garment through the host retailer’s website.</td>
</tr>
<tr>
<td>purchase</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Interface Features of Interface**

- **E-Size and Style Recommender System (Dressipi)**
- **Host retailers:**
  - Topshop, M&S,
  - Very.co.uk
- **Personal preferences**
  - produced and measured by text and imagery. I.e. images of products, trends and celebrities
  - fashion confidence, shopping confidence, celebrity style preferences, product preferences i.e. Likes and dislikes, lifestyle, application of fashion products i.e. events, provision of fashion tips or complete style overhaul and financial spend. This creates algorithmic recommendations based on the consumer’s data entered in to the system.
- **Size & Style Recommendation**
  - Sizes and styles are recommended. Sizes are based on consumer body shape, height and weight. Style recommendations are based on fashion confidence, lifestyle and choice of fashion tips or complete overhaul. The system combines new trends and ranges delivered by the hosting retailer to target groups of consumers with similar tastes.
- **Personal account creation – email updates**
  - Users can create a personal account where their recommendations produced are tracked along with their browsing and purchase history, using cookies.
- **Facilitation of product purchase**
  - Users can purchase products suggested through the recommendations from the host retailer’s website. These may include additional IIT, e.g. outfit image, rotation, consumer ratings and reviews.

3.26. Summary

This section of the chapter has outlined key fashion experiential technology and how emerging use of technology assists online fashion purchase. Key technological developments in this area are summarised in Figure 3.7. The areas of virtual fit and sizing were discussed and finally the stimuli for the study are introduced (Table 3.13).

Playfulness is becoming inherent in new technological experience in online retailing, particularly with pure-play fashion retailers that lack physical stores and rely on maximising consumer online engagement. Playfulness is crucial to the adoption of new technologies and the diffusion of new innovations through technologically confident consumer demographics. This study seeks to analyse the level of new technology acceptance influenced by measuring the playfulness of the technology. Experiential marketing literature has focussed on the online transaction experience, up to the purchase intention phase, rather than the post-purchase...
experience. This research aims to uniquely provide analysis of both online experience and post-purchase which enables explanation of the effect of gamification and playful experience on the physical product and interface evaluation.

Fit and sizing technologies provide a new means for interacting with products and retailers prior to purchase and are attempting to reduce consumer uncertainty, fit dissatisfaction and product returns. This section has built from categories introduced by Gill (2015), and introduces new technologies that have emerged to demonstrate how the technologies are being implemented through retailer availability.

Understanding of how these technologies have progressed alongside web and interface innovations is necessary to provide a clear trajectory to understand how digital fit and sizing technology have emerged and will continue to develop. A deeper understanding of the technologies used by the retailing industry, this chapter has incorporated how digital trends such as augmented and virtual reality have influenced fit and sizing technology. and provides an overview for how AR and VR may guide fit and sizing technology in the future. The structure of the chapter provides a basis to then introduce the stimuli used in this research.

Fit and sizing technologies can assist both consumer and retailer in providing garment visualisation, product recommendation and through the collection of valuable consumer data. Little research has explored the area of consumer adoption and assessment of fit and sizing technologies and the subsequent physical garment received, which demonstrates the need for the research. Extant research regarding consumer decision-making in online retailing is based on consumer behaviour theory (Dennis et al. 2009). Evaluating the approaches to consumer behaviour theory is necessary in developing this research in order to consider and understand the underlying concepts and motivations that are involved in consumer decision making. Consumer behaviour theories are discussed and evaluated in their application to this study in the next chapter.
Chapter 4. Consumer Behaviour and Product Evaluation

4.1. Introduction

To understand the role of fit and sizing tools in online purchase, it necessary to investigate how the tools may assist with decision making. Consumer behaviour theory is based on understanding the processes behind how consumers choose to purchase products. Consideration of consumer behaviour theory is necessary to achieve a complete picture of the effects of size and fit tools on decision making and decide on a suitable framework on which to base the research. Characteristics of UK consumers were previously discussed in Chapter 2. Consumer behaviour plays a central role in measuring the success of fit and sizing technology. In addition, the influence of fit and sizing technology is introduced through the framework of the consumer shopping journey.

4.2. Consumer behaviour theory

Foxall (2002) has stated that consumer behaviour is the application of human behaviour within marketing economies. Foxall (2009) has argued that behavioural research has not recognised the importance of human operant psychology within economic environments. Consumer behaviour therefore, seeks to understand the relationships between original behavioural analysis and the exchanges inherent in marketing activities, such as economic exchange (Foxall 2009). Consumers can gain basic information regarding their needs and wants through sources of information in their lives. Dholakia et al. (2009) found that consumers shop for a variety of reasons such as basic needs to fulfil hunger or thirst, or more complex reasons such as to increase one’s self-esteem. Aspects such as socio-cultural context, income, politics and economic health may also determine the level of consumption of products and services (Sethna and Blythe 2016). Therefore, gaining an understanding of consumers and their behaviour is central for retailers to shape successful marketing strategies. In the past, retailers have focussed on more aggressive profit enhancement. Recently due to retailer growth, it has become commonplace for retailers to implement strategies which hold the consumer’s preferences as central to their success. This is also known as the shift of retail power to consumer focussed business strategies. Consumer behaviour theories have developed throughout the twentieth century. Theories are based around three schools of thought: cognitivist (Engel et al. 1986), attitude-intention (Fishbein and Ajzen 1975) and behavioural (Foxall 1990, 2009). The next section will discuss these approaches to consumer behaviour theory and their application to the study.
4.3. Cognitivist approaches

Foxall (1980) has stated that cognitive behavioural psychology is based on rational decision making such as information search in problem solving. Foxall (1980) has expressed that decision-making originates from rational, cognitive, affective and conative thinking by an ‘ego’. Rational thinking is based on true, organised beliefs. Cognitive thinking is where experiences contribute to learning, affective thinking is based on emotion and conative thinking is how behaviour is derived from cognitive and affective parts of the brain.

4.3.1. Howard and Sheth Model

Howard and Sheth (1969) devised a consumer behaviour model which includes the influence of marketing and socio-psychological influences. This model is based on four constructs consisting of inputs, perceptual constructs, learning constructs and outputs (Foxall 1980). The Howard and Sheth theory (1969) involves an overarching three-stage process of a.) motives, b.) action and c.) decision. Howard and Sheth (1969) have assumed that consumers are rational beings, and the theory of buyer behaviour was built from a positivist approach (Howard and Sheth 1969). The authors denoted that purchase behaviour is systematic and caused by a stimulus as an input with purchase intention as the output. Howard and Sheth (1969) have discussed three elements that effect consumer brand choice: consumer motives, alternative action, and decision mediators. Motives are related to what the buyer is intending to consume and their particular needs (Howard and Sheth 1969). Alternatives are other brands that have the potential to satisfy the consumer. Decision mediators apply to the motives and how these motives may be satisfied by the product (Howard and Sheth 1969). Decision mediators may assist to order the motivations and influence the subsequent decisions that may be made regarding a product purchase (Howard and Sheth 1969). The Howard and Sheth model of buyer behaviour follows the linear decision-making path that is typical of consumer behaviour theories (Figure 4.1), including information search and drawing from past experiences to select the brand that best suits his or her motives. Exogenous variables that are distinguished by the authors include time pressure, financial status, personality traits, social and organisational setting, social class, and culture (Howard and Sheth 1969).

Hunt and Pappas (1972) have stated that the Howard and Sheth (1969) model claims that attitudes influences purchase solely through purchase intention. However, the importance of attitude should be noted as a result of pre-formed experiences and beliefs and therefore, attitude towards a product or brand may also be an outcome and input variable when a product is purchased more than once. Hunt and Pappas (1972) have stressed the importance of testing the intra-model linkages of the Howard and Sheth (1969) model and dismiss other attempts to test the model which does not include measurement of the entire linkages (Farley and Ring 1970). In addition, the assumption of the model that humans are rational in buying decision
making processes, dismisses the opportunity for irrational, unplanned buyer behaviour or impulse purchase which is supported by Foxall (2010).

4.3.2. Engel Kollat and Blackwell Model

Engel et al. (1968) have devised the Engel, Kollat and Blackwell (EKB) model. This model includes consumer attitudes which was adapted by Engel, Blackwell and Miniard (Engel et al. 1986). The EKB model has extended John Dewey’s (1910) problem solving process (Darley et al. 2010). The EKB model does little to recognise the impact of external influences on the decision-making process, which may also be stated as external search according to Jacoby (2002). Another factor is the post-purchase consumer response and use behaviour, whether it be regret, word of mouth or loyalty (Jacoby 2002). Despite criticism, the EKB model provides an outline for the process of consumer decision making which is a multi-stage process (Arndt 1976). This process is outlined in Figure 4.1.

![Figure 4.1 Consumer decision making process](image)

Need recognition is where consumers are aware of the need to fulfil a goal or desire. Information search is where the consumer searches for clarify the need and evaluate alternatives. This may be internal (currently obtained in the mind) or external (for example word of mouth). Then the purchase decision occurs where the transaction is completed. Finally the post-purchase stage, which involves the comparison of the purchase to the pre-purchase evaluation. This may include, attitude, regrets and cognitive dissonance (Arndt 1976). Arndt (1976) has argued that this process is not linear and stages may occur before or after one or another than as pictured in Figure 4.1. The multi-step decision making process is widely
acceptable to be the characteristic process featured in various consumer behaviour models including Nicosia (1996) and Howard and Sheth (1969) (Arndt 1976). These models are underpinned by the concept of AIDA – awareness, interest, desire and action which was devised by Strong (1925). Figure 4.2 shows the full EKB model of buyer behaviour.

Figure 4.2 EKB model of buyer behaviour

It is accepted that most grand models of consumer behaviour (those that follow a linear approach) were proposed within the philosophical perspective of logical postivism (Kassarjian 1982, Erasmus et al. 2001). A criticism of this perspective would be that the models propose only cognitive effects on decision making and therefore do not substantiate the full effects of both cognitive and affective impacts to decision making. General objections to these models include the general inference that consumers are just rational decision makers (Solomon 1996, D’Astous et al. 1989). Moreover, such cognitive models ignore the impact of impulsive and unstructured thought and behaviour within the decision making process as emphasised by Foxall (2010). The effects of the linearity of the decision making model is also considered to be problematic as it does not consider consumer decision making on a micro and macro level. In other words the impact of sensation (micro) within levels of the decision making process are not recognised by the original models (Sirgy 1983). Constructionist criticisms include the acknowledgement that attitudes and preferences are elicited within the decision making process (Erasmus et al. 2001). Decisions are centred within consumer experiences and therefore not as structured as the decision making models depict.

4.4. Attitudes, intentions and behaviour

Foxall (1984) stated that attitudes are a consumers’ predisposed consistent behaviour towards a product or brand. Foxall (1984) argued that attitudes can be measured through social science research, however their measurement is dependent on the analysis of specific attitudinal and behavioural factors. In particular, the object that is of question and the action towards it must
be measured. In addition, when measuring consumer attitude, the difficulty in obtaining accuracy of consumer responses should be questioned, with regard to these conditions being closely observed (Foxall 1984).

### 4.4.1. Fishbein’s intentions model

Fishbein’s intentions model was conceptualised to provide a greater understanding of behavioural intention and its effect on actual target behaviour. Attitudes are formed through an individual’s evaluation of an aspect of their world, for example environment, behaviour or person (Ajzen and Fishbein 1977). The behavioural component is the level of commitment of an individual to perform a behaviour (Ajzen and Fishbein 1977). Intentions are posited to be a key predictor of behavioural performance (Fishbein and Ajzen 1975). Foxall (1984 p.42) claimed that Fishbein’s Intentions model provides “one of the most sophisticated means of relating behavioural intentions to actual behaviour.” However, the intentions model predicts behavioural intention, and therefore does not predict actual behaviour. It arrives at this conclusion through two factors: individual’s attitude towards or with an object, and subjective norm – the individual’s perception of how others may act, behave with or towards the object in relation to their attitude, and how much this may affect their motivational behaviour. These are factors are shown within the model in Figure 4.3.

![Fishbein's attitude intention model](image)


**Figure 4.3 Fishbein’s attitude intention model**

Source: Foxall (1984)

Fishbein posited that other factors such as social, situational and experimental all form part of the attitude or subjective norm (Foxall 1984). Attitude has been found to be one of the closest cognitive measures of actual behaviour (Fishbein and Ajzen 1975). Criticisms of the intentions model focus on the lack of actual behavioural measurement. Additionally, in the failure to adequately measure attitude which is complex (Bagozzi and Burnkrant 1979). Further, attitudinal factors can be biased without the consideration of timing, action and context (Foxall 1984). Fishbein and Ajzen (1975) created a model which further included the multi-attributes of attitude (Kassarjian and Goodstein 2009). Fishbein and Ajzen (1975) have focussed on two...
factors, consumer perceptions and intentions or behaviours. However, there are a number of key criticisms associated with the model that have been described in the previous section. It is stated that attitude cannot sufficiently predict behaviour and should not be used as a “substitute” measure for behaviour (Kraus 1995). Many critiques of attitude intention models are associated with the moderating variables that should be involved within the model and are not. Factors such as prior behaviour (Norman and Smith 1995) and personality should also be further be combined and measured within the models (Kraus 1995). A Freudian perspective of attitude-intention could be likened to the attitude originating from the superego but “the demands of the id result in a failure to act” (Sethna and Blythe 2016 p. 316). Therefore, a holistic perspective to both attitude and intention should be considered in a more dynamic process, to improve the model.

4.5. Behavioural perspective model

Foxall (1990) devised the behavioural perspective model (BPM) which included the analysis of consumer behaviour from learning history and the present consumption setting which evokes an approach or avoidance behaviour (Foxall 2009) (Figure 4.4). Foxall has stated that the BPM model originates from the application of experimental behaviour analysis and consumer choice. This model importantly includes the consumers learned criteria which are used as ‘discriminative stimuli’ Foxall (2009). This historic experience gives ‘meaning’ to the consumption experience (Foxall 2009). This model is set within the discriminative stimuli, also known as learned criteria and the motivating operations that are set within the consumption arena, which can inhibit or evoke predicted consumption behaviour (Foxall 2009). Foxall (2009) compared the model with the openness of human consumption, where the subject can leave the setting at any one time. Foxall (2009) has made the comparison to an animal in a similar setting who cannot leave as openly. However, Foxall (2009) has noted that consumption settings that may be similar in process, may differ in format thus creating a discourse between the two environments (Foxall 1990). This concept is aligned with Hursh’s (1980) theory of open and closed economies. Learned criteria can affect the way a subject will interact with both open and closed consumption environments, such as through the use of technology to pass the time during a mundane experience (Foxall 2009).
4.5.1. Radical behaviourism

Radical behaviourism is concerned with the explanation of consumer behaviour and the environmental forces acting upon it (Foxall 2002). Radical behaviourism denotes that internal events such as thoughts, attitudes and opinions are distinct from the environment. The radical behaviourist view perceives that behaviour is affected by external events rather than internal processes. The operant will in future behave in a similar way, in a similar environment (Foxall 2002). Radical behaviourism does not deny however, the importance of internal events, viewing them as part of the environment rather than the sole contributor to decision making (Foxall 2002). Radical behaviourism is associated with a positivist view (Foxall 2002).

Skinner devised an experiment which denotes much of radical behaviourism (Foxall 1986). His experiment contained three parts, operant conditioning, influence of environmental factors with an individual research strategy and therefore applies this to intra-personal events (Foxall 1986). Radical behaviourism does not investigate intra-personal events, however, it uses them as an outcome rather than causal on behaviour (Foxall 1986). This is separate to the Stimulus-organism-response model which includes ‘classical conditioning’, whereas behaviourism is focussed on reinforcement and probability of responses being repeated (Foxall 1986). Radical behaviourism dismisses the structure of most cognitive consumer behaviour models in assessing situational beliefs and attitudes as part of consumer choice (Foxall 1986). Instead, radical behaviourism relies on consistency of reactions that are functionally equivalent. In other words, consumer attitudes can change throughout the process, and the measure will only be of those that reinforce each situation and are equivalent (Foxall 1986). Foxall (2002) argues...
that radical behaviourists have done little to conceptualise the process of interpreting events. Foxall (2002) also claims that there are no antecedents which form a part of a response based model that can be plausibly tested. Therefore, it may be argued that this perspective to consumer behaviour has little credibility as it cannot be tested using a model and an empirical event.

### Table 4.1 Typology of consumer behaviour theories

<table>
<thead>
<tr>
<th>Theory</th>
<th>Author</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitivist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theory of Buyer Behaviour</td>
<td>Howard and Sheth (1969)</td>
<td>Consumers are influenced by stimuli, they use alternatives to evaluate the decision which leads to a purchase intention.</td>
</tr>
<tr>
<td>Attitude-intention</td>
<td>Engel, Kollat and Blackwell Model (1968)</td>
<td>Inputs are followed by perceptual and learning constructs which lead to an attitude and purchase intention.</td>
</tr>
<tr>
<td>Intentions model</td>
<td>Fishbein (1980)</td>
<td>Attitude and subjective norm lead to a behavioural intention.</td>
</tr>
<tr>
<td>Behaviour</td>
<td>Foxall (1990)</td>
<td>Current behaviour and learning history provide meaning to the consumption experience.</td>
</tr>
<tr>
<td>Radical Behaviourism</td>
<td>Skinner (1953)</td>
<td>Internal events are distinct from the environment. Attitudes towards a subject can change.</td>
</tr>
</tbody>
</table>

### 4.6. Summary of consumer behaviour theories

The consumer behaviour theories that are discussed in this research are summarised in Table 4.1. Through critical analysis of consumer behaviour theories, elements of the approach considered for this research are considered in Table 4.2. This allows for a complete and holistic understanding of the approaches and the applicability of consumer behaviour theory to this research. Much of the application of consumer behaviour theory in this study is related to the need for measurement of post-purchase behaviour, attitude and product evaluations. Therefore, analysis of existing literature enables the identification of key consumer behaviour related constructs to measure. Many traditional consumer behaviour models perceive the buying experience as a linear process and do not take into account external influences on the user such as experience with technology or internet use. Studies in the area of digital fit and sizing have recognised similar limitations with traditional theories and have included the influence of external aspects of consumer behaviour such as technology optimism (Perry 2016), technology anxiety and innovativeness (Kim and Forsythe 2010). This study therefore takes into consideration the influence of both external influences on the consumer, attitudes towards the interface and the post-purchase evaluations after the product has been received. No prior research into fit and sizing has combined these approaches to consumer behaviour and this approach is integral to gain a fuller understanding of fit and sizing.
Table 4.2 Summary of analysis of consumer behaviour theories and approach to be considered for study

<table>
<thead>
<tr>
<th>Theory</th>
<th>Criticism</th>
<th>Approach to be considered</th>
<th>Application to study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard and Sheth Theory of Buyer Behaviour (1969)</td>
<td>Consumer behaviour is a linear approach which is not representative decision making. Consumers are not always rational in decision making.</td>
<td>1. Consider the feedback loops and where decision making may occur in response to a product or stimuli.</td>
<td>The Howard and Sheth model does not account for changes in behaviour e.g. irrational purchase. Use of new technology may not always result in a linear pattern of consumer behaviour. This study focuses on the online purchase along with a comparison of the post-purchase product evaluation. A linear approach would therefore not recognise where the influences to attitude or the stimuli may occur and therefore create new perceptions or attitudes in the process.</td>
</tr>
<tr>
<td>Engel Kollat and Blackwell Model (1968)</td>
<td>No external influences are considered. Lacks use and post-purchase behaviour.</td>
<td>2. Measure external factors such as innovativeness, technology confidence of the user, age, internet use. 3. Capture use and post-purchase behaviour.</td>
<td>This study applies technology confidence to the level of technology acceptance of an innovative fit and sizing interface. The Engel Kollat and Blackwell model does not include external influences which are inherent to the consumer behaviour and post-purchase evaluations of technology. This has been recognised in existing studies that have included antecedent measures (Kim and Forsythe 2010, Perry 2016).</td>
</tr>
<tr>
<td>Fishbein and Ajzen Attitude Intentions Model (1980)</td>
<td>Attitude and behavioural intention are not true indicators of actual behaviour and use. Attitudes can change and this is not captured by the model.</td>
<td>4. Capture actual responses to products/technology through post-purchase evaluations.</td>
<td>The Fishbein and Ajzen attitude intention model does not capture true behaviour, by using post-purchase analysis, this study accounts for adjusting consumer behaviour perceptions post-use.</td>
</tr>
<tr>
<td>Behavioural Perspective Model (1990)</td>
<td>No consideration of prior behaviour.</td>
<td>See point 2</td>
<td></td>
</tr>
<tr>
<td>Radical Behaviourism (1953)</td>
<td>No antecedents are explained within the theory, therefore it is difficult to conceptualise and measure.</td>
<td>5. Dismiss theory from use in study.</td>
<td>The radical behaviourism theory does not adequately account for the influences of consumer behaviour on technology acceptance and subsequent post-purchase behaviours that shall be included in the study. Therefore the theory will not be used.</td>
</tr>
</tbody>
</table>

4.7. The shopping journey

The shopping journey has been studied in various disciplines of consumer behaviour from Howard and Sheth (1969) as previously discussed in this chapter, to consumer centric based perspectives such the emphasis on experience (Schmitt 1999, Verhoef et al. 2009, Lemon and Verhoef 2016). Lemon and Verhoef (2016) state that there are three stages of the consumer shopping journey and experience: pre-purchase, purchase and post-purchase (Figure 4.5). Consumer shopping journeys fall within the wider disciplines of consumer behaviour and
experience. Other influences to the development of the consumer shopping journey also include service marketing, customer relationship management and the multi-channel journey (Lemon and Verhoef 2016). As much online consumer experience research has mainly focussed on the purchase intention as an outcome in the shopping process (Rose et al. 2012), Lemon and Verhoef (2016) emphasise the importance of the journey consisting of three stages. The study depicts the journey and evaluates responses beyond purchase intention. In addition, the model conceptualised by Lemon and Verhoef (2016) recognises the importance of customer experience and how this can feedback into the consumer journey, which has been overlooked in existing consumer behaviour theories and frameworks. Existing models have conceptualised aspects of the consumer journey however have not combined the influence of customer experience.

To illuminate consumer responses to the area of online fit and sizing technology, the analysis of purchase and post-purchase stages is required. This is due to the central role of product evaluation in the process of online fit and sizing. The customer journey is therefore used to frame the research approaches undertaken: quantitative (Metail stimuli) and qualitative (Dressipi stimuli) in their respective stages of consumer purchase. This study focuses specifically on two types of product related experiences: fit and sizing, framed within the context of the consumer shopping experience journey (Lemon and Verhoef 2016).
4.8. Pre-purchase

Consumers search for information when shopping online as this is a crucial step in the decision-making process (Detlor et al. 2003). Saarijärvi et al. (2017) recognise that product returns are an aspect of information that consumers may assess prior to purchase in terms of gathering information about the product. This can be directly related to the product they are intending to buy, for example if the product is described as slim fit, the consumer may purchase a number of sizes in order to assess the fit. The consumer may already intend to keep only one of the products purchased (Saarijärvi et al. 2017). In addition, consumers also assess products at home even if they have no intention on keeping the product, free returns enable the consumer to discover and try products they might have found inspiring (Saarijärvi et al. 2017). Interactive decision-making aids have been researched in the context of online shopping (Häubl and Trifts 2000). As the number of products available online is increasing through the growth of pure-play retailing, recommendation agents assist consumers in the pre-purchase stage in mitigating the difficulty of evaluating alternatives in the online retailing environment (Häubl and Trifts 2000). Consumers seek information regarding products from multiple sources of information such as word of mouth from other consumers, product reviews and retailer information (Chen et al. 2015). Other aspects such as product knowledge, brand knowledge and previous experiences also contribute to online pre-purchase decision making (Karimi et al. 2015). Forms of product information available to consumers in the pre-purchase stage include online product descriptions, fit information, blogs, size charts, fit and sizing information. This research focuses on new product information in the form of fit and sizing tools as previously discussed in Chapter 3. The following sections discuss aspects of pre-purchase consumer behaviour and decision making to be considered for the study.

4.8.1. Involvement

Fashion garments are experience goods (Song and Kim 2012) and fashion can allow consumer self-identity and expression (Loureiro et al. 2017). Consumers often have limited information when purchasing online, and it may be argued that enriching this experience is key to facilitating self-extension when shopping online (Belk 2009). High task atmospheric cues in website design can increase involvement in the online purchase (Song and Kim 2012, Eroglu et al. 2001). The way in which garments are displayed to the consumer can assist to reduce the perceived risk in such purchasing environments and encourage repatronage. Online retailers aim to address this issue through increasing product involvement by providing numerous product images, video content, zoom and 360° viewing options which can provoke positive reactions consumers through inherent media richness (Simon and Peppas 2004). Moreover, Rosa et al. (2006) found that involvement with clothing can positively affect fit and sizing concerns in online fashion retailing. Consumers that have a high level of involvement may be
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Enabling the Digital Fashion Consumer through Gamified Fit and Sizing Experience Technologies

able to picture wearing a garment and therefore have lower risk perception when shopping online (Kim and Damhorst 2010).

4.8.2. Hedonism and utilitarianism

Hedonism is related to the pleasurable aspects of experience due to human nature requiring experiences and excitement (Sethna and Blythe 2016). Consumers may shop for a variety of motivations including for instrumental application such as grocery shopping and also to seek pleasure (Sethna and Blythe 2016). Fashion consumption is concerned with both hedonic and utilitarian motives (Babin et al. 1994), which are dependent on primary factors such as previous information gained, time, disposable income, emotion and wellbeing. Holbrook and Hirschman (Holbrook and Hirschman 1982) noticed the polarisation of shopping motives as problem solvers or fun and fantasy seeking. As physical cues offered on garments in the realm of online shopping are absent, consumers rely on the information provided by the retailer to achieve their shopping goals. Olsen and Skalerud (2011) state that consumers are more likely to retain loyalty for stores that allow for both hedonic rewards whilst retaining their utilitarian justifications. Factors such as navigation through the online environment are required for instrumental purposes so the consumer can browse or complete their purchase. Childers et al. (2001 p.516) claim that in an online environment a consumer has a wider scope of acquiring information regarding a potential purchase as “a consumer is navigating through unchartered territory.” It is therefore important for retailers to consider the usability of a website or tool and its impact on consumer behaviour.

4.8.3. Touch and non-touch preference

Touch and non-touch preference has been defined as the need for haptic interactions prior to purchase (Peck and Childers 2003). Cho and Workman (2011) define two areas of touch, evident in consumer preference when shopping for clothing, instrumental touch, which incorporates the tangible garment properties such as texture and weight and autotelic touch which involves the sensory aspects of touch (Liu et al. 2017). Dholakia et al. (2011) argue that it is important not to neglect the cognitive behavioural processes involved in haptic garment interactions with their functional and utilitarian aspects, which enables the basis for virtual interactions (Dholakia et al. 2011). However, technological advances have begun to enable a solution for this in the virtual world such as through virtual fitting rooms.

Autotelic touch encompasses sensory stimulation and excitement in the garment consumption process. Although as the fashion market is innovating and there is a shift towards virtual consumer involvement through the notion of gamification of the online shopping experience (Insley and Nunan 2014). It may therefore be argued that the autotelic aspects are becoming more prominent in online consumer decisions. Foxall (2010) states that consumer choice
emerges from the information learnt and their behavioural setting, and by enabling the consumer to gain detailed information about the garment fit (utilitarian) whilst gaining satisfaction through visualising it on their body shape, this will form approach behaviours (Foxall, 2010). Further, this behavioural process allows the consumer to generate greater meaning prior to purchase which may consequently provoke patronage (Foxall 2010).

Geissler and Zinkhan, (1998) state that consumers consider both aesthetic and functional qualities of garments when purchasing online, but also how garments will look together and the appearance on the body. Ashdown and Delong (1995) identified two issues in a study from the consumer perspective of garment: how the garment appears on the body and the perception of comfort. Such findings in the context of online retail lead to the level of risk taking propensity that a consumer wishes to take. Thus, the lack of tactility presents issues with consumer wariness and eventual satisfaction gained through the indirect nature of online shopping. The tactility apparent in bricks-and-mortar stores enables consumers to make more informed decisions based on the above preferences by trying on the garment and seeking advice from shop assistants. One way technology has assisted to bridge this gap in online retailing is through the use of online communities. Online product reviews allow consumers to compare their experiences of a garment in playing an important contender in the intent to purchase. Additionally, web-chat facilities could be viewed as an online store assistant where consumers can ask questions about the garments, delivery and returns. Virtual try-on technology has been found to emulate positive responses from consumers when shopping online (Kim and Forsythe, 2008). Ganesh et al. (2010) found that interactivity and the redefinition of convenience was one of the main contenders for success in e-store shopping environments.

**4.8.4. Perceived risk**

Bauer (1960) defined perceived risk as the amount of uncertainty a consumer has towards a product or service, and ultimately the meaning of a poor decision. There have been many approaches to perceived risk in the context of retail from unidimensional to multidimensional approaches (Dai and Forsythe 2014). Taylor (1974) has stated that risk in purchasing contexts involves uncertainty, anxiety and self-esteem. Taylor (1974) denotes that there are levels of information which assist to reduce risk in consumer purchase environments, these are information acquisition, transition and processing. Taylor (1974) emphasised that risk reducing marketing strategies should be used to effectively target consumers when shopping. Mitchell and Harris (2005) have also defined risk through five, multi-dimensional areas of perceived risk evident in retail shopping environments: financial, physical, social, time loss and psychological. In more detail, financial risk is concerned with how much a consumer may spend in relation to their income. Physical risk is attributed to safe or unsafe shopping
environments which a consumer is exposed to. Social risk is related to the psychological dimension in how the store image is attributed to the consumer, embarrassment at poor choice, social pressures and dimensions which then lower self-esteem. Additionally, time loss is related to the duration of the shopping trip, time to purchase, and time taken to receive refunds and returns. As online shopping has grown, consumers have developed a greater understanding of the online retail environment and therefore have developed differing perceptions of perceived risk (Dai and Forsythe 2014). In relation to online shopping for clothing, product and performance risk are often thought to be the reasons why consumers choose not to shop online (Forsythe and Shi 2003, Dai and Forsythe 2014), and is particularly problematic when purchasing garments (Goldsmith and Goldsmith 2002). However perceived risk is dependent on the variables the consumer is considering in their decision-making process (Shim and Lee 2011). Shim and Lee (2011) divided perceived risk into product risk and attribute risk and found that 3D models can reduce risk for consumers through simulating a garment on their virtual bodies. Thus, demonstrating the need for research into virtual fit environments.

4.9. Purchase

The purchase phase of the consumer shopping journey is the decision to make a transaction or not, often referred to as purchase intention. Purchase intention is the measure of whether the consumer will purchase online and is a major feature of pre-purchase satisfaction (Chen et al. 2010, Bai et al. 2008). Aspects that consumers use to assess purchase intention include website quality, information and technology (Chen et al. 2010, Hausman and Siekpe 2009). Many studies that have explored fashion technology websites and the impact of online shopping on consumer behaviour have only used purchase intention as an outcome measure (Beck and Cree 2016, Domina et al. 2012, Papagiannidis et al. 2014, Merle et al. 2012, Pookulangara et al. 2014). No clear distinction has been made between the relationship of purchase intention, pre-purchase and post-purchase evaluation (Chen et al. 2010, Maxham 2001). There is an evident need for a cohesive approach to the interrelated areas of product evaluation, online experience and consumer behaviour online. In addition, few studies have measured actual use of the technology or fashion website tested pre-purchase (Kim and Forsythe 2007) and no studies have measured the impact of post-purchase garment evaluation on the pre-purchase product expectation.

4.10. Post-purchase

Consumers in the post-purchase stage may choose to return or keep a garment. Saarijärvi et al. (2017) state that reasons for returns in the post-purchase stage include sizing, disconfirmed expectations, feelings regarding style and fit, issues with quality or the wrong product was received. Eckman et al. (1990) suggested four criteria that may be used by consumers when evaluating products: aesthetics, usefulness, performance and quality, extrinsic criteria.
However, these criteria have not been assessed in an online purchasing environment using virtual fit or e-sizing. Shin (2013) notes that aspects of fit assessment are physical, functional and aesthetic. Aspects of personal assumptions of fit are important in post-purchase fit evaluation, in addition the social influence of friends and family is also crucial to accepting product fit and sizing (Stone 1965). Firms benefit from positive post-purchase consumer satisfaction (Zeithaml et al. 1996), which emphasises the importance of post-purchase evaluation to clothing related studies. Post-purchase evaluation is where the product has been purchased online and the physical quality of the product or garment can be assessed. Post-purchase behaviour has been overlooked in online fashion retailing studies (Joung 2014). Post-purchase allows consumers to fully evaluate the level that his or her expectations have been met or satisfied (Sethna and Blythe 2016, Oliver 1980). Post-purchase is often related to satisfaction and the confirmation or disconfirmation of expectations. If the product meets expectations, consumers are likely to engage in positive word of mouth, repatronage of the product or brand, and satisfaction. Fit of clothing can contribute highly to post-purchase satisfaction and therefore is a crucial part of post-purchase analysis of clothing products (deKlerk and Tselepis 2007). Consumers will use their own experiences and the reports of others when making product decisions (Etkin and Sela 2015). Analysing the post-purchase consumer experience may be argued to be as integral to the consumer shopping journey or more than purchase intention, as it measures a true indication of product satisfaction.

4.11. Product returns

Due to convenience, wide assortments and low prices, consumers are shopping online now more than ever. Retailers are offering free returns and such liberal policies for returns has had an effect on consumer behaviour (Saarijärvi et al. 2017). Attitudes towards returning fashion purchased online has moved away from the traditional reasons for returns and is becoming an inherent aspect in fashion product buyer behaviour. Opportunistic and impulse buyer behaviour are some of the reasons consumers are returning more products purchased online (Saarijärvi et al. 2017, Park et al. 2012). Product returns are a key consideration in the shopping journey, starting for some at pre-purchase. The ability to return products is a factor that consumers often consider before purchasing a fashion product. Returns policies are also sometimes seen as an indicator of quality, with regards to how easy or hard it is to get a refund or exchange from the retailer (Petersen and Kumar 2015). Indeed, during the purchase phase consumers may have lowered financial risk if they are able to get a refund for the product if it is unsatisfactory. Post-purchase returns may even generate future sales through the consumer’s ability to replace the product and refer the brand to their peers (Petersen and Kumar 2015). Returns should be seen as an opportunity to gain short and long-term benefits to customer service and profitability (Petersen and Kumar 2015, Powers and Jack 2013).
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4.12. Summary

This chapter has discussed consumer behaviour theories from cognitive, attitude-intention, and behavioural perspectives and identified the aspects of consumer decision making. Analysis of these theories allows for a deeper theoretical understanding of consumer behaviour which denotes the way consumers may interact with retailers. There are a number of criticisms related to the theories which are discussed, including the limitation of linear theories such as the Howard and Sheth (1969) model which can simplify consumer shopping behaviour. Similarly, models such as the Engel Kollat and Blackwell model and the Behavioural Perspective model do not consider the influence of post-purchase behaviour.

Much consumer behaviour research has focussed primarily on the purchase intention, whereas with garment fit satisfaction, the post-purchase evaluation is key to assessing garment satisfaction which has been discussed. Consumers evaluate products differently online to the physical store, and with digital fit and sizing technology providing consumers with a new means to product evaluation and fashion services, the models used to analyse online behaviour may be out of date (Dennis et al. 2009).

An inherent challenge of this research is fusing the perspectives of garment fit research with experiential marketing and consumer behaviour. Therefore, this study aims to provide a holistic understanding of the consumer’s decision-making process up to and beyond purchase intention. Consumer behaviour analysis is useful as a research framework to understanding the stages of the consumer’s decision-making process, however consumer behaviour should not exist in isolation when analysing fit and sizing. The multi-disciplinary and theoretical approaches of technology (interface) acceptance, consumer behaviour and garment fit assessment need to be considered in order to fully understand the area of digital fit and sizing in research. As outlined in this chapter, the three stages of pre-purchase, purchase and post-purchase are also key to understanding how the fit and sizing technology assists the consumer when shopping online and frames the research.
Chapter 5. Garment Fit and Sizing

5.1. Introduction

Garment fit and sizing is assessed by the consumer online and during the subsequent physical fit assessment made when the product arrives. In order to further understand the area of fit and sizing tools available in the online environment, recognition of the underlying principles of garment fit and sizing assessment is necessary. This chapter reviews the literature on garment fit and includes the perspectives of both garment technologists and consumers that are evident in extant research. In addition, the chapter discusses new methods such as body measurement including 3D body scanning and consumer evaluation of virtual clothing.

5.2. Assessing the physical fit of garments

Fit is concerned with the relationship between the wearer and the garment. Fit is complex and multi-faceted. Yu (2004) has stressed how definitions of fit may vary depending on external factors such as fashion culture and individual preference. Fit is the combination of both subjective and objective assessment (Yu 2004). Fit has also been stated to be the silhouette of a garment being correct for the wearer and their body (Mastamet-Mason et al. 2012). Kinley (2010) has stated that fit is multifarious to define as it depends on the wearer of the garment. Kinley (2010) also denotes that fashion-related garments concerned with appearance tend to have less ease (distance between the garment and body) and are fitted closer to the body. Whereas comfort-focused garments have more ease and are less concerned with appearance (LaBat and DeLong 1990). A symmetrical, proportioned fit of a garment is said to be a good fit (Hazen 1994). These various definitions of fit demonstrate the range of perspectives in defining what fit is.

In clothing product development research, fit is assessed by technologists or fit professionals and often not the end consumer who wears the garment (Pisut and Connell 2007). Moreover, little research has been conducted from the consumer perspective of fit (Pisut and Connell 2007, Gill 2015). There is also limited information regarding benchmarks that can be used to assess fit (Gill 2015) and defining fit from both technical and consumer perspectives are difficult to standardise or compare. There is no universal information used for guiding clothing fit assessment. However, academic approaches to fit can provide a basis to understanding the technical aspects of fit. Erwin and Kinchen (1969) defined five clear elements of fit which provide a foundation to understanding fit assessment:

1.) Grain
Grain is concerned with the relationship of the pattern or fabric and the wearer. Grain should be “parallel or perpendicular” to the floor (Chen 2007 p.132). Brown and Rice (2014 p.217) state that the “garment must be cut on the grain…with the exception of a garment cut on the bias.” A garment that is on-grain will hang well on the body (drape) and not display any twists or folds where unintended if the grain is aligned (Gill 2015).

2.) Line

Line is the way in which the seams and zips of the garment contour the body. Lines on garments can outline the form and trace areas such as the neckline or armhole (Brown and Rice 2014). As with grain, lines should be parallel or perpendicular to the floor in relation to the body (Chen 2007). Darts should run straight down the garment or silhouette the area they have been designed to fit (Brown and Rice 2014).

3.) Set

According to Chen (2007) set is the lack of wrinkles on a garment. Brown and Rice (2014) state that a smooth garment is usually set correctly and that wrinkles will occur where the garment is set incorrectly due to being too big or small. Set is the relationship between the silhouette and the lines created by the garment (Gill 2015). Brown and Rice (2014) claim that there are five types of set related wrinkles: Horizontal wrinkles occur under tension where the garment is too narrow. Loose vertical where the garment is wider than the body. Vertical wrinkles where the garment is too short. Loose horizontal folds show the garment is too long for the body. Diagonal wrinkles which point to where the garment fits insufficiently on the curve of the body. This shows that the five principles of fit have classifications within them, and further demonstrate the complexities of fit.

4.) Balance

Balance is where a garment should hang evenly on the wearer or mannequin. A balanced garment should have an equal amount of fabric on both sides of the body from the centre. A skirt would be balanced if the fabric does not touch the legs (Brown and Rice 2014).

5.) Ease

Ease is the amount of fabric between the wearer and the garment. It can be functional or styled. The measurement of the garment should be shaped to the body, plus ease can allow for fit, design ease and fullness (Brown and Rice 2014). Brown and Rice (2005) have stated that there are two overarching types of ease, namely style ease and fit ease. Style ease adds fullness to create visual effect (Alexander et al. 2005). An example of this would be oversized garments which have been created by adding more ease. Ease in oversized garments should be calculated so that even with size variations, the amount of ease remains consistent. Fit ease accommodates movement such as walking, breathing and general wear (Brown and Rice,
Chapter Five: Garment Fit and Sizing

2005). Functional ease which is part of fit ease, should enable the wearer to move comfortably in the garment this can be classified as dynamic fit (Brown and Rice 2014). There is also stationary fit which accommodates the stationary form (Brown and Rice 2014, p.219). Researchers have suggested that ease should directly correlate with size (Petrova and Ashdown 2012) but claim that in ready-to-wear garments there is a constant amount of ease. Ease in non-fashion garments can be predefined but with fashion garments this may differ due to consumer preference (Meng et al. 2012). Ease can have implications on comfort, style and movement, therefore ease can be seen as a key consideration in the evaluation of garment fit and sizing.

5.3. Comfort in clothing

Clothing comfort has been stated to consist of four aspects: fashion, feel, fit and function (Goldman 2005). Comfort involves thermal and non-thermal aspects of clothing (Fourt and Hollies 1970). Comfort has also been stated to be the harmony of physiological, psychological and physical properties (Slater 1985). Comfort is important in clothing fit assessment as it is multi-dimensional and related to various external and internal stimuli (Choudhury et al. 2011). Fabric content can have a direct effect on perceived clothing comfort (Kadolph et al. 1993). Consumers may decide to keep or return a garment based on the comfort of the fabric when tried on the body. Comfort may also be associated with how a consumer feels in a social situation when wearing a particular garment style, trend, colour or fit – also known as psychological comfort (LaBat and Delong 1990). Comfort can represent aesthetic or emotional levels of garment satisfaction in consumer fit assessment (deKlerk and Tselepis 2007). In addition, comfort has been found to be related to body shape and the style of the garment (deKlerk and Tselepis 2007). Comfort should be assessed on a functional, aesthetic and emotional level in consumer fit settings. Comfort is therefore a complex, multi-faceted aspect of consumer garment satisfaction and should be a key consideration in product development and post-purchase analysis.

5.4. Garment fit evaluation within product development

Ashdown and Loker (2010, p.158) define fit evaluation as the relationship between the “body and clothing using a variety of measures to assess characteristics such as appearance, comfort and ease of movement”. In product development settings such as 2D garment construction, patterns are formed from basic blocks which are altered to a design specification, this is usually done by a pattern specialist. The mock up garment is then altered to fit a mannequin or fit model and then another final garment is produced (Meng et al. 2012). The fit model will wear the garment as the final consumer would, including carrying things in pockets and wearing accessories (Brown and Rice 2014). Garments are measured and assessed during the product
development process to ensure that a good fit is achieved. Bye and LaBat (2005) looked at
product development processes and found product development teams may adjust garment
prototypes two to three times during development. This is where the manufacturer and retailer
make desired changes to ensure that they achieve the intended garment shape, style and design
(Brown and Rice 2014). Designers and merchandisers may typically have more say in the
garment fit sessions than the technical members of the fit team (Bye and LaBat 2005). Changes
to the prototype are often made through communication of notes from the fit session. Those
altering the garment are often not present for this initial communication and therefore the
changes required may not be consistent (Bye and LaBat 2005). This emphasises the issues that
can occur at design and manufacturing level, before the garment has reached the consumer. In
addition, levels of complexity are added by subjective opinions from the product development
team to the expected garment fit (Fan et al. 2004). Other issues include the communication of
prototype iterations and absence of the opinion the fit model’s experience with the garment.
However, a single fit model’s perspective arguably cannot account for a population of a target
consumer audience (Ashdown and Loker 2010). Other factors that contribute to the issue of
sizing and fit include the outsourcing of garment technologist and manufacturing skills to
remote countries (Tyler 2003) through globalisation (Chapter 2). Out of date sizing charts used
by the fashion industry (Simmons et al. 2004), absence of up-to-date measurements of the
population (Wren and Gill 2010) and a lack of understanding of ease within academic and
industry settings (Gill et al. 2008). These factors all contribute to creating difficulties achieving
accurate garment fit for populations. According to Ashdown and Loker (2010) issues related
to fit emerge at a number of stages prior to consumer garment fit assessment, yet ultimately it
is the consumer that assesses the performance of the garment and therefore decides the level
of acceptable fit.

5.5. Issues identified with garment fit and sizing

Jones and Giddings (2010) state that consumers often find inconsistencies among high street
retailers’ sizing systems, which can lead to poorly fitted garments. Such inconsistencies can
be seen in analysis of high street sizing (Gill 2016). Due to wide variations in body shape, age
and culture, developing a standard system for fit and sizing is recognised to be complex and
fundamentally flawed (Pisut and Connell 2007). Schofield and LaBat (2005) in their analysis
of sizing and grading practices found that there is no correlation between the incremental
grading increase in pattern blocks and the differing sizes of the actual female form. Indeed,
some sizing systems used in the fashion retailing industry were developed in the late nineteenth
century (Ashdown and Loker 2010). Such disparity between sizing systems and the general
population has resulted in dissatisfaction of fit from the consumer perspective (Otieno et al.
2005). High online returns are often as a result of dissatisfaction with physical fit when
consumers are assessing their size (DesMarteau 2000) this can be seen to be related to consumers inability to try-on garments prior to purchase (Cases 2002). Ashdown and Loker (2010) state that fit issues arise from objective fit concepts which are designer led, wear tests to assess fit, and finally the consumer’s perception of fit not matching to the previous criteria. Alexander, et al. (2005) determine that manufacturers must address the elements of fit that are related to differing body size, whilst also combining the consumer's individual perspective of fit. There is an evident need for a common semantic or fit system in order to communicate fit between manufacturer, retailer and consumer to alleviate some of the issues research has raised in relation to fit.

5.6. Assessing consumer fit satisfaction

Fit is determined to be the most important factor consumers consider when purchasing garments (Eckman et al. 1990, Alexander et al. 2005, Otieno et al. 2005). Garment satisfaction is based on whether the fit and sizing of a garment meets a consumer’s aspirations (Kim et al. 2002). Fit in the online purchasing environment is assessed, pre-purchase and post-purchase. In addition, fit is stated the most important dimension of clothing that contributes to satisfaction both post-purchase and functional, cognitive and emotional satisfaction (deKlerk and Tselepis 2007, Figure 5.1). Fit can involve numerous aspects of satisfaction and consumers often assess fit by a number of factors, available at different stages of the shopping journey. Communicating sizing and fit online and offline is therefore essential to consumers finding garments that fit them (Ashdown and Loker 2010). However, retailers continue to offer consumers’ a range of garments that do not represent the modern-day form, and therefore the issue of fit becomes a prominent factor in apparel consumption dissatisfaction.

Today’s consumers have been found to be larger than when fit standards were made in the 1950s (Pisut and Connell 2007). Much of the UK high-street is dominated by ready to wear retailers, that are found not to cater to the variations of the UK population within their sizing systems (Gill 2015). Moreover, consumers accept that discrepancy in sizing among retailers on the UK high street is a known yet difficult issue to navigate in clothing fit assessment (Grogan et al. 2013, Gill 2015). The standardisation of fit used by the fashion industry does not take into consideration the consumer’s understanding or perspectives of fit (Ashdown and O’Connell 2006, Gill 2015). deKlerk and Tselepis (2007) in their research into fit preferences of young consumers, found that it was important for young female consumers to feel positive body self-esteem as a result of garment fit. Their research also determined that the opinions of others did not affect the importance of fit (deKlerk and Tselepis 2007), which emphasises the level of subjectivity of fit satisfaction down to the individual consumer.

Aspects of consumer concerns with sizing include lack of trust in sizing labels, lack of representative sizes for different body shapes, inaccuracy and inconsistency (Kasambala et al.
2016). However, as previously discussed, the level of subjectivity in fit makes defining fit complicated. Visualising fit in online contexts can be complicated for consumers. Kim and Damhorst (2013) assessed concerns with fit in the online shopping environment and found that consumers struggle to imagine garment fit in online shopping contexts. Young female consumers are often concerned with overall appearance, projecting the right impression and inability to try-on garments (Kim and Damhorst 2013). Therefore, the findings of these studies demonstrate the need to investigate the impact of fit and sizing technologies on consumer perceptions of fit and sizing. In particular, the impact of online fit visualisation methods. However, Kim and Damhorst (2013) did not investigate actual garment fit post-purchase and whether fit and sizing was accurately predicted, rather the perceived issues related to pre-purchase concerns when using the online shopping channel. Arguably, concerns with fit and sizing in online shopping cannot be fully realised without physical try-on, which is an aspect that virtual try-on tools attempt to address.

Westbrook and Oliver (1980) postulated the components of consumer satisfaction, the product expectation and actual performance realised through positive or negative disconfirmation. Retailers must ensure they retain consumers by keeping them satisfied as this is less costly than continuously attracting new consumers (de Klerk and Tselepis 2007). A better understanding of the fit and comfort preferences of consumers will enable retailers to deliver better products achieving consumer satisfaction (de Klerk and Tselepis 2007. de Klerk and Tselepis (2007) and Fiore and Kimle (1997) divide fit from the functional perspective to also include satisfaction into sensory, cognitive and affective consumer responses. Sensory is concerned with how the garment fits the body, cognitive is whether the consumer feels they are in control. Affective is related to whether the consumer feels part of a social group (deKlerk and Tselepis 2007, Fiore and Kimle 1997). de Klerk and Tselepis (2007) also emphasise the importance of fashion in style and fabric and how this must be suited to the consumer wearing the garment. Therefore, consumers may not only decide to purchase and keep a garment based on intrinsic aspects of fit but will also consider the extrinsic factors. Due to the lack of tactility in online shopping environments, extrinsic factors may not be fully realised by the consumer until receipt of the physical garment. Online retailers must attempt to portray the extrinsic factors of garments through virtual means.
5.7. Methods developed to improve fit

Song and Ashdown (2012) undertook a study into the fit of women’s pants. They used models which were grouped into three body shapes and graded patterns based on multiple fit sessions. This was in order to increase reliability and validity, and to better represent consumers with varying body types. The information sought from three of the representative women from each group was combined with a block pattern to account for the variation, thus improving the chance of accuracy in fit of women’s pants. Using such methods in order to gain a closer representation of the consumer body shape demographic may ultimately result in increased fit satisfaction and reduced returns for the retailer. However, retailers favour methods that are scalable and therefore implementing new methods for fit and sizing may be costly and disruptive to existing systems. Solutions to the issues of fit and sizing include technologies such as made to measure, online size prediction tools, clothing experience technology and 3D body scanned customised clothing (Ashdown and Loker 2010).

5.7.1. Body shape classification

Body shape classification has often been used in studies to determine fit similarities between populations (Alexander et al. 2005) and those with irregularities are often screened (Chen 2007). This however, does not provide an accurate representation of body variations, which are inherent across the population. It is clear from prior studies in the area of garment fit that information regarding variation in body shape is not consistent in sizing and grading. Indeed,
fit judges have gained specialist knowledge regarding garment fit and similarly in the product development process a fit model employed by the retailer will also have this specialist knowledge. Therefore, this does not represent the variations in body shape nor does it consider the consumer’s perspective of fit from an untrained perspective. Arguably this is the most important factor in the retailing of clothes, to support the need for consumer integrated fit systems, in particular for online retailing.

5.7.2. Body cathectic, body image and body shape esteem

The fashion industry has notoriously presented consumers with ideal fashion ‘forms’ presented in catwalks, magazines and in online retailing. The ideal body shape that consumers strive to achieve is the hourglass (Rasband and Liechty 2006, Faust and Carrier 2011, Grogan et al. 2013). Negative body image through the dissatisfaction of fit can be influenced through fashion trends and fads. This was evident with the emergence of ‘size zero.’ In addition to this Pisut and Connell, (2007), state that new trends bring about a standard assumption of size. The relationship between body image and body self-esteem is not linear and understanding the discourse between the two areas is complex (Hoegg et al. 2014). Consumer relationships with clothing (body image) and their understanding of sizing (self-esteem) can be attributed heavily to consumer satisfaction and positive retailer attitudes (Aydinoglu and Krishna 2012). Negative body self-esteem can correlate with concerns regarding fit (Kim and Damhorst 2010, Faust and Carrier 2011) and females may use clothes to adjust to culture and idealised images of body shape and size (Jourard and Secord 1955). Hoegg et al. (2014) claim there is a relationship between larger sizes and decreased self-esteem (Figure 5.2). Smaller sizes generating more positive self-related images is a common theme amongst consumer literature on vanity sizing (Aydinoglu and Krishna 2012). Consumer relationships with clothing (body image) and their understanding of sizing (self-esteem) can be attributed heavily to consumer satisfaction and positive retailer attitudes (Aydinoglu and Krishna 2012). This often occurs when consumers have to resort to choosing larger sizes often as a result of miscommunication of sizing boundaries between the retailer and manufacturer.

In relation to this, Hoegg et al. (2014) state that some consumers may not be aware of sizes before the invention of the size zero, and in this way their perception of size is skewed towards a ‘vanity’ perspective. Hoegg et al. (2014) denote that vanity sizing is the industry shift towards retailing at smaller sizes. Thus, they infer that through consumers encountering larger sizes in stores who have not followed this sizing trend, the consumer will have lower self-esteem due to this experience (Kim and Damhorst 2010). This argument takes a simplistic and linear approach to consumption and is backed up by the notion that to counteract negative experiences, consumers will continue to buy other products that affirm their self-worth. However, it may be argued that consumers who are loyal to retailers that they shop in, gain
inherent knowledge of their sizes in each store enabling them to shop for the right garments. Consumers have adapted to the invention of vanity sizing in both ends of the sizing spectrum and understand that shops may stock sizes where they are larger or smaller than what they perceive their bodies to be.

**Figure 5.2 Conceptual framework of vanity sizing, product imagery, product evaluation and self-esteem**

Mental imagery of body shape is arguably more memorable to the consumer as it is fixed within experiences and cognitive processes. A counter argument to vanity sizing would be that consumers are focussing heavily on the number on the clothes label which may infer that they are not seeking the most optimum fit. Further research in this area would prove insightful to understanding consumer perceptions of fit in relation to vanity sizing theory.

**5.8. The theory behind sizing systems**

Sizing systems separate populations into sub-categories (Gill 2015). Sizing systems may be defined as the lowest number of sizes to satisfy a large number of consumers (Gill 2015). Sizing systems are considered to be sensitive information related to the particular retailer and contain information regarding how a retailer markets their garment range (Gill 2015). Garment sizing is associated with two key factors: body sizing as a basis for the measurements, and the addition of ease to each size through the grading process (Petrova and Ashdown 2012). Body sizing information is gathered through anthropometric measurement of a target population (Petrova and Ashdown 2012). Ashdown and DeLong (1990) have suggested that sizing systems do not reflect the diversity in populations, and that is still applicable today. Retailers and manufacturers do not adhere to a standardised system of sizing which causes problems for
consumer’s when choosing which garment size and ultimate garment satisfaction (Kasambala et al. 2016).

5.9. Understanding of consumer body satisfaction

Only a small percentage of the population have proportionate figures (Alexander et al. 2005) and ready-to-wear fashion is typically produced for proportionality in body shape (Alexander et al. 2005). Due to the existence of quantifying body size with a number through sizing systems, consumers inherently compare their sizes to an ideal (LaBat and Delong 1990). Such comparison can create negative body satisfaction as previously discussed. Rosa et al. (2006) and Grogan et al. (2013) focus on consumer responses to their body images with alternative approaches. Grogan et al. (2013) measured responses to garments in a fitting room setting and their responses were recorded. Respondents were also body scanned and photographed in dresses to gain a more subjective view of fit. This provided some insight into the consumer’s verbal processes however, cognitive evaluation of responses may provide statistical validation of results and also differ to the affective and verbal response. Additionally, in the setting of experiment conditions respondent’s answers may be biased and be misrepresentative of their normal shopping behaviours. Rosa et al. (2006) investigated the relationship between respondent’s opinions of their bodies, involvement with garments and likelihood of purchase. Respondents had recently purchased garments online however, no direct link to an online fit environment was made. Correlations between body esteem and consumer fit satisfaction were found.

Song and Ashdown (2012) undertook a study into the fit of women’s pants. They used models which were grouped into three body shapes and graded patterns based on multiple fit sessions. This was in order to increase reliability and validity, and to better represent consumers with varying body types. The information sought from three of the representative women from each group was combined with a block pattern to account for the variation, thus improving the chance of accuracy in fit of women’s pants. Using such methods, a closer representation of the consumer body shape demographic is may result in increased propensity of fit satisfaction for the consumer and reduced returns for the retailer.

5.10. Classifications of consumer fit preference

Despite inherent issues with fit and sizing in the manufacture and production of garments, little is understood regarding consumer fit preferences. Pisut and Connell (2007) conducted a study where respondents answered a questionnaire regarding their fit preferences of classified garments, however, more in-depth qualitative research would be required to gain a deeper understanding of the cognitive and emotional responses to fit due to its high subjectivity. Similarly, with Otieno et al. (2005), respondents were asked questions about their preferences
of fit, affordability, range of styles on the UK high street, however to gain more accurate information, an accompanied shop may be more suitable.

5.11. Assessment of fit using digital methods

5.12. 3D body scanning

Apeagyei and Otieno (2007) state that due to a shift in consumer needs, mass customised products and personalised garment product development is increasing. Development of innovative technology such as 3D pattern development and 3D body scanning are an indication of responses to meet such demands (Apeagyei and Otieno 2007). 3D body scanning uses light technology to capture body measurements. 3D body scanners are thought to be more accurate than human measurement and physical measurement methods (Apeagyei 2010). Scanners can generate over 100 measurements in a short period of time (Song and Ashdown 2013). Apeagyei (2010) states that 3D body scanning and garment prototyping technology will pave the future of garment development. 3D body scanners have eliminated costs associated with manual measurement and are providing the means for future mass customised clothing (Song and Ashdown 2013). Chen (2007) states that due to the amount of returns in online retailing as a result of unsatisfactory fitting garments retailers are seeking to invest in technologies such as Computer Aided Design (CAD) and body scanning in order to improve the fit of their garments. Kim and Damhorst (2010) concur and denote that body scanning could reduce return rates in online fashion retailing. However, there is little evidence to prove such reduced returns and consumers are often negative about the appearance of their bodies in 3D (Loker et al. 2004, Grogan et al. 2016). According to Ashdown and Loker (2010) consumer acceptance and readiness are key to adoption of new systems and technologies in fit and sizing. For virtual try-on to be used in conjunction with 3D body scanning, access to body scanners will have to be readily available for consumer use (Ashdown and Loker 2010) and consumers will need to readily accept digital methods of quantifying the body.

However, despite evolving as an industrial tool (Ashdown et al. 2004), little is understood regarding body scanning. The implementation of traditional depictions of the body are needed to be translated to the 3D scan in order for product development to be fully digitised through 3D scans (Ashdown et al. 2004). In addition, depictions of garments in 3D are still not technically accurate enough to compare to the real experience of the garment (Song and Ashdown 2015). Product ranges designed using CAD and 3D techniques should be measured against manually developed ranges to assess the effectiveness of 3D production in reducing returns. However, 3D body scanning has marked a new era for the digitisation of fashion products and online consumer experiences with clothing (Gill 2015) and this will be further discussed in the next section.
5.12.1. Clothing technologists and 3D fit evaluation

The following section will discuss the research on fit focussed from a clothing technologist perspective. The summary of the key studies that are reviewed are shown in Table 5.1. Apeagyei and Otieno (2007) state that due to a shift in consumer needs towards mass customised products, garment product development has seen an increase in the use of innovative technology to meet such demands. They emphasise convenience, speed and efficiency as key competitive factors that retailers must develop to satisfy the modern consumer. Additionally, garment fit is often a primary contender to the consumer’s intent to purchase. CAD and 3D modelling allows product developers to view a garment on a 3D model. Reductions in production costs can be achieved by eliminating prototype garments, more efficiency, rapid modifications and an overall reduction in time to market.

3D garment image fit and actual garment fit were compared in several studies (Ashdown et al. 2004, Apeagyei and Otieno 2007, Song and Ashdown 2015, Lee and Park 2016). These studies focussed on the computation of the virtual garment presented in technologist software against the actual product on a human body. The use of 3D simulation provides insights to how the garment may fit, however the parameters to fit have to be clearly defined prior to fit assessment (Ashdown et al. 2004). A majority of the issues related to 3D simulated garments was with the visualisation of complex areas such as crotch, neckline and shoulder (Ashdown et al. 2004, Lee and Park 2016). In addition, the shape of the actual participant made visualisation problematic. Aspects such as body curvature and pelvic tilt were not accounted for by the visualisation system (Song and Ashdown 2015). From these results, it is clear that 3D garment simulation is a step towards the automation of fit in product development however, there are clear areas that need to be addressed for the technology to be fully used across the industry.
Table 5.1 Clothing technologist evaluated 3D body scanning research

<table>
<thead>
<tr>
<th>Author &amp; Title</th>
<th>Overview</th>
<th>Methodology</th>
<th>Findings</th>
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<tbody>
<tr>
<td>Ashdown et al. (2004) Using 3D scans for fit analysis</td>
<td>Fit judges assessment of fit on 3D body scans.</td>
<td>Fit judges assessed the fit from the 3D body scans taken with the pants on 15 different areas. This was produced on a Likert scale from ‘too loose’ to ‘too tight’. Pre-test discussions were held to ensure a variation was resolved from the judges so the appropriate fit was agreed in advance.</td>
<td>Only two judges were needed for reliable fit tests if visual parameters are established prior. The scan enabled clear visualisation of stress folds, however complex areas may require a different research methodology.</td>
</tr>
<tr>
<td>Apeagyei and Otieno (2007) Usability of pattern customising technology in the achievement and testing of fit for mass customisation</td>
<td>Evaluation of a skirt and jacket presented using 3D technology and human trials.</td>
<td>Fit models and fit judges measured the fit of a jacket and skirt on both real and virtual models.</td>
<td>Assymetrical shapes is difficult to visualise in 3D. Body scan data does not map with 3D pattern prototyping. Patterns had to be created in 2D then converted into 3D and this process could not be done the other way round. Scan data needs to be developed and used in conjunction with garment prototyping software.</td>
</tr>
<tr>
<td>Song and Ashdown (2015) Investigation of the Validity of 3-D Virtual Fitting for Pants</td>
<td>Looking into fit and silhouette between real and virtual fit in 20 fit locations.</td>
<td>61 custom pants to be tried on virtual body scanned avatars. Fit status, lower body shapes and fit locations assessed by fit judges.</td>
<td>Virtual fit simulation technology for garment product development is relatively good for use. This was assessed on womens trousers. Waist placement was not accurately placed in the 3D visualisation. 3D visualisation showed less ease than in reality. 3D visualisation struggled to show the silhouette of the crotch and hem. Body shape and curvature affected the visualisation significantly, showing a poor visualisation of the fit. Clarity of fabric and texture of fabric were poorly represented.</td>
</tr>
<tr>
<td>Lee and Park (2016) 3D Virtual fit simulation technology: strengths and areas of improvement for increased industry adoption</td>
<td>Fit analysis of woven and knitted garments on virtual and real products.</td>
<td>Fit analysis and questionnaire.</td>
<td>2D patterns can be converted into 3D patterns. Issues such as hiking, gaping, draglines and puckering were not depicted well in 3D. Areas such as the neck, shoulder and sleeve were not shown like the actual garment on the body. Used technical clothing specialists and fit judges. The study only measured elasticity of the garment, whereas there are many other tests that may be performed. Only two fabrics – knit and woven were tested. More are required for a fuller picture of assessing virtual clothing visualisation.</td>
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5.12.2. Summary of clothing technologist evaluated 3D scan research

The research in 3D body scanning and clothing simulation dates backed to early 2000s, indeed body scanning and visualisation research has shown stagnating development over the past two decades. Research associated with clothing technology assessment of 3D scans, visualisation and actual fit, use garment technologists to assess the fit. Whilst this is important to understand
a fit professional’s assessment of fit at this stage of technological development, the research in Table 5.1 is focussed on the implementation of fit technology within a product development environment (retailer and manufacturer). Technologist perspectives provide little insight into how a consumer may understand and perceive fit in a digital space. Therefore, the application of technologist based studies can provide a basis for the development of more accurate digital clothing fit and appearance. Separate studies must be undertaken to gain a consumer or lay persons understanding of digital fit visualisation.

5.12.3. Consumer evaluated 3D simulation and body scanning research

The next section will discuss research that is focussed on consumer evaluation of 3D visualised garments and body scanning research. The aim of such research is to assess the effectiveness of the technology if it were to be implemented into a wide-scale retail setting. Evident high returns in the online fashion industry are often a result of dissatisfaction with fit when consumers are assessing their size. Manufacturers must address the elements of fit that are related to differing body size, whilst also combining the consumer’s individual perspective of fit (Alexander, et al. 2005). Consumer enabled virtual try-on technology could aid consumers to make decisions regarding fit prior to purchase, therefore understanding how consumers respond to 3D simulation of their bodies can provide insight into virtual try-on acceptance. The next section discusses key consumer based research and how this has impacted the development of consumer focussed virtual fit technology.

Through an analysis of consumer-focussed fit and through research and investigations into initial virtual fit and sizing interfaces, a better understanding of the fit preferences of consumers in the online environment can be reached. The use of 3D modelling has extended to the fashion e-commerce environment through the introduction of virtual fitting rooms. The availability of 3D data is limited to retailers and institutions with industrial scanners. 3D modelling is also problematic in generating a wide database of scans to make a useful population (Apeagyei 2010). 3D scanning technology and its implementation in the virtual fitting room arena is underdeveloped. The accuracy of measurements produced in a 3D scan could be a profitable tool in bridging the gap for current virtual fit interfaces. These often assume very basic measurements, such as height, weight and bra-size which technologists argue have no scientific relation. Consumer evaluated 3D fit research is summarised in Table 5.2.
Table 5.2 Consumer evaluated 3D simulation and body scanning research

<table>
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<tr>
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<tr>
<td>Park et al. (2009) Apparel consumers' body type and their shopping characteristics</td>
<td>Relationships between body shape, shopping orientation, past fit experiences, and attitudes towards online shopping and body scanning.</td>
<td>441 Korean females were body scanned, five body types were identified.</td>
<td>Shopping orientation and sizing issues varied with body shape. Larger body shapes were likely to shop for convenience and found ready-to-wear apparel unsatisfactory. Slim body shapes enjoyed the hedonic aspects of shopping, higher fashion orientation and body confidence.</td>
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<tr>
<td>Kim and LaBat (2012) An exploratory study of users’ evaluations of the accuracy and fidelity of a three-dimensional garment simulation</td>
<td>Examining experience, satisfaction and willingness to use 3D virtual simulation technology, 3D scan and virtual and real assessment of their body wearing a pair of trousers.</td>
<td>Assessed consumer responses to fit of garment, uses real assessment as well as virtual to compare the two mediums. Participants rated fit on a numerical scale from 1=extremely poor to 7=excellent fit.</td>
<td>Areas of fit discussion included fabric, size, shape, and critical locations. Virtual trousers were inaccurate at the crotch, abdomen, and back thigh. Virtual model fit was not as accurate at real fit. Virtual trousers were shown accurately at the waistband. Virtual trousers were tighter than the real trousers. Virtual fit simulation was found to be &quot;moderately good.&quot;</td>
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<tr>
<td>Song and Ashdown (2013) Female Apparel Consumers’ Understanding of Body Size and Shape: Relationship Among Body Measurements, Fit Satisfaction, and Body Cathexis</td>
<td>Comparison of perceived body size with actual measurements. Analyse the relationship of body size with ready-to-wear trousers.</td>
<td>83 female participants aged 18-35. Perceived body shape dimensions were compared with SizeUSA data. Body cathexis was measured on a 5 point Likert scale.</td>
<td>Enabled the categorisation of participant by size and shape with 3D scans and SizeUSA data. Triangulated perceived body shape with actual body shape. Waists were perceived larger and participants wanted smaller waists. Abdomens were perceived to protrude more than in actual measurement.</td>
</tr>
<tr>
<td>Grogan et al. (2013) Dress fit and body image: A thematic analysis of women’s accounts during and after trying on dresses</td>
<td>Analysed the relationship between women, clothing, sizing and fit.</td>
<td>20 18-45 females tried on dresses and were body scanned and photographed in the dresses. Speech was recorded when the participants tried on the dresses.</td>
<td>Fit of clothes is related to body image. Clothes are used to hide disliked parts of the body. Perceived fit, sizing and size identity are linked with participant confidence, comfort and concealment.</td>
</tr>
<tr>
<td>Grogan et al. (2016) Women’s Long-Term Reactions to Whole-Body Scanning: A Mixed Methods Approach</td>
<td>Investigated whether body scanning affects body satisfaction</td>
<td>456 body scans, 91 completed a post-scan questionnaire.</td>
<td>68% were more likely to have another scan. 34% were more negative about their bodies post body scan. Body scanning cannot be used to promote body satisfaction at this point in time.</td>
</tr>
</tbody>
</table>

5.12.4. Summary of consumer evaluated 3D simulation and body scanning research

Consumer evaluated 3D simulation and body scanning research focusses on consumer acceptance of virtual garments (Kim and LaBat 2012) or of their bodies (Park et al 2009, Song and Ashdown 2013, Grogan et al. 2013, Grogan et al. 2016). However, due to the technology used in studies that assess 3D visualisation, consumers cannot view such simulated garments in retailing formats. In addition, in order to assess fit, fit is described in an objective way in studies e.g. rate fit as poor/excellent on a scale, whereas consumer descriptions and
experiences of fit may differ to these words used. In other words, fit is abstract and subjective and trying to create an objective level of fit is problematic. There is no universal fit measurement scale that uses a “language” of fit that can be understood in the same way by each participant.

Research into the assessment of body shape and body scans enables relationships to be drawn from body perception and the actual body (Song and Ashdown 2013, Grogan 2016). Body perception is a crucial aspect of 3D visualisation in terms of consumer confidence and the acceptance of 3D visualisation technology. Song and Ashdown’s (2013) approach focuses on classifying body perception and actual measurements in terms of accuracy, however due to negative responses to increased accuracy, consumers may want to see an idealised version of their bodies in order to accept the technology. In relation to this, Grogan et al. (2016) found that body scanning does not encourage positive body satisfaction. Participants showed a negative response to body satisfaction post-body scan, which shows that participants did not accept their 3D visualisation. Another issue with fit perception and 3D visualisation is the correlation of fit from the verbal and physical assessment of fit into the virtual fit visualisation - an avatar. An avatar creates another level of communication between human and computer interface that must be overcome. For example, through the computation of fit and body experience with the accurate representation of the virtual fit and body experience. Technology is not at the point where it accurately simulates physical fit. In the future as the technology evolves this may become possible.

5.12.5. Consumer virtual fit assessment studies

There are only a small number of studies that assess consumer responses to virtual fit with evaluation of clothing or the body in virtual contexts. Shin and Baytar (2013) assessed the impact of body satisfaction on virtual try-on and images of model’s bodies. The study found that the impact of the “ideal” body shape did not affect body satisfaction. In addition, when viewing the virtual model, the participants of the study became more anxious. Participants with lower body satisfaction were also more likely to use virtual try-on in the future (Shin and Baytar 2013). Merle et al. (2012) measured the level of confidence in apparel fit, body esteem and self-congruity of a virtual try-on tool and a range of personalised or non-personalised versions of the tool. The results of the study showed that personalised virtual try-on provided a utilitarian shopping experience and higher purchase intentions than non-personalised experiences. Self-congruity of the model was also important to users which directly influenced confidence in apparel fit. In addition, if a participant had high body esteem the more confident they felt in using virtual try-on. These studies indicate the relationship between body satisfaction and esteem and using virtual models, however do not assess the relationship between the physical garment and the expectations of fit made by using the virtual try-on.
studies also used models that were related to stimulus and cognitive responses (Shin and Baytar 2013) or the formulation of attitude through planned behaviour (Merle et al. 2012), yet did not assess the level of acceptance that consumers have with the technologies. The studies also did not use actual virtual try-on as the stimuli used were modified or mocked up websites to simulate the online experience using virtual try-on. There is an evident need to explore other aspects of online consumer fit assessment, acceptance of the technology and the physical garment on existing fit interfaces.

5.13. Summary

This chapter has discussed the aspects of clothing fit, sizing, physical and digital fit assessment. Understanding the areas outlined in this chapter and their research limitations provides a clear understanding of the area of fit and sizing as a multi-disciplinary entity. The area has been approached as distinct in research approaches from garment technology and consumer assessment as discussed. Existing research has not attempted to bridge the perspectives and approaches of fit specialists and consumers to virtual fit and sizing in the past. There is also an evident need for synthesis and comparison of these perspectives in order to fully understand the inter-related influences of all perspectives in the area. Synthesis and comparison can take the form of combining methodologies, using a sample of both technologists and consumers, or triangulating studies.

Moreover, there is no universal fit language that is used across technologist and consumer based research. A comparison of the scales for measurement of fit used in these should be undertaken. This would allow the development of a common language of fit that is currently used and a tool of fit measurement and description can be utilised in both consumer and manufacturing contexts. In addition, much fit related research is out-dated in terms of the speed of current fashion technological innovations. Research in the area of consumer acceptance and adoption of retail visualisation technologies is also under-explored. Research must be continually updated in order to account for the changes in interfaces, technology, and consumer shopping habits in order to accurately reflect the state of the market. After discussion of the relevant disciplines related to the research, the next section will define the theoretical development and framework adopted for the study.
Chapter 6. Theoretical Development

6.1. Introduction

There are many different theoretical frameworks that have been applied in retailing research. Theory enables the identification of variables to measure and this chapter will discuss the variables chosen within the study. A researcher must use theory and apply it to consumer thinking and behaviour in an innovative way (Malhotra et al. 2017). Table 6.1 provides an overview of the role of theory in marketing research. Theory can assist to conceptualise a research project and allow understanding of the processes underlying the research problem (Malhotra et al. 2017). Key variables can be operationalised and the research design and sample can be selected (Malhotra et al. 2017). In addition, theory provides a framework to guide analysis and discussion of findings (Malhotra et al. 2017).

Table 6.1 Role of theory in marketing research

<table>
<thead>
<tr>
<th>Research task</th>
<th>Role of theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptualising and identifying key variables</td>
<td>Creates a conceptual foundation and understanding of the basic processes underlying the problem. Allows identification of variables.</td>
</tr>
<tr>
<td>Operationalising key variables</td>
<td>Practical means to measure the key variables identified.</td>
</tr>
<tr>
<td>Selecting a research design</td>
<td>Framework for research, either causal, descriptive or exploratory.</td>
</tr>
<tr>
<td>Selecting a sample</td>
<td>Helps define the nature of the sample and characteristics that may be used to validate sample.</td>
</tr>
<tr>
<td>Analysing and interpreting data</td>
<td>Existing frameworks, models and hypotheses allow for interpretation of results.</td>
</tr>
<tr>
<td>Integrating findings</td>
<td>Interpret in the light of previous research and suggest future implications.</td>
</tr>
</tbody>
</table>

Source: Malhotra et al. (2017)

The following chapter introduces consumer behaviour, marketing and garment fit based theories. As the current research falls between three areas of academic discipline, it is important to consider the range of approaches, and how they may influence the study. The framework adopted to underpin this research is that of Davis’ (1989) Technology Acceptance Model (TAM) which has been applied to the online retail and virtual fit environment in extant literature. This study applies TAM alongside the post-purchase and garment use stages of online fashion shopping and considers the technical and emotional aspects of garment fit as experienced by consumers. The following section outlines the various theories that are applicable to the research areas identified (Table 6.2, Table 6.4, Table 6.6) and provides a rationale for the decision to choose the TAM framework for the research. This section also provides the theoretical structure to consider how the different data types (Qualitative/Quantitative) and stages of consumer experiences (Pre-purchase and post-purchase) can be considered in a unified manner to support integrated model development.
Table 6.2 Definitions of consumer behaviour theories (1)

<table>
<thead>
<tr>
<th>Theory and Author</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleasure, Arousal Dominance (PAD) (Mehrabian and Russell 1974)</td>
<td>Stimulus from the environment can evoke approach or avoidance behaviours (Schmitt and Zarantello, 2013) and this can be translated into intention to purchase. Pleasure, arousal and dominance are three domains that occur in the affect/emotion of the consumer’s response to the stimuli.</td>
</tr>
<tr>
<td>Theory of Planned Behaviour (TPB) (Ajzen 1991)</td>
<td>Attitudes and beliefs may be positive or negative, which lead to intentions, which lead to behaviours (George 2004, O’Cass and Fenech 2003).</td>
</tr>
<tr>
<td>Stimulus, Organism, Response (S-O-R) (Mehrabian and Russell 1974)</td>
<td>Stimuli will provide the consumer with information that can evoke ‘approach’ or ‘avoidance’ behaviours in cognition or affect and ultimately ‘intent to purchase.’</td>
</tr>
<tr>
<td>Technology Acceptance Model (TAM) (Davis 1989)</td>
<td>Conceptualises the components related to acceptance or rejection of Technology. Includes perceived usefulness - the degree to which a technology can enhance job performance and perceived ease of use – using the technology would be free of difficulties (Davis 1989).</td>
</tr>
</tbody>
</table>

6.2. Pleasure, Arousal, Dominance (PAD)

Emotive consumer based states are coined by Foxall (1986) as teleological in representing a purpose of a process. Such states are psychodynamic thus, they are made up of cognitive, affective and conative events. This idea is conveyed through two constructs, one acting within the consumer’s mental realm and the other within their observable behavioural realm. Pleasure, arousal and dominance (PAD) factors occur within the affect (emotional) stage and measure approach or avoidance behaviours to a stimulus (Schmitt and Zarantello 2013).

6.2.1. PAD Analysis

The pleasure arousal dominance framework measures emotional stimuli on a scale of arousing-non-arousing. This polarisation of emotive factors points towards the difficulties of standardising the results across numerous studies (Bakker et al. 2014). In addition, it is not clearly specified which construct (pleasure, arousal or dominance) represents the cognitive, affective and conative aspects of behaviour. Moreover, future research should focus on refining these elements.

6.3. Theory of Reasoned Action (TRA)

The Theory of Reasoned Action (TRA) predicts rational behaviour from two components named attitude and subjective (Pookulangara et al. 2014). TRA is similar in layout to the PAD framework however TRA does not consider the emotive response of the consumer which has been found in extant online retailing research to elicit purchase intentions. The theory of reasoned action is shown in Figure 6.1. TRA is often linked to the Theory of Planned Behaviour (TPB).
6.4. Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB) states that there are preformed consumer attitudes, which may be positive, or negative and can lead to behavioural outcomes (Figure 6.2) (O’Cass and Fenech 2003, George 2004, Dennis et al. 2009, Hausman and Siekpe 2009). Preformed attitudes rely on pre-exposure to a stimuli and much fit and sizing technology research has relied on no prior exposure to the websites. This is in order to draw pragmatic conclusions about the consumer’s responses to websites without prior influence (Fiore and Jin 2003, Fiore et al. 2005, Lee et al. 2010). Additionally, these platforms have not been widely commercialised (Loker et al. 2008) and therefore supports the use of websites that have not been previously used by respondents in research studies. Studies in the area of virtual fitting rooms have used the TPB to explain the influence of self-congruity, body esteem and confidence in fit on hedonic and utilitarian value (Merle et al. 2012).

Figure 6.2 Theory of Planned Behaviour

Source: Ajzen (1991)
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6.4.1. TRA/TPB analysis

Both the Theory of Reasoned Action and the Theory of Planned Behaviour may be criticised due to their measurement of volitional or controlled behaviour (Norman and Smith 1995). In addition, due to the measurement of attitude on behaviour within these models, it is difficult to measure the actual behaviour in relation to expressed attitudes. Further the definition of attitude and intention concepts must be accurate in relation to the study in order to effectively measure the entire concept. Many studies that have found issues with attitude and intention results have been stated to ineffectively measure attitude (Fishbein and Ajzen 1975). Norman and Smith (1995) found that prior behaviour can be a significant predictor of intention, however in the use of prior behaviour, this approach is dismissed by Ajzen (1987) due to having no explanatory value. Additionally, the TPB does not include sub-conscious reasoning only the rational component of human decision making (Sniehotta et al. 2014). Both the theory of reasoned action and the theory of planned behaviour do not consider the impacts of the emotive on the outcome of the behaviour. Further criticism of attitude, intention, behaviour models was discussed in Chapter 4.

6.5. Stimulus-Organism-Response (S-O-R)

Mehrabian and Russell (1974) devised the stimulus-organism-response (S-O-R) model in environmental psychology which has been used in much social science research. Bitner (1992) undertook a study about the service based workplace and framed it upon the S-O-R model (Figure 6.3). Bitner’s (1992) service-scape model provides in-depth considerations of various aspects of pleasure and arousal, which are interrelated to the S-O-R paradigm. In particular, Bitner (1992) considered the effect on an individual’s environment in the workplace. The S-O-R model was later adapted by Donovan and Rossiter (1982) for the context of the retail environment (Eroglu et al. 2001). This included the pleasure, arousal and dominance factors as part of the organism and affective state of the consumer when shopping (Eroglu et al. 2001). The stimulus-organism-response model embodies this, as consumers are rational in seeking information and using this to solve problems (Foxall 1986). Studies that have used the S-O-R model to map consumer responses to virtual fitting stimuli have assessed the impact of models’ ideal bodies against virtual model bodies (Shin and Baytar 2013). The study assessed their body satisfaction and concerns with the fit and size of garments on purchase intention (Shin and Baytar 2013).

6.5.1. S-O-R analysis

Jacoby (2002) states that the S-O-R model is typically depicted by static, linear boxes which do not account for feedback loops or the non-linear transition of cognitive and affective processing. In support of this, Jacoby (2002) claims that the S-O-R model has transcended
from other linear communication theories such as the Shannon and Weaver model of communication (Shannon and Weaver 1949). This model also faces similar criticisms with regards to issues such as feedback. S-O-R does not consider that certain variables may be both a stimulus and a response. For example, Jacoby (2002) states that factors such as attitude, beliefs and satisfaction may be classed as both stimuli and response factors. Moreover, due to the generalisability of the model, classifying factors into three parts of the model can be problematic when studying a non-linear process such as consumer behaviour. It is also argued that the organism is made up of multiple factors (cognitive and affective) including memory, motivation and self-regulation and therefore the concept of organism is problematic (Young 2016). The organism processes the incoming stimuli and ergo response, therefore this process is not linear or affected purely by one factor preceding another, which is also known as a ‘fuzzy organism’ (Young 2016).

![Stimulus-Organism-Response Model](image)

**Figure 6.3 Stimulus-Organism-Response Model (Mehrabian and Russell 1974)**

6.6. Technology Acceptance Model (TAM)

Technology focused frameworks include Davis’ (1989) Technology Acceptance Model (TAM) which measures consumer responses to technological stimuli through perceived usefulness and ease of use (Dennis et al. 2009, Hausman and Siekpe 2009) (Figure 6.4). TAM was developed from TRA and TPB for use on workplace information technology acceptance (Yousafzai et al. 2007). Perceived usefulness is closely related to information adoption, as it is the level of usefulness of technology perceived by a consumer that is directly related to their willingness to use the platform. In relation to this, Csikszentmihayi (1975) devised the concept of flow, which is the convenience a consumer finds when browsing an online interface and the creation of compelling experiences facilitated by flow (Csikszentmihayi 1975, Schmitt and Zarantello, Mathwick and Rigdon 2004). Similarly play (Mathwick and Rigdon 2004) conceptualises the pleasurable experiences a consumer finds when spontaneously browsing a website. Consumers in virtual environments should be immersed within a ‘meaningful community’ in a focus towards an enjoyable, playful experience (Dholakia et al. 2010). Play is an online process and state of meaningful interaction with a website (Foxall 1989) facilitated by the interface (Ahn et al. 2007, Dholakia and Zhao 2009, Molesworth and Denegri-Knott 2008).
6.6.1. TAM Analysis

TAM was initially developed by Davis (1989) for using IT in job-related tasks, more recently studies have applied it to non-organisational settings (Yousafzai et al. 2007). TAM is a simplistic model of technology acceptance that is argued to be difficult to apply to large groups of users, differing technologies and user motivations (Bagozzi 2007). Moderating variables have been added to perceived usefulness and perceived ease of use to explain differing effects that the original TAM is limited in. However, since conception these variables have not been further developed despite aggressive technological growth. In addition, the actual function of perceived usefulness and ease of use need to be measured in relation to goal attainment and motivations of the user (Bagozzi 2007). Criticisms of TAM lie with typical criticisms of TRA and TPB, which include the issue that attitude and intention do not equate to actual use (Bagozzi 2007). Therefore, there is a need to measure actual use behaviour within TAM. TAM also does not consider the impact of external factors including social/psychosocial effects of technology adoption and use. To measure TAM and the complexities that arise with technology acceptance, can result in many variables to be tested.

Table 6.3 Summary of analysis of consumer behaviour theoretical frameworks

<table>
<thead>
<tr>
<th>Theory</th>
<th>Example in Virtual Fit or Product Recommendation Study</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleasure Arousal Dominance</td>
<td>Retief and De Klerk (2003)</td>
<td>It is unclear which elements relate to cognitive, affective and conative. Difficult to measure emotion on a bi-polar scale.</td>
</tr>
<tr>
<td>Stimulus-Organism-Response</td>
<td>Shin and Baytar (2013) Lee et al. (2010) Benlian (2015)</td>
<td>Difficult to classify factors for each part of the paradigm, suggests a linear pattern to behaviour</td>
</tr>
</tbody>
</table>

This section has discussed consumer behaviour theories and this study adopts TAM as the consumer theoretical basis. The following section will outline the theories used in marketing literature and their relevance to the study.
Chapter Six: Theoretical Development

Figure 6.4 Technology Acceptance Model (Davis 1989)

The next section will discuss the marketing based theories considered in the research from experiential marketing, media richness theory, image interactivity technology and computer mediated communication.

<table>
<thead>
<tr>
<th>Theory</th>
<th>Author</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media Richness Theory (MRT)</td>
<td>Daft and Lengel</td>
<td>Media richness can be lean or rich. The number of atmospheric cues that the media offers determines this. In the online context can be equated to assisting the consumer to achieve their purpose in the online environment (Eroglu, et al. 2001).</td>
</tr>
<tr>
<td>Image Interactivity Technology (IIT)</td>
<td>Fiore et al. (Fiore et al. 2005)</td>
<td>Interactivity on websites can aid consumers through communication, presentation and entertainment. Image interactivity enables consumers to alter the images of a product on a website. Additionally, IIT may include manipulation of features, background, context, angle, distance and operation. For example the use of zoom would be considered a type of IIT (Fiore et al. 2005).</td>
</tr>
<tr>
<td>Computer Mediated Communication</td>
<td>Walther (1992)</td>
<td>The internet provides a medium for the portrayal of rich information. Social presence can be perceived by the receiver of the information through interactivity or social presence.</td>
</tr>
</tbody>
</table>

6.7. Experiential Marketing

Experiential marketing as discussed in Chapter 3 is an important area to consider for the study. Consumer experiences are multi-dimensional (Stein and Ramaseshan 2016) and occur at a number of stages in the consumer shopping journey (Lemon and Verhoef 2016). Consideration of consumer experience is included in this study as the construct of play within the technology acceptance model (Huang and Liao 2015). In support of this, Beck and Crie (2016) similarly assessed the impact of product curiosity using virtual fitting rooms. Huang and Liao (2015) explored the impact of playfulness amongst other constructs on augmented reality technology. No prior research has studied the impact of play on virtual fitting room technology stimuli.
6.7.1. Experiential marketing analysis

Experiential consumer research has often been approached from an antecedent and consequential perspective (Kawaf and Tagg 2017). Experiences are often difficult to conceptualise (Stein and Ramaseshan 2016) and therefore a comprehensive approach should be undertaken when assessing consumer experience. This study adopts a facet of experiential marketing over the conceptualisation of the entire experience, due to the newness of virtual fit and size and style recommendation technology.

6.8. Media Richness Theory (MRT)

Media Richness Theory (MRT) advocates how media can be lean or rich. This is determined by the atmospheric cues offered on the technological theory (Walther 1992, Eroglu et al. 2001).

6.9. Image Interactivity Technology (IIT)

Much of the extant academic research into virtual try-on (VTO) has examined the influence of Image Interactivity Technology (IIT) on consumer responses (Fiore and Jin 2003, Fiore et al. 2005, Yang and Wu 2008, Lee et al. 2010). Consumers can view images in IIT contexts, which simulate the garment on the body, how it may fit the body of a particular shape and size and which sizes and styles are most suitable for body shapes. Additionally, IIT may assist to reduce consumer’s perceived risk regarding the product attributes in online purchases (Lee et al. 2010).

6.9.1. MRT and IIT analysis

The effectiveness of technology can be measured through MRT and IIT however more recent advances in marketing and consumer theory have influenced the framework chosen in this study. It may be argued that MRT and IIT are too conceptual for modern technological developments and cannot be clearly applied to new technologies.

6.10. Computer Mediated Communication (C-M-C).

Similar to MRT, the communication of media may be inhibited by the leanness of a source, as it does not portray the sensory and emotional insights that one may receive through personal interactions (Walther 1996). However, Walther (1996) recognised the influence of the growth of the internet and that richer media, such as video and images are becoming more personal (Walther 1996). The concept of social information processing theory states that users of Computer-Mediated-Communication (CMC) are looking for social relationships with the media they interact with, and that the contextual cues in this environment can elicit social presence and interactivity (Walther 1996), such as within virtual avatars. Choi et al. (2011)
explored the impact of personalised recommender systems using the theory of computer mediated communication. The authors found that social presence could be fostered through online personalised recommendations.

Exploring the influence of web 2.0 on communications is also important due to the increased availability of script within online websites, e.g. blogging, consumer reviews, comments and ratings (Walther et al. 2012). However, such diverse availability of information posits challenges when assessing consumer perceptions of credibility. Often the receiver of the communication will make assessments based on more than just the review they are reading (Walther et al. 2012). Therefore, with new systems such as recommender systems, which take into account semantic processing, browser cookies and collective consumer information provide a more streamlined version of navigating consumer responses. This may be attributed as a form of “aggregate user representation” (Walther and Jang 2012, p.5) towards products and information online.

6.10.1. C-M-C analysis

C-M-C may provide an in-depth theoretical basis for measuring virtual fit and size and style recommendation technologies when they begin to become more widely adopted. As little is currently understood regarding consumer acceptance of these technologies, the facets of the interfaces must firstly be explored.

6.11. Research and theoretical frameworks adopted for study

Research in the area of virtual fit and size recommendation technology has focussed on the online shopping environment. This research aims to address the purchase and post-purchase stages of consumer shopping journeys. The following section outlines the research and theoretical frameworks adopted for the study.

6.11.1. Theoretical framework adopted

The theory framework adopted for the Metail study is the technology acceptance model used in the research context of the online consumer shopping journey. Other research studies that have analysed virtual fitting rooms have similarly adopted TAM as a theoretical basis (Table 6.5). In addition, the underpinning aspects of TAM align well with the study aims. This is due to investigating a new fashion technology within the online shopping context. TAM allows for exploration of both intrinsic and extrinsic constructs within consumer evaluations of new technology. Other frameworks such as the SOR model, TRA and TPB were considered and rejected based on the newness of the Metail website stimulus. In addition, the recognition of the technology at acceptance level was important, as other models such as SOR assesses cognitive and affective states within a stimulus and consumer response. TAM on the other
hand focuses on the behavioural aspects related to the new technology. This therefore provides an emphasis on the role of digital fit and size technology as a product evaluation tool in online fashion retailing. Therefore, the results can provide a trajectory for the future dissemination of such technology within Omni-channel retailing contexts.

6.11.2. TAM in the shopping journey

Relevant studies that have adopted TAM are presented in Table 6.5. This study uniquely applies technology acceptance with stages beyond intended use (Figure 6.5). The Metail stimulus used was not a fully transactional website and the user could not fulfil a product purchase from the Metail website. Therefore, the qualitative consumer study (stage 2) enabled the evaluation of consumer responses to e-size and product recommendation beyond purchase intention. This is shown in Figure 6.5 Virtual fit and e-size journey framework. The use of TAM has been prevalent in fashion research and has shown no stagnation in research due to its applicability to new fashion technology. TAM provides an intrinsic model for motivations to use new technology, which can be applied to new technologies in the future. Using TAM, as a basis for this study is key to applying the consumer’s current approach to the technology, as the stimuli chosen for the study are not widely implemented across the fashion industry. As the technology develops, the use of more in-depth theoretical models can be considered and for that reason were rejected in the theoretical underpinning of the study.

![Figure 6.5 Virtual fit and e-size journey framework](image)

6.12. Constructs to be measured in study

The following section introduces the constructs and hypotheses adopted for the Metail study (stage 1). Firstly, the quantitative constructs are explained, followed by the qualitative discussion guides (stages 2 and 3).
Table 6.5 Virtual model TAM research

<table>
<thead>
<tr>
<th>Authors</th>
<th>Stimuli</th>
<th>Constructs Investigated</th>
<th>Theory</th>
<th>Sample size</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lee et al. (2006)</td>
<td>Virtual Model Technology</td>
<td>Hedonic/utilitarian shopping orientation Perceived Usefulness Perceived Ease of Use Enjoyment Attitude Behavioural Intention</td>
<td>TAM</td>
<td>208</td>
<td>SEM</td>
</tr>
<tr>
<td>Kim and Forsythe (2007)</td>
<td>3D Viewing Technology</td>
<td>Perceived Usefulness Perceived Ease of Use Perceived Entertainment Attitude Intended Use</td>
<td>TAM</td>
<td>978</td>
<td>SEM</td>
</tr>
<tr>
<td>Kim and Forsythe (2008)</td>
<td>Virtual Model Technology</td>
<td>Technology Anxiety Innovativeness Perceived Usefulness Perceived Ease of Use Perceived Entertainment Attitude Intention to use</td>
<td>TAM</td>
<td>491</td>
<td>SEM</td>
</tr>
<tr>
<td>Kim and Forsythe (2010)</td>
<td>Product Virtualisation Technology for online shopping small electronics</td>
<td>Technology Anxiety Innovativeness Perceived Usefulness Perceived Ease of Use Perceived Entertainment Attitude Intention to use</td>
<td>e-TAM</td>
<td>681</td>
<td>SEM</td>
</tr>
<tr>
<td>Pantano and Servidio (2012)</td>
<td>3D Virtual Store</td>
<td>Ease of Use Store perception Enjoyment Customer Satisfaction</td>
<td>TAM (HCI)</td>
<td>150</td>
<td>SEM</td>
</tr>
<tr>
<td>Perry (2016)</td>
<td>Smart Virtual Closets</td>
<td>Aesthetics Optimism Subjective norm Perceived Ease of Use Perceived Usefulness Attitude Usage Intention</td>
<td>TAM</td>
<td>443</td>
<td>SEM</td>
</tr>
</tbody>
</table>

6.13. Technology Readiness Index

The Technology Readiness Index (TRI) focuses on a consumer’s ability to adopt technology to accomplish goals (Parasuraman 2000). Technology readiness provides an overview of a consumer’s likeliness to use a technology and their general approach towards new technology.
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(Parasuraman 2000). Technology readiness enables the measurement of how ready consumers are to embrace new technologies and provides opportunity to address different levels of technology readiness and the managerial implications associated with it (Parasuraman 2000). Mick and Fournier (1998) provided the basis for the development of the TRI scale through their research on consumer behavioural and psychological responses to technology. The TRI has also been related to theoretical underpinnings of Rogers (1995) Diffusion of Innovations Theory. The TRI has since evolved into additional constructs and the following section will describe how the construct has been adapted for this study.

6.13.1. Technology Anxiety

Technology anxiety was defined by Cambre and Cook (1987). It is defined as the ‘fear, apprehension and hope when considering or actually using a technology’ (Cambre and Cook 1987). Technology anxiety focuses on the user’s mind-set towards their ability and willingness to use technology (Meuter et al. 2003). Studies that have explored technology anxiety and virtual try-on have found significant relationships between technology anxiety and attitude (Kim et al. 2016, Kim and Forsythe 2008). Additionally between technology anxiety and intended use (Kim et al. 2016, Kim and Forsythe 2008). Technology anxiety has also been investigated alongside user demographics to assess whether factors such as age or internet usage have an effect on the level of technology anxiety (Meuter et al. 2003). The higher the level of technology anxiety possessed by the user, the less likely they are to feel confident when trying new technologies. The scale is reverse coded.

Within the context of this study the participants were asked questions on the technology readiness scale. Other research studies focussing on smart fashion closets have used the construct technology optimism which can be equated to technology confidence or technology readiness (Parasuraman 2000, Perry 2016). As the sample is focussed on highly innovative and technology ready users, it is hypothesised that they will be more likely to accept the technology:

**H1:** Consumer Technology Readiness will have a positive effect on Perceived Ease of Use of Metail.

**H2:** Consumer Technology Readiness will have a positive effect on Perceived Usefulness of Metail.

6.14. Functional Constructs

The functional constructs related to the study are those that are aligned with use related behaviours (Childers et al. 2001). Functional perspectives have been found to enhance consumer adoption of new technologies (Childers et al. 2001). The following section outlines
the constructs: perceived ease of use and perceived usefulness, their theoretical underpinning and use within this study.

6.14.1. Perceived Ease of Use

Perceived ease of use and perceived usefulness are dimensions of the Technology Acceptance Model (TAM) originally proposed by Davis (1989). Perceived ease of use and perceived usefulness can be linked to external variables (Li and Huang 2009). In this study, the external variable measured is Technology Readiness. Perceived ease of use is based on the ability of the user to complete a task (Davis 1989). If a technology is easy to use then it can directly link to a user’s perceived usefulness (Kim and Shin 2015). Perceived ease of use and perceived usefulness are pre-requisites to forming attitudes towards a technology (Davis 1989). Due to Metail being a new technology, establishing the user acceptance of it in terms of ease of use and usefulness will determine the level of consumer acceptance Metail has within the online retailing context:

H3: Perceived Ease of use will have a positive effect on Perceived Usefulness of Metail.

6.14.2. Perceived Usefulness

Perceived usefulness represents an individual’s motivations and use of technology (Moon and Kim 2001). Perceived usefulness is described as “the degree to which an individual believes that using a particular system would enhance his/her job performance” (Davis 1989, p.320). Perceived usefulness is goal oriented which aligns with the TAM where technology is stated to assist individuals in technological tasks (Moon and Kim 2001, Davis 1989). Perceived ease of use and usefulness have been used in a few virtual try on studies listed in Table 6.5. Once perceived ease of use and usefulness of a technology is established, the perceived usefulness of the technology can also effect the level of playfulness within it, linking the functional and experiential aspects of Metail:

H4: Perceived Usefulness will have a positive effect on the Playfulness of Metail.

6.15. Experiential construct

Due to the nature of online shopping becoming increasingly experiential through digital technology, the impact of playfulness of the interface on consumer technology adoption is measured.

6.15.1. Playfulness

Experiential studies have explored enjoyment and entertainment on technology acceptance (Fiore et al. 2005, Kim and Forsythe 2007, Kim and Forsythe 2008, Kim and Forsythe 2010,
Pantano and Servidio (2012). Huang and Liao (2015) assessed the impact of play on augmented reality technology. However, no existing studies have assessed the impact of playfulness on the technology acceptance of virtual fitting rooms. Playfulness has been described as the individuals ability to interact spontaneously, inventively and imaginatively with a computer or website (Webster and Martocchio 1992). As TAM proposes use of technologies in corporations, Moon and Kim (2001) identified TAM’s limitations when testing new technologies such as the world-wide web. Moon and Kim (1989) also suggest that there are other factors that influence an individual when using the Internet, such as pleasure and education. Equally, as new technologies such as apps and websites are launched within the internet, intrinsic factors will have great importance when measuring technology acceptance with new technologies. Moon and Kim (2001) identified that the work of Davis (1989) has mainly focussed on extrinsic motivations of a task, i.e. the performance and outcome of the task, to achieve set outcomes. However, they posited that intrinsic motivational factors are also important, such as curiosity, arousal, exploration and activity absorption, which was dubbed playfulness (Moon and Kim 2001).

Moon and Kim (2001) based their concept of playfulness in the world wide web on Csikszentimihalyi and Deci’s works, introducing three concepts concentration, curiosity and enjoyment. Concentration is where the individual is focussed on a set task or stimuli where external influences are filtered out. This enables the individual to be immersed within the experience (Moon and Kim 2001). Curiosity can be sensory – through multi-media effects, or cognitive in the desire to learn more about the technology in exploration of the website (Beck and Crié 2016). Enjoyment is where the individual finds the website interesting and enjoys the experience for pleasure than a reward (Kim and Forsythe 2008). Playfulness has been approached in research in two ways, either trait based or state based. The main scholars for trait based are (Webster and Martocchio 1992, Atkinson and Kydd 1997). This study focuses specifically on the level of playfulness state perceived within the technology. Due to experiencing the gamified virtual nature of the fashion avatar, the technology may evoke high levels of user playfulness:

**H5:** Playfulness will have a positive effect on Attitudes towards Metail.

### 6.16. Attitude

Attitudes towards Metail are formed after perceived usefulness, ease of use and playfulness. Attitude is an antecedent to intended use of the technology (Kim et al. 2016). Playfulness combined with use related constructs will form an overall user attitude towards the technology. Childers et al. (2001) state that usefulness, enjoyment and ease of use will be strong indicators of attitudes towards technology. High levels of perceived functional and experiential aspects to the technology will contribute to positive attitudes:
**H6:** Perceived Usefulness will have a positive effect on Attitudes towards Metail

**H7:** Perceived Ease of Use will have a positive effect on Attitudes towards Metail

### 6.16.1. Intended use

Intended use is intention to use, purchase from and re-visit 3D virtual try-on technology. Kim and Forsythe (2010) and Childers et al. (2001) found a positive relationship between the stimuli, attitudes and intended use.

**H8:** Positive attitudes towards Metail will have a positive effect on Intended Use.

Figure 6.6 shows the quantitative conceptual model.

---

**Figure 6.6 Quantitative Conceptual Model**

Table 6.6 shows the summarised questionnaire constructs for the study.
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### Table 6.6 Questionnaire Constructs

| Construct            | Item                                                                 | Theory       | Author                      |
|----------------------|                                                                     |              |                            |
| **Socio-demographics** | Do you shop online? Yes/No                                           |              | Goldsmith and Goldsmith (2002) |
|                      | What is your gender Male/Female                                     |              | Martin et al. (2015)       |
|                      | What is your income bracket? Less than £20,000/£20,000-£29,999/£30,000-£49,999/£50,000-£99,999/£100,000+ |              |                            |
|                      | What is your education level? School/College/Graduate/Post-graduate |              | Powers and Jack (2015)      |
|                      | How frequently do you browse for clothes online? Every day/Once a week/Several times a week/Once a month/Every couple of months/Couple of times a year/Never |              | Rose et al. (2012)         |
|                      | How frequently do you purchase clothes online? Every day/Once a week/Several times a week/Once a month/Every couple of months/Couple of times a year/Never |              |                            |

<table>
<thead>
<tr>
<th><strong>Construct</strong></th>
<th><strong>Item</strong></th>
<th><strong>Theory</strong></th>
<th><strong>Author</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology Readiness</td>
<td>Technical terms sound like confusing jargon to me</td>
<td>Technology Readiness</td>
<td>Meuter et al. (2003)</td>
</tr>
<tr>
<td></td>
<td>I have avoided technology because it’s unfamiliar to me</td>
<td>reverse coded</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I hesitate to use most forms of technology for fear of making mistakes I cannot correct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>I would find the website helpful when shopping online</td>
<td>e-TAM (7 point Likert scale)</td>
<td>Kim and Forsythe (2010)</td>
</tr>
<tr>
<td></td>
<td>Using Metail could increase the quality of my online shopping</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using Metail could make me more productive when shopping online</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using Metail would allow me to evaluate garments more quickly</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using Metail could improve my online shopping ability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>Using Metail is clear and understandable</td>
<td>e-TAM (7 point Likert scale)</td>
<td>Kim and Forsythe (2010)</td>
</tr>
<tr>
<td></td>
<td>Using Metail doesn’t require much mental effort</td>
<td></td>
<td>Ahn et al. (2007)</td>
</tr>
<tr>
<td></td>
<td>Metail is easy to use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Playfulness</td>
<td>Using Metail is fun</td>
<td>TAM (7 point Likert scale)</td>
<td>Ahn et al. (2007)</td>
</tr>
<tr>
<td></td>
<td>Using Metail is enjoyable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using Metail arouses my imagination</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using Metail stimulates my curiosity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>Using Metail is a good/bad idea</td>
<td>e-TAM (7-point semantic differential scale)</td>
<td>Kim and Forsythe (2010)</td>
</tr>
<tr>
<td></td>
<td>Using Metail is superior/inferior</td>
<td></td>
<td>Childers et al. (2001)</td>
</tr>
<tr>
<td></td>
<td>Using Metail is pleasant/unpleasant</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using Metail is appealing/unappealing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using Metail is excellent/poor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intended Use</td>
<td>I would be likely to use Metail again for fashion shopping in the future</td>
<td>e-TAM (7 point Likert scale)</td>
<td>Kim and Forsythe (2010)</td>
</tr>
<tr>
<td></td>
<td>I would be likely to visit Metail for fashion shopping in the future</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I would be likely to purchase fashion from Metail in the future</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 6.17. Summary

The first part of this chapter has discussed the theoretical frameworks and considered a variety of approaches. The TAM was chosen due to its relevance to the stimuli and the measurement constructs. Secondly, discussion of constructs and hypotheses to be measured in the Metail survey, conceptual model for the study (Figure 6.6) and questionnaire constructs are summarised in Table 6.6.
6.18. Qualitative discussion topics (Qualitative clothing try-on - stage 2)

The following section presents the discussion topics relevant to clothing try-on, determined as important considerations from literature (Chapter 5). An overview of existing clothing studies is included in Table 6.7 which outlines constructs or topics that have been used to study how consumers experience clothing. These highlight the important themes and criteria used to describe the consumers’ garment experience. Qualitative clothing experience is important to allow an understanding of the success of the product selection. However, the limitations of existing theory in this area and range of terms used to describe fit, have meant that there are few studies which focus on physical clothing try-ons following an online purchase. A comparison of existing studies and the factors used to measure fit and sizing have been combined and summarised. Therefore, with this in mind, topics were chosen from both questionnaires and interviews used in existing research as the foundation for developing qualitative approaches to fit and sizing assessment. The next part of the chapter will summarise the topics chosen and their relevance to the study.
## Table 6.7 Qualitative fit and sizing criteria

<table>
<thead>
<tr>
<th>Author</th>
<th>Method</th>
<th>Theme/Criteria</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Eckman et al. 1990)</td>
<td>Interviews</td>
<td>Aesthetic criteria: Colour/pattern, Styling, Fabric, Uniqueness, Appearance.</td>
<td>80 females</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Usefulness criteria: Versatility, Matching, Appropriateness, Utility.</td>
<td>predominantly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Performance and quality: Fit, Comfort, Care, Workmanship.</td>
<td>18-30 years old</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extrinsic criteria: Price, Brand, Competition.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intention to buy.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Likes/dislikes.</td>
<td></td>
</tr>
<tr>
<td>(Abraham-Murali and</td>
<td>Focus groups</td>
<td>Physical appearance: Fabric, Colour/Pattern/Texture, Construction, Styling</td>
<td>31 females</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Expressive: Looks good on me Provides scope for individual creativity,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appropriateness to lifestyle, Comments of others</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extrinsic: Brand, Price, Store/catalogue, Country of origin</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Care label, Service</td>
<td></td>
</tr>
<tr>
<td>(Alexander et al. 2005)</td>
<td>Questionnaire</td>
<td>Fit preferences Body Cathexis</td>
<td>223 females</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clothing benefits: Fashion image, Figure flaw compensation, Sex appeal,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clothing preference</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fashion innovativeness: Satisfaction with RTW</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Body shape</td>
<td></td>
</tr>
<tr>
<td>(de Klerk and Tselepis</td>
<td>Questionnaire</td>
<td>Expectation</td>
<td>134 13 year old</td>
</tr>
<tr>
<td>2007)</td>
<td></td>
<td>Functional (comfort)</td>
<td>females</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aesthetic (emotional and symbolic)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intrinsic: Ease, Style, Fabric, Size</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extrinsic: Fit with opinion of others, Opinion of peers, Fashion, Feeling good,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feeling in control, Brand</td>
<td></td>
</tr>
<tr>
<td>(Kinley 2010)</td>
<td>Questionnaire</td>
<td>Clothing benefits sought: Fashion forward</td>
<td>150 females</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sexy</td>
<td>with a mean age</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reputation</td>
<td>of 31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Individualist</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fit preferences Fitted</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Semi-fitted</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Satisfaction with fit</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extremely satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Label preferences Size by waist</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Size by number</td>
<td></td>
</tr>
<tr>
<td>(Holmlund et al. 2011)</td>
<td>Interview</td>
<td>First thoughts</td>
<td>10 women</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Attitudes</td>
<td>aged 50-63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clothing purchase behaviour</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Meaning and importance of fashion clothing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Searching, selecting, choosing, purchase intention and decision making</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clothing problems</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wishes to manufacturers, designers and buyers</td>
<td></td>
</tr>
<tr>
<td>(Gorgan et al. 2013)</td>
<td>Dress try-ons, body</td>
<td>Functional aspects of clothes fit</td>
<td>20 females</td>
</tr>
<tr>
<td></td>
<td>scans and interviews</td>
<td>Body confidence and clothing fit, Slim hourglass ideal</td>
<td>aged 18-45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clothes dimensions and size coding</td>
<td></td>
</tr>
<tr>
<td>(McKinney and Shin 2016)</td>
<td>Content analysis</td>
<td>Apparel evaluative criteria: Fit (overall, aesthetic, physical, functional),</td>
<td>Web content</td>
</tr>
<tr>
<td></td>
<td></td>
<td>garment styling (appearance, style and design elements), social feedback (verbal</td>
<td>analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and imagined), appropriateness (social situation, season), colour and pattern,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>fabric, physical comfort</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>E-service evaluative criteria: Traditional service quality, internet specific</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>service quality</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other content: Self-descriptive information</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recommendation, future patronage intention.</td>
<td></td>
</tr>
</tbody>
</table>
6.19. Performance evaluation of garments

Performance evaluation has been studied by Eckman et al. (1990) in the context of clothing try-on. It is defined as the qualities related to fit, comfort, care and workmanship of the garment (Eckman et al. 1990). Swan and Combs (1976) recognised the relationship between expectations, performance and satisfaction.

6.19.1. Clothing fit satisfaction

Fit satisfaction is defined as “judgements related to how the garment conforms to the body” (Eckman et al. 1990 p.17). Fit can be functional and aesthetic, contributing to emotional and functional aspects of wear (deKlerk and Tselepis 2007). Fit is also related to garment styling and personal preference of clothing fit (Kinley 2010). In the context of this study, the fit satisfaction is measured as an open-ended question, where the participants are encouraged to respond and elaborate on their perspective of fit. As the analysis method is grounded theory, key themes from the responses will be recorded, grouped and analysed.

6.19.2. Size satisfaction of garments

Size satisfaction is an intrinsic factor of fit (deKlerk and Tselepis 2007). Kim and Damhorst (2010) state that fit and size are the most critical factors in garment assessment. In most cases, research in garment fit has encapsulated the assessment of size within fit evaluation. Size satisfaction is also stated to be directly related to the amount of ease available in the garment (deKlerk and Tselepis 2007). Size should be taken into consideration for the consumer market the product is designed for (deKlerk and Tselepis 2007). In this study size satisfaction is measured directly, as the Dressipi interface stimulus provides the user with a size recommendation for purchase. By measuring the size satisfaction, the consumer’s evaluation of the size recommended by the system can be compared with expectations of size pre-purchase and the physical try-on post-purchase.

6.19.3. Fit expectations of garments

Fit expectation can be attributed to product predications “where a consumer makes assumptions concerning the future performance of an item” (Swan and Combs 1976, p.25). How a garment will perform in wear is related to any expectations a consumer may have had prior to purchase. These expectations may be instrumental or expressive (Swan and Combs 1976). When analysing fit expectation in the context of online shopping, consumers learn through online shopping experience and gain personal knowledge of specific brands and their sizing systems. If women experience poor fit, it is commonplace for women to blame their
bodies rather than the garment (LaBat and DeLong 1990). Fit expectation will therefore be related to a consumers’ body perceptions, online shopping experience and brand knowledge.

6.19.4. Comparative fit expectation

Comparative fit relates to the evaluation of garment fit in relation to previous garments and pre-formed ideas during product selection. Oliver (1980) studied the satisfaction of products in comparison to pre-conceived expectations. Grogan et al. (2013) measured consumers’ responses to clothing fit of dresses compared to other product types. These considerations are important as all participants will have prior experience of clothing which will impact their future experiences. This has been shown to influence consumer considerations of fit in other related studies such as Grogan et al. (2013). Mental intangibility is also related to comparative fit expectation, which can also include extrinsic factors such as branding, price, and retailer (Nepomuceno et al. 2014).

6.20. Aesthetic evaluation

Aesthetic evaluation is found to be integral to garment fit satisfaction (Eckman et al. 1990, Swan and Combs 1976). Aesthetic evaluation is concerned with the appearance, quality and style of the garment. Lamb and Kallal (1992) state that aesthetic evaluation is part of clothing evaluation accompanied with emotional and functional factors. deKlerk and Tselepis (2007) found that aesthetics were related to emotional and symbolic factors of fit satisfaction. Bye and McKinney (2007) found that aesthetic evaluation can also relate to the consumer’s perceived sentimental value regarding garments. Aesthetic evaluation is included in this study to encompass factors such as fabric quality, colour and print, length and style which most closely follows the criteria of Eckman et al. (1990). Responses regarding aesthetic evaluation are problematic to assess, due to aesthetics often being highly intangible. This study provides a breakdown of the components associated with aesthetic qualities of garments which will be further discussed.

6.20.1. Fabric quality in garment selection

Fabric assessment is considered an intrinsic element of garment satisfaction and fit (deKlerk and Tselepis 2007). Clothing intrinsic qualities are closely assessed by consumers and are arguably more important due to tangibility (Jacoby et al. 1971). Consumers perceive quality in both objective and subjective components that arise through the consumer’s perpetual assessment (Forsythe et al. 1996). Fabric quality has been assessed by McKinney and Shin (2016) within the context on online product reviews. Moreover, this study assesses fabric quality in online purchasing environments. This study combines assessment of the perceived fabric quality prior to purchase in comparison with actual fabric assessment during try-on.
6.20.2. Colour and print quality

Eckman et al. (1990) state that physical try-on is required in order to adequately assess colour. Thus, demonstrating the importance of colour and print on garment satisfaction. Colour is reported by Holmlund et al. (2011) as an important assessment by older women in clothing preference. Due to evident importance in previous clothing studies and the questions available on Dressipi regarding colour and print preference, colour and print quality are assessed in this study. Participants’ responses to colour and print can therefore infer the effectiveness of the style adviser on consumer perceptions of aesthetic garment properties.

6.20.3. Length and style satisfaction

Styling is related to physical appearance and the aesthetic evaluation of the garment. Styling was reported by Abraham-Murali and Littrell (1995) to be the second most important factor in consumer analysis of clothing attributes. This study measures responses to length and style in relation to the expected style as recommended through the use of Dressipi. Styling is an integral part of fashion product assessment and satisfaction, and in particular with the product ranges of the fast-fashion retailers studied (Very and Topshop). This emphasis on fashion style correlates with the interests of the participant sample (Generation Y) which have also been assessed in existing studies (Overmars and Poels 2015).

6.21. Interface evaluation

Questions regarding interface evaluation follow the garment evaluation questions. This summarises the participant’s perspective of the interface after garment try-on and the full shopping journey has been completed. Participants may repatronage Dressipi based on positive experiences of both garment and the interface. However, garment satisfaction can be seen as a true indicator of overall consumer perceptions of Dressipi. Participants were also encouraged to provide comments on how they may see the website or garment improved which aligned with Holmlund et al. (2011) comments to manufacturers, buyers or designers (Table 6.7).

6.21.1. Purchase intention

Purchase intention is the direct measure of whether a participant would keep, return or exchange the garment. It is used in this study as the behavioural outcome of garment satisfaction. Kim and Damhorst (2010) measured the effect of fit and sizing concerns on purchase intention and found there was a partially negative relationship. Concerns with overall appearance and concerns with imagining fit and size were negatively related to online purchase intention. This study assesses the impact of garment evaluation and satisfaction on purchase intention, after the garment was physically tried on. This extends purchase intention from
existing studies, which stop at online purchase intention (Eckman et al. 1990, Holmlund et al. 2011) (Table 6.7). This study includes the post-try-on purchase intention, which is either keep, return or exchange for another size.

## 6.21.2. Future use

Future use is the participant’s choice regarding their repatronage of the website or interface after physical garment assessment (McKinney and Shin 2016). Future use is also described by Shin and Baytar (2013 p.22) as “intention to use virtual try-on model.” In this study, future use is associated with revisit and repatronage of the Dressipi interface on Very.co.uk or Topshop.co.uk.

## 6.21.3. Post-use evaluation of responses to online fit

Post use evaluation relates to the responses after using the technology. Post-use evaluation was also measured by (Kim and Forsythe 2008). Kim and Forsythe (2008) found that despite entertainment and hedonic value of virtual try-on as a direct outcome, they found there was less effect on sales on the retailer’s website. Users of virtual try-on would experiment with outfits but there existed a need to more accurately depict the clothing (Kim and Forsythe 2008). Post-use evaluation will therefore measure the respondent’s reactions to overall fit, size and style of the products in real world experiences, following the virtual. The interview guide for the qualitative try-ons is shown in Table 6.8.
Table 6.8 Stage 2 Interview discussion guide

<table>
<thead>
<tr>
<th>Introduction</th>
<th>Reference adapted from</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thank you for coming. Aim of today’s session is to brief you on the process of the research, what you will be expected to do, give you the relevant information you need to participate, gain your consent and schedule the next stage with you. To participate you have to be female, a UK resident and have shopped online. The first try on session will be held on the 15th of June 2016. However prior to this we will schedule a time for you to personally meet with me to go through the Dressipi Style adviser and choose your garments. The garment you choose will be the garment that you will be trying on at Shop Direct head office. The Style Adviser is an online quiz which will take into account your personal information e.g. eye colour, hair colour and style preferences to generate personal style recommendations.</td>
<td></td>
</tr>
</tbody>
</table>

### Performance Evaluation

<table>
<thead>
<tr>
<th>Fit satisfaction</th>
<th>How do you feel the garment fits you?</th>
<th>(Eckman et al. 1990, McKinney and Shin 2016)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size satisfaction</td>
<td>Are you satisfied with the size?</td>
<td></td>
</tr>
<tr>
<td>Fit expectation</td>
<td>How does this compare to your expectations of fit through the garment selection process?</td>
<td>(Grogan et al. 2013)</td>
</tr>
<tr>
<td>Comparative fit satisfaction</td>
<td>Are you often satisfied or unsatisfied with the fit of garments in similar areas to this one?</td>
<td></td>
</tr>
</tbody>
</table>

### Aesthetic Evaluation

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour and print quality</td>
<td>How do you feel about the colours/print?</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>How do you feel about the length?</td>
<td></td>
</tr>
<tr>
<td>Style satisfaction</td>
<td>How do you feel about the style of the garment?</td>
<td></td>
</tr>
</tbody>
</table>

### Interface Evaluation

<table>
<thead>
<tr>
<th>Purchase intention</th>
<th>Would you keep this garment or would you return it and if so why?</th>
<th>(Grogan et al. 2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future use</td>
<td>Based on your experience would you use the style adviser or similar technology methods when shopping in future?</td>
<td></td>
</tr>
<tr>
<td>Post-use evaluation</td>
<td>Any other comments?</td>
<td></td>
</tr>
</tbody>
</table>

### 6.22. Summary

This part of the chapter has outlined existing studies that have analysed clothing attributes or used clothing try-ons. Using this as a basis for the post-purchase stages of clothing analysis in the study, a discussion guide was formulated. Each concept used in the discussion guide is described. The final section of this chapter covers the qualitative industry interviews (stage 3), including the rationale for fusing academic and industry thought. In addition, the interview topics are discussed.

### 6.23. Qualitative industry interviews (Stage 3)

This research aims to overcome the divide between academic and industry thought by providing a forum for industrial opinion to bolster academic theory. Qualitative interviews with key industry stakeholders provides the research with a firm industrial overview which is used to support the research results. Due to a stagnation in the growth and utilisation of digital fit and e-size in fashion retailing, there is an evident need to synthesise the work of both
academic and industry practice to date. Synthesis allows for better understanding of the developments in the area of virtual fit and e-size, and the limitations and future projections identified.

The application of industry opinion to the research has been chosen due to the recognition that academic research and industry practice are typically divided. Industrial managers tend to be guided by business operating factors such as profit margins and personal factors such as promotion (Jaworski 2011). This may inhibit their ability to absorb new, academic theories and models to use in established working environments (Lilien 2011). Academics however are immune to the pressures of a profit model yet provide strong incremental research for use in industry. In respect to this, Lilien (2011) strongly suggested there was an evident need for marketing academics to work closely with marketing managers. Lilien (2011) recognised that there has been limited wide-scale use of marketing models in industry and suggested that there are methods that can assist to overcome managers’ reluctance to adopt academic models. Lilien (2011) claimed that academics and practitioners should embrace working practices and develop together using marketing models in the creation of real impact to practice. Kumar (2017) similarly addressed the importance of fusing academic research and industry practice. He emphasised that by combining such perspectives “to generate insights that not only provide much needed relief to practitioners but also spur new research avenues for scholars” (Kumar 2017 p.3). Kumar (2017) claims that little academic research has failed to offer assistance to practice in evolving consumer environments. Thus, providing ample opportunity for business research to be tailored in order to generate real benefits for industry.

6.23.1. Discussion topics

The discussion topics were selected based on a literature review of the area, the company representatives that were available for interview and their involvement in the area of digital fit and sizing. The following areas are introduced and an example discussion guide is included. However, due to the semi-structured nature of the interviews, topics discussed diversified as the discussion evolved. This was due to the nature of the participants representing a range of backgrounds in the area of research. This enabled a broad overview of the industry perspectives to the development of the area. Due to the broad nature of the research, the findings are used to frame overall perspectives and future agendas for research.

6.24. Personalisation

Personalised technologies can deliver enhanced benefits to the online experience (Parise et al. 2016). Dressipi delivers a participative personalised experience with product and size recommendations, and Metail deliver virtual fit visualisation which can be personalised based on appearance. Both technologies aid product experiences in unique ways but harbour the
delivery of enhanced personalised information in online environments. Personalisation was also discussed in Chapter 3.

6.25. Omni-channel

Omni-channel retailing is key to the development of virtual fit and sizing technology through the utilisation of multiple channels for consumer garment evaluation. Omni-channel was also discussed in Chapter 2.

6.26. Gamification in online retail

Gamification is central to the use of marketing concepts within new fashion technology to enhance engagement with consumers. Gamification was also discussed in Chapter 3.

6.27. Augmented and Virtual Reality

This research suggests that augmented and virtual reality will guide the future of fit and sizing technologies. Augmented and virtual reality are also discussed in Chapter 3. The next section of the chapter presents an example discussion guide used in the industry interviews.
Table 6.9 Stage 3 Example interview discussion guide

<table>
<thead>
<tr>
<th>Topic</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview</td>
<td>10-15 minutes about my research on the Dressipi Style Adviser. This study is looking at existing Virtual Fit websites available to consumers in the context of Online Fashion Retailing. Qualitative interviews with retailers, Virtual Fit companies and relevant figures in the fashion and retailing industry will be undertaken, in order to build a broad understanding of Virtual Fit. The study will also consider consumer perspectives, which will take the form of qualitative and quantitative data collection. Questions/remarks. Please could you give an overview of your background, what led you to the retail sector and your current role?</td>
</tr>
<tr>
<td>Personalisation and Data</td>
<td>You have described personalisation as the next big driver of growth for X, having launched personalised versions of the homepage, search and product pages. Can you explain more about these aspects of personalisation and which you will continue to work on? X is described as a ‘data driven fashion label’ can you explain more about this, and which parts of the consumer journey are used to mine the data? Given the increasing awareness of data within retailing and how it can harness growth potential if used correctly, how do you envisage this to continue within the retail sector?</td>
</tr>
<tr>
<td>Omni-channel</td>
<td>Given the growth of Omnichannel retailing, what efforts are being put towards continuous integration of X across multiple channels? Click and collect has been a key success for X, are there any other cross-channel strategies being implemented in the future, to increase consumer touch-points with the business?</td>
</tr>
<tr>
<td>Online technology/product</td>
<td>Tangiblee gives consumers perspectives on size in relation to other goods they own before purchase. In the context of clothing, do you think there is demand for consumers to use similar technology by matching consumers of similar sizes (body measurements) and comparing their garment purchases? Sizing is problematic in the retail industry, are you investing in the area of size and fit? In terms of technology? For example 3D Body Scanning/Product development expertise? How important is fit, size and style to your own brands? Do you feel that measuring this in conversion and returns would give useful insights? Have you found consumer brand loyalty with your retailer partners has an effect on consumer purchasing confidence, what looks good and fits them? How does this compare with your own brands?</td>
</tr>
<tr>
<td>conversion tools</td>
<td></td>
</tr>
<tr>
<td>Data and Privacy</td>
<td>Data laws are changing, consumers will soon own their data and companies must be transparent and responsible with data. X have a big focus on Data as a means to future growth, do you think this will this become a bigger dimension to retail business structure in the future? Have you found privacy and security concerns from consumers to be an increasing issue?</td>
</tr>
<tr>
<td>Concluding questions</td>
<td>What do you think is the next move for online retailing in terms of growth and innovation? Do you have any questions for me? Many thanks for your time.</td>
</tr>
</tbody>
</table>

Enabling the Digital Fashion Consumer through Gamified Fit and Sizing Experience Technologies
This section of the chapter has outlined the justification for the use of industry interviews. In addition, the discussion topics and their relevance to the study are described. Due to a lack of integrated research in digital fit and sizing technology, the literature review (Chapters 3, 4 and 5) and theoretical development provide a trajectory for the research. The next chapters will present the research methodology adopted in the study followed by the results of the quantitative and qualitative studies. Through a synthesis of primary research in the areas of experiential fashion technology, consumer behaviour and evaluation and garment fit and sizing, the research area can be more easily defined and understood. No research has segmented and reviewed the areas of approach used in virtual size and fit technologies in this way.

6.28. Summary

This chapter has provided a summary of the theoretical stances involved in research in fit and sizing technology. The theoretical approach of this study is the Technology Acceptance Model and the rationale for this decision is discussed based on other studies focusing on fit and sizing stimuli. The research is framed within the online consumer shopping journey as introduced in Chapter 4. Furthermore, the theoretical basis for the qualitative studies (clothing try-on and industry interviews) are discussed based on literature in Chapters 2, 3 and 5.

Through an overview of the literature in the area, this research has fully considered the theoretical approaches that could be adopted. A critical analysis of the theoretical frameworks shows understanding of the theoretical influences on the area of digital fit and sizing technology. The theoretical background of the research is primarily TAM, however, it is acknowledged that TAM does not provide a means for assessing post-purchase product and interface evaluation. Post-purchase evaluation has not been considered in clothing research and technology acceptance, therefore the outlining of fit and sizing variables and constructs measured offers a means for assessing clothing. The consumer shopping journey (Lemon and Verhoef 2016) (Figure 6.5) is used to show the relationship between TAM and the post-purchase product evaluation. Broader literature concepts are briefly summarised with regards to the industry interview topics due to the semi-structured nature of the industry interviews. The next section will discuss the research methodology for the study.
Chapter 7. Methodology

7.1. Introduction

This chapter outlines the methodology that the research will assume. Methodology has been defined as the theory of how research should be undertaken (Saunders et al. 2016). Carr (2006) states that research must take an a priori approach to theoretical knowledge. Nokiov and Nokiov (2013) state that methodology is the theory of organisation or activity. Research methodology draws upon philosophical, strategic and theoretical perspectives which form the research approach (Malhotra et al. 2017). Maclaran et al. (2009) state that to understand theory, researchers must understand the notions of philosophical and sociological debates through which theory has evolved. This chapter is divided into two sections, firstly a discussion of research philosophies and secondly the research methods adopted in the study. This includes a review of secondary data, quantitative data analysis, qualitative interviews, and interviews with industry specialists. In addition, the research design, approach, sample data collection and analysis are also discussed, to give a clear and in-depth methodological overview.

7.2. Review of secondary data

Literature was found on the topic of virtual fit, size recommendation and personalisation, garment visualisation and experiential fashion marketing. Appropriate literature was divided in approach either from garment technology, consumer behaviour or experiential marketing. This approach enabled a necessary synthesis of the area of digital fit and sizing technologies offering an overview that could be used to define the research problem and guide the research design.

7.2.1. Approaches derived from experiential marketing literature

Marketing literature has approached the subject of virtual fit and size recommendation from a few perspectives. Firstly, as a form of Image Interactivity Technology (informative, interactive media), as a process of Technology Adoption (theory of reasoned action, theory of planned behaviour), product recommendation (collaborative filtering) and experiential marketing (Chapter 3). It was necessary to understand these areas and the theoretical underpinnings of existing studies to formulate the research design for the current study.

7.2.2. Approaches derived from consumer behaviour literature

Consumer behaviour literature has focussed on the impact of avatars to consumer perceptions of their bodies and satisfaction (Chapter 4). It was important to recognise this as an impact factor to the effectiveness of virtual avatars in effectively portraying the user. Whilst
considering the limitations of 3D visualisation of current avatars used in online fashion retailing. It became clear that rarely was the post-purchase evaluation of consumers used in consumer behaviour analysis, and to fully understand consumer evaluation of virtual fit and size recommendation would be to test consumer reactions to the garment in real world interactions.

7.2.3. Approaches derived from clothing technology literature

Clothing technology literature has focussed around the use of 3D simulated clothing, which has been facilitated by 3D body scanning (Chapter 5). Therefore, there was a need to review the literature that concerned 3D garment simulation, as this is an area which is inextricably linked to the visualisation of clothing in virtual contexts. However, it became clear through analysis of existing research methods that consumer facing virtual fit websites had not been used as stimuli in clothing technology research. Instead, stimuli included software used in product development for industry use was used, which was not widely available to consumers. As an outcome of the secondary data review, it was evident that analysis of commercial fit tools was necessary. This was to enable assessment of consumer fit evaluation in the research and enable consumers to make their own judgements on clothing purchased from online shopping websites.

7.3. Research philosophies

Research philosophies are defined as a “system of beliefs and assumptions about the development of knowledge” (Saunders et al. 2016 p.127). Grenon and Smith (2011) define that philosophical activity determines that there are philosophical entities. Philosophy is not defined by the entities themselves, but by the process of the creation of entities and the studies that make up the philosophy (Grenon and Smith 2011). Humans are active in philosophy in material, practical and intelligent ways (Nokiov and Nokiov 2013). Research philosophy is the foundation to the basis of what is considered knowledge in the research domain (Gill and Johnson 2010).

These beliefs and assumptions formulate credible research through considering the differing approaches. The use of theory in market research should act as a basis for design, execution and understanding of results (Malhotra et al. 2012, Bryman 2012). By using theory as the foundation of research, developments and contributions can be made towards a deeper and improved understanding of the subject in question (Malhotra and Birks 2012). Ontology looks at the way reality and existence work (Easterby-Smith et al, 2015) and epistemology uses knowledge or assumptions to help inform decisions about the world (Easterby-Smith et al. 2015). For philosophers, ontology is the focal point for debate. Within natural sciences there are two debates between the opposing perspectives of realism and relativism (Malhotra and
Within social sciences the perspectives are of objectivism and constructionism (Malhotra and Birks 2012, Saunders et al., 2009). The next section will discuss ontology in more depth.

7.4. Philosophical underpinnings

7.4.1. Ontology

Ontology is concerned with the physical existence of the world and the “nature of reality” (Saunders et al. 2016 p.127). Ontology can be viewed from two perspectives: information science and natural language processes (Grenon and Smith 2011). Ontology can be simply expressed as “what are we studying?” (Gill and Johnson 2010). Ontology is concerned with the way of perceiving the world (Maclaran et al. 2009). Close examination of the potential drawbacks and ambiguities associated with ontologies must be considered in a chosen domain such as science (Grenon and Smith 2011). Ontology is categorised by two perspectives, realism and relativism. Realism focuses on external representation of science in natural action (Easterby-Smith et al., 2015, Bryman and Bell 2011). Realist ontology is concerned with accounting for existing entities within existence from molecules to literature (Grenon and Smith 2011). Realists feel that there is only one truth and that this can be discovered by facts – i.e. it is a pre-existing truth (Easterby-Smith et al., 2015). Relativists believe that there are many outcomes that are based on the perspective of the person considering it (Easterby-Smith et al., 2015). Table 7.1 summarises the main comparisons between ontologies.
Table 7.1 Comparison of positivism and social constructionism

<table>
<thead>
<tr>
<th>Ontologies</th>
<th>Realism</th>
<th>Relativism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methodology</td>
<td>Natural Science Model</td>
<td>Interpretivist</td>
</tr>
<tr>
<td>Aim</td>
<td>Observations</td>
<td>Convergence</td>
</tr>
<tr>
<td>Origin</td>
<td>Propositions</td>
<td>Questions</td>
</tr>
<tr>
<td>The researcher/participant</td>
<td>Independent</td>
<td>Involved</td>
</tr>
<tr>
<td>Research Language</td>
<td>Formal and impersonal</td>
<td>Informal and personal</td>
</tr>
<tr>
<td>Values</td>
<td>Unbiased</td>
<td>Biased</td>
</tr>
<tr>
<td>Design</td>
<td>Large surveys, cause and effect, laboratory experiments, context free, prediction and control, reliability and validity, static research design.</td>
<td>Field/Ethnography, Decision making, case studies, evolving design, understanding and insight.</td>
</tr>
<tr>
<td>Reality</td>
<td>Objective</td>
<td>Subjective</td>
</tr>
<tr>
<td>Human interests</td>
<td>Irrelevant</td>
<td>Are the driving force of science</td>
</tr>
<tr>
<td>Data</td>
<td>Numbers and few words</td>
<td>Words and few numbers</td>
</tr>
<tr>
<td>Explanations</td>
<td>Causal</td>
<td>Increase understanding and knowledge</td>
</tr>
<tr>
<td>Research progression through:</td>
<td>Hypotheses and deductions</td>
<td>Gathering rich data and inducing ideas</td>
</tr>
<tr>
<td>Concepts</td>
<td>Predefined</td>
<td>Incorporate perspectives of those involved</td>
</tr>
<tr>
<td>Analysis</td>
<td>Correlation/regression</td>
<td>Comparison</td>
</tr>
<tr>
<td>Generalisation through:</td>
<td>Statistics and numbers</td>
<td>Theory</td>
</tr>
<tr>
<td>Sampling</td>
<td>Large numbers at random</td>
<td>Small and specific numbers</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Testing of theory</td>
<td>Theory generation</td>
</tr>
</tbody>
</table>

Source: Easterby-Smith (2015), Bryman (2012), Malhotra and Birks (2012)

7.4.2. Objectivist and subjectivist ontologies

Saunders et al. (2009 p.110) described objectivism as “where social entities exist as external to social actors.” Objectivist perspectives will perceive social actors as being separate to social entities. Therefore, social actors can exert, e.g. pressure to conform or perform on the social entity creating an objective environment, which is external of the researcher. Bryman (2012) and Saunders et al. (2009) make a comparison between this and an individual in classical organisation culture. Subjectivists hold a contrasting view where scientific laws are discoverable by the researcher. Diesling (1966) states that objectivism and subjectivism has been of much debate between the philosophers and social scientist perspectives. One way this is suggested to be overcome is by understanding the aims of each perspective, as each are important and each aim to improve scientific methods (Diesling 1966).

7.5. Epistemology

Epistemology is concerned with knowledge and methods of enquiry into the world (Easterby-Smith et al., 2015). It “concerns the question of what is (or should be) regarded as acceptable knowledge in a discipline” (Bryman and Bell 2015, p.26). Epistemology is about how we know what we know and what can define truth (Gill and Johnson 2010). Epistemology is claims that are made to validate knowledge (Hunt and Hansen 2009). Bryman and Bell (2011)
highlight the question of whether epistemology can be applied in such a way of investigation to the social world this perspective is called positivism (Bryman 2012).

7.6. Realism

Realist ontology states that the “external world does not exist unperceived” (Hunt and Hansen 2009 p.114). Hegel claimed that reality is associated with mental perception taking prominence over physical perception. This original argument for realism was debated by G.E Moore and Bertrand Russell, due to the use of terms such as ‘perception’ and ‘real’ that discredit that the external world which is tangible and can exist separately to perception. Heath and Chatterjee (1995) devised a scientific realism model which denotes that truth is an attribute (Figure 7.1). The model depicts that theory can denote the existence of claims such as the senses or the success of a theory (Hunt and Hansen 2009). Based on this model, realism is often adopted for scientific research philosophies (Hunt and Hansen 2009). Realism claims that there is one single truth and that facts exist to tell us exactly what has happened (Easterby-Smith et al. 2015). Realists believe that the world is “concrete and external and that science can progress only through observations that have a direct correspondence to the phenomena being investigated” (Easterby-Smith et al. 2015, p.48). Realist perspectives assume that status of phenomena is independent of our “perceptual or cognitive structures” waiting for discovery (Gill and Johnson 2010 p.201). Some have pointed out the difference between natural laws and laws of physics. This is a notion called transcendental realism. This is the belief that objects that are being investigated by science are completely independent of scientists, this was pioneered by Bhaskar (1989) (Easterby-Smith et al. 2015).

Figure 7.1 Scientific Realism

Source: Hunt and Hansen (2009)
7.6.1. Positivism

Positivists state that reality can be observed objectively (Levin 1988). Positivism advocates that there is an observable social code, which results in the most credible data (Saunders et al., 2009). A positivist belief in the context of market research is that a scientific approach must be taken which is similar to that of the natural sciences. Malhotra and Birks (2012) state that qualitative research does not rely on facts so therefore should align with a positivist perspective. However there have been interpretations of qualitative methods, which are viewed purely as a set of techniques to which then more in-depth research is taken then a positivist perspective can be applied (Healy and Perry 2000). Positivism is where the researcher knows that reality is a set of facts that can be observed and measured with no influence on the researcher (Hennink et al. 2011).

Causality is at the heart of the positivist approach as the world is ordered by cause and effect that can be tested by scientific research (Sekaran and Bougie 2016). Positivist approaches aim to seek out the causes that determine outcomes (Creswell 2009). Causality can be uncovered through positivist philosophies which is enabled by the measurement of defined concepts (Easterby-Smith et al. 2015). Replicable, factual data is sought by the positivist researcher. Positivism takes an epistemological approach, taking facts from the world around the researcher. Hypotheses are formed from theoretical concepts and the qualitative data is then collected and measured against these concepts to see if the evidence supports the hypothesis (Hennink et al. 2011). Separating the researcher from the research is often seen as a criticism of the positivist approach, as it does not take into account the human nature of research (Hennink et al. 2011). Positivism is often critiqued based on its lack of attention to the importance of human subjectivity or interpretation (Gill and Johnson 2010, Giddens 1976).

7.7. Relativism

Relativism is defined as each culture holding its independent and unique history, in a distinct entity of its own (Obeyesekere 1966). Relativism regards that if something relates to something else, then there is no standard to evaluate across the two paradigms (Hunt and Hansen 2009). There are several forms of relativism including culture and ethical for example. Ethical relativism can be derived through cultural relativism (Obeyesekere 1966). Relativism is often rejected in the philosophy of scientific research (Hunt and Hansen 2009). Relativism is also dismissed based on whether two things such as culture or ethics can be compared or ranked (Obeyesekere 1966). However, scholars may argue whether marketing research is a scientific phenomenon (Maclaran et al. 2009). Hunt and Hansen (2009) state that relativism should be completely rejected by marketing studies along with subjectivism which posits that human condition prevents clear, objective knowledge (Hunt and Hansen 2009).
7.7.1. Social constructivism

Constructivism denotes that in contrast to positivism, society is based on people rather than external factors (Easterby-Smith et al. 2015). Additionally, social constructivism focuses on how the social interactions which are constantly changing and revised. Social constructivists seek to understand the world and the meanings within it being both varied and simple. The complexity of meaning within life and interactions is at the heart of the social constructivist paradigm (Creswell 2009). The emphasis of this school of thought is that thoughts and feelings of people are emphasised along with the frequency and facts of social behaviours (Easterby-Smith et al. 2015). In addition, meaning is attributed through people and the world in which they interpret (Creswell 2009). Meaning is derived from the individual’s interpretations of events and not external factors (Easterby-Smith et al. 2015). Social constructionists deeply regard all human condition, empirically observable information and knowledge that arises from it as genuine (Weinberg 2014). Social constructionism purports that interactions between humans can be rooted within “sociohistorical or sociointeractional processes” (Weinberg 2014, p.4). Social constructionism is endorsed to original constructionist authors including Marx, Kant and Nietzsche. Subjective meaning in social interactions is the focus of social constructionist study (Weinberg 2014).

7.7.2. Interpretivism

Interpretivism takes the perspective that the investigator has his or her own perspectives on the subject, as does the participant. This perspective is in contrast to positivism (Bryman and Bell 2015). Together these influences may subconsciously effect the researcher’s perspective, where the interview is described as a “co-elaborated act” (Miles and Huberman 1994, p.8). Researchers therefore, seek to understand the persons feelings and experiences, which is also known as an “emic” perspective, or the inside approach (Hennink et al. 2011, p.14, Lincoln and Guba 1985). Interpretivists also understand that humans are affected by social factors. Often interpretivists are sceptical about the application of scientific perspective of the world (Bryman and Bell 2015). Bryman and Bell (2015 p.28) state that “interpretivism is concerned with empathic understanding of human action rather than the forces that act on it.” Therefore, the centrality of the meaning that humans can give to research is important in interpretivism.

7.7.3. Pragmatism

Pragmatism is often stated to be viewed as the middle ground between internal realism and relativism as proposed by Sayer (1992). Pragmatism postulates not that there are determined theories or frameworks, or that people can invent truths. Instead it advocates the meaning must come from the experience of individuals (Easterby-Smith et al. 2015). Pragmatism denotes that things are representative of one another (Dewey 1905). Actions and outcomes are central
to pragmatism, the emphasis is on the problem rather than the cause and effect as previously described with positivism (Creswell 2009). Pragmatism focuses on the balance between concrete and abstract, and reflection and observation (Easterby-Smith et al. 2015). A key example of pragmatism is Kolb’s learning cycle (1984) which uses both theory, observation and reflection in a cycle. Kolb’s cycle provides synthesis of two schools of thought, positivism and anti-positivism that are often perceived as irreconcilable (Easterby-Smith et al. 2015). Pragmatism can align well with mixed methods research as there is no set unity, where qualitative and quantitative are equally important in the research project (Creswell 2009). Pragmatism focuses on truth being established in the moment, where there is no duality between the mind and the world (Creswell 2009).

7.7.1. Research ontology adopted in this study

This research adopted a realist ontology which advocates that by adding perspectives to the data, the more insight can be made towards the intangible nature of enquiries (Easterby-Smith et al. 2015). Internal Realism originated with Putnam (1975). Internal realists accept scientific truth and a realist ontology (Ellis 1988). This is not as strong an approach as realism and strong positivism, however it advocates that “reality cannot be accessed directly” (Easterby-Smith et al. 2015 p.54). Reality can be reached by conducting a large sample size of quantitative surveys, combined with qualitative data (Easterby-Smith et al. 2015). Therefore, as this research collects quantitative and qualitative data the approach is adopted. Realist ontology advocates that novel ideas can be uncovered and patterns can be identified. Pilot tests and statistical analysis will help to improve accuracy and validity and the sample will not be selected with any pre-existing knowledge of digital fit and sizing tools due to the need for a real representation of the female consumer demographic.

7.7.2. Research philosophy adopted in the study

The research philosophy adopted for stages 1 and 2 of the study is that of positivism. Positivism advocates that the researcher is separate to the subject, that truth can be proven via confirmation of theories. In addition, positivism also fits best with internal realism which is the ontology adopted for the study. The research focuses on the theoretical underpinning of the Technology Acceptance Model (Davis 1989), with an aim to support the results with a qualitative study. Therefore, as a large proportion of the data is quantitative supported by smaller samples of qualitative, the approach can be considered positivist (Easterby-Smith et al. 2015). This is demonstrated in the study due to the mixed methods research and triangulation of quantitative and qualitative data (stages 1, 2 and 3). This is due to the use of qualitative, subjective data which incorporates the perspectives of industry professionals (Easterby-Smith et al. 2015).
Chapter Seven: Methodology

7.8. Research approach

The research approach is the method taken to establish what is true and what false. Induction uses empirical evidence to establish what’s true, while deduction uses logic (Ghauri and Gronhaug 2010). Inductive conclusions are based on empirical observations, where findings can be used to further develop theory, typically this approach is used in qualitative research (Ghauri and Gronhaug 2010). Findings of induction can arguably never be fully conclusive due to their basis in empirical observation. In contrast, conclusions that are based on logic or hypotheses that can be proved or disproved are typical of deductive research. Positivism aligned researchers often adopt an approach based on deduction. This is a way of reaching a conclusion that is true if the premises it is built upon are true. Arguments are formed from links to facts existing within the premise of the question (Malhotra and Birks 2012). Often, researchers embrace both approaches at some stage during their research, therefore the approaches are not completely distinct (Malhotra and Birks 2017).

7.8.1. Deductive reasoning

Deductive reasoning enables the researcher to remove themselves from the situation. Deduction is informed by existing theory established prior to testing (Gill and Johnson 2010). The responses can be assessed based on theoretical frameworks that have been prior established and proven. Results are tested against theory to ensure that findings are correlative (Malhotra and Birks 2012). Figure 7.2 shows the process of deduction. It forms the traditional view of the relationship between theory and research (Bryman and Bell 2015). For deductive reasoning, there must be a clear association between how the data is related to the concepts in the hypothesis of the study (Bryman and Bell 2015). Popper (1967) stated that the creative aspect of science is unanalysable and therefore, scientific enquiry must be based on hypotheses and theory that can be systematically used for solving problems (Gill and Johnson 2010, Sekaran and Bougie 2016). The final stage of deductive reasoning actually involves induction, where the findings are feedback into the original theory (Bryman and Bell 2015). Therefore new results to theory can be found before the final findings of the study and the data may or may not fit the original hypothesis (Bryman and Bell 2015).
7.8.2. Inductive reasoning

Induction focuses on the empirical world and how the researcher’s interpretations can subjectively drive theory (Gill and Johnson 2010). It is the reverse of deductive reasoning. Theory does not inform the enquiry instead it originates from observations of participants, working from specific to more general conclusions (Sekaran and Bougie 2016). Validity is difficult to be proved in inductive research when using large samples (Bryman and Bell 2015). This is due to the use of interpretation of individuals in the method of induction (Malhotra and Birks 2012). Interpretivist researchers tend to favour induction approaches. Figure 7.3 shows the reversed process to deduction which is induction.

7.8.3. Research approach adopted

The research approach adopted for stage 1 was deductive. This was due to the use of the Technology Acceptance Model (TAM) (Davis 1989) as the theoretical underpinning. As TAM assesses observations to technological stimuli using the framework to structure responses, the results are deduced using the original theoretical basis. The research approach for stages 2 and 3 was inductive as observations were drawn using grounded theory and analysis.
7.8.4. Summary

The first section of this chapter has explored research ontologies and philosophies that are typical in social science research. The two approaches adopted for the study were also outlined. The following section discusses the data collection approaches in more detail. Additionally, the research design, layout and sampling adopted.

7.8.5. Quantitative

Quantitative research entails the collection of numerical data. This enables linking theory and research in a deductive manner (Bryman and Bell 2015). Concepts are measured as the basis of theories and key elements of business research. These concepts are measured as an aspect of the social world in which businesses operate (Bryman and Bell 2015). Quantitative research alone provides opportunity for replication, causality and generalisation. However, quantitative data alone can limit research from recognising the influence of the external world (Bryman and Bell 2015). This perspective of the detachment of quantitative data without distinguishing the impact of society around it is supported by Blumer (1956).

7.8.6. Qualitative

Qualitative research is a method that covers a wide range of techniques including in-depth interviews, focus groups, discussion, content analysis and visual methods (Hennink et al. 2011). Qualitative research allows the understanding of research participant’s perspectives, which is namely an interpretivist approach. Interpretivist approaches are undertaken in the participants in their natural context or settings which should be embraced by the researcher to be able to understand the meanings that are attributed to them (Hennink et al. 2011, Denzin and Lincoln 2003). Qualitative research is often undertaken in natural circumstances to the participants, ones that replicate common experiences of the individual or group (Miles and Huberman 1994). The researcher aims to get an overview of the context and the individuals feelings about an experience, which they can then use to isolate key themes (Miles and Huberman 1994).

7.9. Data sources

Data sources are a form of information and can be secondary or primary. Secondary data is the information collected from earlier studies, websites and books for example (Ghauri and Gronhaug 2010). Secondary data is important as it assists to understand the research problem and explain the research questions, aiding to formulate design, interpret the data, give insight and validate findings (Malhotra and Birks 2012). However, secondary data is limited in that it cannot directly answer specific questions related to the research. In other words, the data has
been collected for another purpose and therefore can be used to support but not lead results (Ghauri and Gronhaug 2010). The reliability and quality of secondary data must be continually assessed and primary data must be collected once secondary data is exhausted (Malhotra and Birks 2017). Primary data is collected for the project in question, and is often not available in other secondary sources (Ghauri and Gronhaug 2010). The benefits of primary data collection include the specificity to the research topic and the ability of the data to be tested against hypotheses. With primary data collection, the researcher can be involved through interviews and observations or independent through online surveys such as with this research. Primary data and secondary data will be used in the study. An extensive literature review has provided an overview of the secondary data for the research collected prior to undertaking the primary research. Moreover, stages 1, 2 and 3 all obtained primary data. The sources of secondary data originated from external sources online and offline, such as books, academic publications and market information.

7.10. Research design

Research design is the plan or proposal of the researcher in approach to the research question (Saunders et al. 2016, Creswell 2009). Creswell (2009 p.5) states that research design is the “intersection of philosophy, strategies of enquiry and specific methods”. Moreover, research design is holistic and involves the philosophical perspective and procedures of the research that is being used as an approach. Research design should detail the required elements to effectively address a market problem (Malhotra et al. 2017). Generally, as discussed, a quantitative research adopts a deductive approach due to using structured theories and data collection approaches (Saunders et al. 2016). The research philosophy for quantitative studies also tend to be interpretivist but can also be pragmatic (Saunders et al. 2016). Qualitative approaches are characteristically interpretivist (Saunders et al. 2016) due to the role of the participant and the researcher’s analysis of the results, but can deviate. The research design can be either mixed methods, exploratory, conclusive, descriptive or causal (Malhotra et al. 2017).

7.10.1. Mixed methods research design

Mixed methods provides benefits to managerial and business research as it can assist to overcome weaknesses using a single method alone (Saunders et al. 2016). Mixed methods assists pragmatists as they view the adoption of one theory or philosophical view as unhelpful (Saunders et al. 2016). Mixed methods theory design may be inductive or deductive, where quantitative and qualitative methods can be used to test theory (Saunders et al. 2016). Mixed methods research utilises the strengths of both qualitative and quantitative research (Creswell 2009). Qualitative research derives meaning from processes that are measured using non-
experimental methods. Qualitative research seeks to gain insight into the nature of experiences and processes within social settings (Denzin and Lincoln 2003). Quantitative research measures relationships between variables, exclusive of the process unconstrained by values that are present in qualitative research (Denzin and Lincoln 2003). Both approaches apply different methods to collecting and analysing data which can make mixed methods approaches problematic for the researcher. The differing paradigms that underpin both qualitative and quantitative methods are integral to the research community and perspectives on which the research approach is formed (Hennink et al. 2011). There have been many arguments to the addition of a positivist approach to quantitative data, with statements focussing on the damning this approach completely (Miles and Huberman 1994). Despite this, scholars have emphasised the need for both qualitative and quantitative studies to enrich research. Kaplan (1964) states “quantities are of qualities and a measured quality has just the magnitude expressed in its measure” (from Miles and Huberman 1994). However, importantly, both methods focus on developing solutions to research problems (Denzin and Lincoln 2003).

Combining qualitative and quantitative mixed methods can draw from positivist and constructionist epistemologies (Easterby-Smith et al. 2015). There has been significant popularity of the use of mixed methods approaches (Tashakkori and Teddlie 2010). Mixed methods can also be referred to a triangulation or sequencing (Hennink et al. 2011). Mixed methods triangulation requires the collection of both quantitative and qualitative data, analysing it and then drawing inferences between the two (Tashakkori and Creswell 2007). There is also the repertory grid technique, where qualitative data is analysed to become quantitative data (Easterby-Smith et al. 2015). Table 7.2 summarises the advantages and disadvantages of mixed methods. These perspectives are summarised from Easterby-Smith et al. (2015) based on the work of (Tashakkori and Teddlie 2010, Jick 1979, Bryman and Bell 2015).
## Table 7.2 Advantages and disadvantages of mixed methods

<table>
<thead>
<tr>
<th>Advantages of Mixed methods</th>
<th>Disadvantages of Mixed methods</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased credibility and validity of results</td>
<td>Difficult to replicate</td>
<td>Easterby-Smith et al. (2015)</td>
</tr>
<tr>
<td>Results are derived through creative methods</td>
<td>Research design must be coherent with the research question</td>
<td></td>
</tr>
<tr>
<td>Uncover new dimensions to the research</td>
<td>Require more resources</td>
<td></td>
</tr>
<tr>
<td>Synthesis and integration of theory</td>
<td>Researcher must be skilled in both areas</td>
<td></td>
</tr>
<tr>
<td>Test competing theories</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combine exploratory and confirmatory research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strengthens inferences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantitative research can ‘de-emphasize individual judgment and qualitative research can provide richer depiction and comparison to the more abstract nature of quantitative.’</td>
<td>Firestone (1987)</td>
<td></td>
</tr>
</tbody>
</table>


### 7.10.2. Exploratory research design

Exploratory research enables the evaluation of what and how. It applies well where a particular issue or phenomenon is relatively under-explored, or difficult to understand (Saunders et al. 2016, Malhotra et al. 2017, Sekaran and Bougie 2016). Exploratory research is often characterised by qualitative research through the use of literature, interviews, focus groups and perspectives of key industry experts (Saunders et al. 2016). Exploratory research focuses on interviews and observations that are unstructured and tend to be on a one-to-one basis (Malhotra et al. 2017). Exploratory research is flexible in terms of how the research can start broad but become more defined throughout the process (Sekaran and Bougie 2016, Ghauri and Gronhaug 2010). This evolution is key to developing the results of the study, however means that the results are often subjective and difficult to generalise.

Often, exploratory is used where quantitative methods are unable to be used. In addition, it can be used to define an area with more precision (Malhotra et al. 2017). Such as using interviews with industry experts, which can allow for the most insightful results. Often the sample used for exploratory research is small and does not represent the whole segment (Malhotra et al. 2017). However the quality of the response enables the researcher to gain a clear picture of key opinions on the subject matter. The nature of exploratory design can assist with such interviews as it enables the interviewee to open up to the researcher and talk confidently about an area of which they hold extensive experience or knowledge and gather information informally (Sekaran and Bougie 2016). Typically, due to the nature of the exploratory design, the researcher may have to change direction due to findings from the exploratory research.
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Therefore this approach can cause the research direction to change due to the insights that can be uncovered (Malhotra et al. 2017). This is shown in Table 7.3.

7.10.3. Conclusive research design

Conclusive research is “characterised by the measurement of clearly defined marketing phenomena” (Malhotra et al. 2017, p.69). Conclusive research investigates clear criteria using theoretically based hypotheses. Specific topics, specific constructs and specific hypotheses can be tested using a conclusive research design (Malhotra et al. 2017) (Table 7.3). Gill and Johnson (2010) state that testing theory can provide explanation through operationalisation as clear instructions are provided on how to achieve the intended results. Typically, quantitative data analysis is used, but conclusive research design can be either descriptive or causal (Malhotra et al. 2017). The following section will discuss these approaches in turn.

Table 7.3 Exploratory and conclusive research

<table>
<thead>
<tr>
<th>Type of research</th>
<th>Aim</th>
<th>Characteristics</th>
<th>Findings</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exploratory</strong></td>
<td>Insights and understanding of marketing phenomena.</td>
<td>Information needed is loosely defined.</td>
<td>Can be used in own right.</td>
<td>Unstructured interviews.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Research process is flexible and may evolve.</td>
<td>May assist with conclusive research.</td>
<td>Pilot surveys.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Small samples.</td>
<td>May illuminate conclusive findings.</td>
<td>Secondary data.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data analysis can be quantitative or qualitative.</td>
<td></td>
<td>Qualitative interviews.</td>
</tr>
<tr>
<td><strong>Conclusive</strong></td>
<td>Test hypotheses and measure relationships.</td>
<td>Information needed is clearly defined.</td>
<td>Can be used in own right.</td>
<td>Questionnaires.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Research process is formal and structured.</td>
<td>May feed into exploratory research.</td>
<td>Secondary data.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sample is large.</td>
<td>May set a context to exploratory findings.</td>
<td>Databases.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data analysis is quantitative.</td>
<td></td>
<td>Panels.</td>
</tr>
</tbody>
</table>

Source: Malhotra et al. (2017)

7.10.4. Descriptive research

Descriptive research can be a prerequisite to or extension of exploratory research (Saunders et al. 2016) therefore a clear picture of the research area is required. Often descriptive research is based on large samples such as market studies, or sales analysis (Malhotra et al. 2017). Descriptive studies aim to gain a clear and accurate perspective on a particular issue or subject (Saunders et al. 2016), gathering information on the characteristics of objects or people (Sekaran and Bougie 2016). The problem in descriptive research is usually structured and well-understood and the aim of the research is clear. Descriptive research can be either qualitative (in describing the decision-making process) or quantitative in measuring ratings, figures or demographics (Sekaran and Bougie 2016). Clear and effective measurement is used in descriptive research to meet the required structure, rules and procedures (Ghauri and Gronhaug 2010).
7.10.5. Casual research

Causal research enables the identification of relationships and can allow for understanding of the influence of dependent variables on independent variables or test hypotheses (Malhotra et al. 2017). Causal research requires a structured approach similar to descriptive research any variables that may affect the dependent variables must be checked and controlled for (Malhotra et al. 2017). Casual research focuses on the problem to identify the cause and effect of something (Ghauri and Gronhaug 2010). Figure 7.4 summarises the relationships between marketing research designs.

![Figure 7.4 Marketing research designs](source: Malhotra et al. (2017))

7.11. Research design for this study

The research design for this study was a mixed methods approach. Following qualitative research from quantitative surveys can assist with the interpretation of the quantitative findings. It can also assist to “contextualise the behaviour” and understand underlying trends (Hennink et al. 2011 p.55). In this study, the latter provides the rationale for the use of mixed methods in a quantitative followed by qualitative manner. Figure 7.5 illustrates how the data was collected in this research, with each stage building upon the previous to provide richer meaning for the study.
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Figure 7.5 Illustrative design linking quantitative and qualitative data
Adapted from: Miles and Huberman (1994).

The quantitative research was undertaken as an initial sequence. The qualitative research provides a secondary stage as it focuses on exploratory post-purchase evaluations of a physical garment and separate interface. Sequencing can assist to increase the validity of results in seeking of causality (Easterby-Smith 2015, Malhotra and Birks 2012). This research undertakes three layers of approach, considering the perspectives of consumer, industry and academic approaches to the area. Respondents were drawn from a population, in this case females who have shopped online in the past six months. This controlled reliability and validity of the experiments, measured against theory to develop consistent latent constructs and a conceptual model.

7.12. Choice of stimuli

The technology used as stimuli in the research were two types of fit and sizing interfaces: fit visualisation and size and style recommendation. The quantitative stimuli was a fit visualisation interface called Metail. Using Metail, consumers can create a parametric avatar by entering their height, weight and bra-size. The fit of garments is visualised on the avatar to enable consumers to make better decisions regarding which size to purchase online. The qualitative stimuli were two size and styling recommendation interfaces developed by Dressipi featured on Very.co.uk and Topshop.com. The Dressipi interface uses consumer inputs such as clothing fit preference, body confidence and colour preferences to produce size and style recommendations. The two types of interfaces chosen reflected fit and sizing technologies that existed in online consumer fashion environments but require different types of interactions and different outputs. Types of technologies available to consumers in online contexts were outlined in detail in Chapter 3 Section 2.1. Chapter 3 also explains the classifications of fit visualisation, size recommendation and fit recommendation from Gill (2015) along with the required consumer inputs and outputs.

7.13. Industry collaborations

Industry collaborations were set up during the exploration of the research topic during the initial stages of the research design. Relationships with industry were built through networked opportunities and contacting fit and sizing technology companies directly. The collaboration with Shop Direct (Very.co.uk) was formed through meeting with the search and navigation
team and networking within the e-commerce function. This working relationship was sustained from March 2016 - March 2017 and facilitated the research by providing the researcher with access to the user experience research premises at the Head Office of Shop Direct where try-ons took place. The garments were provided by the retailer and ordered on behalf of the research team. Collaborating with Very.co.uk also enabled participants involved in the research to experience a fashion retailer head office and also received a tour of the photography studios.

The use of Dressipi was established through other networking opportunities with contacts working with a major UK retailer that had links with Dressipi. Companies were protected by anonymising any research interviews that were conducted and use of non-disclosure agreements. Fit and sizing technology companies were also visited across London and stakeholders were invited to the University in order to establish research-based relationships in the area of fit and sizing. Conversations and interviews were conducted as outlined in Stage 3 of this research which assisted with the research design, process of research and commercial application. The commercial context provided a unique insight into the research that has not been captured from both retailer and fit and sizing technology start-up perspectives.

7.14. Data collection

This research applied a mixed method approach to the collection of data. Firstly, quantitative online surveys (conclusive) were undertaken as a prerequisite to the qualitative stage (exploratory). This was due to a need to gain an in-depth understanding of the consumer’s perspective of the online virtual platforms that allow for product evaluation. This was important as literature did not consider virtual fit stimuli that was suitable for this study to build from.

7.14.1. Online Surveys

Online surveys are also called self-completion questionnaires (Bryman and Bell 2015, Malhotra et al. 2017). Online surveys are a low cost and convenient method for data collection, accessed by a web browser or mobile (Saunders et al. 2016). Online surveys pose many benefits to the researcher and participant, including access to unique populations, time and cost (Kevin 2005). This research adopted online surveys through the platform Survey Gizmo to obtain responses for stage 1 quantitative questionnaires. The following section describes the research design for the study, including the development and application of the surveys.

7.14.2. Quantitative: Questionnaires (Stage 1)

The quantitative questionnaires were in the form of inferential surveys. This allowed the testing of constructs (Easterby-Smith 2015) adopting an internal realist ontology. The stimuli
website used for the quantitative stage was Metail virtual fitting room, this allowed for testing of many of the key components of developing virtual fit interfaces. This interface is one of few embedded into actual retailer platforms, though in a beta stage of testing it does not facilitate purchases. A consumer panel called Critical Mix recruited the participants. The survey asked the participants about their age, income and basic demographics, before asking them to use the Metail website and then complete the remaining questions. This allowed participants to explore the interface in a manner accessible to current consumers and provide details enable results to be analysed and compared with existing studies. Participants were screened prior to data collection, based on their online shopping history. The inclusion criteria used in the survey screening is outlined in Table 7.4. These questions were included to ensure the desired sample was measured in the online survey, the survey aligned with the practices of critical mix and only usable data was collected.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Reject/accept</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your age?</td>
<td>&lt;18</td>
<td>Reject</td>
</tr>
<tr>
<td></td>
<td>18-24</td>
<td>Accept</td>
</tr>
<tr>
<td></td>
<td>25-34</td>
<td>Reject</td>
</tr>
<tr>
<td></td>
<td>35-44</td>
<td>Reject</td>
</tr>
<tr>
<td></td>
<td>45-54</td>
<td>Reject</td>
</tr>
<tr>
<td></td>
<td>55-64</td>
<td>Reject</td>
</tr>
<tr>
<td></td>
<td>65+</td>
<td>Reject</td>
</tr>
<tr>
<td>What is your gender?</td>
<td>Male</td>
<td>Reject</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>Accept</td>
</tr>
<tr>
<td>Do you shop for clothes online?</td>
<td>Yes</td>
<td>Accept</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Reject</td>
</tr>
<tr>
<td>Have you shopped online in the past 6 months?</td>
<td>Yes</td>
<td>Accept</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Reject</td>
</tr>
<tr>
<td>Do you live in the UK?</td>
<td>Yes</td>
<td>Accept</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Reject</td>
</tr>
</tbody>
</table>

Constraints were also set within the survey to ensure the questions were answered in the desired format. Each question was mandatory and was marked with an asterisk to ensure participants gave an answer. No incomplete responses were used in the analysis. Questions about online shopping behaviour were also included, and if participants stated they did not shop online they were also kindly disqualified. This filtering mechanism is usual within Critical Mix research and helps to ensure participants from their pool are those who are desired by those commissioning the questionnaires.

After technology readiness was measured, the participants were directed to the Try Metail website, and were given a set of instructions to complete the task. The task included creating a personalised avatar by entering height, weight and bra-size measurements. This is the usual criteria required by Metail and corresponded with practices of many of the interfaces as shown in Chapter 3. Participants could also further personalise the avatar’s appearance including adjusting hair colour and skin tone. The participants were then required to virtually try-on some garments from a pre-selected range available on the Try Metail website. Once they had
completed this they were re-directed to the survey. A page with a mandatory question was included after the task to ensure all participants had completed it. Figure 7.6 shows the process of the Metail task.

![Diagram showing the Metail virtual try-on process](image)

**Figure 7.6 Metail virtual try-on process**

The next section will describe the questions and constructs that were used in the online survey. The questions and constructs were modelled on existing marketing scales and literature and dependent variables identified and validated by academic studies. This showed that the research approach for stage 1 was deductive (Gill and Johnson 2010). Constructs and subsequent responses from the survey were underpinned theoretically using the Technology Acceptance Model (Davis 1989) and discussed in Chapter 6.

### 7.15. Question content

Researchers must determine question content to derive the required information from participants. This includes the selected theoretical underpinning of the constructs to be tested. Question content is important due to the need to critically address the need for generating the response data from the respondent (Brace 2008). Questions may be asked that are neutral at the beginning of the questionnaire to gain the involvement of the participant. Sometimes multiple questions are required to gain the information from the participant that the researcher aims to produce, these can often be followed with a ‘why’ question (Malhotra et al. 2017). Providing respondents with a ‘why’ or neutral response enables the participant to provide an answer where they may not know the answer. In addition, filter questions can also be used to ensure participants are familiar with question content. Online surveys provide the opportunity to filter participants based on factors such as past experiences (Malhotra et al. 2017). The question content for the study were derived from tested marketing scales published
in academic journal papers. This was to ensure accurate measurement of the constructs related to the participant, stimulus and the theoretical background (TAM) were captured.

7.16. Question wording

Malhotra et al. (2017) suggest that question wording is the most critical part of questionnaire design. This can lead to “item non-response” where the data can become difficult to analyse. Or it can lead to “response error”, which will create bias within the results (Malhotra et al. 2017 p.329). Questionnaires where the researcher is not present are limited in terms of communication and do not provide the respondent with further opportunity to gain clarity on a poorly worded question. Three suggestions are made by Malhotra et al. (2017), which include “define the issue”, “use ordinary words” and “use unambiguous words” (Malhotra et al. 2017 p. 389). The use of who, what, when and where can help with defining the question. This allows the question content to be carefully considered and the desired information to be obtained. Language that is clear and easily understood should be used when writing a questionnaire this is because the researcher is imposing their words onto the participant (Malhotra et al. 2017). Related to this is the use of unambiguous words. Response bias due to ambiguous words can be eliminated by setting clear time frames within questions rather than vague measures such as “sometimes” (Malhotra et al. 2017).

Similarly, to Malhotra et al. (2017), Sekaran and Bougie (2016) state that factors including appropriateness, sophistication of language, type and form, sequence and personal effects must be considered when wording a question for a questionnaire. To ensure the variables represent the concept being measured, content of the question is crucial. Additionally, language and wording should be equated to the respondent’s level of understanding or culture. In addition, slang should be avoided (Sekaran and Bougie 2016). Type and form of questions enable different response formats, for example open ended or closed. Closed questions enable the respondent to make quick decisions from a list of options, whereas open ended questions require a more considered, personalised approach. Positively and negatively worded questions can assist to steer respondents away from systematically answering questions in a pattern. Considering the influences on question wording, the proposed questions were tested with experienced researchers, edited by the research team and piloted more than once with pilot sample participants.

7.17. Type of response format

The simplest format of closed questions used in online surveys are dichotomous questions, which request a yes or no answer (Brace 2008). Multiple choice questions are another format of closed questioning format. To provide the respondent the choice where a neutral or ‘do not know’ response is called for, a neutral response option should also be considered (Malhotra et
Another type of response format is measurement scales which will be discussed later in the chapter.

### 7.18. Questionnaire layout

The way in which a questionnaire is laid out is important to the clarity of the research and engaging the respondent in the right way. Order effects such questions that are similar should be grouped together. Secondly facts should be asked about before opinions. Thirdly sensitive or objectionable questions should be placed at the end. This may reduce a participant’s likelihood to object to a question. Fourthly, the questionnaire should run in a chronological order so participants can recall information easily (Easterby-Smith et al. 2015). Other aspects such as font size, layout and the use of upper and lower case are all important in presenting the information so that is easy to read by the respondent or interviewer (Brace 2008). With web based surveys, questions can be listed in groups on a page or as single questions. With many participants using technology such as smartphones, the questions should also be considered in multiple screen designs. Brace (2008) suggests using a single page per question, minimising mouse-clicks for ease, including progress bars to aim to avoid participant frustration. The questionnaire layout for the study followed from existing research and modelled the order of TAM constructs. In addition, the questionnaire was piloted on mobile, desktop and tablet devices. A progress bar was added and questions were presented before the ‘fold’ of the scrolling point on the webpage.

### 7.19. Questionnaire design process

The questions chosen for the online survey need to be precisely chosen prior to launch. This should be undertaken after an extensive literature review of existing studies (Saunders et al. 2016) and rigorously based on theory. With online surveys, there is only one opportunity to obtain data from a participant (Saunders et al. 2016) and it may have monetary and time-related constraints attached. Therefore, ensuring the questions chosen and the layout of the survey is achieved prior to launch is crucial. An important part of the questionnaire design understanding which aspects will form dependent variables and which will form independent variables. A dependent variable “changes in response to changes in other variables”. An independent variable “causes changes in that independent variable” (Saunders et al. 2016 p.445). This relates to the constructs that are intended to be tested in the research. The research design process undertaken is outlined in Table 7.5.

### 7.20. Questionnaire design

Questionnaires or surveys allow responses to be obtained from a sample population. Questionnaires are designed to elicit particular information from the sample (Malhotra et al.
2017). There are particular principles associated with questionnaire design according to Easterby-Smith et al. (2015), which allow for the most effective method of capturing the desired information. Online survey design involves the use of survey systems such as survey monkey or in the case of this study, survey gizmo (Sekaran and Bougie 2016). The systems enable the researcher to utilise formats that have been widely used in marketing research, in an online platform. Questionnaire responses can be measured in real time and international samples of respondents can be accessed if needed (Sekaran and Bougie 2016).

In designing the online questionnaire, it was important to consider multiple aspects to ensure responses fitted with the desired area of research. Foddy (1994) proposed a systematic process to ensure questionnaires are designed clearly (Figure 7.6). Firstly, it was important to establish that “each item of the survey should only express one idea.” This is backed up using simple language and ensures analysis does not need to focus on drawing out data from competing themes. Using this approach enables the reduction of ambiguous responses (Ghauri and Gronhaug 2010, Easterby-Smith et al. 2015, p.232). Secondly questions were generated to “avoid jargon and colloquialisms” to ensure no confusion between participants potentially different understanding of the terms. In addition, simple expressions allow for the ease of understanding from the respondents. Thirdly it was determined as important to avoid negatives this is due to the bi-polar nature of Likert scales. However reverse coding is often used in consumer studies and is considered widely acceptable (Malhotra et al. 2017). Fourthly, provide appropriate time for the respondents to give accurate results. For example, including questions about something respondents did a week ago may dilute the credibility of results. Finally, leading questions were avoided. This is due to the selective nature of leading questions and the answers that the respondents may give can be favoured by the wants of the researcher, rather than what the participant thinks is right. (Easterby-Smith et al. 2015 p.232). The process of designing questions for questionnaires is outlined in Figure 7.7 and the research design process for the study is outlined in Table 7.5.

![Figure 7.7 Designing questions for questionnaires](image)

Adapted from: Foddy (1994)
<table>
<thead>
<tr>
<th>Table 7.5 Research design process</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task</strong></td>
</tr>
<tr>
<td>Specify the information needed</td>
</tr>
<tr>
<td>Specify the type of interviewing method</td>
</tr>
<tr>
<td>Determine the content of individual questions</td>
</tr>
<tr>
<td>Overcome the respondent’s inability or unwillingness to answer</td>
</tr>
<tr>
<td>Choose question structure</td>
</tr>
<tr>
<td>Choose question wording</td>
</tr>
<tr>
<td>Arrange questions</td>
</tr>
<tr>
<td>Identify the form and layout</td>
</tr>
<tr>
<td>Reproduce the questionnaire</td>
</tr>
<tr>
<td>Eliminate problems by pilot testing</td>
</tr>
</tbody>
</table>

Source: Adapted from Malhotra et al. (2017).

Measurement is the assignment of numbers to attributes of objects, measurement scales enable the application of the numbers that have been assigned to provide meaning (Sekaran and Bougie 2016). Rating scales are where the researcher asks a respondent to rate their response to aspects such as attitude which is under investigation in the study (Quinlan 2011). Scales offer a broad approach for surveys that employ a large number of respondents. The point of scales is to ensure the same response can be obtained across the sample (Quinlan 2011). Responses to scales are listed as nominal, ordinal, interval and ratio (Brace 2008). These are described including examples and methods of statistical analysis and shown in Table 7.6.

<table>
<thead>
<tr>
<th>Type of Scale</th>
<th>Example</th>
<th>Descriptive</th>
<th>Inferential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal</td>
<td>Student number</td>
<td>Percentages, mode</td>
<td>Chi square, binomial test</td>
</tr>
<tr>
<td>Ordinal</td>
<td>Ranking scale</td>
<td>Percentile, median</td>
<td>Rank order correlation, Friedman, ANOVA</td>
</tr>
<tr>
<td>Interval</td>
<td>Attitudes, opinions</td>
<td>Range, mean, Standard deviation</td>
<td>Product moment correlations, t tests, ANOVA, regression, factor analysis</td>
</tr>
<tr>
<td>Ratio</td>
<td>Age, income, sales</td>
<td>Geometric or harmonic mean</td>
<td>Coefficient of variation</td>
</tr>
</tbody>
</table>

Source: Malhotra et al. (2017)

Nominal scales relate directly to a number assigned to what is being measured and are assigned to discrete categories (Brace 2008). There is a direct relationship between the number and the object which correspond to one another. Ordinal scales rank objects in a series but do not describe the differences between them (Malhotra et al. 2017). Interval scales allow for differences between objects to be compared i.e. in the measurement of temperature. Ratio scales include nominal, ordinal, interval scales and have a set point of zero.

There are many types of scaling methods including continuous rating, q-sort, constant sum and rank order however, only Likert and semantic differential scales will be further discussed. Likert scales refer to the amount of “agreement or disagreement” of a series of statements (Malhotra et al. 2017 p.349). Likert scales have a neutral mid-point where the other response options are positive or negative (Easterby-Smith et al. 2015). Likert scales measure the direction of attitudes towards a stimulus and the force of the attitude (Quinlan 2011). Semantic differential scales are typically a seven-point scale with labels that have either a positive or negative meaning. Adjectives are often used such as “boring” and “exciting” (Malhotra et al. 2017 p.351). Responses to scaled questions can be either binary response, which include either agree/disagree answers. Numerical response formats include a statement where numbers relate to 1=strongly disagree and 5=strongly agree. Verbal formats are where each response is written out in full, from strongly agree, agree, undecided (Malhotra et al. 2017). Bipolar numerical response format is from I love this, 7, 6, 5, 4, 3, 2, I hate this. Frequency formats are where
words using frequency time scales are used such as all the time, often and fairly often (Malhotra et al. 2017). Semantic differential scales identify the participants response which best describes their attitude towards the stimuli (Quinlan 2011). Scales can also be presented effectively in online surveys through a variety of methods which include drop down boxes, arrows or radio buttons (Brace 2008). This research collected nominal, interval and ratio scaled data. The scales were coded prior to data entry in SPSS. Likert scales and five semantic differential scales were used to measure participants attitudes. Table 7.7 shows the scale items for stage 1.
Table 7.7 Scale items for stage 1

<table>
<thead>
<tr>
<th>Construct</th>
<th>Item</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-demographics</td>
<td>Do you shop online?</td>
<td>Goldsmith and Goldsmith (2002)</td>
</tr>
<tr>
<td></td>
<td>Yes/No</td>
<td></td>
</tr>
<tr>
<td>What is your gender</td>
<td>Male/Female</td>
<td>Martin et al. (2015)</td>
</tr>
<tr>
<td>What is your age?</td>
<td>18-24/25-35/36-45/46-55/55-65/65+</td>
<td></td>
</tr>
<tr>
<td>What is your income bracket?</td>
<td>Less than £20,000/£20,000-£29,999/£30,000-£49,999/£50,000-£99,999/£100,000+</td>
<td>Goldsmith and Goldsmith (2002)</td>
</tr>
<tr>
<td>What is your education level?</td>
<td>School/ College/ Graduate/Post-graduate</td>
<td>Powers and Jack (2015)</td>
</tr>
<tr>
<td>How frequently do you browse for clothes online?</td>
<td>Every day/Once a week/Several times a week/Once a month/Ever couple of months/Couple of times a year/Never</td>
<td>Rose et al. (2012)</td>
</tr>
<tr>
<td>How frequently do you purchase clothes online?</td>
<td>Every day/Once a week/Several times a week/Once a month/Ever couple of months/Couple of times a year/Never</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construct</th>
<th>Item</th>
<th>Theory</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology Readiness</td>
<td>Technical terms sound like confusing jargon to me</td>
<td>e-TAM</td>
<td>Kim and Forsythe (2010)</td>
</tr>
<tr>
<td></td>
<td>I have avoided technology because it’s unfamiliar to me</td>
<td>7 point</td>
<td>Ahn et al. (2007)</td>
</tr>
<tr>
<td></td>
<td>I hesitate to use most forms of technology for fear of making mistakes I cannot correct</td>
<td>Likert scale</td>
<td></td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>Using Metail could increase the quality of my online shopping</td>
<td>e-TAM</td>
<td>Kim and Forsythe (2010)</td>
</tr>
<tr>
<td></td>
<td>Using Metail could make me more productive when shopping online</td>
<td>7 point</td>
<td>Ahn et al. (2007)</td>
</tr>
<tr>
<td></td>
<td>Using Metail would allow me to evaluate garments more quickly</td>
<td>Likert scale</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using Metail could improve my online shopping ability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>Using Metail is clear and understandable</td>
<td>e-TAM</td>
<td>Kim and Forsythe (2010)</td>
</tr>
<tr>
<td></td>
<td>Using Metail doesn’t require much mental effort</td>
<td>7 point</td>
<td>Ahn et al. (2007)</td>
</tr>
<tr>
<td></td>
<td>Metail is easy to use</td>
<td>Likert scale</td>
<td></td>
</tr>
<tr>
<td>Playfulness</td>
<td>Using Metail is fun</td>
<td>TAM</td>
<td>Childers et al. (2001)</td>
</tr>
<tr>
<td></td>
<td>Using Metail is enjoyable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using Metail arouses my imagination</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using Metail stimulates my curiosity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>Using Metail is a good/bad idea</td>
<td>e-TAM</td>
<td>Kim and Forsythe (2010)</td>
</tr>
<tr>
<td></td>
<td>Using Metail is superior/inferior</td>
<td>7-point</td>
<td>Ahn et al. (2007)</td>
</tr>
<tr>
<td></td>
<td>Using Metail is pleasant/unpleasant</td>
<td>semantic differential scale</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using Metail is appealing/unappealing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using Metail is excellent/poor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intended Use</td>
<td>I would be likely to use Metail again for fashion shopping in the future</td>
<td>e-TAM</td>
<td>Kim and Forsythe (2010)</td>
</tr>
<tr>
<td></td>
<td>I would be likely to visit Metail for fashion shopping in the future</td>
<td>7 point</td>
<td>Ahn et al. (2007)</td>
</tr>
<tr>
<td></td>
<td>I would be likely to purchase fashion from Metail in the future</td>
<td>Likert scale</td>
<td></td>
</tr>
</tbody>
</table>

7.22. Fatigue and order effects

Fatigue is indirectly out of the researchers control, as although it can be aimed to be reduced it cannot be controlled by the researcher during the time the participant completes the survey (Brace 2008). Through following the procedures mentioned in the research design and wording sections, the amount of fatigue can also be reduced. Pilot studies also assist to assess the respondents level of fatigue when answering the questions and increase the quality of the research instrument through testing. Order bias occurs when participants may select the same...
item throughout the quantitative questionnaire because it occurs in a particular place (Malhotra et al. 2017). Online surveys often have randomising software to change the position of items to be random throughout the survey. In addition, positively and negatively worded items assist to ensure the participant is engaged throughout the survey.

### 7.23. Participant interviews

Interviews generate qualitative data where key respondents can be identified (Quinlan 2011). Types of interview formats include one-to-one, group interviews, telephone interviews, online interviews and photo-elicitation interview. Interviews enable a level of conscious and subconscious response that cannot be obtained through quantitative methods of enquiry. Stage 2 of the research focused on one-to-one exploratory interviews. During interviews, the researcher should identify what is valuable information and remember it (Easterby-Smith et al. 2015). Interviewers should be good at listening and ensure they remain objective to the conversation. Key elements of interviews include maintaining participant trust, building a social rapport with the participant and the location and setting of the interview (Easterby-Smith et al. 2015, Quinlan 2011). These are all key factors that need to be considered when conducting interview research. Qualitative interviews allow the researcher to be immersed within information that might have been difficult to collate or receive adding a unique layer to the analysis.

Qualitative industry interviews in stage 3 were undertaken for this research as they enabled for the discussion of current issues within the context of the research. One of the benefits of thematic analysis of interviews in research is the information that is uncovered, that is not easily accessible in normal research environments e.g. published papers, conferences, commercial publishing and the media. There is little academic involvement in the fashion and retailing industry, thus providing an opportunity for the fusion of the two approaches, creating a desire to collect innovative and unique data. With virtual fit and fashion technologies developing rapidly, industry perspectives can provide insights into the future development with those that have acquired a first-hand understanding (Malhotra et al. 2012). This was also discussed in Chapter 6.

The area of digital fit and sizing has proven to be subject to high levels of short-term change, which is not captured in current academic publications, this insight from industry, helps to capture this and enable it to be recognised in this work. This extends from research undertaken by Miell et al. (2018). Commercial interfaces also govern how and when consumers will experience these interfaces, developers are often detached from academic theory, and this enables a contrasting between academic theory and application development. There is not a universal, industry-wide platform being used, which may point towards difficulties in the development of the applications and websites. Retailers and technology companies use
different fit and sizing platforms and trial them at different periods. The interviews with industry participants allowed for wider perspectives on the individuals’ position, utilisation by the industry and their effectiveness within their websites.

7.23.1. Semi-structured interviews

Interviews can be structured or unstructured (Hennink et al. 2011). Semi-structured interviews provide a guide to topics to be discussed (Easterby-Smith et al. 2015). Interview formats usually follow the structure of an introduction, including introducing the researcher, the research topic and any ethical information. Then it is followed by opening questions which build rapport. Semi-structured interviews enable the interviewee to express themselves in relation to the stimuli investigated (Quinlan 2011). Meanings, understanding and personal experience can therefore be derived, whilst the researcher can remain impartial and unbiased. Qualitative interviews will be conducted in the study with an open-ended questioning technique. The interviews with participants (try-ons) and interviews with industry experts were both semi-structured. This enabled the participant to express their feelings about the situation or product rather than producing specific answers unlike in the quantitative data collection. The interview discussion guide for stage 2 is shown in Table 7.8.

7.24. Qualitative: Garment try-ons and interviews (stage 2) – Very.co.uk collaboration

The qualitative research took the form of clothing try-ons and interviews, which allowed participants to explore their actual clothing fit experiences based on product purchased using recommendation systems. The try-ons for Very were conducted in collaboration with Shop Direct (group owner company of Very). The stimuli websites that were used were Very.co.uk Style Advisor and the Topshop Style Quiz, these were selected as they were fully integrated within retailer websites that the sample participants were familiar purchasing with. The Very style adviser is a product recommendation tool that enables a user to generate a selection of garments displayed with their appropriate size to purchase. The two Dressipi interfaces were chosen as Topshop was a newer version of the interface than Very. This allowed for the comparison of the use of Dressipi within two retailers and between the influence of a more developed platform to be tested. This is shown in Figure 7.8 and 7.9.

7.24.1. Garment Selection using Dressipi

This initial process was undertaken on an iPad, whilst the researcher recorded the participants responses on an excel spreadsheet. The stages of the process was captured using screenshots. The Dressipi style adviser asked the participant questions about body measurements, clothing preferences and occupation to form a picture of their shopping habits, behaviours and preferences. The style quiz and style adviser took around ten minutes to complete and was
undertaken with prospective participants to establish if they would like to progress further through the research. Once this was completed, the participants were provided with product recommendations, which they were asked to pick a dress that they would consider trying on in a real-life, physical fit situation.
Figure 7.8 Very.co.uk Style Adviser Image

Figure 7.9 Topshop Style Quiz Image

7.24.2. Garment Try-ons and Interviews

The interviews were firstly undertaken at Very.co.uk and the Topshop sample were undertaken at the University of Manchester. The Very try-ons were facilitated by the e-commerce search and navigation team and dates were arranged where participants travelled to the Head office to participate in the interviews. These websites are hosted by product recommendation systems.
developer Dressipi. Dressipi is one of the few embedded technologies that was linked to actual product purchase, allowing it to be tested with actual garments. Participants were required to take the style adviser (Very) and the style quiz (Topshop) and select garments from their recommended selection and recommended size. Through this process the researcher was able to build a rapport with the participants, ensure they were clear with the process and organise a convenient time for the garment try-on. Once this rapport was established, the try-ons occurred once the garment had been ordered on behalf of the participant. The interviews were undertaken at Very.co.uk Head office in Speke, Liverpool using their user experience laboratory facilities. The try-on audio was recorded to capture the discussion of the interviews. In total, over a period of 5 months, 3 full days of interviews were conducted with an average of 6 interviews undertaken per day. For the Topshop part of the research, the process followed the same structure as the Very try-ons, however the garments were ordered by the researcher and delivered to the University of Manchester. The try-ons took place in a private cubicle and interview room at the University of Manchester, in accordance with ethical guidelines. 18 participants were interviewed over a period of around 10 working days. The overall process of stage 2 is summarised in Figure 7.10.

A direct approach was taken regarding the qualitative research. This was also imparted for ethical reasons and follows the method of existing literature (Kim and Forsythe 2007). Interviews were used to gather in-depth information although the depth of focus can control

Figure 7.10 Research process (stage 2)
the outcome of discussion. The discussion was based on a pre-determined interview guide (Table 7.8) which the researcher used to structure the interview. The analysis process followed grounded theory where insights can be constructed to form explanations or theory (Ghauri and Gronhaug 2010). Qualitative research addresses both the conscious and sub-conscious levels of the respondent additionally, the researcher can gain a holistic understanding of the responses through techniques such as ethnography (Malhotra and Birks 2012). Therefore, the research approach for the qualitative was inductive and exploratory. Qualitative data records the naturally occurring events that happen, in this instance participants were recorded during a garment try on phase after they had selected the garment online. This replicates the process that would be normally undertaken by a consumer when shopping online similar to a physical changing room or try-on at home. The process used was based on a three-stage thematic analysis (open, axial and selective) of the factors fit satisfaction, size satisfaction, fabric expectations, colour and print, style and length gave the initial themes, labelled as open codes. This is further discussed in Chapters 8 and 10. The interview discussion guide for stage 2 is shown in Table 7.8 and the themes discussed in Chapter 6.

Table 7.8 Interview discussion guide (stage 2)

<table>
<thead>
<tr>
<th>Reference adapted from</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
</tr>
</tbody>
</table>

**Performance Evaluation**

<table>
<thead>
<tr>
<th>Reference adapted from</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fit satisfaction</td>
</tr>
<tr>
<td>Size satisfaction</td>
</tr>
<tr>
<td>Fit expectation</td>
</tr>
<tr>
<td>Comparative fit satisfaction</td>
</tr>
</tbody>
</table>

**Aesthetic Evaluation**

<table>
<thead>
<tr>
<th>Reference adapted from</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour and print quality</td>
</tr>
<tr>
<td>Length</td>
</tr>
<tr>
<td>Style satisfaction</td>
</tr>
</tbody>
</table>

**Interface Evaluation**

<table>
<thead>
<tr>
<th>Reference adapted from</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase intention</td>
</tr>
<tr>
<td>Future use</td>
</tr>
<tr>
<td>Post-use evaluation</td>
</tr>
</tbody>
</table>
Qualitative data analysis was used as it takes into the account the nature of trying on a garment for the first time, qualitative data emphasises the use of context and its role embedded in the case (Miles and Huberman 1994). Thus, use of data collection methods and analysis enabled strong inferences that are made when a consumer tries on a garment to be realised. Qualitative data analysis is useful when exploring a new subject area, and the use of recommendation software was used in the context of this study, therefore this is a recognisable benefit of using a qualitative method. Qualitative data analysis requires reflection and analysis throughout the study and then interpretations can be made (Creswell 2009). Additionally the impact of latent issues surrounding consumer use of product recommendation systems when purchasing can also be recognised (Miles and Huberman 1994).

7.24.3. Qualitative: Industry interviews (stage 3)

During the research, opportunities arose to collect information from key companies involved in virtual fit as discussed in Section 7.13. Data was collected the form of interviews and thematic analysis was chosen to analyse the interviews as it allows for exploration of themes within qualitative data (Hennink et al. 2011). Malhotra et al. (2012) state that industry experts can help diagnose a research problem. The first stage of thematic analysis was to search and carry out interviews with relevant industry figures. This was according to retailers and companies who are in the UK and have an affinity with the concepts of Virtual fitting, e-sizing, recommender systems and augmented reality. The participants asked to undertake these interviews were either in higher-management positions or specific roles to the subject areas of interest. Themes relevant to the subject areas were used as a basis, in conjunction with the summary data of the interviews to develop a framework. Descriptive and analytical themes were drawn from the data, via coding. Malhotra et al. (2012) state that the interviews should be flexible enough to evolve to capture the insights from industry professionals. Industry professionals can also give insights into the future development of emerging technology. The interview discussion guide for stage 3 is shown in Table 7.9.
Table 7.9 Example interview discussion guide (stage 3)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview</td>
<td>10-15 minutes about my research on the Dressipi Style Adviser. This study is looking at existing Virtual Fit websites available to consumers in the context of Online Fashion Retailing. Qualitative interviews with retailers, Virtual Fit companies and relevant figures in the fashion and retailing industry will be undertaken, in order to build a broad understanding of Virtual Fit. The study will also consider consumer perspectives, which will take the form of qualitative and quantitative data collection. Questions/remarks. Please could you give an overview of your background, what led you to the retail sector and your current role?</td>
</tr>
<tr>
<td>Personalisation and Data</td>
<td>You have described personalisation as the next big driver of growth for X, having launched personalised versions of the homepage, search and product pages. Can you explain more about these aspects of personalisation and which you will continue to work on? How important is purchase history and consumer feedback in this? X is described as a ‘data driven fashion label’ can you explain more about this, and which parts of the consumer journey are used to mine the data? Given the increasing awareness of data within retailing and how it can harness growth potential if used correctly, how do you envisage this to continue within the retailing sector?</td>
</tr>
<tr>
<td>Omni-channel</td>
<td>Given the growth of Omnichannel retailing, what efforts are being put towards continuous integration of X across multiple channels? How did the move from catalogue to entirely digital impact the business? Structure, expertise and consumer loyalty? Click and collect has been a key success for X, are there any other cross-channel strategies being implemented in the future, to increase consumer touch-points with the business?</td>
</tr>
<tr>
<td>Online technology/product conversion tools</td>
<td>Tangiblee gives consumers perspectives on size in relation to other goods they own before purchase. In the context of clothing, do you think there is demand for consumers to use similar technology by matching consumers of similar sizes (body measurements) and comparing their garment purchases? What other types of technology products have you considered or are considering launching into the website in the future? Sizing is problematic in the retail industry, are you investing in the area of size and fit? In terms of technology? For example 3D Body Scanning/Product development expertise? How important is fit, size and style to your own brands? Do you feel that measuring this in conversion and returns would give useful insights? Have you found consumer brand loyalty with your retailer partners has an effect on consumer purchasing confidence, what looks good and fits them? How does this compare with your own brands?</td>
</tr>
<tr>
<td>Data and Privacy</td>
<td>Data laws are changing, consumers will soon own their data and companies must be transparent and responsible with data. X have a big focus on Data as a means to future growth, do you think this will this become a bigger dimension to retail business structure in the future? Have you found privacy and security concerns from consumers to be an increasing issue?</td>
</tr>
<tr>
<td>Concluding questions</td>
<td>What do you think is the next move for online retailing in terms of growth and innovation? Do you have any questions for me?</td>
</tr>
<tr>
<td>Many thanks for your time.</td>
<td></td>
</tr>
</tbody>
</table>
Qualitative interviews can allow consideration of the opinions of a range of stakeholders in the area of digital fit and sizing, including developers, senior management. The data collected through the interviews and analysed using thematic analysis gives context and perspectives which were considered during the analysis of the overall results. Due to lack of insight into the industrial settings of technology, exploratory interviews allow for linking of academic literature and themes to industrial discussion. Industry professionals were interviewed due to networks made with key figures. The interviews were performed in a semi-structured way, which enabled the researcher to gain responses on the key areas concerned with the research. The industry interviews give insight to the area that has not been collected and allowed for the comparison and contrast of academic approaches to the area. The information gained from industry was essential in framing the area, as industry play a large part in guiding the future availability of such product stimuli for consumers.

7.25. Sampling

Sampling is a crucial stage in the research project. Sampling should identify the population of the study and the intended size of the population. Additionally, the sampling design should be decided, whether it is single stage or multistage. The selection process should also be defined to ascertain how much chance a respondent has at being selected. Identification of whether stratification will be included should also be decided, this is where characteristics will be represented in the sample e.g. males or females (Creswell 2009). There are two types of sampling used in marketing research namely probability and non-probability sampling. The next section describes these approaches and the techniques used in this research. Sampling consists of six steps according to Malhotra et al. (2017) that are shown in Table 7.10.

<table>
<thead>
<tr>
<th>Table 7.10 Sampling design process</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sampling Design Process</strong></td>
</tr>
<tr>
<td>Define the target population</td>
</tr>
<tr>
<td>Determine the sampling frame</td>
</tr>
<tr>
<td>Select a sampling technique</td>
</tr>
<tr>
<td>Determine the sample size</td>
</tr>
<tr>
<td>Execute the sampling process</td>
</tr>
<tr>
<td>Validate the sample</td>
</tr>
</tbody>
</table>

Source: Malhotra et al. (2017)

7.26. Sampling techniques

The next section will discuss a range of sampling techniques used in marketing research.

7.26.1. Probability sampling

Probability sampling is where each participant is selected at random. The elements of the population have a nonzero chance of being selected (Sekaran and Bougie 2010). It aims to produce the lowest amount of sampling error and it tends to be representative of a population.
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(Malhotra et al. 2017). Probability sampling includes simple random sampling, stratified sampling, systematic sampling and cluster sampling (Quinlan 2011). Probability sampling is often involved with conclusive research. Researchers that use probability sampling are aiming to generalise the findings to the population of the study (Quinlan 2011). Table 7.11 describes probability sampling techniques.

### Table 7.11 Probability sampling techniques

<table>
<thead>
<tr>
<th>Technique</th>
<th>Characteristic</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple random sampling</td>
<td>Each element could be equally drawn at random. Lottery system. A sampling frame is compiled and each element has a number numbers are generated at random. “No opportunity for human bias.” Works best with over 100 elements.</td>
<td>Malhotra et al. (2017) Bryman and Bell (2015) Saunders et al. (2016)</td>
</tr>
<tr>
<td>Stratified sampling</td>
<td>Proportional representation of sections of sampling elements. Can be prone to sampling error.</td>
<td>Bryman and Bell (2015)</td>
</tr>
<tr>
<td>Cluster sampling</td>
<td>Can allow focus on geographical location. Any groups within the population. Large sample sizes.</td>
<td>Bryman and Bell (2015) Saunders et al. (2016)</td>
</tr>
<tr>
<td>Multi stage/Multi stage cluster sampling</td>
<td>Overcome issues associated with geographical sampling. Large sample sizes.</td>
<td>Saunders et al. (2016)</td>
</tr>
</tbody>
</table>

Adapted from: Malhotra et al. (2017), Bryman and Bell (2015) and Saunders et al. (2016).

#### 7.26.2. Non-probability sampling

Much qualitative research focuses on non-probability sampling. However, it is not exclusive to qualitative as some quantitative studies can be non-probable (Malhotra et al. 2017). Non-probability sampling or purposive sampling focuses on selecting a group of respondents that are not random (Malhotra et al. 2017). Therefore, the non-probable sample is related to the research questions and the research context (Malhotra et al. 2017). The sample represents the population but cannot be generalised to the population (Quinlan 2011). Non-probability sampling is often used with exploratory research. Table 7.12 describes non-probability sampling techniques.
Table 7.12 Non-probability sampling

<table>
<thead>
<tr>
<th>Technique</th>
<th>Characteristic</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience</td>
<td>Also known as haphazard. Based on individuals available at the time. Prone to bias. Low credibility.</td>
<td>Saunders et al. (2016)</td>
</tr>
<tr>
<td>Purposive</td>
<td>Elements are selected based on the ability to provide answers to research objectives.</td>
<td>Saunders et al. (2016)</td>
</tr>
<tr>
<td>Critical Case Sampling</td>
<td>Cases are selected as they can most effectively portray the point required. The cases are an important segment of a target population.</td>
<td>Saunders et al. (2016)</td>
</tr>
<tr>
<td>Quota</td>
<td>Non-random sampling method. Sample represents the variation in a population via a quota of that population. Used for a large target population. The representation of a quota sample is dependent on the selection of particular quota characteristics</td>
<td>Saunders et al. (2016)</td>
</tr>
<tr>
<td>Snowball</td>
<td>Where it is difficult to identify and connect with individuals that are part of the target population required. Data collected by advertising research or approaching individuals. Cases may have required characteristics for the research. May have strong feelings or opinions about the research area.</td>
<td>Saunders et al. (2016)</td>
</tr>
</tbody>
</table>

Source: Saunders et al. (2016)

7.27. Determining sample size

Sampling design and sample size are important to represent the sample (Sekaran and Bougie 2010). Sample sizes can be difficult to define, as there is no golden rule as to how many elements in a sample is enough. It is thought that the larger the sample size, the more precise the results (Bryman and Bell 2015). However, if the sampling design method has not been chosen, then the sample will not be representative, no matter how large the sample is. Large sample sizes can lead researchers to accept findings when they should be rejected, also known as a Type II error (Bollen and Long 1993). In other words, the relationships between two variables may be weak although reaching significance, when they should not be significant (Sekaran and Bougie 2010). Large sample sizes should therefore be executed with caution to such errors. There are many factors related to the sample size. Sampling error is a key part of choosing a sample size in terms of the level of error that can be tolerated (Bryman and Bell 2015). The method of analysis that will be used in the research is also an important consideration for sample size (Saunders et al. 2016). In addition, the overall size of the population investigated (Saunders et al. 2016) should also be estimated and reflected in the choice of sample size chosen. With quantitative surveys, time and cost is a significant factor when deciding sample size (Malhotra et al. 2017). In terms of sampling precision, quantitative researchers are focussed on achieving 95% certainty (Saunders et al. 2016). With qualitative
samples Saunders, et al. (2016) suggest increasing the sample size until data saturation has occurred. In other words, when no new themes are discovered through further analysis.

7.28. Sampling techniques used in this research

The sampling techniques used in the research are purposive and snowballing. Table 7.13 documents the technique used at the correlating stage of research. The following section describes the sample in more detail.

<table>
<thead>
<tr>
<th>Table 7.13 Sampling techniques used in the research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Stage 1</td>
</tr>
<tr>
<td>Stage 2</td>
</tr>
<tr>
<td>Stage 3</td>
</tr>
</tbody>
</table>

7.28.1. Quantitative sample (stage 1)

An online survey was developed to measure female consumer acceptance of Metail virtual try-on technology. 8 latent constructs were measured through the online questionnaire, which took around 15 minutes to complete. Survey responses were obtained through Critical Mix, an online consumer panel. Respondents were targeted by gender, age and prior experience of online shopping. Online surveys have been used in extant virtual fit research to collect response data (Kim and Forsythe 2008). Online survey distribution through a consumer panel posed many sampling benefits to the study, such as speed of data collection, flexibility and controlled sampling (Evans and Mathur 2005). The quantitative research was projected at females aged 18-24 due to the innovativeness of the sample. As the study measured consumer responses to online virtual fit platforms, no pre-existing knowledge on garment fit was needed. This was aimed to produce the most realistic and externally valid results (Malhotra and Birks 2012).
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7.29. Quantitative sample size

The sample size chosen for the study n=400 and was adapted from existing studies that have virtual fitting room or virtual closet stimuli, TAM theory and Structural Equation modelling (SEM) analysis (Kim and Forsythe 2008, Perry 2016) shown in Table 7.14.

Table 7.14 Sample sizes used in virtual fit research

<table>
<thead>
<tr>
<th>Authors</th>
<th>Stimuli</th>
<th>Theory</th>
<th>Sample size</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Lee et al. 2006)</td>
<td>Virtual Model Technology</td>
<td>TAM</td>
<td>208</td>
<td>SEM</td>
</tr>
<tr>
<td>(Kim and Forsythe 2007)</td>
<td>3D Viewing Technology</td>
<td>TAM</td>
<td>978</td>
<td>SEM</td>
</tr>
<tr>
<td>(Kim and Forsythe 2008)</td>
<td>Virtual Model Technology</td>
<td>TAM</td>
<td>491</td>
<td>SEM</td>
</tr>
<tr>
<td>(Kim and Forsythe 2010)</td>
<td>Product Virtualisation Technology for online shopping small electronics</td>
<td>e-TAM</td>
<td>681</td>
<td>SEM</td>
</tr>
<tr>
<td>(Pantano and Servidio 2012)</td>
<td>3D Virtual Store</td>
<td>TAM (HCI)</td>
<td>150</td>
<td>SEM</td>
</tr>
<tr>
<td>(Domina et al. 2012)</td>
<td>Fashion Shopping with Second Life</td>
<td>TAM</td>
<td>119</td>
<td>SEM</td>
</tr>
<tr>
<td>Huang and Liao (2015)</td>
<td>Augmented Reality Information Technology (Virtual Model)</td>
<td>TAM</td>
<td>220</td>
<td>PLS</td>
</tr>
<tr>
<td>(Perry 2016)</td>
<td>Smart Virtual Closets</td>
<td>TAM</td>
<td>443</td>
<td>SEM</td>
</tr>
</tbody>
</table>

7.30. Quantitative survey inclusion criteria

All respondents were required to have shopped online during six months prior to taking the survey. The inclusion criteria for the study were that the participants were female, had shopped in the UK online in the past six months and were aged 18-24. This aligned with existing studies who state that participants selected were under the age of 25 (Pantano and Servidio 2012), or had majority ages of 18-20 (Domina et al. 2012) (Table 7.15). The sample can also be described as Generation Y. Generation Y consumers are born between 1977 and 1994 and are considered an emerging demographic for research (Overmars and Poels 2015). According to Colucci and Scarpi (2013), Generation Y are technology literate, innovative and represent typical fast fashion consumers.

7.31. Demographic sample validity

The consumer segment also represents the demographic 18-24 female consumers who would shop at fast-fashion retailers (Colucci and Scarpi 2013). Mintel (2014a) states that women under the age of 35 claim that viewing items on a 3D model would assist them to shop online, with females favouring retailers that provide such technology. As Metail and other product virtualisation technologies have trialled avatars within fast fashion retailers, this provided the
rationale for the study as these consumers are more likely to try or use new technologies (Lee et al. 2006). Additionally female participants aged 18-24 are likely to be college or University students, which has provided a sampling characteristic for many existing studies (Domina et al. 2012, Merle et al. 2012). University students are users of the web, social media and use technology for enjoyment and entertainment (Kim et al. 2009).

7.31.1. Qualitative sample (stage 2 & 3)

The sampling method used for the qualitative interviews (try-ons) was an a priori approach. This is where the participants needed are identified at the beginning of the research and the sample characteristics do not change as the research evolves (Malhotra et al. 2017). Where possible, the sample was replicated across the two brands, however, 3 participants that took part in Topshop.com had not completed the Very.co.uk style adviser. The participants were selected based on a purposive sampling method. Prior to experiments and try-on the participants were briefly informed of the nature of the style quiz (Poushneh and Vasquez-Parraga 2016). The sample was selected based on alignment with Topshop and Very.co.uk’s target audience and existing research in the area (Table 7.15). The participant’s age ranges were from 18-34 as this is considered to be an innovative sample who shop online (Mintel 2014a) and are interested in fashion technology. The sampling used for the industry interviews is snowball sampling, as by building relationships with industry, further contacts and interviews were developed for the sample.

<table>
<thead>
<tr>
<th>Sample Size used in study</th>
<th>Age distribution of sample</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative Research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>152</td>
<td>Average age of 21</td>
<td>(Merle et al. 2012)</td>
</tr>
<tr>
<td>366</td>
<td>58.8% were 20-24</td>
<td>(Verhagen et al. 2014)</td>
</tr>
<tr>
<td>342</td>
<td>Average age of 22</td>
<td>(Yu et al. 2012)</td>
</tr>
<tr>
<td>385</td>
<td>Average age of 21</td>
<td>(Park and Lennon 2009)</td>
</tr>
<tr>
<td>144</td>
<td>Average age of 22</td>
<td>(Park et al. 2005)</td>
</tr>
<tr>
<td>206</td>
<td>92% were 18-25</td>
<td>(Lee et al. 2010)</td>
</tr>
<tr>
<td>Qualitative Research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>18-45</td>
<td>(Grogan et al. 2013)</td>
</tr>
<tr>
<td>223</td>
<td>18-29</td>
<td>(Alexander et al. 2005)</td>
</tr>
<tr>
<td>150</td>
<td>18-84, 43% were 18-22</td>
<td>(Kimley 2010)</td>
</tr>
<tr>
<td>37</td>
<td>19-35</td>
<td>(Kim and LaBat 2013)</td>
</tr>
</tbody>
</table>

7.32. Pilot testing

Pilot testing is a necessary step in any research to enable any issues to be found and rectified. Pilot testing should be rigorous and undertaken in a one-to-one environment. This enables the researcher to understand how participants may react to the questions (Malhotra et al. 2017, Quinlan 2011). Pilot studies are carried out using small numbers of respondents which mimic those used in the final sample (Quinlan 2011). Pilot tests were performed on stages 1 and 2. It was not possible to pilot test stage 3 due to the nature of snowball sampling which limited the
access to industry professionals. Once pilot tests have been undertaken, revisions can be made to the survey or interview guide. This process enables the correct data to be collected on final launch.

7.33. Ethics and Incentives

Research ethics is a crucial part of any research project. It is undertaken to ensure both the participants and the researcher are informed and protected. Miles and Huberman (1994) state that project worthiness and competence – assessing the contribution of the study and the ability of the researcher is a pertinent factor in research ethics. Aspects that must be considered include confidentiality of information, personal information, protection for the individual and consent are all key to delivering ethically sound research (Sekaran and Bougie 2010). Ethics also includes a participant’s ability to provide informed consent at the beginning of any type of research. It is a procedure that gains permission for the research to take place (Easterby-Smith et al. 2015). Other factors include the “benefits, cost and reciprocity” (Miles and Huberman 1994 p. 291). This allows for the mutual assessment of these three factors on both researcher and participant. Harm, risk, honesty, confidentiality and anonymity are all factors that should be considered with regards to research ethics (Miles and Huberman 1994). The questionnaire and interview discussion guides were sent for ethical review at the University of Manchester’s ethical approval board. The research was reviewed and granted ethical approval from the panel.

In stage 1 participants were incentivised separately to the researcher through Critical Mix, an online survey panel who offer monetary reimbursement to the correct respondents for targeted studies. Incentives for stage 2 took the form of a tour of the Very.co.uk Head Office in Speke, which included the company’s photography studios where live photoshoots were happening. This incentive was created due to the research being in collaboration with Very and designed to target the female fashion oriented sample. The incentive was therefore suitable for the sample age (18-24) and their frequent online shopping behaviour and interest in the fashion industry. This enabled fast and convenient recruitment due to the unique opportunity for participants to visit to a pure-play retailer’s head office. For the Topshop studies which were not held in collaboration with a retailer, participants received a £10 voucher for Amazon or Love2Shop which were supplied through the researcher’s budget. Stage 3 was not incentivised due to the snowball sampling method.

7.34. Quantitative data analysis

The next section will introduce the data analysis for the quantitative stage of research (stage 1).
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7.34.1. Statistical Analysis

Quantitative data can be analysed using statistical analysis. Statistical analysis can be classified as univariate (using one variable) or multivariate (using multiple variables) (Sekaran and Bougie 2016). This relates to the type of data collected in the research. This research uses a multivariate approach, as the data collected is not metric and there are two or more measures of each element or construct (Malhotra et al. 2017). Interdependence techniques are undertaken for the research using factor analysis. The first step of factor analysis is exploratory factor analysis (EFA). This is conducted using SPSS statistical software and enables the researcher to gain a matrix of correlations of coefficients between variables (Field 2009). EFA enables the generation of the “maximum amount of common variance in a correlation matrix using the smallest number of exploratory constructs” (Field 2009 p.629). Factor analysis models represent traditional regression but the independent variables are not measurable (Blunch 2013). Once EFA has been established, confirmatory factor analysis (CFA) can be undertaken. CFA is the secondary version of factor analysis, which allows hypotheses and the relationships between variables to be tested (Field 2009). CFA enables verification of the factors and factor loadings (Brown and Moore 2012). Once factor analysis has passed confirmatory tests, model fit requirements and structural equation modelling is undertaken. Structural equation modelling or SEM is modelling of the dependence relationships among observed constructs which consist of variables (Malhotra et al. 2017). SEM is typically depicts the causal process that creates relationships between variables (Byrne 2010). The result of SEM is an integrated model with regression weights to show the relationships. Software used to support factor analysis and structural equation modelling are IBM SPSS and AMOS (Field 2009).

7.35. Research credibility

There are a number of factors related to the quality of research and credibility is concerned with the trustworthiness of the source (Malhotra et al. 2017). In business research, factors of credibility include research validity and reliability (Bryman and Bell 2015). These areas will be further discussed in the next part of the chapter as criteria for credible business research.

7.36. Research reliability and validity

Reliability is the measure of whether the study could be repeated. Validity and reliability of research is typically embedded within the ontological approach of the study. For example, SEM is highly related to the realist paradigm (Healy and Perry 2000). There are three types of validity, namely measurement validity, internal validity and ecological validity (Bryman and Bell 2015). Measurement validity is related to quantitative research where the construct should reflect the area being measured (Bryman and Bell 2015). To assess the stability of a measure
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it has to have consistency (Bryman and Bell 2015). Reliability is important as it applies to ability of the research measures used to be applied in future research contexts. Reliability in quantitative data analysis is typically measured by Cronbach’s Alpha. Cronbach’s Alpha measures how well the items are positively correlated to one another (Sekaran and Bougie 2010).

Factor analysis can identify the validity of data. The theorised dimensions should emerge within the analysis and represented by the items in the measure (Sekaran and Bougie 2010). If a construct measured is not valid, it is also not reliable (Bryman and Bell 2015). The construct being measured should be checked for both validity and reliability respectively. Internal validity refers to the relationship between two variables. Discriminant validity is where two concepts are not correlated to one another and do not share any covariance. Convergent validity is where there is a high level of correlation between concepts which respond to the same measure.

Survey designs follow a realist ontology. Easterby-Smith et al. (2015) state how survey based research takes a positivist stance for validity. It is common for questionnaires and constructs to be criticised for accuracy, however pilot tests can assist to measure reliability to ensure the research produces consistent results. A similar concern lies with external validity and whether the results can apply to other contexts. This research will be based on marketing scales, constructs and tested using factor analysis, confirmatory factor analysis and model fit. If a researcher interferes with a research setting it may cause invalidity to the findings (Bryman and Bell 2015). The use of external validity measures can apply to quantitative survey settings as they can be generalised to other samples that take the survey. It may be argued that taking surveys is unnatural and therefore results in “limited ecological validity” (Bryman and Bell 2015 p.51).

Bryman and Bell (2017) argue that external validity may also apply to qualitative research. Studies by LeCompte and Goetz (1982) have applied reliability and validity to qualitative research by the application of the research findings to quantitative measures of credibility. Healy and Perry (2000) follow the idea that internal validity of realist qualitative research is understanding that there may a range of influences to the data, rather than setting the research in a laboratory and testing it. The authors argue that realism can be applied to qualitative research if validity and reliability are measured in terms of the research ontological paradigm. Lincoln and Guba (1985) stress that the terms reliability and validity are very much related to quantitative research and emphasise that terms such as credibility, neutrality and confirmability are much more applicable to qualitative research. Strauss and Corbin (1990) also recognised that for qualitative research to be tested new definitions are required to test the quality. Validity in qualitative research has also been argued to be different to quantitative in
that it is related more to rigour in subjectivity, reflexivity and social interaction (Davies and Dodd 2002).

7.37. Qualitative data analysis

Qualitative data analysis requires the researcher to immerse themselves within the data and interpret the responses of the participants (Hennink et al. 2011). Qualitative data analysis is primarily interpretive, Charmaz (2006) defines it was structured but flexible. There are many approaches to qualitative analysis including discourse analysis, content analysis, thematic analysis and biographical or narrative analysis (Hennink et al. 2011). This research adopts grounded theory as the approach to analysing the qualitative data (stages 2 and 3). The following section describes grounded theory and how it is used in this study (stage 2 and 3).

7.37.1. Grounded theory

Grounded theory originated with Glaser and Strauss (1967), and is said to “embrace science and creative elements of emergent discovery” (Hennink et al. 2011). Grounded theory incorporates a subtle positivist approach and an interpretivist approach. Grounded theory is the process of using qualitative data and principles, the process is outlined in Table 7.16. Grounded theory is where the researcher identifies a set of themes or concepts and shows how these are linked using a theoretical model (Miles and Huberman 1994). Grounded theory enables researchers to analyse and understand experiences in depth, by categorising the themes that emerge from the information which are then linked to form theories (Denzin and Lincoln 2003). Grounded theory allows a richer concept of how the study works.
Table 7.16 Grounded Theory Tasks

<table>
<thead>
<tr>
<th>Tasks for Grounded Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbatim Transcripts</td>
</tr>
<tr>
<td>Anonymization</td>
</tr>
<tr>
<td>Develop Codes</td>
</tr>
<tr>
<td>Define codes in codebook</td>
</tr>
<tr>
<td>Code data</td>
</tr>
<tr>
<td>Describe</td>
</tr>
<tr>
<td>Compare</td>
</tr>
<tr>
<td>Categorize</td>
</tr>
<tr>
<td>Conceptualise</td>
</tr>
<tr>
<td>Develop Theory</td>
</tr>
</tbody>
</table>

Source: Hennink et al. (2011)

7.37.2. Inductive and deductive coding

Once the data has been converted to verbatim transcripts and participants made anonymous, coding of the data can begin. A code is an issue, topic, or idea relating to the data (Hennink et al. 2011). Coding of the data is necessary as it enables the labelling of data and grouping of series of information. First level coding is where this summarising can take place, pattern coding is linking smaller themes (Miles and Huberman 1994). Inductive codes are those which originate in the data, and deductive codes originate from the researcher (Hennink et al. 2011). Researchers should use a combination of both inductive and deductive reasoning when analysing qualitative data. Inductive codes demonstrate the factors that emerge directly from the data which is central to grounded theory (Hennink et al. 2011). Inductive codes can be identified through repeated words, annotating transcripts and memo-ing “in-vivo” codes which are words that occur in the transcript (Hennink et al. 2011). Through listing the codes evident in the data, the researcher can summarise ideas about what is going on in the data (Denzin and Lincoln 2003). The researcher then reports the quotations of text and describes the theory or concepts that it relates to. These concepts may be new discoveries or reinforce existing principles or schools of thought.

7.38. Triangulation

Triangulation is the confirmation or disconfirmation of one research method with another (Bryman and Bell 2015). Theory can be validated through corroboration and multiple methods (Campbell and Fiske 1959). Triangulation is also a form of validating qualitative data (Malhotra and Birks 2017). Miles and Huberman (1994) state that triangulation can be completed using two data sources, for example qualitative and quantitative. Findings can be bracketed to achieve a confidence interval (Miles and Huberman 1994, Greene et al. 1989). Bryman and Bell (2015) state that triangulation can help improve confidence in quantitative findings. Indeed, research can be strengthened using triangulation to help counter balance the strengths and weaknesses of mixed methods designs. Stiles (2001) conducted a study featuring the impact of board members to corporate strategy. Stiles (2001) concluded that “multiple
perspectives were necessary to understand the nature of board activity” (Bryman and Bell 2015 p.649). Triangulation can occur as a process within research design, or as a post-research method employed (unintended) to give meaning to the overlap of multiple findings (Bryman and Bell 2015). Triangulation offers an opportunity to strengthen a study (Patton 2001). Triangulation can also assist as a validity procedure in verifying multiple sources of information to form themes within a study (Creswell and Miller 2000, Golafshani 2003). Combinations of both qualitative and quantitative data allow underlying aspects of a broad subject to be gleaned through triangulation (Bryman and Bell 2015). Qualitative findings may supplement quantitative findings or vice versa (Bryman and Bell 2015). Triangulation meets a difficulty where the findings do not corroborate, so the researcher must decide which data source is “right.” This is problematic however in that both sources of data may be equally credible.

In the context of the research the findings from the qualitative data are triangulated with the quantitative survey. This is due to the quantitative survey focussing on technology adoption and the outcome of the qualitative surveys focussing on technology adoption in the future. Therefore, triangulation of these two parts of the research enable a greater understanding of the influence of post-purchase perspectives in their influence on technology acceptance. The link between post-purchase and technology acceptance are discussed in the results (Chapter 10). The use of the qualitative industry interviews provides a strong basis to connect industry perspectives with academic findings through triangulation to give a clear, corroborated outcome which combines the perspectives of consumer, academic and industry.
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7.39. Summary

This chapter has given an in-depth discussion of the research methodology adopted in the study. Table 7.17 gives an overview of the methodological choices made in the chapter.

<table>
<thead>
<tr>
<th>Method</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Ontology</td>
<td>Realism</td>
<td>Realism</td>
<td>Realism</td>
</tr>
<tr>
<td>Research Philosophy</td>
<td>Positivism</td>
<td>Positivism</td>
<td>Positivism</td>
</tr>
<tr>
<td>Research approach</td>
<td>Deductive</td>
<td>Inductive</td>
<td>Inductive</td>
</tr>
<tr>
<td>Research design</td>
<td>Mixed methods - conclusive</td>
<td>Mixed methods - exploratory</td>
<td>Mixed methods - exploratory</td>
</tr>
<tr>
<td>Data collection method</td>
<td>Quantitative</td>
<td>Qualitative</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Format</td>
<td>Online survey</td>
<td>Interviews</td>
<td>Interviews</td>
</tr>
<tr>
<td>Sampling</td>
<td>Purposive</td>
<td>Purposive</td>
<td>Snowball</td>
</tr>
<tr>
<td>Data analysis</td>
<td>Reliability, EFA, CFA, SEM</td>
<td>Grounded theory and Triangulation</td>
<td>Grounded theory and Triangulation</td>
</tr>
</tbody>
</table>

The chapter began by firstly outlining the research ontology, philosophy and research approach. This is followed by the data sources and research design. Then the chapter concludes with information regarding sampling, pilot testing ethics and analysis of the data. The results of the studies will be presented in the order of research stages: stage 1 (Chapter 8), stage 2 and 3 (Chapter 9) followed by discussion (Chapter 10).
Chapter Eight: Quantitative Data Analysis

8.1. Introduction

The following chapter presents the quantitative data analysis and results. The data was firstly coded, and then an estimated factor analysis was performed (Section 8.5). A confirmatory factor analysis was then undertaken (Section 8.6) before continuing to structural equation modelling (Section 8.12). The resulting model and subsequent path values are presented at the end of the chapter (Figure 8.10). Throughout this chapter validation is provided for sample size (Chapter 7), and reliability and validity tests are undertaken for factor analysis and structural equation modelling stages that were measured against recognised fit indices discussed in Section 8.6.8.

8.2. Descriptive statistics and sample validity

Descriptive statistics were measured to quantify specified attributes of the sample (Malhotra et al. 2017). Descriptive statistics allowed for understanding whether the intended sample had been obtained. The frequency distributions for the descriptive statistics measured such as gender and age are shown in Table 8.1. Obtaining frequencies enables a count of the responses that are associated with a value, which shows the amount of response and non-response to a question (Malhotra et al. 2017).

408 full responses were obtained through a consumer response panel named Critical Mix, all participants were screened by Critical Mix prior to starting the questionnaire to ensure they had previously shopped online. In addition, the participants of the survey were pre-screened to ensure they met the sample requirements: were female and aged 18-24. These questions are shown in the top rows of Table 8.1 and represent a 100% valid percent of the sample. Other descriptive analysis included the frequency of browsing behaviour on fashion websites and the frequency of shopping behaviour on fashion websites. From the results of the descriptive statistics it was clear that 50% of participants browse fashion websites several times a week. From the remaining 50%, participants shopped online for fashion once a month or a couple of times a year. The results of shopping and browsing behaviour demonstrate that the sample were proficient online fashion shoppers and were suitable for the survey. Other statistics analysed include education level, where 54% of the sample were college educated and 29% university graduates. Incomes were reflective of educational status and age with 77% of participants earning less than £20,000 and 16% earning £20,000-£25,000.

The results of the descriptive statistics show that the sample demonstrate characteristics of millennial females, also known as Generation Y. Millennials are college or graduate educated and demonstrate strong purchasing power in the market (Valentine and Powers 2013).
Moreover, technology and smartphone use is high in Millennials (McCormick 2016). Millennial females are more likely to be interested in new technology and shop online for clothing (Mintel 2017a). In addition, their perspectives on new technologies can be used as a basis on which to guide how future segments will adopt technology in the future. The sample was also discussed in Chapter 7.

### Table 8.1 Descriptive statistics frequency distributions

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>Frequency</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you shop online?</td>
<td>Yes</td>
<td>408</td>
<td>100%</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>408</td>
<td>100%</td>
</tr>
<tr>
<td>Age</td>
<td>18-24</td>
<td>408</td>
<td>100%</td>
</tr>
<tr>
<td>How frequently do you browse fashion websites?</td>
<td>Everyday</td>
<td>72</td>
<td>17.6%</td>
</tr>
<tr>
<td></td>
<td>Several times a week</td>
<td>205</td>
<td>50.2%</td>
</tr>
<tr>
<td></td>
<td>Once a week</td>
<td>80</td>
<td>19.6%</td>
</tr>
<tr>
<td></td>
<td>Once a month</td>
<td>33</td>
<td>8.1%</td>
</tr>
<tr>
<td></td>
<td>Every couple of months</td>
<td>15</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>Couple of times a year</td>
<td>3</td>
<td>0.7%</td>
</tr>
<tr>
<td></td>
<td>Never</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>How frequently do you shop on fashion websites?</td>
<td>Everyday</td>
<td>2</td>
<td>0.5%</td>
</tr>
<tr>
<td></td>
<td>Several times a week</td>
<td>39</td>
<td>9.6%</td>
</tr>
<tr>
<td></td>
<td>Once a week</td>
<td>93</td>
<td>22.8%</td>
</tr>
<tr>
<td></td>
<td>Once a month</td>
<td>183</td>
<td>44.9%</td>
</tr>
<tr>
<td></td>
<td>Every couple of months</td>
<td>72</td>
<td>17.6%</td>
</tr>
<tr>
<td></td>
<td>Couple of times a year</td>
<td>19</td>
<td>4.7%</td>
</tr>
<tr>
<td></td>
<td>Never</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>What is your education level?</td>
<td>School</td>
<td>47</td>
<td>11.5%</td>
</tr>
<tr>
<td></td>
<td>College</td>
<td>221</td>
<td>54.2%</td>
</tr>
<tr>
<td></td>
<td>Graduate</td>
<td>118</td>
<td>28.9%</td>
</tr>
<tr>
<td></td>
<td>Post-graduate</td>
<td>22</td>
<td>5.4%</td>
</tr>
<tr>
<td>Please select your income bracket.</td>
<td>Less than £20,000</td>
<td>316</td>
<td>77.3%</td>
</tr>
<tr>
<td></td>
<td>£20,000–£29,999</td>
<td>66</td>
<td>16.1%</td>
</tr>
<tr>
<td></td>
<td>£30,000–£49,999</td>
<td>23</td>
<td>5.6%</td>
</tr>
<tr>
<td></td>
<td>£50,000–£99,999</td>
<td>3</td>
<td>0.7%</td>
</tr>
<tr>
<td></td>
<td>£100,000+</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

8.2.1. Survey stimuli

The online survey included a link to the ‘Try Metail’ website, where participants were asked to enter their bra-size, height and weight to create an avatar on which to try clothes. Participants could customise their virtual model and select from a range of outfits to try on the virtual model. Once the participant had completed the Metail task, they then returned to the survey to complete further questions.

8.3. Data analysis - Metail

This section will present the tool used for analysis of participant response data for the Metail quantitative survey and reliability of scale items used.

8.3.1. SPSS Statistics

SPSS (statistical package for the social sciences) enables quantitative data analysis. SPSS uses two primary windows: the data editor and the data viewer. The data editor allows the input of
Chapter Eight: Quantitative Data Analysis

data and statistical analysis to be carried out (Field 2009). The data viewer shows the output of statistical tests performed through the data editor window. Graphs and results can be displayed depending on the intended output (Field 2009). SPSS enables relationships to be drawn among variables based on correlation using regression techniques (Pallant 2013). In addition, SPSS enables factor analysis, which reduces the data to a smaller set of factors and their interrelationships (Pallant 2013). Factor analysis is the method adopted in the first stage of the structural equation modelling.

8.4. Reliability Analysis of Scales and Items

Reliability is the assessment of consistency of measurements contained within an overall variable (Hair et al. 2014). Reliability measures the distribution of scores alongside other measures within a given variable. The more reliable a scale the more enhanced the analysis (Tabachnick and Fidell 2014). Kline (2011) outlines that reliability of a scale is the degree of scores that are free from random error. Cronbach’s alpha is the coefficient most commonly used in literature for reliability (Kline 2011). It measures the internal consistency, or the degree of internal consistency across items within a variable or measure (Kline 2011). If the score for reliability is low, the items may be heterogeneous and therefore the score is not the most optimised unit of analysis (Kline 2011). Cronbach’s alpha is shown in Equation 8.1, where n=number of items, Vt is the variance of total scores and Vi is the variance of the items.

Equation 8.1 Cronbach’s Alpha Coefficient

\[
\alpha = \frac{n}{n-1} \left( 1 - \frac{\sum V_i}{V_t} \right)
\]

A lower limit for Cronbach’s alpha that is commonly agreed is 0.7 according to Hair et al. (2014). Values of around 0.90 are considered “excellent” and 0.80 are “very good”, as stated by Kline (2011, p.70). The Cronbach’s alpha scores for the study are shown in Table 8.2. The overall Cronbach’s Alpha for all items is shown on the top row of values. In addition, the Cronbach’s Alpha coefficient and Cronbach’s Alpha for the standardized items are also shown.
Table 8.2 Scores for Cronbach’s Alpha

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Label</th>
<th>Cronbach’s Alpha</th>
<th>Cronbach’s Alpha based on Standardized items</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>Overall</td>
<td>.937</td>
<td>.943</td>
<td>23</td>
</tr>
<tr>
<td>Perceived Playfulness</td>
<td>PP</td>
<td>.901</td>
<td>.904</td>
<td>4</td>
</tr>
<tr>
<td>Technology Readiness</td>
<td>TR</td>
<td>.837</td>
<td>.837</td>
<td>3</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>PU</td>
<td>.941</td>
<td>.942</td>
<td>5</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>PEU</td>
<td>.857</td>
<td>.861</td>
<td>3</td>
</tr>
<tr>
<td>Attitude</td>
<td>ATT</td>
<td>.913</td>
<td>.913</td>
<td>5</td>
</tr>
<tr>
<td>Intended Use</td>
<td>IU</td>
<td>.894</td>
<td>.894</td>
<td>3</td>
</tr>
</tbody>
</table>

All individual items have values above the suggested threshold of .7, which means the scales have internal consistency (Table 8.2). The overall Cronbach’s alpha overall for the study was 0.937, which is above 0.7 and around 0.90, that is considered excellent for reliability. This means that the scales are consistent, reliable internally and can be used for further analysis in the study.

8.5. Exploratory Factor Analysis

As reliability was achieved, exploratory factor analysis was then undertaken. Factor analysis is used to allow analysis of large sets of data, by defining sets that are independent but coherent (Tabachnick and Fidell 2013). Factor analysis can reveal patterns among the data which are not immediately apparent. Factor analysis enables reduction of large amounts of variables to fewer, relevant factors. This is through summarising score of variables and grouping them in their patterns. This is arguably more efficient than looking at individual variables (Tabachnick and Fidell 2013). Factor analysis consists of two types: exploratory and confirmatory. Exploratory consists of grouping the variables which correlate with one another, confirmatory is used to reveal latent correlations between factors which is achieved through structural equation modelling (Tabachnick and Fidell 2013). Exploratory factor analysis involves understanding relationships and patterns in complex data sets (Hair et al. 2014). Exploratory factor analysis can be used to determine the number of factors to explain the correlations among a set of observed variables (Schumacker and Lomax 2016). The following section presents the EFA results for the final Metal survey study.

8.5.1. Suitability for EFA

Exploratory factor analysis is an “indeterminate solution because more than one configuration of variables exists that could produce the factors” (Schumacker and Lomax 2016 p.86). Therefore, aspects such as sample size, number of factors, the rotation method, the analytic method (Principle component analysis or factor analysis), the retention method (eigenvalues greater than one, scree test) and factor scores are assessed during factor analysis (Schumacker
and Lomax 2016, Comrey and Lee 1992, Costello and Osborne 2005, Howard 2016). This study addressed the sample size, factor retention, rotation methods and the strengths of relationships among the variables or items included in the study, which were measured through Kaiser-Meyer-Olkin test of sampling adequacy (Table 8.2). The correlations between variables measured through Barlett’s test of Sphericity are also presented (Table 8.3).

8.5.2. Sample Size

Field (2009) states that reliability of factor analysis is highly concerned with sample size. A sample of 300 or more is considered to provide a suitable solution for factor analysis (Pearson and Mundfrom 2010). Factors that do not converge are often due to small sample size (Costello and Osborne 2005). However, in addition to sample size, precise selection of variables is also important to ensure the factors converge and provide stable estimates (Hogarty et al. 2005). Tabachnick and Fidell (2014) claim that the minimum case of 300 is preferred. A widely used specification of sample size for EFA is that of Comrey and Lee (1992), who outline that sample sizes of 100 is poor, 200 is fair, 300 is good, 500 is very good and 1000 and over is excellent. The more stable the sample size the more valid the inferences (Schumacker and Lomax 2016). The more complex the model the larger sample size is required (Blunch 2013). The sample size used in this study was 408, which is considered a good size for EFA according to Comrey and Lee (1992). Costello and Osborne (2005) state that for best practice factor analysis, 20 participants per variable would result in favourable solutions. Applying this rule to the study would result in a suggested sample of 440. The sample obtained was 408 so this was within range of the suggested sample size. The sample size justification was also discussed in Chapter 7, including reference to similar studies such as Perry (2016) and Kim and Forsythe (2008) that also used a similar sized sample.

8.5.3. Kaiser-Meyer-Olkin (KMO) sampling adequacy

Another measure used to assess sampling adequacy and suitability for EFA is Kaiser-Meyer-Olkin (KMO) measure on sampling adequacy. KMO represents the ratio of squared correlation of the variables compared to the squared partial correlations (Field 2009). Equation 8.2 shows the KMO.

\[
KMO = \frac{\sum \sum r_{jk}^2}{\sum \sum r_{jk}^2 + \sum \sum p_{jk}^2}
\]

Equation 8.2 Kaiser-Meyer-Olkin
KMO results range between 0-1. Values that are below 0.50 are barely acceptable which suggests factor analysis may not be a suitable method. Values that are closer to 1 for example, 0.90 and above are an excellent result. A result close to 1 represents that the correlations are compact and therefore factor analysis would provide reliable results (Field 2009). Table 8.3 presents the results for the KMO test. The value of .936 was achieved and therefore was an excellent result. This provided reasoning for the use of factor analysis.

### Table 8.3 Results of KMO

| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | .936 |

#### 8.5.4. Bartlett’s Test of Sphericity

Barlett’s test of Sphericity (Equation 8.3) tests whether the correlations in a correlation matrix are zero (Tabachnick and Fidell 2013). This is ideal when there are less than five cases to analyse, as it is sensitive, there are less correlations with larger samples. The results of Bartlett’s Test are shown in Table 8.4.

**Equation 8.3 Bartlett’s Test of Sphericity**

\[
- \left[ \frac{(n - 1) - \frac{(2p + 3)}{6}}{\ln|R|} \right] \sim \chi^2, \quad |R| = \prod_{j=1}^{p} \lambda_j
\]

- degrees of freedom \( \nu = (p^2 - p)/2 \).
- \( \lambda_j \) : Eigenvalues of the matrix \( R \) (or variances of the principal components).
- \( p \) = # of variables, \( n \) = # of observations.

\( H_0 \) : Data set is uncorrelated, \( H_1 \) : Data set is correlated.

### Table 8.4 Results of Bartlett’s Test of Sphericity

<table>
<thead>
<tr>
<th>Bartlett’s Test of Sphericity</th>
<th>Approx. Chi-Square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7739.576</td>
<td>253</td>
<td>.000</td>
</tr>
</tbody>
</table>

For factor analysis, the significance should be less than 0.05 (Pallant 2013). The significance for the study during EFA was 0.00, which indicates that the data was suitable for factor analysis (Table 8.4).

#### 8.5.5. Factor Retention

The number of factors to be retained can be determined through a scree plot chart. Factors should be selected with one or more eigenvalues – this is also known as the Kaiser Criterion (Schumacker and Lomax 2016, Howard 2016, Kaiser 1960). The exploratory part of EFA is to “find the fewest factors that have the largest amount of variance” (Schumacker and Lomax 2016 p. 87). All factors used in EFA in this study contained 2 or more variables.
8.5.6. Factor Rotation

Once factor extraction is achieved, factor rotation calculates the degree to which variables load onto the factors. As there is an infinite number of solutions that can be produced through rotation methods available in SPSS, the researcher should rotate the solution to achieve a meaningful solution (Schumacker and Lomax 2016). Rotation presents the factors in an order which is more easily interpreted (Pallant 2013). Higher loadings will be visible on the most important factors, and small loadings on other factors. There are two types of rotation that can be used namely oblique and orthogonal. Oblique rotation allows the factors to correlate (Pallant 2013). Orthogonal rotation is where factors remain unrelated (Field 2009). Oblique rotation is most commonly used as a first method to rotation. Within factor rotation there is a range of techniques used by SPSS which includes varimax, promax, direct oblimin, quartimax and equamax (Pallant 2013). The most commonly used method is direct oblimin. The aim of rotation is to achieve a structured factor matrix where each of the variables load only on one component (Pallant 2013). The factor rotation method adopted in the study was Promax with Kaiser Normalisation. Promax is a fast method and often used for large data sets (Field 2009). Despite Varimax being the most commonly used method (Comrey and Lee 2005), a study based on 220 EFA tests, Howard (2016) stated that a considerable number of studies employed Promax rotation.

8.5.7. Factor Extraction

There are a range of approaches to factor extraction, which include principle components analysis and maximum likelihood factoring. For the factors to be extracted, the researcher must balance the need to find a simple solution and the need to explain the variance in the data as much as possible. In order to achieve this, Pallant (2013) suggests that an exploratory approach to factor analysis should be adopted. Maximum likelihood aims to estimate factor loadings that maximise the likelihood of the correlation matrix (Tabachnick and Fidell 2014). Maximum likelihood estimates the values for factor loadings by calculating the loadings that maximise the probability of sampling the observed correlation matrix from the data (Tabachnick and Fidell 2014). Additionally, maximum likelihood is useful when using confirmatory factor analysis (Tabachnick and Fidell 2014). An exploratory approach involves experimenting with a number of factors until a solution is achieved (Pallant 2013, Tabachnick and Fidell 2014).

8.5.8. Factor Loadings and Pattern Matrices

Factor loadings are where the EFA calculates factor scores (Schumacker and Lomax 2016). Factor loadings show the extent that a variable represents the emerging factor (Howard 2016). Variables that represent multiple or no factors are often removed, with those that are
representative, kept (Howard 2016). Factor loadings are displayed as standardised scores in pattern matrices (Schumacker and Lomax 2016). Schumacker and Lomax (2016, p.92) state that “the rows of a pattern matrix represent the regression where the standardised observed variable is expressed as a function of the factors, and the loadings are the regression coefficients”. The pattern matrix shows the effect of a factor on other variables (Schumacker and Lomax 2016). Costello and Osborne (2005) state that .30 provides a “good” factor loading. Factor loadings are often contested amongst authors in the field of EFA and therefore there is no hard rule regarding the cut-off point. In this study, there was a number of exploratory attempts to achieve a favourable factor and variable combinations.

After trying a number of combinations, the resulting 6-factor solution was extracted. Table 8.5 shows the final pattern matrix for the study on a 6-factor solution. In this study .40 was the loading cut off used as inclusion for the analysis. A 6-factor solution was achieved with all factors receiving loadings of 3 or more variables. A simple method for assessing factor scores is to observe variables that load the highest on each factor. Factors with loadings above .32 should be considered (Tabachnick and Fidell 2014). Comrey and Lee (1992) state that loadings above .71 are excellent, .63 are very good, .55 are good, .45 fair. The lowest loading within the observed pattern matrix was PP3 at .438, which is still considered fair. The highest loading was PEU3 at .923 and is considered excellent. All variables loaded onto separate factors, with three or more items loaded. This has been considered ideal by (Pallant 2013). The final pattern matrix was therefore considered optimal for confirmatory analysis.
### Table 8.5 Final Pattern Matrix

<table>
<thead>
<tr>
<th>Label</th>
<th>Factor Matrix</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PU2</td>
<td>.906</td>
<td></td>
</tr>
<tr>
<td>PU5</td>
<td>.881</td>
<td></td>
</tr>
<tr>
<td>PU4</td>
<td>.876</td>
<td></td>
</tr>
<tr>
<td>PU1</td>
<td>.830</td>
<td></td>
</tr>
<tr>
<td>PU3</td>
<td>.785</td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATT3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATT4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATT5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATT1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td></td>
<td>.923</td>
</tr>
<tr>
<td>PEU3</td>
<td></td>
<td>.763</td>
</tr>
<tr>
<td>PEU1</td>
<td></td>
<td>.763</td>
</tr>
<tr>
<td>PEU2</td>
<td></td>
<td>.750</td>
</tr>
<tr>
<td>Perceived Playfulness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology Readiness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TR2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TR3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TR1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intention to Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IU2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IU1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IU3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

#### 8.5.9. Exploratory Factor Analysis Summary

The final EFA retained 23 items. The variables that were retained were Perceived Usefulness (PU), Attitude (ATT), Perceived Ease of Use (PEU), Playfulness (PP), Technology Confidence (TC), and Intention to use (IU) (Table 8.6). Respecifying factors by adding labels provides meaning to the factor matrix derived through EFA (Hair et al. 2014). The scale ‘Technology Readiness’ shown as ‘TR’ in Table 8.4 was therefore renamed to Technology Confidence. The variables were then tested using confirmatory factor analysis.
### Table 8.6 Factor Labels for CFA

<table>
<thead>
<tr>
<th>Factor</th>
<th>Items</th>
<th>Renamed?</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PU</td>
<td>No</td>
<td>Perceived Usefulness</td>
</tr>
<tr>
<td>2</td>
<td>ATT</td>
<td>No</td>
<td>Attitude</td>
</tr>
<tr>
<td>3</td>
<td>PEU</td>
<td>No</td>
<td>Perceived Ease of Use</td>
</tr>
<tr>
<td>4</td>
<td>PP</td>
<td>No</td>
<td>Playfulness</td>
</tr>
<tr>
<td>5</td>
<td>TR</td>
<td>Yes</td>
<td>Technology Confidence</td>
</tr>
<tr>
<td>6</td>
<td>IU</td>
<td>No</td>
<td>Intention to Use</td>
</tr>
</tbody>
</table>

#### 8.6. Confirmatory Factor Analysis

Both EFA and CFA produce relationships between variables, however EFA is driven by the data and no specific relationships are initially used to derive results (Brown and Moore 2012), which is why EFA is exploratory. CFA requires specification of the number of factors and the pattern between the indicators and loadings. The CFA solution is then tested in terms of its ability to reproduce the sample covariance matrix of the variables (Brown and Moore 2012). Confirmatory factor analysis (CFA) tests how well variables represent a number of constructs (Hair et al. 2014). CFA determines whether the hypothesised model yields a matrix similar to that of the sample (Schumacker and Lomax 2016). The pattern matrix is used in CFA by obtaining the variables that are used in the theoretical measurement model (Schumacker and Lomax 2016). CFA involves the specification of the number of factors involved in the model which is why CFA follows EFA (Brown 2015). CFA in SEM can follow a five-step process as defined by Bollen and Long (1993) and McDonald and Moon-Ho (2002): model specification, model identification, model estimation, model evaluation, model respecification (Chin et al. 2008). The structure of this section will follow this order.

#### 8.6.1. AMOS 23

CFA is performed through use of AMOS software (analysis of moment structures), which is used in conjunction with SPSS. AMOS is a graphical program which enables analysis of CFA and SEM models (Byrne 2010). AMOS consists of two modules: AMOS graphics and AMOS basics (Kline 2011). In this study AMOS 23 graphics was used as it allows for path models to be depicted and estimates to be displayed in a latent model (Kline 2011, Tabachnick and Fidell 2014, Byrne 2010). Paths within the model can be designated in AMOS graphics and fit statistics can be paired with the corresponding structural model (Kline 2011).

#### 8.6.2. Hypothesized Model for the Study

CFA allows the testing of a theory through a measurement model (Hair et al. 2014). Literature on online retailing, garment fit and digital fashion technology was reviewed to measure consumer’s use behaviours of virtual fitting room technology in fashion environments in Chapters 3, 4 and 5. A conceptual model was derived through literature review using TAM theory and is shown in Chapter 6. The constructs obtained through literature review, were
explore through a pilot test sample of 100 responses prior to final the study. Hypotheses were derived from the literature and used to develop the model for analysis. The variables obtained after EFA and those which were renamed (Technology Readiness - Technology Confidence) are shown in Figure 8.1. The concepts were therefore used to develop the model for CFA.

<table>
<thead>
<tr>
<th>Technical terms sound like confusing jargon to me</th>
<th>Technology Readiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Among my peers I am usually the first to try new technologies</td>
<td>Technology Readiness</td>
</tr>
<tr>
<td>I like to experiment with new technologies</td>
<td>Technology Readiness</td>
</tr>
<tr>
<td>I would find Metall useful when shopping online</td>
<td>Perceived Usefulness</td>
</tr>
<tr>
<td>Using Metall could increase the quality of my online shopping</td>
<td>Perceived Usefulness</td>
</tr>
<tr>
<td>Using Metall could make me more productive when shopping online</td>
<td>Perceived Usefulness</td>
</tr>
<tr>
<td>Using Metall could help me to evaluate garments more quickly</td>
<td>Perceived Usefulness</td>
</tr>
<tr>
<td>Using Metall could improve my online shopping ability</td>
<td>Perceived Usefulness</td>
</tr>
<tr>
<td>Using Metall is clear and understandable</td>
<td>Perceived Ease of Use</td>
</tr>
<tr>
<td>Using Metall doesn’t require much mental effort</td>
<td>Perceived Ease of Use</td>
</tr>
<tr>
<td>Metall is easy to use</td>
<td>Perceived Ease of Use</td>
</tr>
<tr>
<td>Using Metall is fun</td>
<td>Playfulness</td>
</tr>
<tr>
<td>Using Metall is enjoyable</td>
<td>Playfulness</td>
</tr>
<tr>
<td>Using Metall arouses my imagination</td>
<td>Playfulness</td>
</tr>
<tr>
<td>Using Metall stimulates my curiosity</td>
<td>Playfulness</td>
</tr>
<tr>
<td>Using Metall is a good/bad idea</td>
<td>Attitude</td>
</tr>
<tr>
<td>Using Metall is superior/inferior</td>
<td>Attitude</td>
</tr>
<tr>
<td>Using Metall is pleasant/unpleasant</td>
<td>Attitude</td>
</tr>
<tr>
<td>Using Metall is appealing/unappealing</td>
<td>Attitude</td>
</tr>
<tr>
<td>Using Metall is excellent/poor</td>
<td>Attitude</td>
</tr>
<tr>
<td>I would be likely to use Metall for fashion shopping again in future</td>
<td>Intended Use</td>
</tr>
<tr>
<td>I would be likely a website like Metall for fashion shopping in future</td>
<td>Intended Use</td>
</tr>
<tr>
<td>I would be likely to purchase fashion from a website like Metall in future</td>
<td>Intended Use</td>
</tr>
</tbody>
</table>

**Figure 8.1 Conceptual Measurement Model for study**

### 8.6.3. Model Specification

Model specification is the representation of hypotheses within the model and is the most important step in CFA and SEM (Kline 2011). Specification uses theory and existing research to model relationships (Schumacker and Lomax 2016). There are many different relationships between variables and many models can be deduced through relationships between factors and variables (Schumacker and Lomax 2016). CFA does not provide the researcher with information on how to specify the mode, but sheds light on the relationships between
parameters in the model (Schumacker and Lomax 2016). Specification can also involve ensuring loadings or variance on each construct is set to the correct values (Hair et al. 2014). Additional constraints may also be set on factors during model specification. The model specification was firstly drawn in AMOS 23 and showed the observed variables that were retained from Figure 8.1.

8.6.4. Notation

The initial CFA model is shown in Figure (8.2). Figure 8.3 shows the standardised factor loadings between 23 observed variables (rectangles) and 6 latent constructs (ovals) and the existing correlations between the latent constructs (right-hand side arrows). The three relationships described are representative of measurement relationships (items and constructs), correlational relationships (between constructs) and error terms (between each item) (Hair et al. 2014).

8.6.5. Model Estimation

Model estimation is the statistical method employed (Chin et al. 2008). Methods include maximum likelihood, generalised least squares, weighted least squares, ordinary least squares and unweighted least squares (Blunch 2013). The parameters in maximum likelihood are estimated to have the largest probability of producing the sample covariance matrix. Maximum likelihood was used in this study as it is the preferred method of estimation used in SEM (Blunch 2013).

8.6.6. Model Identification

In order to perform CFA, the model must be “identified” (Brown and Moore 2012). Model identification involves checking that there are no errors prior to estimation of the parameter values (Schumacker and Lomax 2016). Model identification shows the extent that the values within the model can represent unknown parameters within the model (Byrne 2010). Identification is whether a construct is sufficiently represented. Model identification is related to the amount of degrees of freedom available to estimate parameters. If a model has zero degrees of freedom it is saturated (Hair et al. 2014). Structural models can be “just-identified, over identified or under-identified” (Byrne 2010 p. 34). Just identified models have a close correspondence between the data and parameters. A just identified model usually has no degrees of freedom and is therefore unable to be rejected by science (Byrne 2010). A model that is over identified has degrees of freedom that are >0. Therefore, it can be rejected and is of “scientific use” (Byrne 2010 p.34). Therefore, over identified models are the aim of SEM. In addition to the level of degrees of freedom, Hair et al. (2014) state that at least three variables should be present in one factor. Other indicators of issues in identification include large
standard errors and the inability of the program to compute results. The model in Figure 8.2 shows that each factor was represented by 3 or more variables.

![Figure 8.2 CFA Model Specification for study](image)

### 8.6.7. Measurement Model Evaluation

When creating a measurement model in CFA, the model should represent “valid” and “unidimensional” aspects of constructs (Hair et al. 2014). Unidimensionality is defined as a set of variables represented by one construct (Hair et al. 2014). The minimum and maximum number of indicators for constructs should also be considered, including whether constructs and items should be omitted (Hair et al. 2014). Finally, assessments must be made as to whether the measures accurately portray the construct (Hair et al. 2014). Assessing a number of factors in the model evaluation is preferred, however, Chin et al. (2008) state that there is no clear consensus on which aspects or threshold values should be reported. Figure 8.3 shows the CFA model with standardised regression weights applied.
8.6.8. Goodness-of-Fit

After CFA, the model needs to be assessed for goodness-of-fit or model fit (Hair et al. 2014). This is between the “covariance matrix and the estimated population covariance matrix” (Tabachnick and Fidell 2014, p. 770). It may be misconceived that the assessment of Chi-square is the only measure of model fit. Therefore the most accurate way of measuring model fit is through assessing numerous measures (Tabachnick and Fidell 2014). There are many indices used to measure model fit, which may include RMSEA, GFI, RMR and CFI. Model fit criteria are based on the difference between the observed and reproduced variance-covariance matrices (Schumacker and Lomax 2016). These are shown in Table 8.7. It is important to note that there is no perfect value for model fit due to differing sample size across studies for example (Tabachnick and Fidell 2014). Therefore, the values described should be used as a guide. In the next section, summaries of the goodness-of-fit indices used in the study are included and their suggested values discussed in literature are provided.
Table 8.7 Summary of Fit Indices of the Initial CFA Measurement Model

<table>
<thead>
<tr>
<th>Fit Index</th>
<th>Initial Measurement Model</th>
<th>Suggested Values and Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>585.885 (df=215) P=0.01</td>
<td>P≤0.05 (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td>RMSEA</td>
<td>.065</td>
<td>≤0.6 (Tabachnick and Fidell 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;0.5≤0.8 (Browne and Cudeck 1999)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;.07 with CFI of ≥.92 (Hair et al. 2014)</td>
</tr>
<tr>
<td>ECVI</td>
<td>ECVI Saturated&lt;ECVI</td>
<td>ECVI&lt;ECVI Saturated</td>
</tr>
<tr>
<td></td>
<td>ECVI&lt; Independent</td>
<td>ECVI&lt;ECVI Independent (Byrne 1998)</td>
</tr>
<tr>
<td>CFI</td>
<td>.952</td>
<td>≥.95 (Tabachnick and Fidell 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥.92 (Hair et al. 2014)</td>
</tr>
<tr>
<td>NFI</td>
<td>.926</td>
<td>&gt;.95 (Tabachnick and Fidell 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;.90/95 – Good fit (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td>TLI</td>
<td>.943</td>
<td>&gt;.92 (Hair et al. 2014)</td>
</tr>
<tr>
<td>RMR</td>
<td>.071</td>
<td>&lt;.05 (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≤.08 (Hair et al. 2014)</td>
</tr>
<tr>
<td>GFI</td>
<td>885</td>
<td>&gt;.90 (Hair et al. 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>~.90-95 – Good fit (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td>PGFI</td>
<td>.689</td>
<td>&gt;.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0-1 (closer to 1) (Malhotra et al. 2012)</td>
</tr>
</tbody>
</table>

8.6.9. Chi-Square ($\chi^2$)

Chi-square is often referred to as the “most basic” of the model fit indices (Kline 2011, p.199). The Chi square is the difference between the observed and estimated covariance matrices (Hair et al. 2014). The closer these values are the better the model fit (Hair et al. 2014). Statistical significance of chi-square is tested to ensure the sample and model covariances are equal in a population (Hair et al. 2014).

\[ \chi^2 = \sum \frac{(O - E)^2}{E} \]

A chi-square of 0 would indicate perfect fit according to Schumacker and Lomax (2016). The $p$-value should be small (<0.5) to be significant (Field 2009). Schumacker and Lomax (2016, p.113) state that “a non-significant chi-square would show that observed and implied variance-covariance matrices are similar.” The $p$-value in the initial test was $p<0.01$ which is below the recommended value of 0.05 according to Field (2009). There are issues with using the Chi-square test in that if the sample is relatively large the model may be rejected (Blunch 2013). Therefore a number of fit indices should be considered when assessing whether the model is supported by the data (Blunch 2013).

8.6.10. RMSEA

The Root Mean Square Error of Approximation (RMSEA) is used to estimate the lack of fit in a model by comparison to a saturated model (Tabachnick and Fidell 2014). RMSEA may also be referred to as badness of fit (Hair et al. 2014). RMSEA has been recognised as one of the
most useful fit indices due to approximating “how well the model with optimal parameters 
would fit the sample covariance matrix” (Byrne 2010 p.80). RMSEA represents a model fit 
compared to a population than an estimated sample (Hair et al. 2014). RMSEA considers the 
degrees of freedom and the sample size (Schumacker and Lomax 2016), with a general rule 
that if there is a higher number of degrees of freedom, the more relationships between variables 
exist. RMSEA provides insight to the quality of the model (Byrne 2010, Hu and Bentler 1998). 
Tabachnick and Fidell (2014) state that .06 or lower indicate a good fitting model, with values 
about .10 indicating poor fitting models. An RMSEA value of 0 would indicate the best fit 
(Kline 2011). The RMSEA of the initial model was .065 which indicates an acceptable fit.

8.6.11. ECVI

The Expected Cross Validation Index was originally proposed by Browne and Cudeck (1989). 
ECVI is used for comparing models from one sample, typically the saturated and independent 
model. According to Schumacker and Lomax (2010 p.230), “ECVI is a function of chi-square 
and degrees of freedom.” Schumacker and Lomax (2010) go on to state that the model 
compared within ECVI or the alternative model results in the “smallest ECVI value is the most 
stable”. The ECVI is an assessment of how well the data would fit against a calibrated sample 
in comparison to other validated samples (Kaplan 2000). Byrne (1998), suggests picturing 
ECVI values on a scale, with independence model at one extreme and the saturated model at 
the other. The ECVI for the hypothesized model should be in between for an ideal fit. ECVI 
should be compared with the ECVI of the saturated model and the independence model (Byrne 
2010). The ECVI of the hypothesized model should be lower than the independence and 
saturated model (Byrne 2010). The ECVI was higher in comparison to the saturated model 
and therefore indicates that it did not achieve the recommended value.

8.6.12. NFI

The Normed Fit Index (NFI) evaluates the estimated model comparing chi-square value of the 
model to the chi-square of the independence model (Tabachnick and Fidell 2014). NFI 
considers the sample size and the CFI (Byrne 2010, Bentler 1990). NFI is used by comparing 
a restricted model to a full model by means of a null baseline model (Schumacker and Lomax 
2016). The resulting value usually ranges between 0-1, with good fitting models having a value 
of greater than .95 (Tabachnick and Fidell 2014). NFI is problematic when used with small 
samples as it may underestimate the fit of the model (Tabachnick and Fidell 2014). The initial 
test resulted in an NFI of .926, which was just below the good fitting index. However, 
Schumacker and Lomax (2016) state than an NFI of .90 is acceptable.
8.6.13. TLI

The Tucker Lewis Index (TLI) can be used in a comparison of alternative or proposed models against a null model (Schumacker and Lomax 2016). The TLI value is represented by 0=no fit to 1=perfect fit (Schumacker and Lomax 2016). TLI can be said to take into account the complexity of the model (Hair et al. 2014) and “penalizes” models with many parameters (West et al. 2012). The initial model produced a TLI of .943, as this was close to the suggested value of 1 (Blunch 2013) this was an acceptable result.

8.6.14. CFI

Comparative fit index is a measure of the improvement of the specified model over a baseline model which is often the independence model (Kline 2011). Bentler (1990) devised the comparative fit index which overcomes the issues with NFI. Bentler (1990) states that of NFI and CFI, CFI should be reported and chosen over NFI, as NFI can suggest model fit is only marginal. Specifically CFI involves a series of models from less restrictive to saturated (Schumacker and Lomax 2016). The CFI measures the improvement from theoretical model with the non-centrality parameter to define comparative fit (Schumacker and Lomax 2016). CFI can also be used when models are relatively complex (Hair et al. 2014). CFI is one of the most widely used model fit indices, according to Hair et al. (2014). The recommended value for CFI is .95 or above, the initial model resulted in .952, which indicated a good CFI.

8.6.15. RMR

The Root Mean Square Residual is a fit index based on the differences between sample variances and covariances and the estimated population. RMR is the “average residual value derived from the fitting of the variance-covariance matrix of the model to the variance-covariance matrix of the data” (Byrne 2010). The smaller the RMR the better fitting the model (Tabachnick and Fidell 2014). Standardised RMR values are suggested to be less than .05 according to Schumacker and Lomax (2016). The RMR for the initial model was .071, which was not ideal, however Hair et al. (2014) state that an RMR of .08 or lower is still acceptable.

8.6.16. GFI and PGFI

Goodness of Fit Index (GFI) is less sensitive than Chi-Square is to sample size (Hair et al. 2014). GFI is focussed on the ratio of the squared differences between observed and reproduced matrices to the observed variances (Schumacker and Lomax 2016). The closer the value of GFI to 1 the better the fit of the model (Hair et al. 2014). Values of above .90 can be considered good (Hair et al. 2014). Byrne (2010 p.77) states that GFI does not compare the hypothesized model with other models and therefore is considered an “absolute” fit index (Hu
and Bentler 1995). PGFI considers the complexity of the number of parameters within the model (Byrne 2010). Similarly with GFI, the Parsimony Goodness of Fit Index (PGFI) should have a value of 0-1, with values closer to 1 representing better fit (Tabachnick and Fidell 2014). The initial model yielded a PGFI result of .689, which was within the suggested range. PGFI indices tend to be lower than other thresholds for fit statistics (Byrne 2010).

8.6.17. CFA Model Modification

In addition to goodness-of-fit assessment, the path estimates, standardised residuals and modification indices must also be checked to reduce problematic items and promote model fit (Hair et al. 2014). Path estimates enable identification of any candidates for removal. This may be due to loadings being below suggested cut-off levels (Hair et al. 2014). In addition, standardised residuals can be selected to show the highest values. Modification indices are also used when adding or creating covariances or paths between variables (Schumacker and Lomax 2016). This enables the final model to be produced with the most optimum relationships and therefore model fit indices. Modification indices can assist when indicators share a unique aspect of the factor, adding a covariance can assist measurement error (Schumacker and Lomax 2016). When considering model modification, the model fit should be assessed as to whether it also requires improvement. Figure 8.4 shows the final CFA model where covariances have been added, however no variables were eliminated through use of modification indices.
Figure 8.4 Final CFA Measurement Model
The model fit indices summary for the final model is displayed in Table 8.8. This shows how the results had improved in comparison to the initial results. GFI, TLI, NFI, CFI and RMSEA had resulted in improved indices. However, the value for ECVI remained unfavourable.

Table 8.8 Summary of Initial and Final Measurement Model Fit Assessment

<table>
<thead>
<tr>
<th>Fit Index</th>
<th>Initial Measurement Model</th>
<th>Final Measurement Model</th>
<th>Suggested Values and Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>585.885 (df=215) P=&lt;0.01</td>
<td>427.577 (df=213) P=&lt;0.01</td>
<td>P&lt;0.05 (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td>RMSEA</td>
<td>.065</td>
<td>.050</td>
<td>≤0.6 (Tabachnick and Fidell 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;0.5-≤0.8 (Browne and Cudeck 1999)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;.07 with CFI of ≥.92(Hair et al. 2014)</td>
</tr>
<tr>
<td>ECVI</td>
<td>ECVI Saturated&lt;ECVI Saturated&lt;ECVI Independent</td>
<td>ECVI Independent</td>
<td>ECVI&lt;ECVI Saturated&lt;ECVI Independent</td>
</tr>
<tr>
<td>CFI</td>
<td>.952</td>
<td>.972</td>
<td>≥.95 (Tabachnick and Fidell 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>≥.92 (Hair et al. 2014)</td>
</tr>
<tr>
<td>NFI</td>
<td>.926</td>
<td>.946</td>
<td>&gt;.95 (Tabachnick and Fidell 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;.90/95 – Good fit (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td>TLI</td>
<td>.943</td>
<td>.967</td>
<td>&gt;.92 (Hair et al. 2014)</td>
</tr>
<tr>
<td>RMR</td>
<td>.071</td>
<td>.076</td>
<td>&lt;.05 (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>≤.08 (Hair et al. 2014)</td>
</tr>
<tr>
<td>GFI</td>
<td>.885</td>
<td>.916</td>
<td>&gt;.90 (Hair et al. 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>~.90-95 – Good fit (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td>PGFI</td>
<td>.689</td>
<td>.707</td>
<td>&gt;.50 (closer to 1)</td>
</tr>
</tbody>
</table>

8.7. Reliability and Validity

CFA can be used to validate constructs (Brown and Moore 2012). When using CFA to measure reliability and validity, measurement error and error theory is adjusted for, whereas other methods such as ordinary least squares do not account for measurement error (Brown and Moore 2012). Validity is the extent to which the outcome produced is accurate (Hair et al. 2014). AMOS computes latent scores for each respondent (Hair et al. 2014). Where construct validity can be provided, this demonstrates that the item measures from the sample represent the true score in the population (Hair et al. 2014). AMOS lists construct correlations automatically (Hair et al. 2014). Construct validity consists of four aspects: convergent validity, average variance extracted, reliability and discriminant validity. Other aspects that are also measured include maximum shared variance and average shared variance which will be described in the following section.
8.7.1. Reliability

Reliability is sought to ensure the construct will achieve identical results in repeated measurements (Blunch 2013). Reliability can indicate convergent validity. Construct Reliability (CR) is the most common method applied to estimate reliability for SEM models (Hair et al. 2014). CR is calculated by squared sum of factor loadings for each construct and the sum of error variance for a construct. CR is where a measurement of a certain construct should “correlate positively or negatively with measurements of other constructs” (Blunch 2013, p.47). Construct reliability is both theoretically and empirically justified (Blunch 2013). From Table 8.9, it is evident that all factors yielded a CR of .7 or above (Hair et al. 2014). High construct reliability indicate that the factor is internally consistent, which means that all items within the scale represent the observed latent construct (Hair et al. 2014).

<table>
<thead>
<tr>
<th>Table 8.9 Reliability test results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology Confidence</strong></td>
</tr>
<tr>
<td><strong>Perceived Usefulness</strong></td>
</tr>
<tr>
<td><strong>Attitude</strong></td>
</tr>
<tr>
<td><strong>Ease of Use</strong></td>
</tr>
<tr>
<td><strong>Playfulness</strong></td>
</tr>
<tr>
<td><strong>Intended Use</strong></td>
</tr>
</tbody>
</table>

8.7.2. Convergent Validity

To assess validity, Campbell and Fiske (1959) proposed a number of methods called the “multitrait-multimethod technique” (Blunch 2013, p.48). This method is used to support the evaluation of construct validity (Blunch 2013). Convergent validity is shown by different constructs that are theoretically similar are strongly interrelated (Brown and Moore 2012). Convergent validity can be measured by the Average Variance Extracted (AVE) (Hair et al. 2014). AVE is the mean variance on items within a construct which indicates convergence (Hair et al. 2014). The AVE is the average squared standardised factor loading (Hair et al. 2014). It is stated by Hair et al. (2014) that an AVE of .5 or higher is a good indicator of convergence. From Table 8.10, it is evident that all factors demonstrated an AVE of .5 or above. If AVE is less than .5, error is more prominent than variance in the latent factor structure yielding poor convergence (Hair et al. 2014). AVE of less than .5 means that the construct is displaying 50% or more of the variation in the variable (Malhotra et al. 2012). AVE can be seen as a more “conservative measure” than CR (Malhotra et al. 2012, p.876).
Table 8.10 Convergent Validity test results

<table>
<thead>
<tr>
<th>Construct</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology Confidence</td>
<td>0.638</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>0.766</td>
</tr>
<tr>
<td>Attitude</td>
<td>0.680</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>0.683</td>
</tr>
<tr>
<td>Playfulness</td>
<td>0.682</td>
</tr>
<tr>
<td>Intended Use</td>
<td>0.746</td>
</tr>
</tbody>
</table>

8.7.3. Discriminant Validity

Discriminant validity can be defined by how much a construct is distinct from other constructs being observed (Hair et al. 2014). If a high discriminant validity is yielded, a construct is unique (Hair et al. 2014). Discriminant validity is where constructs that are theoretically distinct are not correlated (Brown and Moore 2012). One way to test discriminant validity is by comparing the average variance extracted values with the square of the correlation between the two constructs (Hair et al. 2014). By comparing the factor correlation matrices discriminant validity can be determined (Byrne 2010). Another test for discriminant validity is cross loadings. If cross loadings are present (in EFA) then this demonstrates that the item represents more than one construct. This explains why any high cross loadings found in EFA are removed (Hair et al. 2014). The average variance extracted (AVE), maximum shared variance (MSV) and maximum reliability (MaxR (H)) are compared in Table 8.11. Another test for discriminant validity is to show that AVE is greater than the square of the correlations (Malhotra et al. 2012). This is demonstrated in Table 8.12.

Table 8.11 Discriminant Validity Analysis Results (AVE, MSV, MaxR (H))

<table>
<thead>
<tr>
<th>Construct</th>
<th>AVE</th>
<th>MSV</th>
<th>MaxR(H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology Confidence</td>
<td>0.638</td>
<td>0.030</td>
<td>0.855</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>0.766</td>
<td>0.663</td>
<td>0.958</td>
</tr>
<tr>
<td>Attitude</td>
<td>0.680</td>
<td>0.579</td>
<td>0.971</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>0.683</td>
<td>0.411</td>
<td>0.977</td>
</tr>
<tr>
<td>Playfulness</td>
<td>0.682</td>
<td>0.536</td>
<td>0.983</td>
</tr>
<tr>
<td>Intended Use</td>
<td>0.746</td>
<td>0.663</td>
<td>0.985</td>
</tr>
</tbody>
</table>

The results in Table 8.10 and 8.11 show that there are no discriminant validity issues with the data. This was because they were resolved during EFA by eliminating issues such as cross loadings (Malhotra et al. 2012). Using Fornell and Larcker’s (1981) test, where AVE for each variable is analysed against the shared variance of other variables, AVE should be greater than the shared variance. From Table 8.12, it is clear that the AVE is higher than the MSV between the construct and other constructs.
Table 8.12 Discriminant Validity Analysis Results

<table>
<thead>
<tr>
<th></th>
<th>CR</th>
<th>AVE</th>
<th>MSV</th>
<th>MaxR(H)</th>
<th>TC</th>
<th>PU</th>
<th>ATT</th>
<th>EoU</th>
<th>PP</th>
<th>IU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology Confidence</td>
<td>0.840</td>
<td>0.638</td>
<td>0.030</td>
<td>0.855</td>
<td>0.799</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>0.942</td>
<td>0.766</td>
<td>0.663</td>
<td>0.958</td>
<td>-0.030</td>
<td>0.875</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>0.914</td>
<td>0.680</td>
<td>0.579</td>
<td>0.971</td>
<td>0.115</td>
<td>0.749</td>
<td></td>
<td></td>
<td></td>
<td>0.825</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>0.865</td>
<td>0.683</td>
<td>0.411</td>
<td>0.977</td>
<td>0.174</td>
<td>0.525</td>
<td>0.580</td>
<td>0.826</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Playfulness</td>
<td>0.894</td>
<td>0.682</td>
<td>0.536</td>
<td>0.983</td>
<td>0.009</td>
<td>0.700</td>
<td>0.676</td>
<td>0.641</td>
<td>0.826</td>
<td></td>
</tr>
<tr>
<td>Intended Use</td>
<td>0.898</td>
<td>0.746</td>
<td>0.663</td>
<td>0.985</td>
<td>0.045</td>
<td>0.814</td>
<td>0.761</td>
<td>0.626</td>
<td>0.732</td>
<td>0.864</td>
</tr>
</tbody>
</table>

8.8. Method Effects

Unlike EFA where measurement error is random, CFA can include correlated measurement error (Brown and Moore 2012). This is where covariation is represented by something other than the relationships between variables. When the measurement error is random as in EFA, the relationship between two variables can be said to have a correlation of zero (Fornell and Larcker 1981). Method effects are where the correlation between two variables are related due to their influence on the variable, however some covariation is due to other sources (Brown and Moore 2012). Additional covariation may be influenced by the measurement approach (Brown 2015). Brown (2015) states that method effects can occur where there have been positively and negatively worded items, as is the case with this research. Testing for latency within the results can assist to improve the viability of the model, including the amount of variance present (Brown 2015). The following section discusses how method effects were identified and mitigated in the final model development stage of CFA.

8.9. Method Bias (MB) and Harman’s Single Factor Test

Method bias is the alterations to true effect of correlations among variables, due to data being collected “in the same study at the same time” (Malhotra et al. 2017, p.193). Podsakoff et al. (2003) states that method bias is usually attributed to the measurement of the model rather than the constructs. Misspecification of one measured construct can have serious consequences for the model (Jarvis et al. 2003). Method bias has both random and systematic components, and systematic error can be particularly troublesome for the model due to the potential of yielding deceptive results (Podsakoff et al. 2003). Method bias can have a substantial inflated or deflated effect on the relationships between measures (Podsakoff et al. 2003). Bias may occur due to respondents giving middling answers in questionnaires, or answering in socially acceptable ways rather than providing realistic responses (Malhotra et al. 2017). One of the most widely used methods in identifying method bias is Harman’s Single Factor Test (Podsakoff et al. 2003, Malhotra et al. 2017). This is where one factor will hold a substantial amount of the shared variance (Podsakoff et al. 2003). Harman's Single Factor Test can be identified by constraining factors to one during extraction and using the total variance table. Although Harman’s Single Factor Test can be used to demonstrate the presence of method
bias, it does not statistically control for the method variance (Malhotra et al. 2017). Table 8.13 demonstrates that 49.266% of the variance was explained by one factor and therefore shows that MB was present.

### Table 8.13 Harman's Single Factor Test

<table>
<thead>
<tr>
<th>Factor</th>
<th>Initial Eigenvalues</th>
<th>Total Variance Explained</th>
<th>Extraction Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
<td>Cumulative %</td>
</tr>
<tr>
<td>1</td>
<td>11.331</td>
<td>49.266</td>
<td>49.266</td>
</tr>
<tr>
<td>2</td>
<td>2.416</td>
<td>10.502</td>
<td>59.769</td>
</tr>
<tr>
<td>3</td>
<td>1.498</td>
<td>5.513</td>
<td>66.282</td>
</tr>
<tr>
<td>4</td>
<td>1.205</td>
<td>5.241</td>
<td>71.523</td>
</tr>
<tr>
<td>5</td>
<td>0.989</td>
<td>4.298</td>
<td>75.821</td>
</tr>
<tr>
<td>6</td>
<td>0.718</td>
<td>3.120</td>
<td>78.941</td>
</tr>
<tr>
<td>7</td>
<td>0.574</td>
<td>2.496</td>
<td>81.437</td>
</tr>
<tr>
<td>8</td>
<td>0.485</td>
<td>2.109</td>
<td>83.545</td>
</tr>
<tr>
<td>9</td>
<td>0.433</td>
<td>1.884</td>
<td>85.429</td>
</tr>
<tr>
<td>10</td>
<td>0.377</td>
<td>1.639</td>
<td>87.068</td>
</tr>
<tr>
<td>11</td>
<td>0.360</td>
<td>1.566</td>
<td>88.634</td>
</tr>
<tr>
<td>12</td>
<td>0.334</td>
<td>1.452</td>
<td>90.087</td>
</tr>
<tr>
<td>13</td>
<td>0.299</td>
<td>1.299</td>
<td>91.386</td>
</tr>
<tr>
<td>14</td>
<td>0.274</td>
<td>1.193</td>
<td>92.579</td>
</tr>
<tr>
<td>15</td>
<td>0.254</td>
<td>1.033</td>
<td>93.682</td>
</tr>
<tr>
<td>16</td>
<td>0.239</td>
<td>1.037</td>
<td>94.720</td>
</tr>
<tr>
<td>17</td>
<td>0.226</td>
<td>0.984</td>
<td>95.703</td>
</tr>
<tr>
<td>18</td>
<td>0.202</td>
<td>0.876</td>
<td>96.580</td>
</tr>
<tr>
<td>19</td>
<td>0.194</td>
<td>0.843</td>
<td>97.423</td>
</tr>
<tr>
<td>20</td>
<td>0.176</td>
<td>0.766</td>
<td>98.189</td>
</tr>
<tr>
<td>21</td>
<td>0.164</td>
<td>0.712</td>
<td>98.901</td>
</tr>
<tr>
<td>22</td>
<td>0.156</td>
<td>0.677</td>
<td>99.578</td>
</tr>
<tr>
<td>23</td>
<td>0.107</td>
<td>0.422</td>
<td>100.000</td>
</tr>
</tbody>
</table>

Extraction Method: Maximum Likelihood.

Another method in mitigating method bias is to use a common latent factor as shown by the CLF oval in Figure 8.5 and Figure 8.6. This method explains the shared variance, however does not identify the specific variable that is causing the variance (Gaskin 2016a).
Figure 8.5 Common Latent Factor Results
8.9.1. Chi-square difference test

Due to the CLF being retained in the final factor analysis (Figure 8.6), the chi-square difference test is calculated (Gaskin 2016). This is achieved by subtracting the chi-square value for the larger model from the chi-square of the smaller model. Equally the degrees of freedom are also subtracted (Tabachnick and Fidell 2014). The chi-square difference test may be problematic in assessing the relationship between sample size and chi-square where smaller samples are used (Tabachnick and Fidell 2014). However, in the case of the Metal s study, a larger sample size was used so this issue was mitigated. SEM tests whether a variance-covariance matrix is supported by a theoretical model (Schumacker and Lomax 2016). Common variance can be assessed by identifying a latent variable or common method bias in models that are either constrained to 0 or unconstrained (Schumacker and Lomax 2016). This can be tested by the chi-square difference test of statistical significance, this is through
establishing the key variables that relate to a construct (Schumacker and Lomax 2016). A significant result shows that the models are different (Table 8.14) (Schumacker and Lomax 2016) and therefore the latent factor should be retained.

Table 8.14 Chi-square Difference Test

<table>
<thead>
<tr>
<th></th>
<th>Chi-square</th>
<th>df</th>
<th>p-val</th>
<th>Invariant?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall Model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unconstrained</td>
<td>298.2</td>
<td>190</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fully constrained</td>
<td>427.6</td>
<td>213</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of groups</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>129.4</td>
<td>23</td>
<td>0.000</td>
<td>NO</td>
</tr>
<tr>
<td><strong>Chi-square Thresholds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90% Confidence</td>
<td>300.91</td>
<td>191</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>2.71</td>
<td>1</td>
<td>0.100</td>
<td></td>
</tr>
<tr>
<td>95% Confidence</td>
<td>302.04</td>
<td>191</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>3.84</td>
<td>1</td>
<td>0.050</td>
<td></td>
</tr>
<tr>
<td>99% Confidence</td>
<td>304.83</td>
<td>191</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>6.63</td>
<td>1</td>
<td>0.010</td>
<td></td>
</tr>
</tbody>
</table>

Source: Gaskin (2016)

8.10. Summary of Confirmatory Factor Analysis for Metal

Due to evidence of CMB within the constructs as shown in Table 8.14 and explained in section 8.7, the CLF was retained in order to proceed to Structural Equation Modelling.

8.11. Structural Equation Modelling

Structural Equation Modelling (SEM) allows for testing the theoretical model (Hair et al. 2014). CFA enables the testing of constructs and establishing latent variables (Schumacker and Lomax 2016). In structural equation modelling, the emphasis is placed on the relationships between latent constructs (Malhotra et al. 2012). As a result the covariance matrix changes, along with the fit statistics which shows the structural model is different to the fit of the measurement model (Malhotra et al. 2012). SEM provides a combined method of assessing a theoretical model involving the measurement and structural model in one analysis (Hair et al. 2014). SEM “considers and estimates the linear or causal relationships between exogenous (independent) and endogenous (dependent) constructs” (Babin and Svensson 2012 p.321). Antecedent steps in the process of SEM are dependent on producing the correct results (Babin and Svensson 2012) therefore it is crucial to ensure the theory is tested correctly. The variables and latent constructs that were retained for SEM are shown in Figure 8.7.
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Figure 8.7 Variables and Latent Constructs in Structural Equation Modelling

8.12. Structural Models

Measurement theory tests concepts in a reliable and valid way through indicator variables of constructs and how they relate to one another (Hair et al. 2014). Structural models delineate linear relations in multivariate data in graphical format (Ho et al. 2012). Validity can be deduced by model fit and construct validity as previously discussed. Structural relationships are shown through a conceptual representation in a model (Hair et al. 2014). The relationship is quantified by a path estimate, which is a value given to that relationship. EFA and CFA are concerned with the relationships between constructs whereas structural models show the magnitude of the relationships (Hair et al. 2014). CFA provides the means to test the hypotheses amongst variables, however CFA is best measured in SEM according to Hoyle (2000). Structural models are specified using a path diagram and are often created in AMOS.
The structural model relationships in structural equation modelling (SEM) replace the correlational relationships discovered in CFA (Hair et al. 2014). Structural models are often seen as a clearer way of presenting algebraic data (Ho et al. 2012). The next section will discuss the results of the SEM in more depth.

8.12.1. SEM Specification

As common method bias was found to be present and the CLF was retained, the SEM model was specified with the CLF using the relationships from the hypotheses (Table 8.15).

<table>
<thead>
<tr>
<th>No.</th>
<th>Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Consumer Technology Confidence will have a positive effect on Perceived Ease of Use of Metail.</td>
</tr>
<tr>
<td>H2</td>
<td>Consumer Technology Confidence will have a positive effect on Perceived Usefulness of Metail.</td>
</tr>
<tr>
<td>H3</td>
<td>Perceived Ease of Use will have a positive effect on Perceived Usefulness of Metail.</td>
</tr>
<tr>
<td>H4</td>
<td>Perceived Usefulness will have a positive effect on the Playfulness of Metail.</td>
</tr>
<tr>
<td>H5</td>
<td>Playfulness will have a positive effect on Attitudes towards Metail.</td>
</tr>
<tr>
<td>H6</td>
<td>Perceived Usefulness will have a positive effect on Attitudes towards Metail.</td>
</tr>
<tr>
<td>H7</td>
<td>Perceived Ease of Use will have a positive effect on Attitudes towards Metail.</td>
</tr>
<tr>
<td>H8</td>
<td>Positive Attitudes towards Metail will have a positive effect on Intended Use.</td>
</tr>
</tbody>
</table>

The initial structural model was drawn in AMOS. Figure 8.8 shows the initial structural model with relationships from the hypotheses drawn.

![Figure 8.8 Initial Structural Model](image)

8.12.2. SEM Model Measurement

The initial estimates are shown in the Figure 8.9. The estimates show that there were some relatively high relationships between constructs. Firstly, the model fit was assessed before
analysing the estimates of the model. The model fit indices were analysed using the same suggested values used in the CFA stages.

![Initial Structural Model Estimation](image)

**Figure 8.9 Initial Structural Model Estimation**

### 8.12.3. Assessing the Structural Model Fit and Validity

The fit indices used during CFA are used to measure the fit of the structural model. Model fit shows how well the model can reproduce the observed data (West et al. 2012). Aspects of the model that should be assessed include path coefficients and loading estimates (Hair et al. 2014). Individual parameter estimates must also be examined to ensure they are meaningful (Hair et al. 2014). Diagnostic aspects such as the degrees of freedom and significance level can provide insight into where paths may be added. A summary of the indices for the first model is presented in the Table 8.16.
Chapter Eight: Quantitative Data Analysis

### Table 8.16 Summary of Fit Indices for Initial Structural Model

<table>
<thead>
<tr>
<th>Fit Index</th>
<th>Initial Measurement Model</th>
<th>Suggested Values and Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>198.45 (df=8) P&lt;0.01</td>
<td>P&lt;0.05 (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td>RMSEA</td>
<td>≤0.06 (Tabachnick and Fidell 2014)</td>
<td>&lt;0.5&lt;0.8, ≤0.8, &lt;0.7 with CFI of ≥0.92 (Hair et al. 2014)</td>
</tr>
<tr>
<td>ECVI</td>
<td>ECVI&gt;ECVI Saturated</td>
<td>ECVI&lt;ECVI Saturated</td>
</tr>
<tr>
<td>ECVI&gt;ECVI Independent</td>
<td>ECVI&lt;ECVI Independent (Byrne 1998)</td>
<td></td>
</tr>
<tr>
<td>CFI</td>
<td>≥.95 (Tabachnick and Fidell 2014)</td>
<td>≥.92 (Hair et al. 2014)</td>
</tr>
<tr>
<td>NFI</td>
<td>&gt;.95 (Tabachnick and Fidell 2014)</td>
<td>&gt;.95 – Good fit (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td>TLI</td>
<td>&gt;.92 (Hair et al. 2014)</td>
<td>≥.92 (Hair et al. 2014)</td>
</tr>
<tr>
<td>RMR</td>
<td>&lt;.05 (Schumacker and Lomax 2016)</td>
<td>≤.08 (Hair et al. 2014)</td>
</tr>
<tr>
<td>GFI</td>
<td>&gt;.90 (Hair et al. 2014)</td>
<td>&gt;.90 – Good fit (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td>PGFI</td>
<td>&gt;.50</td>
<td>0-1 (closer to 1) (Malhotra et al. 2012)</td>
</tr>
</tbody>
</table>

#### 8.12.4. Diagnosis

As shown in Table 8.16 it is clear that the majority of the fit indices showed unfavourable values. The model fit indices that did not meet the suggested values are highlighted in yellow (Table 8.16). Therefore, the initial structural model did not meet the model fit requirements. The model was respecified to improve model fit and is explained in Section 8.12.5.

#### 8.12.5. SEM Model Respecification

In order to achieve a more favourable model, the model goes through a respecification process. This may be achieved by assessing relationships by the path estimates or standardized residuals (Hair et al. 2014). Co-variances or error terms can be added where justified (Schumacker and Lomax 2016). Respecification is undertaken to achieve a more favourable model fit. Through assessing the described specifications and model fit criteria, relationships were added to the model to improve model fit. Figure 8.10 presents the final SEM and the Table 8.17 shows the final model fit indices.
As illustrated in Figure 8.10, in the final SEM two new relationships were added to the model to improve model fit. It is clear from Table 8.17 that the model fit had changed with RMSEA and NFI having improved.

**Table 8.17 Summary of Final Fit Index for Structural Equation Model**

<table>
<thead>
<tr>
<th>Model Fit Statistic</th>
<th>Final Measurement Model</th>
<th>Suggested Values and Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>8.103 (df=3) P&lt;.050</td>
<td>P&lt;.050 (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td>RMSEA</td>
<td>.065</td>
<td>≤0.6 (Tabachnick and Fidell 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;0.5≤0.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;.07 with CFI of ≥.92(Hair et al. 2014)</td>
</tr>
<tr>
<td>ECVI</td>
<td>ECVI&lt;ECVI Saturated</td>
<td>ECVI&lt;ECVI Saturated</td>
</tr>
<tr>
<td></td>
<td>ECVI&lt;ECVI Independent</td>
<td>ECVI Independent (Byrne 1998)</td>
</tr>
<tr>
<td>CFI</td>
<td>.994</td>
<td>≥.95 (Tabachnick and Fidell 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥.92 (Hair et al. 2014)</td>
</tr>
<tr>
<td>NFI</td>
<td>.991</td>
<td>&gt;.95 (Tabachnick and Fidell 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;.90/95 – Good fit (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td>TLI</td>
<td>.970</td>
<td>&gt;.92 (Hair et al. 2014)</td>
</tr>
<tr>
<td>RMR</td>
<td>.022</td>
<td>&lt;.05 (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≤.08 (Hair et al. 2014)</td>
</tr>
<tr>
<td>GFI</td>
<td>.993</td>
<td>&gt;.90 (Hair et al. 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;.90–.95 – Good fit (Schumacker and Lomax 2016)</td>
</tr>
<tr>
<td>PGFI</td>
<td>.142</td>
<td>&gt;.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0-1 (closer to 1) (Malhotra et al. 2012)</td>
</tr>
</tbody>
</table>

The fit of the final model improved significantly where 7 out of 9 indices were within the acceptable thresholds. ECVI and PGFI were still unfavourable. However, the results were deemed good fit.
8.12.6. Hypotheses Testing

In order to assess the hypothesized relationships in the study, the p-value indicates significance or insignificance. Field (2009) states that if \( p <= .05 \) then there is a significant prediction between two constructs. This can be observed in the regression weights for the study in Table 8.18.

<table>
<thead>
<tr>
<th>Table 8.18 Regression Weights for MetaIl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>EaseofUse &lt;--- TechnologyConfidence</td>
</tr>
<tr>
<td>Perceived Usefulness &lt;--- EaseofUse</td>
</tr>
<tr>
<td>Playfulness &lt;--- PerceivedUsefulness</td>
</tr>
<tr>
<td>Playfulness &lt;--- EaseofUse</td>
</tr>
<tr>
<td>Attitude &lt;--- PerceivedUsefulness</td>
</tr>
<tr>
<td>Attitude &lt;--- Playfulness</td>
</tr>
<tr>
<td>Attitude &lt;--- EaseofUse</td>
</tr>
<tr>
<td>Attitude &lt;--- TechnologyConfidence</td>
</tr>
<tr>
<td>IntendedUse &lt;--- Attitude</td>
</tr>
<tr>
<td>IntendedUse &lt;--- EaseofUse</td>
</tr>
<tr>
<td>IntendedUse &lt;--- Playfulness</td>
</tr>
<tr>
<td>IntendedUse &lt;--- PerceivedUsefulness</td>
</tr>
</tbody>
</table>

Significant relationships found between measures are shown in Table 8.18. The \( p \)-value is demonstrated by ***. Only one path had a probability value of .007. However, this was still below the threshold of \( p=0.05 \) as recommended by Field (2009). Table 8.19 shows the final hypotheses for the model. Four new hypotheses were added resulting in twelve supported hypotheses as shown in twelve paths in the final model (Figure 8.10).
### Table 8.19 Summary of Final Hypotheses

<table>
<thead>
<tr>
<th>No.</th>
<th>Hypotheses</th>
<th>Supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Consumer Technology Confidence will have a positive effect on Perceived Ease of Use of Metail.</td>
<td>Yes</td>
</tr>
<tr>
<td>H2</td>
<td>Consumer Technology Confidence will have a positive effect on Perceived Usefulness of Metail.</td>
<td>No</td>
</tr>
<tr>
<td>H3</td>
<td>Perceived Ease of Use will have a positive effect on Perceived Usefulness of Metail.</td>
<td>Yes</td>
</tr>
<tr>
<td>H4</td>
<td>Perceived Usefulness will have a positive effect on the Playfulness of Metail.</td>
<td>Yes</td>
</tr>
<tr>
<td>H5</td>
<td>Playfulness will have a positive effect on Attitudes towards Metail.</td>
<td>Yes</td>
</tr>
<tr>
<td>H6</td>
<td>Perceived Usefulness will have a positive effect on Attitudes towards Metail.</td>
<td>Yes</td>
</tr>
<tr>
<td>H7</td>
<td>Perceived Ease of Use will have a positive effect on Attitudes towards Metail.</td>
<td>Yes</td>
</tr>
<tr>
<td>H8</td>
<td>Positive Attitudes towards Metail will have a positive effect on Intended Use.</td>
<td>Yes</td>
</tr>
<tr>
<td>H9</td>
<td>Perceived Usefulness of Metail will have a positive influence on Intended to use Metail</td>
<td>Yes</td>
</tr>
<tr>
<td>H10</td>
<td>Perceived Ease of Use of Metail will have a positive influence on Playfulness experienced when using Metail</td>
<td>Yes</td>
</tr>
<tr>
<td>H11</td>
<td>Perceived Ease of Use will have a positive effect on the Intended Use of Metail</td>
<td>Yes</td>
</tr>
<tr>
<td>H12</td>
<td>Technology Confidence has a positive effect on Attitudes towards Metail</td>
<td>Yes</td>
</tr>
<tr>
<td>H13</td>
<td>Playfulness of Metail has a positive effect on Intended Use Metail</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### 8.13. Summary of Structural Equation Modelling for Metail

The overall results of the SEM for Metail are shown in Table 8.17. The results indicate that the more useful consumers found Metail the more they experienced play when using the technology .726***. This shows that playfulness was a central factor in the technology acceptance and use of Metail. In addition, the perceived ease of use of Metail positively influenced the perceived playfulness experienced when using Metail .509***. This indicates that consumers found Metail playful, useful and easy to use when shopping online. Furthermore, the usefulness of Metail assists with forming positive attitudes towards Metail .426***. When experiencing play on Metail, this also had a positive effect on attitudes towards the technology .266***. The ease of use of Metail had a positive influence on attitudes towards Metail .208***. Ease of use and usefulness of Metail were also positively related .193***. This shows how the use and play related constructs were key in forming positive consumer attitudes towards the technology in its role in online shopping. Finally, the playfulness of Metail significantly affected the consumer’s intended use of Metail .263***. Overall positive attitudes towards the technology resulted in intended use of the Metail .186***.
Chapter 9. Qualitative Data Analysis

9.1. Introduction

This chapter describes the qualitative data analysis and results as denoted in the methodology (Chapter 6). This chapter firstly presents the results from stage 2: the Very.co.uk Style adviser, followed by the Topshop Style Quiz and finally stage 3: the industry interviews. Through transcription, open coding and analysis the sub-themes and emerging elements became clear. Open, axial and selective codes were applied and from this coding process, a model was developed that shows the interrelationships between aspects of fit, sizing and styling in post-purchase garment evaluations. The key themes deduced through industry interviews are also presented and discussed in the final section of the chapter.

9.2. Participant demographic information

The garment try-ons in stage 2 were split across the Very.co.uk and Topshop.com Dressipi stimuli and data was collected in accordance with the University’s ethical guidelines. A total of 20 participants took part in the final try-ons with 23 garments being tested (3 as part of a pilot study). The participants recruited had predominantly participated in both the Very study and the Topshop study, however three participants had not taken part in the Very study due to constraints on their availability. The sample age range recruited were from 18-34. This was due to the target demographic consumer age of Very and Topshop falling within this range (Observer 2002). Existing studies have used similar age ranges for garment try-on studies (Grogan et al. 2013, Alexander et al. 2005, Kinley 2010, Kim and LaBat 2013). The sample selection process for stage 2 was also discussed in Chapter 7. Dresses were selected as the try-on garment which accorded with existing research (Grogan et al. 2013). Dress garments typically fit both the upper and lower body and therefore allowed for optimum clothing fit assessment.

A total of 17 female participants took part in the Very.co.uk garment try-ons, which were held at the Head Office in Speke, Liverpool. This was due to the collaboration between the research project and the Shop Direct Group, which houses the fashion retailer Very.co.uk. Very.co.uk is the UK’s second largest pure-play fashion retailer that sells own brand and third-party fashion garments, retail and home products (Shop Direct 2016). Very.co.uk is part of a larger group of retailers that includes Littlewoods and Very Exclusive that are traded under the Shop Direct Group (Shop Direct 2016). A total of 18 female participants took part in the Topshop.com Style Quiz try-ons.

Participants were briefed prior to the study to ensure understanding of the research process. The participants were taken through either Very.co.uk or Topshop.com style quiz website and
were asked to select a garment. The information entered by the participant into the style quiz was recorded in a spreadsheet and in the form of screenshots of the websites. Participants chose a dress garment through the product and sizing recommendations presented by the style adviser/style quiz. The dresses were ordered on behalf of the participant and delivered to Shop Direct Head Office or the University of Manchester, depending on the study. As Very.co.uk was a collaboration, the garments were delivered to the head office and the user experience lab was used to facilitate the try-ons. A private cubicle at the University of Manchester was used for the Topshop try-ons. The participants did not have to pay for the dresses purchased as they were ordered on their behalf. Participants were incentivised accordingly which was also discussed in Chapter 7. Information obtained through the initial stages of the style adviser/style quiz are recorded in Table 9.1. It is evident that the sample were between the ages of 18-31 and considered themselves to be between size 6-14 based on self-reported measurements. The full questions used by the style adviser/style quiz are included in the appendix.

Table 9.1 Participants measurements and sizes

<table>
<thead>
<tr>
<th>No.</th>
<th>Height (cm)</th>
<th>Weight (Kg)</th>
<th>Age</th>
<th>Self reported Dress size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>172.5</td>
<td>63.5</td>
<td>24</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>167.5</td>
<td>76.2</td>
<td>31</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>170</td>
<td>46.3</td>
<td>24</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>162.5</td>
<td>58.5</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>167.5</td>
<td>52.6</td>
<td>22</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>167.5</td>
<td>58.1</td>
<td>21</td>
<td>12</td>
</tr>
<tr>
<td>7</td>
<td>167.5</td>
<td>57.2</td>
<td>21</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>160</td>
<td>65</td>
<td>24</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>157.5</td>
<td>68</td>
<td>25</td>
<td>14</td>
</tr>
<tr>
<td>10</td>
<td>162.5</td>
<td>62.6</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>Withdrew</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>170.5</td>
<td>60.8</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>13</td>
<td>160</td>
<td>69.9</td>
<td>22</td>
<td>12</td>
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<tr>
<td>14</td>
<td>163.7</td>
<td>54.5</td>
<td>19</td>
<td>8</td>
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<tr>
<td>15</td>
<td>159</td>
<td>58.8</td>
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<td>16</td>
<td>169</td>
<td>53</td>
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<td>8</td>
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<td>17</td>
<td>169.5</td>
<td>52.6</td>
<td>21</td>
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<td>18</td>
<td>179</td>
<td>77</td>
<td>22</td>
<td>12</td>
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<td>19</td>
<td>164</td>
<td>58</td>
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<td>20</td>
<td>167.5</td>
<td>66.2</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>21</td>
<td>162.5</td>
<td>55</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>

9.3. Very.co.uk Style Adviser

This stage of the study aimed to capture the consumer’s perception of fit, the affordances and expectations that consumers may have based on their physical experience of garments. The following section discusses the results of the Very.co.uk try-ons using Dressipi and the subsequent performance and aesthetic related evaluations of the garments. Fit is recognisably attributed to four main areas, as denoted in this study namely psychological fit, aesthetic, social, and physiological fit (LaBat and DeLong 1990, Yu 2004). A new area of fit was
categorised in the results based on participant knowledge of fit, size and body named comparative fit. Additionally haptic expectations (physical touch) was also added based on fabric expectations from the online product image. The discussion is divided into performance evaluation, aesthetic evaluation and interface evaluation as defined by the literature (Chapter 6, Section 19, 20 and 21).

9.4. Performance evaluation of the garment – Very.co.uk

9.4.1. Consumer fit and size satisfaction

Fit satisfaction was a primary research theme used in the study as this relates to the nature of the participants evaluation of the product. Existing studies that have also included fit evaluation include Grogan et al. (2013) Shin (2013), deKlerk and Tselepis (2007), Alexander et. al (2005) and LaBat (1990). The themes that emerged are categorised in accordance with existing studies as noted in the literature (Chapter 5), into the area of functional and behaviourl aspects of fit/size/style satisfaction, denoted as either instrumental or expressive (Swan and Combs 1976, de Klerk and Tselepis 2007). In addition, psychological and comparative fit were also emerging themes to fit and size satisfaction. The consumer evaluations of fit satisfaction results from the Very study are shown in Table 9.2.
### Table 9.2 Consumer fit satisfaction (Very.co.uk)

<table>
<thead>
<tr>
<th>Open code</th>
<th>Axial code</th>
<th>Selective Code</th>
<th>Statement examples</th>
</tr>
</thead>
</table>
| Fit satisfaction| Functional fit           | Conforms to body | The dress fits fine along the body [1]  
It fits really well, it’s quite figure hugging on the waist but it’s also quite flattering on the hips as well [4]  
I feel like it makes me look like I’ve got a waist, it goes in at the smallest part of myself [1]  
It fits really nicely on the waist [7]  
Its really quite big around the waist and the bottom half [15]  
The fit I feel is really good on the waist, especially on the upper waist [16]  
Too big around my bust and waist area [18] |
|                 |                          |                | Fit Symmetry Consistently the same size all over the garment…the bottom half is balanced with the top half [8]  
For example this dress I would need it fitted round my waist and then the fact that I’m usually a 12 on the bottom doesn’t matter because it is a flared style, I’d need it smaller on the top, so I think it would be more accurate if they took that into account [6]  
I can be unsatisfied because often they don’t fit me around the waist, whereas this one fits me in all places [4] |
| Psychological   | Comfort                  |                | Psychological Comfort It wouldn’t necessarily be something that I’d actually choose to wear…it may suit my figure but it’s not something that I feel comfortable in [12] |
| Physiological   | Comfort                  |                | Physiological Comfort Very comfortable fit [8]  
I think that the fact that it is just stretch even in an 8, is very comfortable [5] |
| Social          | Fashion figure           |                | Social Fashion figure It’s thinking that women always want to look slimmer, but I’m not really bothered about looking slimmer, it’s just what I want to wear [P6] |
| Fit expectation | Comparative fit          | Trueness to perception of fit | For fit, I don’t think it’s that true, I haven’t got that much of a big bust, so I don’t understand why it’s that tight around this area[1a]  
If anything I usually find them [dresses in the waist region] a bit tight [9]  
I feel like I was expecting it to be a bit tighter and shorter [14]  
I didn’t think it would fit me, but it does fit fine [3]  
I didn’t think it would fit as well as it does [8] |
| Comparative     | Body Catheix             | Knowledge of own body/fit | Comparative fit satisfaction It normally is hard to find (garments that fit in the shoulder area), because I am larger here (shoulders) [P1a]  
I can never get anything to fit my shoulders or the boob area’ [P2a]  
I can be unsatisfied because often they don’t fit me around the waist, whereas this one fits me in all places [P4]  
I find it difficult to find dresses that fit me well on the hips without bagging around the tummy [P6]  
I also know the shape of my body [6]  
Sometimes I’m not satisfied with the length, because my legs aren’t the longest…it’s quite hard to find a dress that satisfies [14] |

### 9.4.2. Consumer evaluations of aesthetic fit

LaBat and Delong (1990) state that one of the primary issues with consumer fit issues may be the lack of garment conformation to the body and how this is described i.e. loose fit, depends on the consumer. Aesthetic fit has been described by Shin (2013) as the appearance of the garment on the body and in this study aesthetic fit is used in relation to the perception of conformation to body or “figure hugging.” From the study, it was clear with the dresses from
Very that a good fit was described by participants in relation to (1) conformation to body and (2) definition in the waist area (Table 9.2).

“It fits really well, it’s quite figure hugging on the waist but it’s also quite flattering on the hips as well” [4]

“I feel like it makes me look like I’ve got a waist, it goes in at the smallest part of myself” [1]

Interestingly, participant 1 defined their waist as “the smallest part of myself” demonstrating learnt parameters of how to judge their waist area. The use of body conformation and waist definition relates to the idea of a flattering silhouette when participants seek a sexy or fashion forward garment (Kinley 2010). The hourglass figure defined by Pisut and Connell (2007) is stated to have a defined waist region. The want for the hourglass shape has remained in popular culture and has been found to be an ideal that females are looking to emulate (Grogan et al. 2016, Chapter 5). Established by Secord and Jourard (1953), who stated that females compare themselves to the ideal figure, which is reflected by a perceived societal standard that women feel they should look like. This is based on the inter-personal and social effects for the want of the idealised female figure (Rasband and Liechty 2006). It is evident from literature that body shape and consumer perceptions are complex (Chapter 5). It is important to consider that garment assessment for dresses may differ from garments which fit the body in different ways. However dresses remain one of the only garments that fit over the three major sizing dimensions of the body.

9.4.3. Consumer evaluations of garment symmetry

LaBat and Delong (1990) state that in clothing manufacture, there is an ideal dress figure that is used in new garments. This ideal was stated by Armstrong (1987) as a symmetrical figure. Similarly, in the Very try-ons, fit satisfaction was related to the consistent balance of the garment in how it fitted both above and below the waist region. This aligns with Erwin and Kitchen’s (1974) concept of balance as part of the five elements of fit (Chapter 5):

“Consistently the same size all over the garment, the bottom half is balanced with the top” [8]

This concept of balanced fit is also related to the impact of garment styling, for example:

“I would need it fitted round my waist and then the fact I’m usually a 12 on the bottom doesn’t matter because it is a flared style, I’d need it smaller on the top” [6]

Participants’ pre-existing knowledge of body shape and learned experiences of garment fit were important concepts that were captured in this data. Colls (2004, p.589) states that sizing, clothing consumption involves body knowledge and “self-reflective awareness of the inconsistency of the products they are consuming.” Emphasising the notion that consumers navigate between their own knowledge of their body, the quantification of their body within a
size and inconsistent size labelling among retailers. Body discrepancies between perceived size and experienced size during physical fit may result in negative body satisfaction (Kim and Damhorst 2010). Body discrepancies in size and experienced size is one the inherent issues with quantifying populations through sizing systems. As a result, women often generate negative perceptions of their body due to negative experiences with clothing sizing systems (Colls 2004).

Knowledge of body shape and previous fit experiences could also be influenced by pre-purchase information provided through the style adviser. In store shopping experiences can enable higher sensory affirmation (Fiore and Jin 2003) due to direct interaction with the product. In online experiences, consumers rely on mental intangibility (Nepomuceno et al. 2014) which can be attributed to the consumer’s prior knowledge of body shape and size. Mental intangibility is commonly described in online shopping environments to assist with pre-purchase product assessment and has been documented in online shopping studies (Nepomuceno et al. 2014). The influence of knowledge of the consumer’s own size and visualising of fit can therefore be considered as a pre-purchase mechanism. This mechanism can assist with the assessment of product risk factors where sensory affirmations cannot be achieved.

**9.4.4. Consumer evaluations of comfort**

Comfort is a physiological factor that was evaluated by participants and was found to be an element of fit related to fabric. For some participants, the use of stretch fabric meant that the dresses provided additional comfort. This finding aligns with deKlerk and Tselepis’ (2007) study regarding comfort, where participants expected a high level of functional comfort in garments, which is also described as intrinsic comfort (Chapter 5). Grogan et al. (2013) also found that comfort is important when assessing fit, stating that sizing is not the primary concern if the garment is comfortable:

“I think that the fact that it is just stretch even in an 8, is very comfortable” [5]

The concept of psychological comfort was an emerging theme within existing research (Chapter 5) and is discussed with regards to consumer experience in most detail by de Klerk and Tselepis (2007). Psychological comfort was related to the participant’s feelings when wearing the garment, which is also known as an extrinsic factor (de Klerk and Tselepis 2007). Comfort in a psychological sense for this study, was related to a consumer’s knowledge of her own personal style and how they felt wearing the garment:

“It may suit my figure but it’s not something that I feel comfortable in” [12]

Swan and Combs (1976) measured comfort as an expressive factor. Results from this study directly align with Swan and Combs’ (1976) findings and demonstrate the importance of
psychological comfort and feelings with fit. Grogan et al. (2013) found that participants commented on a flattering fit for their body shape. However, this study denoted that participants may find a garment suits their figure, but they may not feel comfortable in it in terms of wearer confidence.

It was also important to recognise how the participant felt that the style adviser had considered their personal body shape when estimating size. How the participant feels when wearing the physical garment is an aspect that cannot be deduced until try-on (Shin 2013). Similarly, Alexander et al. (2005) also stated that clothing can directly relate to self-confidence, if fitted correctly. Assessing wearer comfort may be a barrier to fit evaluation in online contexts due to the need for physical try-on. The results from this study therefore recognise the influence of styling to body shape, and how prescriptive sizing may not overcome the wearer’s feelings once in the garment. In other words, comfort and sizing are inter-related as consumer confidence and psychological feelings towards what is recommended and what they feel suits them are often distinctive factors. Despite being an integral part of fit satisfaction through the results of this study, the comfort of garments assessed from a consumer perspective has not been widely documented in research.

9.4.5. Consumer evaluations of the hourglass ideal

Closely related to the concept of psychological comfort, is the concept of the hourglass figure as previously discussed in Chapter 5 (Faust and Carrier 2011, Rasband and Liechty 1985). Despite existing research that has stated that consumers wish to achieve the ideal hourglass figure, the results from try-ons showed that confident consumers may not necessarily wish to achieve this:

“It’s thinking that women always want to look slimmer, but I’m not really bothered about looking slimmer, it’s just what I want to wear” [6]

The move away from the want for a slim figure may not be applicable across a wider range of participants in the study, however, it may be explained by the emerging influence of fast-fashion. Fast fashion is where clothing is produced to reach stores as fast as possible, usually on a highly trend-led business model (Bruce and Daly 2006). Due to fast fashion, consumers have a greater amount of clothing availability and choice, which can enable consumers to be more experimental with styles, sizes and brands (Jong 2014). The ideal fashion figure may have changed over time due to variations in styles such as oversize. Therefore, how a wearer prefers to look in a garment and how they wish to express themselves (Loureiro et al. 2017) can be seen to be more to do with their own interpretation of fashion (Dove 2016).
9.4.6. Consumer evaluations of tightness

Tightness is often described as an assessment of fabric ease or movement in the garment. Tightness from a fit judge perspective is often depicted in stress folds (Song and Ashdown 2015, Gill 2015) (Chapter 5). Stress folds form when the garment pulls tightly on areas of the body (Erwin and Kinchen 1974). In the results of the study, the tightness of the garment was described in availability of movement around the arm region:

“Across the arms I can’t move my arms at all” [1a]
“I still can’t move my arms” [2b]

As a range of body shapes, dress styles and sizes were assessed, it is difficult to deduce variations within a particular size range from this sample. To investigate further, the fit model reports, garment style or grading could be analysed to identify if the issue with fit in the arm region was specific to the product. Whether this was problematic derived from a garment pattern, or a consumer led issue could be then deduced, which further emphasises the difficulties associated with standardised sizing systems (Ashdown and DeLong 1990, Wren and Gill 2010, Gill 2015, Gill 2016).

9.4.7. Consumer evaluations of comparative fit

Comparative fit was assessed by Grogan et al. (2013) which was developed from fit expectation. Comparative fit relates to the consumer’s expectations of fit in comparison to previous garments they own, or previous clothing try-on experiences that they have had. As this research was based on online garment fit expectations and size recommendation that was produced through a style adviser, the participants may have had altered expectations to those when purchasing a garment in a store. Fit information online may include an online size chart, model height information, ‘model is wearing’, consumer reviews and size information (McKinney and Shin 2016). However, consumers often have limited information in such contexts which is where consumers will use their own information gained through previous experiences. Consumers may also struggle to visualise garments on the body when shopping online (Kim and Damhorst 2013). This was a key factor to consider and which was why it was used in this research to assess the trueness of the garment to the online perceptions of fit. This was in order to understand the factors that consumers take into account such as their anticipated expectations versus their actual experiences of the garment. Comparative fit in this study was often based on a negative perception of the garment prior to try-on:

“I feel like I was expecting it to be a bit tighter and shorter” [14]
“I didn’t think it would fit me, but it does fit fine” [3]

Comparative fit indicates that consumer expectations during the study were different to the actual experience of the garment. This may pertain to how the products are presented on the
website and the consumer’s ability to reference this against previous garment experiences, similar to Kim and Damhorst’s study into online fit concerns (2013). Implications to product presentation are a key factor in how the consumer develops information prior to purchase in the online retailing environment, as investigated by Park et al. (2012). Additionally, consumers may also have positive relationships with the retailer, after a positive post-purchase fit experience. Comparative fit is also related to the consumer’s knowledge of their bodies, body confidence, how they perceive fit and learned fit experiences. Learned experiences regarding clothing include information gained from wearer experience (Colls 2004). The compromises the consumer may have to make in relation to fit of garments, i.e. the discrepancies between how the garment was designed and how it actually fits (Gill 2015, Grogan et al. 2013), can also be linked with comparative fit and retailer sizing discrepancies (Gill 2016).

9.4.8. Consumer body cathexis

Body cathexis is defined as ones feelings about their body shape and size (LaBat and DeLong 1990, Secord and Jourard 1953). Body cathexis is also related to knowledge of the wearers own body and fit, which is how it is described in this study. A consumer’s knowledge of their own body and fit in garments can be an indicator of how they assess a garment to fit them based on experience and additionally how they perceive areas of their bodies (that may be problematic) in the fit of garments. Fit of garments in the waist area were deemed by Grogan et al. (2013) to be preferred by participants, and that they wished to emulate the hourglass figure when assessing clothing fit (Faust and Carrier 2011). Therefore, it was deduced that if clothing fits in the waist area it is likely to achieve a higher level of fit satisfaction in the eyes of the consumer:

“I can be unsatisfied because often they don’t fit me around the waist, whereas this one fits me in all places” [4]

Participants often stated that they wanted to achieve the hourglass ideal, as this was the most desired body shape in clothing (Pisut and Connell 2007). The above quote describes the garment fitting in all places as the participant preferred a closer fit to all areas of the body. Additionally, the garment could be made from a stretch fabric, which would have implications to clothing ease or movement due to tightness or looseness, how they prefer fabrics and fit (Dove 2016).
9.4.9. Consumer size satisfaction

The concept of size satisfaction relates to how a participant feels about the size they are recommended for the garment selected. The thematic analysis for size satisfaction is outlined in Table 9.3. This indicates that size was evaluated on consumer size satisfaction elements and size expectations elements. This need for confirmation with other sizes relates to the nature of consumer online shopping habits, through purchasing more than one garment and returning the item that is not satisfactory in fit or size. This was described in Chapter 3 and 4. The results emphasise that the need for comparison with other sizes, alongside the use of personal knowledge of size and body shape were key aspects to consumer size satisfaction.

<table>
<thead>
<tr>
<th>Open code</th>
<th>Axial code</th>
<th>Selective code</th>
<th>Statement examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size satisfaction</td>
<td>Functional</td>
<td>Need for comparison</td>
<td>I’d be happy with sticking with this size, it’s just a consideration of trying a 10 just if it’s more breathability [5] Normally when I shop I buy two sizes (10 &amp; 8), unless they don’t do free returns and then I look at the measurements a bit more carefully [6] This style dress I would have got a ten, just because I know that my top half where this dress clings, is smaller than my bottom half [18]</td>
</tr>
<tr>
<td>Size expectation</td>
<td>Functional</td>
<td>Personal size knowledge</td>
<td>Usually I click 6 because that is what I am in most shops, so I would’ve just filtered this out because it’s in an 8 and I wouldn’t have looked at it twice being an 8 [3a] Normally I get a ten because my top half is a bit wider whereas the rest is usually a bit looser. I definitely couldn’t have worn an 8 in this [8]</td>
</tr>
<tr>
<td>Knowledge of body shape</td>
<td>Body Cathexis</td>
<td></td>
<td>I like the shape but it doesn’t fit me at the top around the boobs, it’s too big here, but that’s generally what I get because of my body shape [2a]</td>
</tr>
</tbody>
</table>

9.4.10. Consumer size comparison

There is currently little existing literature on the consumer need for size comparison (comparing larger or smaller sizes of garments) in online purchasing contexts. This is a new concept adapted through the rise of new online shopping formats, such as mobile browsing that has directly impacted on consumer purchasing behaviour. Many retailers offer free returns policies which enable the consumer to purchase more than one garment and return the one they are least satisfied with (Petersen and Kumar 2009, Bower and Maxham 2012, Foscht et al. 2013). A direct outcome of the study showed that during the Very try-ons, 24% of participants wanted to try a different size garment to compare the fit. Size comparison became evident as a new emerging behavioural factor when evaluating the purchases.

"Normally when I shop I buy two sizes (10 & 8), unless they don’t do free returns and then I look at the measurements a bit more carefully" [6]
Similarly to fit expectation, size satisfaction was also related closely to comparative fit, personal size knowledge in previous garments and knowledge of personal body shape, which is also known as Body Cathexis (LaBat and DeLong 1990) (Table 9.3).

9.4.11. Consumer knowledge of personal size

Knowledge of personal size is related to how a participant would choose a size when shopping online, as there is no direct opportunity to try the garment on. Park et al. (2009) found that consumers with different body types will shop for different motivations and therefore retailers must guide consumers when it comes to sizing decisions. With the use of a style adviser which recommends a size based on previous purchases, this will consider the top, dress and trouser sizes of the participant before recommending a size. Through previous shopping experiences, participants have learnt where they have problematic areas of fit and often make allowances for this when choosing garments:

“ Normally I get a ten because my top half is a bit wider whereas the rest is usually a bit looser. I definitely couldn’t have worn an 8 in this” [8]

Participants that have this knowledge may already make these allowances for sizing in areas of their body whilst not consciously realising. Retailers do not consider body shape when devising sizing systems (Wren and Gill 2010). However, using the online style adviser meant that consumers had to consider this by entering body shape information to ensure the recommendation was correct. This is emphasised by the fact that there is a major difference between retailer sizing systems (Petrova and Ashdown 2012) where the same measurements may not relate to the same size, which is also clearly illustrated by Gill (2016). The style adviser can help to eliminate sizing issues in theory. However, the style adviser’s system is also not developed enough to understand the inherent differences between retailer sizing charts (Gill 2016) and therefore cannot provide a completely accurate recommendation for each body shape and size. However, size recommendation interfaces can assist to reduce size related risk in online purchase decisions.

9.5. Consumer aesthetic evaluation – Very.co.uk

9.5.1. Consumer evaluations of fabric, colour and print quality

Evaluations of fabric colour and print quality were categorised into themes of functional (which included haptic expectations) and colour implications. Haptic expectations were discussed in Chapter 4 regarding a consumer’s need for touch when using online shopping channels. Colour implications were not of primary importance in previous consumer fit research (Eckman et al. 1990). Due to the nature of the online channel used in the study, colour held increased importance with regards to matching consumer evaluations to the online product. The thematic results are displayed in Table 9.4.
Table 9.4 Consumer evaluations of fabric, colour and print quality (Very.co.uk)

<table>
<thead>
<tr>
<th>Open code</th>
<th>Axial code</th>
<th>Selective code</th>
<th>Statement examples</th>
</tr>
</thead>
</table>
| Fabric quality | Functional     | Haptic expectation        | I thought it would be jersey but it’s actually woven, so it’s not what I expected [2a]  
I don’t like the fabric, it looks like gym fabric [3b]  
The fabric looked a lot thicker [4]  
I like the fabric more than I did online [6]  
I did think it was going to be jersey, but it is thinner and slightly better quality [7] |
|               | Underwear      | Fabric properties and improvements | Put something in about which fabric that you prefer, whether you want something that’s thicker and more structured or whether you’re happy with a more, think revealing fabric because obviously it does impact how it’s going to look on you and how it’s going to fit [4] |
| Colour and Print Quality | Colour implications |                            | I love the print [2a]  
I feel this print makes me look fatter...because this is quite busy [2b]  
Really like the colour [4]  
Felt like the style adviser knew she liked prints and colours [10]  
Wouldn’t wear prints but was recommended [12] |

9.5.2. Consumer haptic expectation

A large component of the results was based around fabric composition. This may have been because participants did not look as closely at the product information as they would when shopping using their own disposable income. The garments were ordered on their behalf, so less product and pricing information during the purchasing stage may have been taken into account. More emphasis may have been placed on the aesthetic factors of colour, style and appearance on the model, emulating impulse purchase behaviour. Fabric composition can affect fit due to the flexibility, bending, thickness, composition, blend and quality (Yu 2004). These aspects are usually tested using the Kawabata system (Yu 2004). Fabric composition can be realised in physical try-on through how the garment will fit the body and appear when worn. Stretch garments often contour the form (Dove 2016) however, stretch qualities do not always indicate good fit (Fan et al. 2004). Participants found that their expectations were not often met, or that they were surprised about the fabric in comparison to the garment they saw online. This suggests that’s consumers struggle to understand from existing website cues what the material may be like:

“I like the fabric more than I did online” [6]

“I thought it would be jersey but it’s actually woven, so it’s not what I expected” [2a]

Overall, the participants found that the fabric had a positive influence on their perception or that it did not meet what they expected. Haptic expectation relates to how the fabric is to touch and what it was like to wear on the body. Haptic interactions that are present in offline contexts are only met once the garment has been delivered to the consumer. Depending on the level of technology confidence, consumers require different levels of haptic interactions when
shopping online, and this may be related to online shopping experience (Peck and Childers 2003) (Chapter 4). Haptic interactions are important to defining perceptions of product quality, thus a better presentation of products is essential to overcoming the haptic barrier in online retailing (Weathers et al. 2007, Peck and Childers 2003, Liu et al. 2017). The style adviser currently does not include information about preferences related to fabric. This is important as it can influence the fit of garments, e.g. a knitted garment, due to its structure, will inherently have more stretch/give than a non-woven (Dove 2016). Additionally, a stretch garment, one that contains elastane in its blend will allow a closer fit than one without elastane, as it will stretch to fit the body (Dove 2016).

9.5.3. Consumer strategies for better fit

Underwear exposure was a significant result from the study and aligned with Grogan et al. (2013).

“Put something in about which fabric that you prefer, whether you want something that’s thicker and more structured or whether you’re happy with a more revealing fabric because obviously it does impact how it’s going to look on you and how it’s going to fit” [4]

Fabric implications on underwear is a key factor in online purchasing and may be a big factor that users will consider when assessing whether to keep or return a garment. For example, participant 4 stated that keeping the garment would depend on the level of effort and expenditure needed to source appropriate underwear as the dress she chose exposed the outline of her underwear. Careful choice of underwear is important for participant’s end use of the garments and therefore their confidence in wear of the garment. Line is related to the appearance of underwear described in Chapter 5, in the fact that tight fitting garments in the underwear region may display lines or wrinkles, which are not desired by the wearer (Erwin and Kinchen 1974).

9.5.4. Consumer evaluations of colour and print

There was evident discrepancy in the recommendation of colour and print within the style adviser. Despite the style adviser asking questions based on the preferences of the user in terms of colours, participants stated that they were recommended colours they did not like:

“I wouldn’t wear prints but I was recommended” [12]

The credibility of the style adviser as a system to recommend an ideal wardrobe or new garments to a participant would therefore be reduced if the wrong colours related to preference were recommended. Credibility of online fashion recommendations is an important factor for consumer’s re-use intention (Choi et al. 2011). This could result in issues of trust with the interface if the system did not conform to the guidance from the consumer’s responses. Vogiatzis et al. (2012) denote the level of complexity involved in fashion recommendation
systems, which was also described in Chapter 3. Colour and print also had confidence related results, as a person who did not like busy prints or patterned fabric that bought attention to areas of her body that the participant was not confident about:

“I feel this print makes me look fatter... because this is quite busy” [2b]

Therefore, the choice of colour and pattern, which is not included in the questions of the style adviser, should be asked to ensure that the participant has a more realistic selection of recommendation. However, previous studies have also shown that colour is not as important than other dimensions of fit (Eckman et al. 1990).

9.5.5. Consumer evaluations of length and style

Length and style results (Table 9.5.) indicate that consumer evaluations were concerned with functional and aesthetic aspects of styling and personal style. Length evaluations were associated to the functional impacts of the dress on wearability. Style satisfaction was linked to personal style due to the style adviser recommending products to match the consumer’s style preferences.

<table>
<thead>
<tr>
<th>Open code</th>
<th>Axial code</th>
<th>Selective code</th>
<th>Statement Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length Satisfaction</td>
<td>Functional</td>
<td>Styling</td>
<td>Length is perfect, not too short, not too long or frumpy [2a]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>It’s kind of nearly knee length it’s not like a mini dress, so it’s not like I’d have a problem with this kind of length [5]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I like the length, it’s not too long, it just about skims my ankle, which means with a heel it would be just right [9]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The length’s nice, although for me I’d probably wear it with some sort of heel just because I’m short [10]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The length is really good [7]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Really impressed with the length as quite tall, it’s a really good length I could even wear heels with it and it would still be a really good length’ [18]</td>
</tr>
<tr>
<td>Style Satisfaction</td>
<td>Aesthetic</td>
<td>Personal style</td>
<td>Normally satisfied, has quite a lot of dresses in this style. [7]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I’m very satisfied with it, I probably wouldn’t have chosen the style if it hadn’t have been recommended to me but I actually might buy it[8]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>It doesn’t suit my style [12]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Would go for similar style [13]</td>
</tr>
</tbody>
</table>

9.5.6. Consumer evaluations of styling

Length responses were closely related to the impacts to styling, such as pairing the dress with heels.

“Really impressed with the length as I’m quite tall, ‘it’s a really good length I could even wear heels with it and it would still be a really good length” [18]

Length also had implications to the confidence of the wearer, which aligned with Grogan et al. (2013), stating that clothes should not expose thighs or underwear.
“It’s kind of nearly knee length it’s not like a mini dress, so it’s not like I’d have a problem with this kind of length” [5]

“Length is perfect, not too short, not too long or frumpy” [2a]

However, as dresses were used as the garments to be assessed in this study, it is important to consider the impact of styling, such as the difference between a body-con dress, maxi dress and skater dress. Therefore, in contrary to Grogan et al. (2013), it is important to consider the differences in styling. Due to a range of participants selected with varying heights, there was not an objective rule to what lengths were deemed acceptable due to the varied styles of dresses chosen. This is similar to the findings of Shin (2013). For maxi dresses (floor length) findings show that the dress should be able to be worn with a heel:

“I like the length, it’s not too long, it just about skims my ankle, which means with a heel it would be just right” [9]

9.6. Interface evaluation – Very.co.uk

9.6.1. Future use of the platform

Participant’s made statements regarding their intended future use. Responses regarding future use were coded based on the topic the participant mentioned. This was linked to the attributes and usability of the interface to suit their shopping task. McKinney and Shin (2016) and Kim and Forsythe (2007) include the measurement of future use of a fashion interface. The areas that participants mentioned are coded as style quality, credibility, and refinement of purchase, brand perception, style suggestions and suitability. This is briefly described in Table 9.6.
### Table 9.6 Reasons for future use (Very.co.uk)

<table>
<thead>
<tr>
<th>Dress Size</th>
<th>Keep/Return/Exchange</th>
<th>Reason</th>
<th>Exchange Size</th>
<th>Re-use? (Y/N)</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Exchange</td>
<td>Compare 10 with 12</td>
<td>12</td>
<td>Y</td>
<td>Styles recommended were aligned with preference</td>
</tr>
<tr>
<td>14</td>
<td>Keep</td>
<td>Versatile style</td>
<td>N</td>
<td></td>
<td>Didn’t feel body shape was attributed to her personal recommendations</td>
</tr>
<tr>
<td>14</td>
<td>Return</td>
<td>Doesn’t suit me</td>
<td>N</td>
<td></td>
<td>Because it’s algorithms I don’t believe it</td>
</tr>
<tr>
<td>8</td>
<td>Return</td>
<td>Fabric low quality</td>
<td>N</td>
<td></td>
<td>Didn’t like personal recommendations given</td>
</tr>
<tr>
<td>8</td>
<td>Return</td>
<td>Fabric and length</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Keep</td>
<td>Based on suitable underwear</td>
<td>Y</td>
<td></td>
<td>Based on finding a well fitting dress</td>
</tr>
<tr>
<td>8</td>
<td>Keep</td>
<td>Summer wear only</td>
<td>N</td>
<td></td>
<td>Narrows down but recommended out of season stock</td>
</tr>
<tr>
<td>12</td>
<td>Exchange</td>
<td>Recommended too large</td>
<td>8</td>
<td>N</td>
<td>Not good enough selection for what she wants</td>
</tr>
<tr>
<td>8</td>
<td>Keep</td>
<td>N</td>
<td></td>
<td>Need to try it again to test accuracy</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Keep &amp; buy</td>
<td>Style</td>
<td>Y</td>
<td></td>
<td>Liked new suggestions for style options</td>
</tr>
<tr>
<td>14</td>
<td>Exchange</td>
<td>Too large</td>
<td>12</td>
<td>Y</td>
<td>Felt it was in-depth and tailored to her personal tastes</td>
</tr>
<tr>
<td>10</td>
<td>Return</td>
<td>Style</td>
<td>Y</td>
<td></td>
<td>If you want to guarantee something will look nice for a special occasion. Allows you to sort through sale</td>
</tr>
<tr>
<td>10</td>
<td>Return</td>
<td>Doesn’t suit me</td>
<td>N</td>
<td></td>
<td>Requires more personalisation</td>
</tr>
<tr>
<td>12</td>
<td>Return</td>
<td>Depends on when I’m wearing it</td>
<td>Y</td>
<td></td>
<td>Good to see what experts recommend you wear for your body shape</td>
</tr>
<tr>
<td>8</td>
<td>Exchange</td>
<td>Too large</td>
<td>6</td>
<td>Y</td>
<td>Took into consideration her personal style</td>
</tr>
<tr>
<td>10</td>
<td>Return</td>
<td>Doesn’t fit</td>
<td>N</td>
<td></td>
<td>Does help, but still relies on physical try-on</td>
</tr>
<tr>
<td>8</td>
<td>Keep</td>
<td>Price and quality</td>
<td>N</td>
<td></td>
<td>Depends on next garment ordered fitting</td>
</tr>
<tr>
<td>8</td>
<td>Keep</td>
<td>Alter to fit</td>
<td>N</td>
<td></td>
<td>Garments recommended aren’t ones they would wear</td>
</tr>
<tr>
<td>12</td>
<td>Exchange</td>
<td>Too large</td>
<td>10</td>
<td>Y</td>
<td>Good to know what suits you instead of what’s trendy</td>
</tr>
</tbody>
</table>

### 9.7. Final results for Very Style Adviser

The results from the Very style adviser were calculated and are shown in Table 9.6. 8 participants stated that they would keep their garments, 7 participants would return, 5 participants would exchange the garment and 11 participants would re-use. These statistics show that even though not all garments were considered successful i.e. some were returned, over half of the respondents stated that they would re-use the style adviser. Figure 9.1 shows a summary of the style adviser results.
Figure 9.1 Very.co.uk post-purchase results

9.8. Summary of Very.co.uk results

From the Very Style adviser try-ons, the areas of fit satisfaction, size satisfaction, fabric, colour and print, and length, and styling were measured and analysed. Figure 9.1 shows the final number of participants who would either re-use the website, exchange, return or keep the garment. 13 participants would re-use the style adviser within Very.co.uk, and 8 participants were satisfied enough with the interface and would keep their garment. This shows that over 50% of the participants were satisfied enough with the interface to re-use it for fashion shopping in the future.

9.9. Topshop Style Quiz Results

The next section presents the qualitative results for the Topshop style quiz study. This was conducted using the majority of the sample of participants who undertook the study with Very.co.uk. 3 new participants were added to replace those that were unable to take-part which was summarised at the beginning of the chapter in Table 9.1.

9.10. Performance evaluation – Topshop

9.10.1. Consumer fit satisfaction

Fit satisfaction was an essential criterion with the Topshop style adviser study. This was to test the fit of the garment ordered through the style quiz. Table 9.7 summarises the results for consumer fit satisfaction. Similarly to the Very fit satisfaction, the emerging themes of fit satisfaction were in relation to fit expectations and comparison to previous garment experiences.
Table 9.7 Consumer fit satisfaction (Topshop)

<table>
<thead>
<tr>
<th>Open code</th>
<th>Axial code</th>
<th>Selective Code</th>
<th>Statement examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fit Satisfaction</td>
<td>Waist fit</td>
<td>It fits on the waist and it’s nice on my arms [1]</td>
<td></td>
</tr>
<tr>
<td>Bust fit</td>
<td>Okay everywhere apart from around my boobs [20]</td>
<td>I don’t think it fits very well around the boobs [1]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The bust area is really nice it’s not tight but not loose [14]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>It’s almost a tiny bit tight on the top half which is quite rare for me [17]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I wouldn’t necessarily say I have small boobs, but if I did have any smaller boobs this would be massively worse and I have got a bra on which I wouldn’t necessarily wear with this sort of dress...which would cause this to gape even more [5]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I didn’t expect the top to be so small, the bit around my boobs’ [20]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Didn’t expect it to fit as well when chose it online, I thought it would be quite tight on my hips and loose on the top, so it’s complete opposite, it’s loose on my hips and tight up here on the bust area [boobs] [18]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Model comparison</td>
<td>On the model it’s supposed to be tight, so that’s why I think it doesn’t fit me perfectly [19]</td>
<td></td>
</tr>
<tr>
<td>Fit expectation</td>
<td>I like the fit and I didn’t think I would [6]</td>
<td>It fits really nice, in terms of the...the way it hugs the body its nice [10]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I expected it to be a bit smaller [21]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>It’s like really ill-fitting in all the wrong places, round here...it’s alright around the waist [7]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I think it fits better than I thought it would, I was a little bit concerned about the, obviously it’s got a really deep, but I think just obviously with the lace it’s not too overly revealing [4]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I did think when I chose it, I thought maybe it might be like that (small) [7]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>For that money (£85) I would want to feel comfortable and for it to be perfect fit [7]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I didn’t know if it was going to fit me around the bust area, and also around the waist if it was going to fit me very well [14]</td>
<td></td>
</tr>
</tbody>
</table>

| Comparative fit satisfaction | I find what fits me on the top doesn’t fit me on the bottom [20] |

9.10.2. Bust fit

Bust fit was an area that was problematic than expected fit for participants. The following quotes demonstrate the responses to bust fit which were not aligned with the user’s expectations:

“I didn’t expect the top to be so small, the bit around my boobs (bust)” [20]

“Okay everywhere apart from around my boobs” [20]

“I don’t think it fits very well around the boobs” [1]

The results of negative reactions to bust fit could imply that the bust fit of Topshop dresses are smaller than the sample expected. Tightness at the bust was also found within Dove’s (2016) study on stretch garments. A larger study would be required to test whether this applies to a larger population of Topshop consumers. LaBat et al. (2007) have stated that consumers are satisfied if garments exceed their expectations with regards to fit. In the case of bust fit, this claim is not supported. Participants would possibly need to consider a different style or size in...
order to achieve better bust fit. As the style adviser aims for consumers to gain recommendations of garments that could fit them, the lack of satisfactory bust fit may discourage repeated use of the style quiz. Lack of fit in the bust area may also point towards the need for more garment ease in that region.

9.10.3. Model comparison

Model comparison is used by Shim and Lee (2011) in their assessment of 3D models and 2D models and was discussed in Chapter 4. In this study, the style quiz did not contain 3D models. However, the comparison of the participants fit expectations to the model pictured on Topshop.com with their own experiences of dresses, formed part of consumer fit evaluative criteria.

“On the model, it’s supposed to be tight, so that’s why I think it doesn’t fit me perfectly” [19]

In online shopping contexts, users have less information to assess products prior to purchase than in the bricks-and-mortar store (Kim and Damhorst 2013). Therefore, the use of the model images and video imagery on a retailer’s website can be a key source of information regarding fit, discussed in Chapter 3. If fit is depicted accurately on a model it can assist consumers to visualise the garment on their bodies prior to purchase (Shim and Lee 2011). It is clear from the above quote that the participant felt that the fit on her body should be comparable to the models’ image wearing the garment. Therefore, if the fit was dissimilar then the participant may have been unsatisfied with the fit of the garment. However, Kim and Damhorst (2010) state that presenting consumers with idealised images of models can result in body dissatisfaction in apparel shopping (Kim and Lennon 2007, Yu and Damhorst 2008). This demonstrates the impact of online garment fit information prior to purchase on the physical garment assessment and consumer body satisfaction.

9.10.4. Consumer fit expectation

Fit expectations with garments purchased online should be exceeded during physical assessment to ensure the user is satisfied. This could also positively influence future patronage intention. Within the study, there is evidence of wearer fit expectations being exceeded within the following statements:

“I like the fit and I didn’t think I would” [6]

“It fits really nice, in terms of the... way it hugs the body it’s nice” [10]

“I think it fits better than I thought it would, I was a little bit concerned about the (neckline), obviously it’s got a really deep (neckline), but I think just obviously with the lace it’s not too overly revealing” [4]

“I did think when I chose it, I thought maybe it might be like that” (small) [7]
In addition to exceeding of fit expectations, monetary value also proved to be an important factor in relation to fit expectation:

“For that money (£85) I would want to feel comfortable and for it to be perfect fit” [7]

As the participants did not use their own money to purchase the garments, this may have resulted in the purchase of garments that were higher than the participant’s usual affordable budget. Therefore, results regarding price and garment fit may be biased due to financial immunity of the participants. However, financial considerations and fit are understood to be interlinked with fit expectation. In the above quotation, it is clear that the expectations of the participant would be higher if the price of the garment were greater than their disposable income, which also aligns with Shin’s (2013) findings. Price is an important pre-purchase consideration and can be related to a consumer’s shopping motivations (Park et al. 2012). Price-sensitive consumers may be more rational in their purchase decisions and may look to compare prices and shipping costs (Park et al. 2012, Lee et al. 2009). Consumers who seek lower priced, fast-fashion garments often shop frequently and impulsively (Jong 2014). Therefore, price sensitive consumers may be more analytical about fit, tend to be goal-directed than impulse orientated in their shopping (Novak et al. 2003).

9.10.5. Comparative fit satisfaction

As with the Very Style Adviser study, comparative fit satisfaction was the user’s comparison of their previous fit-related experiences with clothing with the current garment in the study. Such comparative experiences of fit are crucial in forming a consumer’s subjective perspective of fit learned through experience of garment try-on and wear. Fit comparison can also link to the participant’s knowledge of their body shape:

“I find what fits me on the top doesn’t fit me on the bottom.” [20]

As consumers are not symmetrical with sizing, i.e. participants are not necessarily the same size on the top half of the torso as they are on the bottom (Chapter 5). The response of participant 20 relates to LaBat and Delong’s (1990) conclusion that participants find fit more problematic on the lower part of the torso or body, emphasising the need to consider body shape within sizing systems. Table 9.7 presents summarised quotes regarding consumer fit satisfaction of the Topshop study.

9.10.6. Consumer size satisfaction

Size satisfaction is related closely to fit satisfaction is a key measure for participants overall fit satisfaction, as established in the Very.co.uk results. Size satisfaction was divided into two themes which included sub-themes such as size comparison, personal size knowledge and brand based size knowledge. Reference to previous experiences when evaluating size
demonstrates the discrepancies within high-street sizing systems as described in Chapter 5. Table 9.8 summarises the Topshop size satisfaction results.

### Table 9.8 Consumer size satisfaction (Topshop)

<table>
<thead>
<tr>
<th>Open code</th>
<th>Axial code</th>
<th>Selective code</th>
<th>Statement examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td></td>
<td></td>
<td>Its lovely really really nice, I think its definitely the right size and flattering on my shape [4]</td>
</tr>
<tr>
<td>expectation</td>
<td></td>
<td></td>
<td>The size is perfect [4]</td>
</tr>
<tr>
<td>Size comparison</td>
<td></td>
<td></td>
<td>I’d try a size bigger, just to see what it was like on the top [17]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>It just fits on my hips, if I wanted more give I’d probably go for a size up [20]</td>
</tr>
<tr>
<td>Oversize</td>
<td></td>
<td></td>
<td>I like that it is oversized… it doesn’t look that oversized [6]</td>
</tr>
<tr>
<td>Styling</td>
<td></td>
<td></td>
<td>I would try a different size, it feels like the style of it the way it fits on certain parts, I feel like it has to be quite fitted because the style is body con [7]</td>
</tr>
<tr>
<td>Size</td>
<td>Personal size knowledge</td>
<td></td>
<td>The website advised me a size 12, but I still believe I am a size 10 [19]</td>
</tr>
<tr>
<td>expectation</td>
<td></td>
<td></td>
<td>I expected this to be my size (4) [3]</td>
</tr>
<tr>
<td>Brand size</td>
<td></td>
<td></td>
<td>Not one of the places I usually shop, mainly because I tend to find their sizes are quite small [9]</td>
</tr>
<tr>
<td>knowledge</td>
<td></td>
<td></td>
<td>It fits, I was quite surprised, I was a bit worried because it’s an 8 ‘I normally wear a 10 in Topshop’ [12]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>It depends with Topshop the sizing is a lot different for me I could be different sizes with everything I choose [18]</td>
</tr>
</tbody>
</table>

As the style quiz recommends the participant an appropriate size, it is important from the developer and retailers point of view that size recommendations are accurate so the user is encouraged to re-use the technology. If the size can be accurately recommended then the participant will potentially perceive the system as trustworthy and accurate.

“It’s lovely really really nice, I think it’s **definitely the right size** and flattering on my shape” [4]

“The size is perfect” [4]

Often dissatisfaction with sizing has been reported in research (Colls 2004, Kim and Damhorst 2010), more studies should investigate the positive experiences of consumer size satisfaction.

#### 9.10.7. Consumer size comparison

If the consumer is not fully satisfied regarding the size they were recommended, they often try another size. Smaller or bigger sizes may be tried to more accurately assess and set acceptable limits within user size evaluation.

“I’d try a size bigger, just to see what it was like on the top” [17]

“It just fits on my hips, if I wanted more give I’d probably go for a size up” [20]

In a bricks-and-mortar store, consumers can easily select a range of sizes of the same garment in order to compare them. Due to flexible retailer returns policies (Saarijärvi et al. 2017) consumers may order a selection of sizes to assess at home (Petersen and Kumar 2009, Bower and Maxham 2012, Foscht et al. 2013) (Chapter 5). The style quiz aims to reduce this uncertainty by recommending the user a size based on sizing charts. It is evident that users were not completely confident with the sizing recommendations provided by Dressipi.
may be because the garments were not made to measure, therefore sizes may not be completely suited to the wearer. Wearers may want to compare the fit of different sizes and adjust their expectations of fit, or assess the amount of ease available in alternative sizes. Therefore, size comparison can provide insights into how consumers assess fit in relation to high street sizing systems.

9.10.8. Oversize and style

Styling plays a key part in understanding the consumers’ assessment of fit and sizing. LaBat and Delong (LaBat and DeLong 1990) found that styling was the most important factor in creating positive intentions to purchase. McKinney and Shin (2016) evaluated online clothing reviews and found that styling was linked to the assessment of garment appearance. It is clear from the results that participants considered styling influences in their garments chosen during the try-on including the influence this had on sizing. For example, oversized is often a problematic style to define and place within a sizing system. Oversized garments are often characterised by excess amounts of ease as discussed in Chapter 5. However, the wearer can only define the acceptable amount of ease in relation to their expectations.

“I like that it is oversized ...it doesn’t look that oversized” [6]
“I would try a different size, it feels like the style of it the way it fits on certain parts, I feel like it has to be quite fitted because the style is body-con”

Participants were also concerned with the influence of the appearance of tighter fitting styles such as body-con. The consideration of the role of sizing within both loose and tighter fitting garments was important during try-on. This was due to the subjective nature of defining how loose or how tight fitting a garment should be and how this links to participant’s accepted level of fit.

9.10.9. Consumer evaluations of personal size and brand size knowledge

Linked to the concept of size comparison is participant’s personal size knowledge. As the style quiz recommends the user a size, users may already know what size they are in Topshop. This was evident as participants may have had made previous purchases with Topshop and learnt which sizes they prefer (Chapter 9, Section 4.3). Reactions regarding personal size knowledge were both positive and negative:

“The website advised me a size 12, but I still believe I am a size 10” [19]
“I expected this to be my size (4)” [3]

Similarly, with brand size knowledge:

“Not one of the places I usually shop, mainly because I tend to find their sizes are quite small” [9]
“It fits I was quite surprised, I was a bit worried because it’s an 8” ‘I normally wear a 10 in Topshop” [12]
A concept linked to this is brand knowledge and brand size perception. As some participants showed a perception of Topshop having a smaller sizing system. Equally participants also displayed confusion with sizes varying across their product range. The results of consumer size satisfaction are summarised in Table 9.8.

9.11. Aesthetic evaluation – Topshop


Fabric quality responses were multi-dimensional and related to consumer expectations from online imagery such as how the garment sits on the body and the physical comfort of the wearer. This was also recognised by McKinney and Shin (2016). The results are summarised in Table 9.9.

<table>
<thead>
<tr>
<th>Open code</th>
<th>Axial code</th>
<th>Selective code</th>
<th>Statement examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabric quality</td>
<td>Fabric expectations</td>
<td>Fabric appearance</td>
<td>I did think the fabric was going to be stiffer online when I saw the photo, but I like that it’s thinner, it drapes nicely [6]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The fabric is dense, it’s good so it will not crumple [19]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The fabric is not movable [7]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I really like the fabric and it feels soft [17]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I thought it would be more basic and cottony, but this is much nicer and it feels more expensive and nice on the skin [20]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>There’s just no stretch in the seams, so it would be quite uncomfortable to like wear for a long period of time [7]</td>
</tr>
</tbody>
</table>

9.11.2. Consumer evaluations of fabric appearance and fit

Fabric appearance was related to the assessment the consumer made when browsing online. Drape is the ability of a garment to hang gracefully on the body (Hunter and Fan 2004). Due to lack of haptic interaction in online retailing environments (discussed in Chapter 4), the responses were linked closely to how participants thought the fabric was going to be, drape and appearance:

“I did think the fabric was going to be stiffer online when I saw the photo, but I like that it’s thinner, it drapes nicely” [6]

“The fabric is dense, it’s good so it will not crumple” [19]

The appearance of the garment on arrival had implications to the implied quality expectations, such as how expensive the garment looks and feels when worn:

“I thought it would be more basic and cottony, but this is much nicer and it feels more expensive and nice on the skin” [20]

“There’s just no stretch in the seams, so it would be quite uncomfortable to like wear for a long period of time” [7]
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Consumers will require differing levels of haptic interactions when shopping (Peck and Childers 2003). As online retailing does not currently include a means for the assessment of haptic qualities of a garment, this is a problematic for the user of the style quiz. However, research in the area of technologies to assist haptic assessment is emerging (Loker et al. 2008, Blázquez-Cano et al. 2017).

9.11.3. Consumer evaluations of colour and print quality

Consumer evaluations of colour and print quality were related to the outcomes of the recommendations. This was because the style quiz asks users about their colour preferences in the assessment of the user for a style profile or outcome of the recommendations. The quiz enables the elimination of colours that the wearer would not look for in garments or that they dislike. Therefore, the outcome of including colours that were eliminated resulted in consumer dissatisfaction when using the interface. The results therefore provide insight into consumer perspectives of credibility and trust of the recommendations provided. The results are summarised in Table 9.10.

<table>
<thead>
<tr>
<th>Open code</th>
<th>Axial code</th>
<th>Selective code</th>
<th>Statement Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour and Print Quality</td>
<td>Colour implications</td>
<td></td>
<td>The colours definitely (suited), creams and blacks, but maybe not the print so much [3]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I wouldn’t normally go for this bright colour [3]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I’d prefer it if it was in black…because I think this is quite an unforgiving colour [13]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not a massive fan of the colour, I think I’d prefer it if it was a bit more beigey, it looked a bit warmer in the picture [8]</td>
</tr>
</tbody>
</table>

9.11.4. Consumer evaluations of colour implications

Preference is closely related to colour in a garment and can dissuade a consumer to try a garment. Eckman et al. (1990) state that colour can influence feelings of creativity or uniqueness which can have significant influence on positive purchase decisions. From the following quotes, it was clear that colour influenced consumer perceptions. Garment colour can be presented through the online product imagery so if the online colour does not match the physical garment this may result in negative responses:

“I’d prefer it if it was in black…because I think this is quite an unforgiving colour” [13]

“Not a massive fan of the colour, I think I’d prefer it if it was a bit more beigey, it looked a bit warmer in the picture” [8]

As the style quiz uses colour as a preference measurement tool, in recommending items that were colours that the participant disliked it was clear participants were unsatisfied with their recommendations. This could result in the difference between a decision to keep or return a garment.
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### 9.11.5. Consumer evaluations of length and style quality

Length is relatively important in intention to purchase according to LaBat and Delong (1990). McKinney and Shin (2016) found that length was mentioned particularly in relation to garment satisfaction. Length and style quality were found to be interrelated within the results of the study. Further evaluations on where the consumer may wear the garment was a facet of style quality evaluation. This whilst being a key contender to whether a consumer may keep or return a garment, has not been considered in research. The results of length and style evaluations are shown in Table 9.11.

**Table 9.11 Consumer evaluations of length and style (Topshop)**

<table>
<thead>
<tr>
<th>Open code</th>
<th>Axial code</th>
<th>Selective code</th>
<th>Statement examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length Satisfaction</td>
<td></td>
<td></td>
<td>Length is perfect [4]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The length is a good size as well [14]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>It is a nice length as well [1]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Length is too long for me [19]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I like the length because it means that I don’t have to wear tights, its not too short [6]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The length is wrong on me just because I’m shorter [10]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Really like the length and I like how it goes in narrower, because sometimes…they can be quite wide at the bottom [5]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A good length for me, I don’t like having my legs out much [12]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I don’t really like it, I think it’s way too long on me, literally it makes me look so short, it sort of comes just below my knees because there’s a part that’s asymmetrical coming down that bits even longer [10]</td>
</tr>
<tr>
<td>Style Quality</td>
<td>Yeah I like the fit, I like the colour and the print but I don’t like the style on me but I think that personal preference [3]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I think the cut was interesting to me and I love this colour anyway (2.50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I like the style, but maybe I’d like a deeper cut here (chest) [19]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Doesn’t like style due to length, neckline and the sleeves [3]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I’d usually go for this sort of style in terms of the way it fits with the waistband, its just…this bit hanging in front doesn’t do anything for it, the length is wrong on me just because I’m shorter [10]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I like the style and I like the colours [7]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Really like the off the shoulder style [8]</td>
</tr>
<tr>
<td>Style Consideration</td>
<td>It took into account the sizing and the styles that I go for [14]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose/ Occasion for wear</td>
<td>If I had an event, a birthday or a nice night out that I would spend some money towards [12]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Evening out or a night out (1.38) [4]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I would wear it to a nice occasion [19]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I’d probably wear this on a night out, or to a nice meal with high heels [1]</td>
</tr>
<tr>
<td>Styling Imagery</td>
<td>Process was really good, especially compared to other ones, I really like how it used images to portray what it was trying to say…what’s your style, to make sure everyone’s on the same page, so what I might think is girly, they might not think is girly [4]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>‘Used good imagery to represent that, and I think that was really good inspiration and helped you see what category you might fall in to [18]</td>
</tr>
<tr>
<td>Trends</td>
<td>I like the fact that it gave you different trends and different fashion personalities to match with [18]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 9.11.6. Consumer length satisfaction

Length satisfaction related to the satisfaction the wearer had with the dress in terms of covering or displaying their legs:
“A good length for me, I don’t like having my legs out much” [12]
“The length is wrong on me just because I’m shorter” [10]

Although the style quiz involves consideration of height, the length satisfaction of the garment still resulted in mixed responses. Similarly, to McKinney and Shin (2016), the length of dresses on shorter participants was more problematic being too long.

9.11.7. Consumer evaluations on style quality

As the style quiz takes into consideration personal style, the quality of the dress styles that were recommended were intended to be suited to the wearer. Style preference is subjective, therefore asking the user questions regarding their style icons, preferences and lifestyle recommendations could be made (Loureiro et al. 2017). The subjective nature of styling was evident:

“Yeah, I like the fit, I like the colour and the print but I don’t like the style on me but I think that is personal preference” [3]

Responses to the style of the dresses were positive and included comparisons to personal style:

“I like the style and I like the colours” [7]
“Really like the off the shoulder style” [8]
“I think the cut was interesting to me and I love this colour anyway” (2.50)

The positive responses regarding style can be linked to future purchase intention and repatronage intention of Dressipi (Eckman et al. 1990). Another factor related to positive responses to styling is the brand loyalty of the participant. If the user had previously shopped at Topshop, they would understand the brands and the style profiles that exist within Topshop’s ranges.

“It took into account the sizing and the styles that I go for” [14]

The responses can also be linked to the influence of styling within the pre-purchase questions of the style quiz. This will further be discussed in style imagery and trends. Participants recognised the influence of their personal style within the recommendations.

9.11.8. Purpose or occasion for wear

A key factor not previously considered in other studies is the purpose of the garment for an occasion or where it would be worn. This may be because the style quiz recommends garments and existing studies have not focussed on garment recommender systems. Additionally, the style quiz asked questions regarding participant’s lifestyles that would influence their likelihood to comment on the use of the garments recommended. It was evident through the results that participants claimed they would wear the dresses on an evening out or at a birthday. These are more specific occasions and therefore may relate to the choice of dresses made by the participants in the experiment.
“If I had an event, a birthday or a nice night out that I would spend some money towards” [12]

“I would wear it to a nice occasion” [19]

This can be linked back to the financial immunity of participants and their likelihood to purchase more high-ticket items, which they may normally spend on special occasions.

**9.11.9. Styling imagery and trends**

The style quiz is unique to the style adviser in the use of styling imagery. This includes how consumers may identify with celebrity style and style personas (Loureiro et al. 2017). The style quiz recommends products that fall within the categories that consumers have stated to identify with. Styling imagery and trends can inspire the consumer, provide additional products that may be considered and assist with fashion choices (Loureiro et al. 2017). As the style categories are based upon Topshop’s product range, the inclusion of style preferences is linked to a participants’ knowledge and understanding of the Topshop styles and trends. Due to the use of pictures and trend-related imagery this process was made clearer:

“Process was really good, especially compared to other ones, I really like how it used images to portray what it was trying to say…what’s your style, to make sure everyone’s on the same page, so what I might think is girly, they might not think is girly” [4]

This mitigates against the misconception of styles. The use of style imagery was key to participant understanding of style profiles on the style quiz. Additionally, the imagery provided the participant with inspiration:

“Used good imagery to represent that, and I think that was really good inspiration and helped you see what category you might fall in to” [18]

However, this is problematic as style is subjective, therefore it is only style perceptions of the user that the recommendations can be based on.

**9.12. Interface evaluation - Topshop**

**9.12.1. Future use and implications**

The participant’s future use and intention to keep exchange or return the garment are essential to measuring and assessing the success of the style quiz. The responses from the participants are used to illustrate a model that can be used to provide improvements to the interface from an experienced user perspective. This is because the sample of participants had previously tested the Very.co.uk style adviser. The future use of the Topshop Style Quiz is described in the Table 9.12. The following section will summarise the thematic areas related to future use.
Table 9.12 Reasons for future use (Topshop)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Return</td>
<td>Size up too big on bust</td>
<td>Y</td>
<td>Easy process, easy to navigate and related to it</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>Return</td>
<td>Too small</td>
<td>Y</td>
<td>Only three choices, not suited personally</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Return</td>
<td>Doesn’t suit</td>
<td>N</td>
<td>Not suited to personal style</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Keep</td>
<td>Good fit</td>
<td>Y</td>
<td>Easy and simple</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Return</td>
<td>Style</td>
<td>N</td>
<td>Enables picking new styles</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Keep</td>
<td>Comfort and fit</td>
<td>N</td>
<td>Too much information, wasn’t suited to recommended Alexa Style</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Exchange</td>
<td>Too restrictive</td>
<td>10</td>
<td>Would’ve worn a lot of recommendations, good if had little time</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Return</td>
<td>Wrong size/style for shape</td>
<td>Y</td>
<td>Suited</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Return</td>
<td>Too small</td>
<td>N</td>
<td>Not a place she usually shops</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Keep</td>
<td>Style</td>
<td>Y</td>
<td>Understands the brand, having options for a night out and that suit her style</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Return</td>
<td>Doesn’t fit</td>
<td>N</td>
<td>Doesn’t like her and personalised</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Keep</td>
<td>Perfect fit</td>
<td>Y</td>
<td>Accurate, suited to her and personalised</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Keep</td>
<td>Like it</td>
<td>10</td>
<td>Took into account sizing and styles that she usually goes for</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Exchange</td>
<td>Too small</td>
<td>12</td>
<td>Bored easily, too many recommendations</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Return</td>
<td>Too big</td>
<td>10</td>
<td>Helpful to find the right size</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Exchange</td>
<td>Too small</td>
<td>14</td>
<td>Narrow down, if you are looking for a specific garment</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Exchange</td>
<td>Too big</td>
<td>8</td>
<td>Wouldn’t have picked unless was recommended</td>
<td></td>
</tr>
</tbody>
</table>

9.13. Final results for Topshop style quiz

From Figure 9.2 and in comparison, to the Very.co.uk results, it was evident that there were less participants that would keep the garment delivered through the Topshop style quiz. 5 participants stated that they would keep the garment, with 9 returning the garment (50% of the sample). Despite a high number of participants that would return their garment, a larger proportion of the sample – 12 stated they would re-use the technology (67%). This may be due to the sample being more familiar and loyal with the Topshop brand than Very.co.uk. Overall, re-use of the technology is higher, suggesting that participants were more accepting of the technology and were open to the recommendation technology assisting their purchases.

For the Topshop study, it was clear from Figure 9.2 that 12 of the participants would re-use the technology. Figure 9.2 also shows that 9 of the participants would return the garments, with less participants keeping the garment (5) than the Very.co.uk study. From these results, it can be deduced that users were satisfied with the interface through intending to re-use, however garment satisfaction and intention to keep the garment is lower than Very.co.uk. User re-use behaviour or interface satisfaction is high but the concepts measured in relation to the garment (fit satisfaction, size satisfaction) were significantly lower.

9.15. Dressipi reasons for re-use

Overall, the user responses and reasons for re-use were combined and categorised into the main positive reasons for re-use. These are displayed in Figure 9.3. The reasons for re-use were linked to positive responses to the interface evaluation and can be seen to influence the user in their future re-use of the Dressipi website. The main reason for re-use of the interface was due to suiting personal style (8 responses) followed by the ability to refine product selection (3 responses). This shows that Dressipi is perceived to be a personal style interface that is integral to refine products in online purchase environments. The closer the product recommendations were to the participant’s personal style, the more likely they were to re-use the interface in the future.
Figure 9.3 Dressipi reasons for re-use

9.16. Final Dressipi model

To summarise the results of the Very and Topshop qualitative try-ons a final model is shown in Figure 9.4. The model summarises the thematic areas explored, the relationships between the clothing factors and the reasons for re-use. The thematic areas were categorised as aesthetic evaluation, performance evaluation and interface evaluation stages of the discussion. The final model (Figure 9.4) can be further applied in future studies that investigate online product fit and size evaluation, by using the thematic areas and relationships to explore clothing fit and size satisfaction.
9.17. Conclusion

The qualitative try-ons provide a unique insight into post-purchase product evaluation. The interfaces used prior to purchase were the Dressipi Style Adviser on Very.co.uk and the Dressipi Style Quiz on Topshop.co.uk. The aspects of fit, sizing, product and interface evaluation were categorised into aesthetic evaluation, performance evaluation and interface evaluation. From the aesthetic evaluation results it as clear that aesthetic appearance of the garment was a key element of satisfaction. As the products were purchased online, the participants were unable to view the garment until after payment. The consideration of aesthetics was important on evaluating the garment post-purchase. Length and styling were also important which related to the purpose or occasion for wear, style preference, imagery and trends. The Topshop interface included more trend and styling information due to the demographic of Topshop’s typical consumer being young fashion innovators. Performance evaluation of the products were related centrally to fit and size satisfaction. Functional, psychological and social aspects of fit provide an outline for future studies that analyse fit expectations with physical products. Size satisfaction was linked to the ability to compare sizes, the expectation of the size on the body, styling features such as oversize and the users own knowledge of sizing either through the brand or personal body size knowledge. Both aesthetic and performance evaluations lead to the consumer’s ultimate decisions to keep,
exchange or return the garment purchased using Dressipi. Consumers who chose to re-use Dressipi after garment and interface evaluation provided reasons for re-use. These reasons were coded and grouped and are displayed in a graphical format (Figure 9.3). The pertinent reason for re-using Dressipi was the provision of personal style suggestions. This shows that Dressipi is perceived to be a style advice platform and the success of the platform is built upon offering consumers satisfactory garment style recommendations. Satisfaction regarding the product and interface can only be derived through post-purchase and post-use evaluation. This study has provided post-purchase and post-use analysis to measure the success of size and style recommendation systems available on popular fashion retail websites Very and Topshop.
9.18. Industry Interviews (Stage 3)

The next section will present the results of the industry interviews, which forms stage 3 of the research.

9.18.1. Introduction

Industry perspectives have received little attention in scholastic research. Pursuing industry perspectives provided a chance to gain an additional outlook to the area of Omni-channel fashion retailing. The research adopted an inductive, exploratory approach to industry interviews, similar to that of Saghiri et al. (2017). The next section outlines the industry-based research interviews that were conducted. 5 interviews were undertaken with 6 stakeholders that were key informers in the current fashion-retailing world. Stakeholders were chosen for research due to their industry knowledge and experience (Barnes and Lea-Greenwood 2006) (Table 9.13). The next section provides a contextual overview of key perspectives in the area and their insights into future developments.

9.19. Sample

The interviewees worked within multi-channel retailers, pure-play retailers or part of a technology start-up firm. Roles included: product owners, fashion director, head of quality and innovation and chief executive officers (Table 9.13). Retailer stakeholders selected were operating within the UK top FTSE 100 or the top 50 UK according to Retail week (Wiggenraad 2017), which aligned with other industry focussed qualitative research (McColl and Moore 2011).

<table>
<thead>
<tr>
<th>Organisation type</th>
<th>Position</th>
<th>Core Business</th>
<th>Core Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-channel Retailer</td>
<td>Fashion Director</td>
<td>Fashion, Food and Home Retailing</td>
<td>Global</td>
</tr>
<tr>
<td></td>
<td>Product Owner</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quality and Innovation Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pure-play retailer</td>
<td>CEO</td>
<td>Fashion and Home Retailing</td>
<td>UK</td>
</tr>
<tr>
<td>AR/VR/AI Technology Company</td>
<td>CEO (background marketing director – Luxury sector)</td>
<td>Innovative technology development and conceptualisation in fashion</td>
<td>UK, US, Asia</td>
</tr>
<tr>
<td>Virtual try-on company</td>
<td>Product Owner</td>
<td>Online Fashion Retailing</td>
<td>UK, India, Asia, South-America</td>
</tr>
</tbody>
</table>

9.20. Method

An overview letter was sent with a consent form for the participants to read and consider. The researcher also visited the head office of the company and gained consent. The consent was based on the responses from the interview remaining anonymous. The interviews were
undertaken in a semi-structured way (Moore 1995) and recorded with permission from the participant on a dictation device for later transcribing. The interviews began with the researcher connecting with relevant stakeholders within the industry and informing them of the nature of the research. The interview transcriptions are included in the appendix. The questions asked were kept to particular themes and weaved into discussion to enable own opinions to be expressed (Moon and Ngai 2008). The results of the industry interviews were analysed used thematic analysis.

9.21. Results

The results of the industry interviews are discussed and categorised into the relevant areas that linked to extant literature and themes within the research.

9.21.1. Issue of fit and sizing in fashion retailing

As previously discussed in Chapters 3 and 10, the issue of fit and sizing is inherent in fashion retailing, which also emerged in industry interviews:

“A particular challenge for us while there are some advantages to online retail one of them is not that it’s easy to try something on for fit and feel.” (Interview 4)

Perspectives on fit and sizing discussed the development of a digital fit system which included fabric drape, lustre, handle and combining this with 3D body scanning data:

“We’re working with two partners at the moment, so one partner has developed a machine that can assess technically and give a read out of drape, lustre and handle, We’re working with another partner on how we can then put in certain core/key bases in terms of scanning that data and getting it into a virtual fit world to try and combine the two. By no means have we solved it, but that’s what we’re working on.” (Interview 1).

Retailers are attempting to overcome the issue of fit and sizing through the computation of fabric (Ancutiene et al. 2014). However, this does not provide the consumer with an idea of how a garment may fit prior to purchase in an online context. Digitisation of fabrics is also problematic due to the limited pace of technological innovation (Song and Ashdown 2015, Lee and Park 2016).

Fit is also related to how it appears on the body and how it feels to the wearer (Shin 2013). Appearance of the garment and comfort are two concepts of fit which were explored in the qualitative interviews and clothing try-ons in Chapter 10 (LaBat and Delong 1990). The comfort and aesthetics of fit are problematic to portray in an online environment and this is shown in this quote:

“There’s no point having a great fitting garment but if it doesn’t feel right or it doesn’t look right, you know, you’re more likely to think something is working well if it actually looks good. It could be absolutely on point in terms of every
The issue of fit and sizing is also extended to market segments and how digital fit and sizing technologies can cater to different consumer types. Consumers are evidently interested in how a garment may fit, be styled, or can be worn (Mintel 2017a). Digital fit and sizing technology should provide solutions to a range of consumer motivations for product use.

“You’ve got young people who are leading and styling and being innovative and unique and then at the other end you’ve got women who are trying to keep up with the latest trends but they know now what works for them” (Interview 2)

This quote suggests that the interviewee felt that interest in online fashion styling and size technology is polarised from a consumer point of view.

9.21.2. Personalisation

Personalisation was discussed in Chapter 3 and how personalised recommendations must be used to enhance consumer trust recognised by Lee and Cranage (2011). The online fashion industry is using personalisation as a means of differentiating their product offering and online styling services to consumers (Pappas et al. 2017, Grewal et al. 2017, Vogiatzis et al. 2012, Hall and Towers 2017). The quote below states how the need for personalised fashion product recommendations was conceptualised:

“We know our consumers have got low fashion confidence and they like help choosing something and I think at the time there would have probably been a need for some kind of styling advice on site and sort of personalised recommendations” (Interview 1).

Personalisation also relates to the consumer’s overall shopping experience. Online retailers are also using the online shopping experience over the bricks-and-mortar store, as a key opportunity to personalise the consumer journey to enhance repeat purchase, loyalty and online satisfaction:

“Put simply the more relevant the shop is for a customer the more they’re going to buy. And I think the big difference between bricks-and-mortar and online is that Selfridges cannot layout their Department store differently for every customer that walks in the door, we can and do layout our shop differently for different customers and that’s the fundamental difference between online and bricks-and-mortar that we are exploiting here” (Interview 5).

The online shopping channel provides retailers with the opportunity to understand their customer through transactions, likes, dislikes and personalised recommendation services (Vogiatzis et al. 2012) such as Dressipi. Digital personalisation can also be implemented far easier than in the bricks-and-mortar store due to the ease of digital product layout (Hall and Towers 2017), whereas this is not possible in the bricks-and-mortar store. Retailers are recognising this benefit and capitalising on the convenience of re-designing online
personalised shopping experiences in order to enhance purchase intention (Bigné-Alcañiz et al. 2008).

### 9.21.3. Mobile retail

A key theme that emerged from industry experts was Mobile retail. Mobile has been previously discussed in Chapter 2. Mobile provides the retailer with a unique opportunity to sell products to consumers at all times (Shankar 2016). However, retailers must ensure they are aware of the short attention span that users have on a mobile site or app. This was made clear by two of the experts as shown in the quotes below:

“*The great thing about mobile is the customer is there all day and so she can shop all day and we can reach her all day and if she shops all day that’s fantastic, she’s carrying the shop around with her. The disadvantage of mobile is that attention spans have shrunk before you had that three seconds to get their attention before they drift off and do something else*” (Interview 5)

“I’ve never spent more than 45 seconds on an app. But I’m constantly on an app grazing like some kind of digital sheep you know what’s the latest email, what’s the latest forecast, when’s my train going to arrive, a quick look at the new headlines, quick look at twitter, constantly jumping about between apps but with a very short attention span” (Interview 6).

The low levels of attention to mobile applications and websites have consequences to how a retailer can effectively grab attention of users which is supported by Grewal et al. (2016). Such low levels of concentration can make promoting products more competitive, as users can easily browse and compare other retailer apps from their mobile device.

### 9.21.4. Virtual fit

Virtual fit has been discussed in Chapter 3 and 4. Interview responses to virtual fit resulted in a mixed response, perhaps due to the range of professional backgrounds within the sample. Industry interviewees stated that unless a product and avatar can be effectively digitised so that the wearer and garment look appealing and attractive, users will not use the technology which does not align with research on adoption (Beck and Crie 2016). However, the industry experts recognised that the technology is likely to develop enough to be perceived as more useful by industry in time:

“I’m very negative at the moment, I’ll be very positive about it 30 years’ time, I guess my position is that if you walk into a real shop and you pick up a real item of clothing and you go down to a real fitting room and you try that product on. You want to look good looking or sexy or hot, you kind of want to look good. And if you don’t look good, you will absolutely not buy it.” (Interview 5).

“There is no point in doing it until the technology works for a start. More than the technology works it works incredibly easily if everybody had a 100% reliable body scanner on the mobile that they just press one button and it pointed at them and instantly gave them a perfectly 3-D rendition of the figure in a way that was then instantly matchable to the fit of all of the clothes on the site that would be very interesting. That doesn’t exist to today.” (Interview 4)
According to industry, virtual fit needs to be implemented in a highly accurate way, that is easy to use yet appealing and attractive for wide-scale usability in the online fashion industry. The bricks-and-mortar store is highly sensory in nature through the consumers’ ability to touch, try-on, and experience a product.

“The physical stores have tremendous attributes around touch and feel and fit and the experience and how’s it looks like on me and asking sales people and humanity and social interaction but real social interaction” (Interview 5).

The impact of social interaction is also important and how this may be used in the future development of online fit and sizing (Vogiatzis et al. 2012, Choi et al. 2011). The physical store will always offer the opportunity to interact with sales staff, other consumers and friends which current virtual fit platforms cannot do. Such aspects include the influence of social sharing, social media and crowd-based opinion need to be integrated into the future of virtual fit interfaces.

In terms of sensory, virtual fit must be able to supersede the ability of the physical store and the physical product.

I’d go further and say, that kind of digital, virtual fit, has no business being in a store unless it doesn’t just meet that criteria but betters it in some way. Otherwise what is the point just pick up a real item and try it on. (Interview 5).

However, it may be argued that it is impossible to compare the physical store to digital fit and sizing due to current technological limitations of digital technologies.

I think what’s made us unique is that the others don’t go for the visual. We’ve seen a lot of companies just trying to do size advice, I don’t personally think it will ever be enough just to have, just to know you’re a medium or a size 12 (Interview 3)

9.21.5. Play and gamification

Play and gamification are discussed in Chapter 3 and 6, and play is further investigated in the structural model in Chapter 8. A clear aspect of virtual fit and the enjoyment associated with using a playful interface is the influence of discovery and inspiration, this is also supported in other studies (Muller-Stewens et al. 2017, Huang and Liao 2015, Javornik et al. 2016).

“It’s the style and play and inspiration versus the fit. We’re trying to do all of it. But I feel there are different routes you can go down. You can do a really good fitting product, do all the wrists and get really accurate or maybe the bigger prize is up here in helping people discover and see cool stuff?” (Interview 3).

Providing users with the opportunity to play, be curious and discover products in a novel way through digital means is an evident aim of virtual fit at this current stage of technological development (Beck and Crie 2016).

“If we see it in store, then it becomes more of a gimmick, it’s not actually helping the purchase process but it’s a kind of gamification and something that’s fun.” (Interview 6).
Whilst this study recognises the limitations of technology, the results of Chapter 8 and 9 prove that virtual fit technology is both useful, easy to use and playful which lead to positive attitudes and intention to re-use. In addition, styling is a key consideration of consumers when looking to re-use recommender systems. Therefore, the impact of gamification and play are a central part of the technology, but equally the utilitarian benefits are also currently being recognised by consumers.

“What our visualisation does is, lets you play and imagine and create outfit combinations and imagine yourself and your future self-wearing the clothes a little bit more. So, we’re more interested in the sales uplift, the increase in sales and the increase in traffic we can drive retailers through having this technology on their side rather than returns” (Interview 3).

“Before their buying intent is quite high what’s happening in the wider discovery world and that’s where we’re getting quite excited about how we can enable more play, deeper new ways of engaging and discovering. So, play is definitely becoming a stronger and stronger thing.” (Interview 3)

Play and gamification are continuing to be an important driver for the development of virtual fit interfaces.

9.21.6. Consumer confidence

Consumer confidence in fit and whether technology can assist or affect this was considered by the respondents. Consumer confidence with their bodies is discussed in Chapter 5 (Merle et al. 2012). The industry experts state that the level of confidence a consumer has in a purchase provides the retailer with a benchmark as to whether they wish to purchase.

“Before we get to technology as a way of online we have to address the customer’s confidence, that’s ultimately what it comes down to confidence, because I’m going to buy this because it’s going to fit me.” (Interview 4)

Self-concept is also closely related to fit visualisation due to the impact of a user seeing their body in 3D (Merle et al. 2012). As users are not used to viewing their body in such a subjective way, perceptions of their body may influence whether they accept or reject a 3D visualisation of themselves.

“People’s concept of themselves and what they actually aren’t the same. You might see your X and think that’s not me.” (Interview 3).

In addition to this, the self-perception of the user is not redundant. It is inextricably linked to the ability of the interface to deliver an accurate depiction of the body. Therefore, if the person does not see themselves within their avatar, in other words they are not virtually present (Suh and Suh 2011) then they will be likely to reject the technology.

Humans are seen to be motivated by the feeling of positive self-worth as represented in the quote below. If the visualisation cannot produce such feelings then the technology falls short of the ability to motivate a purchase decision.
Aspiration in fashion is related to self-perception of body size, shape and appearance and therefore has consequences to the acceptance of virtual fit technology:

“It isn’t a kind of a piece of technology we’re talking about human being’s confidence and their feeling of self-worth. And that’s what this is about. It’s like Charles Revlon in the 1920s he used to say he didn’t sell the white cream that came out of the bottle, he sold the feeling that a woman has when she walks down the street and feels brilliant. I spent ten years marketing diamonds for DeBeers and you know we never focussed on the shininess of the rock, we focussed on the symbol of love or the symbol of beauty or the symbol of success or achievement and that’s the human motivation” (Interview 5)

9.21.7. Consumer style advice

Providing users with style advice was a consideration for both ends of the market: young innovative fashion consumers (deKlerk and Tselepis 2007) and older females interested in style (Howarton and Lee 2010), which also aligned with the results of Chapter 9. The online platform provides a key medium for providing style advice and guidance for users. Style advice was found through try-ons of garments to be a key consideration for platform re-use (Chapter 10).

“I know what suits me my body shape, I know I’m definitely not going to wear any of these things erm, but they get stuck in a rut, because they’re just sticking to the same stuff, they just want a little idea and inspiration about how to keep up to date.” (Interview 2)

“One thing you need to realise is you can make this a science up to a point but the rest is art and when trends are maybe cocooning, trends is to wear a big oversized coat, you get that if you are informed, if you’re not informed as a consumer you go to your normal size but you think this is swamping me” (Interview 1)

9.22. Industry interview model

To summarise, the key findings of the discussions with industry experts are shown in Figure 9.5. The findings are separated into the benefits of online and digital, the user acceptance attributes of virtual fit, and the future development areas for virtual fit. The benefits of online fell into two themes in the discussion with industry experts. Firstly, personalisation and secondly mobile retail. These aspects have been summarised in the first stage of the model as drivers in the development of fit and sizing technology.
Aspects of personalisation currently feature within online fit and sizing technology. However, personalisation is continuing to develop through integrated retailing experiences across channels. As retailing experiences become more personalised as technology develops, this will further feed into fit and sizing interfaces, supported by algorithm development (Vogiatzis et al. 2012, Zhou et al. 2017). A more personalised online experience will make fit and sizing technology an inherent part of the retailing environment, due to the level of consumer data and information captured through personalisation (Bigné-Alcañiz et al. 2008), personalisation is discussed in Chapter 4. The user acceptance attributes of virtual fit were defined through the statements related to how consumer acceptance is perceived by industry experts. For example, statements were made regarding how consumers will accept or reject online fit and sizing technology. Themes identified were the need for style advice and guidance, consumer confidence (Merle et al. 2012) in the interface and the product and the need for a playful experience (Javornik et al. 2016, Muller-Stewens et al. 2017, Beck and Crie 2016). Style advice and guidance was attributed to the level of fashion knowledge and innovativeness a consumer possessed. For example, an innovative fashion consumer is often the first to adopt new trends and technologies, therefore it was posited that these consumers would require fashion inspiration when using fit and sizing technologies which is supported by Goldsmith and Goldsmith (2002) and deKlerk and Tselepis (2007). Introducing new products and styles to these consumers would be a method of retaining customers and increasing conversion (Hall and Towers 2017). Conversely, consumers who are not fashion innovators, who were suggested to be older may require guidance of styles that may suit their body shape or style
and would require style advice from the online fit and sizing interface (Howarton and Lee 2010). It was generally accepted by industry experts that sizing, styling and fit were considered to be inter-related aspects of garment satisfaction.

9.22.2. User acceptance attributes

Consumer confidence was also key to consumer acceptance of virtual fit and sizing technologies. If the consumer was not confident, it was stated they would not adopt the technology or buy the product supported by Merle et al. (2012). This was relevant across all sectors and ages of consumers. Consumer confidence can be likened to the level of aesthetic appearance with a virtual avatar, which aligns with results from 3D visualisation studies discussed in Chapter 3 (Shim and Lee 2011), or trust discussed in Chapter 4 (Choi et al. 2011). Play was an additional factor related to consumer acceptance of virtual fit and sizing interfaces. Play was discussed within virtual fit and sizing from an academic perspective in Chapter 5 (Huang and Liao 2015, Beck and Crie 2016, Muller-Stewens et al. 2017). The experience of playfulness within the interface was found to be a key influence for consumer technology acceptance as shown in the quantitative structural model in Chapter 9. Therefore, demonstrating the link between playfulness literature (Chapter 5) empirical results (Chapter 9) and industry perspectives, pertinent to consumer acceptance of new fit and sizing technology.

9.22.3. Future developments

Lastly the need for improved accuracy within visualisation and product recommendation was identified by industry experts. This can be compared with results from the literature that tested accuracy of 3D product simulation (Chapter 3) and the importance of developing personalised recommendation accuracy (Chapter 4). By improving accuracy of visualisation and recommendations, both consumers and industry stakeholders will perceive the technology to be more useful, increasing satisfaction and encouraging more users to adopt the technology. As the technology is still in early stages of development, there was confidence that the technology will be able to fulfil consumers entirely in the future. The need for technological development was the key driver of future acceptance, which demonstrates why experiential aspects such as playfulness are the pertinent characteristics required for adoption currently.

Another aspect of future developments is the integration of social factors. Social can be linked to playful experiences in the notion of being able to share such experiences with peers as other research studies have focussed on individual play experiences without the consideration of social. Social is also related to the level of social presence experienced on a website, for example through product reviews (McKinney and Shin 2016), trust in algorithmic recommendations (Choi et al. 2011) due to the digital nature, or through the presence of staff.
or peers in store. Hasan (2010) states that females may prefer to shop in the physical store due to lack of social interactions online and this is also discussed in Chapter 6. Social interactions should therefore be key area for future research in relation to the acceptance and use of fit and sizing technology.

9.2.4. Conclusion

In conclusion, this section of the chapter has presented the results of stage 3: the interviews with key industry stakeholders. Key themes from the discussion were derived through relevance to literature, the topic and then linked through analysis in relation to research and stages 1 and 2. An important area derived through the discussion was the influence of style advice which was found to be the main driver of re-use intention of Dressipi. Additionally, the importance of play within the online interface which was shown through the quantitative study in Chapter 9 is linked with the opinions of industry experts in the discussion of the model. Finally, the impact of the future development areas provide clear recommendations for how digital fit and sizing interfaces can be improved.
Chapter 10. Discussion and Conclusion

10.1. Introduction

The aim of this research is to measure consumer responses to fit and sizing stimuli in online fashion retailing. Specifically, through: 3D try-on avatars (Metail virtual fitting room) and personalised recommender systems (Dressipi size and style recommendations). Using a mixed methods approach, this study has collected and analysed primary data (both conclusive and exploratory) and reviewed secondary data to meet the research aim. This chapter concludes the research and will present the objectives that were met in the study. Meaningful conclusions are drawn which contribute to existing research and insights that can be used for future managerial and technological development of digital fit and sizing technology.

The research objectives and outcomes for this study are listed in chapter one. To recognise the existing approaches to digital fit and sizing stated by Gill (2015), the classification of virtual fit and sizing websites presented in chapter 3 meets objective 1. The literature review on playfulness in chapter 3, and attitude and use in chapter 4 meets objective 2. Discussion of existing research in garment fit in chapter 5 and product recommendations in chapter 3, meet objective 3. The theory is discussed throughout the literature review: in chapter 3 on experience, chapter 4 on consumer behaviour and chapter 5 on garment fit and sizing which meet objective 4. The theoretical frameworks considered for the study are summarised in chapter 6. The hypothesized model and selected constructs are also presented in chapter 6 which meets objective 5. The extended TAM model is tested in chapter 8 (quantitative) and post-purchase consumer responses (qualitative) are explored in chapter 9 which meets objective 6.

10.2. Chapter Summaries

Chapter 1 introduces the research through providing the research context and gap in extant research. The overview, focus, aims, objectives and outcomes are also presented. As the research is split into three studies, the method describes how the study will progress towards each area and the realist ontological approach adopted for the study. Digital fit and sizing technologies are associated with the academic disciplines of experiential marketing, consumer behaviour and garment fit. As online returns are prevalent in the fashion industry, research in fit and sizing technologies is important to understand whether the tools effectively assist consumers to make better decisions when shopping online.

Chapter 2 provides an overview of the online fashion retail market. The chapter describes the market size and forecast growth. In addition, channels of retailing are defined outlining the types of consumer touch points. Web 2.0 fashion technologies are discussed which have
provided a basis for the development of digital fit and sizing technologies and how technology has developed alongside the evolution of the web. Developments have been made to bridge the physical and digital consumer experience when shopping for clothing online. New technologies that can facilitate online experiences for the consumer effectively (Blázquez 2015) and increase online product conversion should be further investigated.

Chapter 3 discusses experiential fashion technology. Firstly, experiential marketing is defined and the elements of the online experience are discussed. Digital fit and sizing technologies are introduced and the ways in which they are guiding the future of online fashion experiences is discussed. Existing research has focused on the experiential marketing attributes such as entertainment and enjoyment (Kim and Forsythe 2008, Pantano and Naccarato 2010) or experiential value of interfaces (Muller-Stewens et al. 2017, Huang and Liao 2015, Dacko 2016, Javornik et al. 2016, Beck and Crie 2016, Overmars and Poels 2015). The concepts of play and gamification are emerging within online experience literature and could be further investigated. In addition, few studies have attempted to categorize the existing types of fit and sizing technologies that assist with online purchase decisions (Gill 2015). Chapter 3 also identifies the features of the three types of fit and sizing tools, building from Gill (2015). This chapter demonstrates the range of tools available to consumers, alongside the theoretical approaches that have underpinned previous experiential research in the area.

Chapter 4 applies consumer behaviour and evaluation theory to digital fit and sizing technology. Consideration of consumer behaviour theories provides a basis to understand how fit and sizing tools assist with online purchase, consumer decision making and post-purchase behaviour. Few studies have investigated post-purchase consumer evaluations in online shopping environments. Traditional consumer behaviour models provide a basis to understanding decision making and the shopping journey model (Lemon and Verhoef 2016) is adopted as a research process framework. This research process is adopted as it provides a framework that bridges both the pre-purchase (interface) evaluation and post-purchase (clothing and interface) experiences of fit and sizing technologies.

Chapter 5 reviews the literature on garment fit and sizing. The chapter discusses perspectives of clothing technologists and consumers on virtual fit and size technology. This chapter identifies that garment fit and sizing has been approached by academics and researchers who note that the clothing and sizing industry does sufficiently cater to the modern consumer. Further, there is little research that assesses clothing product evaluation from a consumer perspective, which provides the trajectory for undertaking stage 2 of the research.

Chapter 6 discusses relevant theory frameworks applicable to the research. Models such as PAD, S-O-R and TAM are considered and a discussion of the theory applied to the study is provided. The TAM is selected to underpin consumer responses to a new pre-purchase fashion
Chapter Ten: Discussion and Conclusion

Enabling the Digital Fashion Consumer through Gamified Fit and Sizing Experience Technologies

The chapter then describes the constructs and hypotheses that are measured in the quantitative study. The constructs to be explored in the qualitative studies are devised from theory and consumer fit studies are also summarised. It is noted that there is no widely adopted theoretical underpinning for consumer clothing evaluation or industry interviews.

Chapter 7 describes the methodological approaches adopted in the study, including the ontological position, research design and approach for each stage. Realism is adopted as the ontological approach of the research. The research design is described and outlined in Table 7.5. Stage 1 is a quantitative study investigating technology acceptance to virtual try-on using structural equation modelling (Chapter 8). Stage 2 explores physical try-ons of clothing ordered through a size and style recommendation website and semi-structured interviews (Chapter 9). Stage 3 are semi-structured, exploratory industry interviews used to frame the results and discussion from an alternative perspective (Chapter 9). The research samples are also justified and described, in addition to questionnaire format, validity, bias and reproduction.

Chapter 8 presents the results of the quantitative data analysis (Stage 1). The method used is firstly EFA using SPSS software. Secondly CFA is achieved through assessing model fit, validity and reliability in AMOS. Finally, a structural model shows the relationships between the observed constructs (Figure 8.10). Model fit indices are used to explain the level of reliability and validity of the data, and the replicable probability of the research. Key results of the SEM show that there is a significant positive relationship between playfulness (experience) and intention to use virtual fit technology (Table 8.18).

Chapter 9 presents the qualitative results. The qualitative research consists of investigating user experience of Dressipi (size and style recommendation interface) and the subsequent products received after using Dressipi on Very.co.uk or Topshop.co.uk. These results are summarised in a final qualitative model that can be used to guide consumer garment fit research in the future (Figure 9.4). The chapter also presents the results of the interviews with industry participants. Sections of the discussion are categorised into themes and the relevance discussed in terms of the links to previous analysis within the thesis. A model is depicted that shows the influences of industry perspectives to the area of digital fit and sizing and how the tools are expected to develop (Figure 9.5).

Chapter 10 summarises the research results, indicates that the research objectives are met details contributions to research and theory, limitations and areas for future research.

10.3. Discussion

The findings from stage 1 (quantitative), 2 and 3 (qualitative) provide a basis for understanding the role of digital fit and sizing interfaces and the impact on consumer garment selection and
The next part of this chapter will discuss the results from each stage of the research and the importance of the results to online fashion retailing.

10.3.1. Stage 1 - Quantitative Results

Stage 1 collected 408 female responses to a virtual fit visualisation stimulus through identification of the specific attributes i.e. usefulness and playfulness that can create positive consumer attitudes and stimulate intentions to reuse the technology (Chapter 6). Quantitative analysis and a conclusive research design was chosen as it can produce valid and reliable data which can be replicated across additional consumer segments. Quantitative research also employs a deductive approach which also best aligns with a realist ontology as discussed in Chapter 7.

The quantitative research used an extended version of the TAM through measurement of additional constructs: technology confidence (Kim and Forsythe 2008, 2010) and playfulness which were applicable to the sample, research stimuli and developed from existing studies (Kim et al. 2016). Studies that have used TAM and measured innovativeness as a consumer trait have not used current virtual fitting room websites as a stimulus (Kim and Forsythe 2010) (Table 6.5). The hypothesized model was analysed using EFA, CFA and SEM techniques. 12 final hypotheses were supported as shown in Table 8.19. This study therefore provides a comprehensive understanding of constructs related to consumer adoption of virtual fitting room technology prior to purchase (Figure 10.2). The constructs from the final model will now be discussed individually.

10.3.2. Technology confidence – Generation Y

Due to stagnation in the adoption of virtual fit and e-size recommendation in online fashion retailing, it was important to identify the existing level of consumer technology confidence (adapted from technology readiness) (Meuter et al. 2003). This was to address the effectiveness of the technology in relation to the confidence of the user. The sample tested consisted of UK based females aged 18-24. This sample falls within the definition of generation Y consumers (Chaney et al. 2017). In nature, generation Y are heavily influenced by technology and the internet (Bilgihan 2016) and have high propensity to spending (Sullivan et al. 2012). They place emphasis on online experiences and are looking for time-effectiveness and efficiency (Sullivan et al. 2012). This sample was selected to gain understanding of highly confident users that may guide future application of the technology to wider, late adopting consumer groups. Jones and Biasiotto (1999) state that when middle aged consumers begin to adopt new technology, adoption rates and application to wider consumer segments is limited. The sample is further justified in Chapter 6. The results indicate that using an innovative
segment of consumers provides key indicators towards the benefits and limitations of new technology which can be utilised for maximum success in the future.

10.3.3. Gamified experience of Metail

The impact of both functional and experiential aspects of adoption are essential in online shopping environments (Childers et al. 2001). Playfulness (discussed in chapter 3) has been defined as the consumer’s experience of creativity and exploration when interacting with a computer or interface (Webster and Martocchio 1992). Avatar stimuli used in either clothing assessment (Merle et al. 2012) or assistant based retailing environments (Aguirre-Rodriguez et al. 2014) have focussed on the consumer-avatar interactions. The impact of the avatar evoking playfulness has been under-explored.

This research has therefore enabled a clearer understanding of the role of playfulness in virtual fitting room experiences on consumer perceptions of usefulness, attitudes and re-use intentions. The results of Metail were supported by the assumptions of Hofacker et al. (2016) that consumer traits affect the level of gamification within an interface. This is evidenced in the measurement of the technology confidence with perceived interface playfulness. Positive relationships between technology confidence, ease of use and attitude towards the interface provide this justification. The results of this research build upon studies that have investigated entertainment (Pantano and Naccarato 2010) or enjoyment (Kim et al. 2017) within virtual and augmented retailing technology (Table 6.5). In contrast to Beck and Crié (2016) who measured curiosity as a key motivator for consumer use of an augmented try-on mirror, this study focussed on the role of playfulness inducing consumer responses which is a facet of online consumer experience related to gamification. Often virtual fitting rooms have been marketed and researched as a gamified version of retailing (Kuntze et al. 2013). This study supports the findings of Ahn et al. (2007) in that playful consumer experiences are more likely to evoke positive attitudes and re-use behaviour from consumers (Figure 10.1). The result of playfulness implies that consumers are not only confident about the technology, but also perceive it as useful, enjoy the gamified experience and have positive attitudes towards it (Section 8.13).

10.3.4. Functional experience of Metail

Functional constructs were related to perceived usefulness and ease of use which are original components of the TAM. The results indicate that there was a positive relationship between perceived usefulness and attitude towards Metail. Perceived usefulness in TAM has been argued in research to be associated with the level of consumer trust in technology (Pavlou et al. 2003). Recognising the construct of trust posited by Pavlou et al. (2003), this study establishes that trust in fit and sizing interfaces can assist to generate positive attitudes towards the technology and may increase loyalty in the future.
Chapter Ten: Discussion and Conclusion

10.3.5. Attitude towards Metail

Consumer perspectives of innovative technology such as Metail will always supersede the ability that modern technology can deliver, which is evident in the Mind vs. Machine conundrum (Dreyfus and Dreyfus 1986). Therefore, consumer attitudes towards developing technology such as virtual fitting rooms can be expected to be moderate. This is demonstrated in the results of the structural model (Figure 10.1) through the moderate relationship between attitude and intention to use (Figure 10.1). Fishbein and Ajzen (1975) also recognised that attitudes may fail to comply with behaviours when they are incompatible with either action, context or time elements. This result may be explained by the fact that the Metail stimuli used was in a beta-testing phase which meant it was non-transactional. In support of this, gamification is used often in A/B testing of interfaces (soft launch testing) to assess consumer responses (Hofacker et al. 2016). The virtual fitting room stimuli was a key example of this, due to the lack of retailer partner or transactional capability.

10.3.6. Intention to use

Despite the newness of virtual fitting rooms within online shopping contexts, consumers still responded positively to intention to use the technology. Therefore, interfaces should be developed to establish consumer trust and should capitalise on the effects of gamified virtual clothing shopping experiences to induce positive attitudes and encourage re-use intention.

![Final Metail Structural Model](image-url)

**Figure 10.1 Final Metail Structural Model**

In any fashion consumption scenario, the product purchased is physically tried on the body. Therefore, post-purchase consumer evaluation was explored to test consumer responses to the garment.
10.4. Stage 2 - Qualitative Try-ons Results

Stage 2 (Section 9.1) measured responses of 20 females aged 18-35 to two Dressipi interfaces: the Very.co.uk style adviser and Topshop style quiz. The results of the study provide insight into consumer evaluations and expectations of the performance and aesthetic aspects of fit and sizing alongside interface evaluation. Despite no universal consumer fit and sizing assessment method, the constructs established through literature review (Chapter 3, 4 and 5) were measured through exploratory, semi-structured interviews. The aspects of post-purchase product evaluation included aesthetic qualities of dresses purchased through Dressipi. Garment attributes measured included length, styling, fabric colour and print which were similar to those measured by deKlerk and Tselepis (2007), Eckman et al. (1990) and Shin (2013).

Through analysis of consumer post-purchase experiences, new aspects to garment evaluation such as occasion for wear and comparison of fit were discovered. Key performance evaluation attributes of the garment such as satisfactory comfort (both physical and psychological) were crucial for re-use intention, which aligned with Eckman et al. (1990) and deKlerk and Tselepis (2007). The results indicate that consumer preferences to actual garment fit evaluation substantially differ to the input stimuli required by Dressipi as shown in Chapter 3. Moreover, the results show the multi-faceted nature of responses to physical garment fit and sizing and demonstrate that consumer product experiences both on and offline is highly complex. Fit and sizing interfaces may fall short of capturing the nuances discovered that are involved in fit.

Analysis of the post-purchase interface evaluation included the need for accurate personalised styling advice to encourage re-use intention and loyalty towards the tool. Further reasons for re-use included good fit of the resulting garment, the ability to refine products for navigability, access to personalised expert recommendations, ease of use, new style suggestions and use of fashion trends.

The outcomes of stage 2 indicate that positive post-purchase consumer responses can therefore increase consumer repatronage and loyalty towards future use of personalised recommendations. In addition, post-purchase evaluations can provide a measure of consumer satisfaction of both product and interface success shown in the qualitative research results model (Figure 10.2). Interfaces could be developed in future to cater to the inter-relationships found between interface evaluation (Stage 1 and 2) and garment evaluation (Stage 2) as shown in Figure 10.2.
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Enabling the Digital Fashion Consumer through Gamified Fit and Sizing Experience Technologies

Figure 10.2 Qualitative try-on Model

10.5. Triangulated results

Triangulation of both conclusive and exploratory research can assist to validate each approach. As the quantitative study measured responses to the interface in terms of fit visualisation and the qualitative study measured responses to both garment and interface through size and style recommendation, the interfaces produced key findings in their own right. Through leveraging the positive consumer results towards each interface, this could enable insights for utilisation of the tools for adoption in the future.

The qualitative results of the re-use intention statements from users were triangulated with the technology acceptance constructs measured through EFA, CFA and SEM. A triangulated model is shown (Figure 10.5). The emphasis of the triangulation is therefore focussed around use behaviour of fit and sizing technology which the next section will discuss. Figure 10.4 shows the variables measured and constructs observed in the quantitative model in blue. The standardised residuals are shown for each construct and the standardised estimates that represent the relationship between quantitative constructs are shown next to the arrows. The arrows demonstrate the relationship between the constructs which are pertinent to the TAM model (Davis 1989). Through response counts and coding of the qualitative information related to re-use, statements regarding interface re-use were correlated with the quantitative
results for intention to use. Insights can be directly drawn from post-purchase evaluation of
the interface with pre-purchase evaluation as shown in Figure 10.3 in green.

**Figure 10.3 Triangulated quantitative and qualitative results**
The triangulated results in Figure 10.4 indicate that despite being different approaches to fit and sizing online, the interfaces both hold advantages in relation to consumer use. Statements such as Dressipi is easy to use show how the results of quantitative and qualitative can be directly compared. Perceived usefulness was triangulated through the influence of new style suggestions which can improve online shopping ability, convenience, navigability and suitability which correlate to the perceived usefulness measured variables. Playfulness was related to the use of imagery and trends to inspire the user, and the use of expert recommendations on body shape which stimulated user curiosity regarding products and fit. Intended use was based on two criteria: the fit of product after purchase and the suggestion of the correct size. These two results from the qualitative study were related to the fit and sizing satisfaction with the garment and linked to whether a user would shop for fashion using the fit and sizing interface in the future.

![Combined interface model](image)

**Figure 10.4 Combined interface model**

**10.6. Future research model**

To contextualise the results of the individual stages of the research, the results have been displayed in accordance with the online shopping journey Chapter 4 (Lemon and Verhoef 2016) (Figure 10.5). The first stage of the model is the consumer’s technology confidence, which can influence the interface evaluation. The blue boxes represent the quantitative constructs and results and the green boxes show the triangulation with the qualitative. The
clothing evaluation relates to the post-purchase garment evaluation with the relevant measured aspects summarised such as fabric, length, size and fit. Finally, the post-use evaluation is shown through the consumer’s post-use behaviour: keep, re-use, return or exchange. The intention to keep and re-use the interface is linked with a red arrow. The arrow shows how the consumer’s shopping experience using virtual fit and sizing interfaces can then influence a cycle of re-use and technology acceptance. Once the interface has been used and the product and interface both evaluated, the attitudes and opinions formed can feed into a re-use behaviour and re-start the cycle of use.

The future research model combines the studies from two points of view. Firstly, a data collection perspective: the quantitative and qualitative results regarding the interface are linked in the model through the red arrow. Secondly through the connection of the studies can summarise the consumer’s shopping experience journey when using a digital fit and sizing interface. If the complexities of fit as recognised in the results of stage 2 of the research can be fed into interface inputs, fit visualisation and size/style recommendation will increase in accuracy. Increased accuracy in visualising fit or recommending sizes and styles pre-purchase, will enhance consumer satisfaction and potentially reduce online returns post-purchase.

10.7. Stage 3 - Qualitative Industry Interview Results

Through literature review it was evident that there were few studies that combine the approaches of industry, consumer and interface evaluation in a single research project (Chapter 6). Kumar (2017) denotes that academic and practitioner perspectives should be drawn.
together more frequently for collective gain. Saghiri et al. (2017) also recognise that Omni-channel retailing research lacks a theoretical underpinning on which to base research. Therefore, constructs used in the discussion guide were derived through digital fit and sizing literature (Chapter 2) and adopted an exploratory research design.

Stage 3 of the research took an inductive approach to interviews with industry experts similarly to Saghiri et al. (2017). Primary data was obtained through 5 semi-structured, exploratory interviews (Chapter 9). The results of the interviews show that the conversation deviated away from the proposed discussion guide. This was accepted due to recognition of the opinions of industry professionals where participant responses could provide useful data and insight into the future of the field. Results pertained to the themes of gamification, virtual reality, increased accuracy of recommendations and the introduction of social (Figure 10.6). The discussion and resulting model produced are unique as they capture the industry-based perspectives on the area of fit and sizing fashion technology that other research studies have not included. The model can also be contrasted and compared with academic perspectives on the area.

![Figure 10.6 Industry interview model](image)

### 10.8. Contribution to theory

The research makes a number of contributions to theory which are summarised in Table 10.1. The study recognised that there is limited literature on consumer evaluations of product purchased using online fit and sizing tools. Moreover, the existing interfaces categorised by Gill (2015) often used a range of input criteria which identifies that there is no industry-wide method to gaining consumer body and preference related information prior to and post-purchase. Fit and sizing technology have not been explored within one body of research. The areas of fit and sizing technology include experiential marketing, consumer behaviour and
garment fit and sizing. This research combines the areas mentioned and develops the categories of virtual fit defined by Gill (2015) to better explain the types of developing fashion consumer technologies (Chapter 3).

The quantitative contributions to theory are through the inclusion of technology confidence and playfulness in extending the original TAM model. The extended TAM model provides a more in-depth understanding of consumer acceptance of virtual fit technologies. This provides a clear foundation for developing future virtual fit interfaces that are accepted by consumers. The model demonstrates that the playful aspect of gamification can positively influence a consumer’s experiential state when using fit visualisation interfaces.

The structural model can be used to ascertain initial consumer technology adoption of new technologies and can be extended to measure engagement in future studies. At early stages of innovation diffusion across consumer markets, gamification could assist to gain increased consumer immersion and engagement with fit and sizing technology for future mass market adoption (Hofacker et al. 2016). Gamification should not be considered in isolation, and should be combined with usefulness interface attributes to enhance consumer intentions to re-use virtual fit technology. Enjoyable and well-designed user interfaces can go further than satisfaction towards engaging experiences (Pine and Gilmore 2016).

The qualitative results suggest that high levels of personalised styling information will encourage future consumer use of size and style recommendation. Combining both fit visualisation and size and style recommendation methods could enhance purchase intention and engagement with interfaces in the future.

The research uniquely results in a complete end-to-end picture of the consumer’s garment and interface evaluation (Figure 10.5) using digital fit and sizing tools. Existing research in digital and experiential retailing technology have not explored product evaluation beyond online purchase intention (Dacko 2016, Beck and Crie 2016). Investigation of post-purchase is crucial in understanding the feedback between experience and re-use (Figure 10.6). Positive post-purchase experiences are proven to influence consumer likelihood to re-use, repatronage and spread positive word of mouth (Etkin and Sela 2015).

There are a limited number of studies that incorporate the perspectives of industry in academia. Kumar (2017) emphasises the need for combining marketing and practice with the influence of managers which this study begins to develop. This study explores the perspectives of industry experts to the area of digital fit and sizing technology which provides novel insight to an under-explored area that can be contrasted with consumer and academic perspectives.

In the future, retailers and developers should combine the strengths of both fit visualisation and size and style recommendation to provide a highly utilised interface for consumer adoption.
### Table 10.1 Contribution to Theory

<table>
<thead>
<tr>
<th>Contribution to Theory in this Study</th>
<th>Chapter number in Thesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognition of the limited research on consumer post-purchase experiences of fashion products.</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>Analysis of clothing technologist and consumer evaluations of 3D body scanning and 3D visualisation of clothing. Exploration of existing categorisation of three areas of fit and sizing in online purchase environments</td>
<td>Chapter 3 and 5</td>
</tr>
<tr>
<td>Extension of TAM: Intended use and perceived usefulness of virtual fit platforms can be dependent on users experiencing high levels of playfulness.</td>
<td>Chapter 8</td>
</tr>
<tr>
<td>Extension of TAM: Consumers with a high technology confidence may form positive attitudes towards virtual fit technology.</td>
<td>Chapter 8</td>
</tr>
<tr>
<td>Attitudes towards virtual fit technology may depend on the experience of play and perceived usefulness when using the technology. Therefore virtual fit in online shopping is influenced by both functional and experiential consumer motivations.</td>
<td>Chapter 8</td>
</tr>
<tr>
<td>Gamification and personalisation of information are key aspects of digital fit and sizing tools driving future adoption and can be combined to best utilise interfaces in the future.</td>
<td>Chapter 8 &amp; 9</td>
</tr>
<tr>
<td>Fashion e-size and product recommendation software can be validated for future use by evaluation of clothing try-on.</td>
<td>Chapter 9</td>
</tr>
<tr>
<td>TAM does not take into consideration the post-purchase evaluation stage and this study therefore assesses that through clothing try-ons.</td>
<td>Chapter 8/9</td>
</tr>
<tr>
<td>Industry perspectives to the area of virtual fit, e-sizing and product recommendations have not existingly been considered in academic research studies in the area.</td>
<td>Chapter 9</td>
</tr>
<tr>
<td>TAM typically is modelled as a linear path, however this research shows that post-purchase evaluation of the technology and product links to consumer technology evaluation. Thus showing how attitudes can influence the user at more than the pre-purchase stage.</td>
<td>Chapter 10</td>
</tr>
<tr>
<td>This research provides the triangulation of qualitative and quantitative data analysis of two digital fit and sizing interfaces in the form of a combined model. The model depicts how two interfaces are experienced by consumers. In the future, research should develop new theories that further link clothing performance (qualitative) and attitude (quantitative) concepts explored in this study through the future research model (Figure 10.6) to fully understand how the product and interface are experienced by consumers.</td>
<td>Chapter 10</td>
</tr>
</tbody>
</table>
10.9. Future implications to theory

This study has identified the level of playfulness and gamification in virtual fit studies, however the distinct attributes of experience could be measured for a more holistic understanding. The Unified Theory of Acceptance and Use of Technology (UTAUT) could be implemented as a theoretical framework within future studies (Venkatesh et al. 2003). The framework would be useful to measure a range of consumer demographics adoption behaviour to virtual fit and sizing technology recognised in the limited sample segment used in this study. As previously discussed, virtual and augmented reality provide a promising direction for simulating online customer product experience. Social presence and telepresence are theoretical concepts that could further be explored, in addition to the impact of social feedback and sharing within future interfaces. TAM could also be extended to include post-purchase behaviours such as word of mouth and measures of loyalty to further understand post-purchase behaviour. Clothing experience is limited in theoretical basis, future studies could continue explore this area further in application to the use of virtual fit and sizing to post-purchase evaluation.

Table 10.2 Future implications to theory

<table>
<thead>
<tr>
<th>Theory</th>
<th>Future Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiential marketing</td>
<td>Measuring distinct aspects of experiential marketing could assist to identify further key drivers required for future fit related virtual experiences.</td>
</tr>
<tr>
<td>Unified Theory of Acceptance and Use of Technology</td>
<td>As virtual fit and e-size technology develops, a range of consumer demographics should be analysed to assess technology acceptance of sampled segments.</td>
</tr>
<tr>
<td>Virtual and Augmented Reality</td>
<td>Fit and Size platforms should be analysed using virtual and augmented reality technology to assess which platforms are the most useful in simulating online customer product experience.</td>
</tr>
<tr>
<td>Social Presence &amp; Telepresence</td>
<td>Applying social presence and telepresence theories to virtual fit avatars will assist to assess consumer’s perception of avatar realism.</td>
</tr>
<tr>
<td>Extended TAM</td>
<td>Constructs such as e-WoM and loyalty should be measured as virtual fit becomes widely available on online retailing websites.</td>
</tr>
<tr>
<td>Clothing experience</td>
<td>More research needs to be applied to the area of post-purchase clothing evaluation in relation to the expected product gleaned from information pre-purchase. There are limited clothing theories that have been tested in recent virtual clothing environments that sufficiently provide a theoretical underpinning.</td>
</tr>
</tbody>
</table>

10.10. Research Limitations

The Metail virtual fitting room stimuli that was used in the study was not a fully transactional website as it was an A/B testing website. This provided justification for use of Dressipi style adviser and style quiz in the post-purchase stages of the research. In the future, when Metail is fully transactional the post-purchase environment could be considered using the method adopted in this study.

The sample demographic investigated were a small segment of the total fashion consumer market. Future research should assess the effects of digital fit and sizing on other consumer...
groups, ages and geographical locations. Equally, the qualitative sample used in stage 3 was small due to difficulty of recruiting participants in the retailing industry. Therefore, future studies should leverage relationships with industry partners and as the interfaces develop over time such results can provide further suggestions for development.

In addition, the qualitative studies were exploratory as there is a lack of theoretical underpinning that encapsulates the measurement of consumer responses to the interface whilst combining evaluations of physical product and garment fit. However, therein also lies the strength of the research findings in providing a potential trajectory that could be used for future investigation in digital fit and sizing.

10.11. Managerial implications

Companies can apply the findings of this research to understand the consumer journey using digital fit and sizing interfaces. Managers can assess how consumers may interact with fit and sizing interfaces and the areas of responses to products purchased can be mapped using the future research model (Figure 10.6). The first section of managerial implications covers Metal the virtual try-on stimuli and the second discusses Dressipi. Overall, by combining the best aspects of both garment fit visualisation methods (Metal) and size and styling product recommendation methods (Dressipi) retailers and academics can understand how to optimise fit and sizing tools for consumer use in the future.

10.11.1. Metal managerial implications

Technology confident users, such as generation Y measured within this study are a useful demographic in understanding how a larger number of consumers may adopt the technology in the future. Perceived usefulness and ease of use are important prerequisites of developing positive attitudes to the online technology. This may be strongly related to the accuracy of visualisation methods. In the future, technology will increase visualisation which will enhance further consumer adoption.

Further, users that perceive virtual try-on to be both functional and experiential in their shopping activity which demonstrates that consumers may re-use the technology in the future. Playfulness within the interface provides the user with the opportunity to experiment with virtual garments and avatars which may enhance user adoption in the future. This result is supported by the information provided in the industry interviews. Positive attitudes towards Metal will enhance the use of the technology within the users online shopping experiences in the future. As consumers become more accustomed to using new technologies, attitudes and intention to use will increase (Table 10.3).
Table 10.3 Metaill managerial implications

<table>
<thead>
<tr>
<th>Construct</th>
<th>Short term managerial implications</th>
<th>Long term managerial implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology confidence</td>
<td>Gen Y were highly likely to try and experiment with new technology and felt comfortable using digital technology. Consumers also had a low level of anxiety towards using new technology. Therefore, consumers that are innovative and have high levels of technology confidence will be more likely to be comfortable using virtual fitting technology.</td>
<td>Consumers that display innovative behaviours determine how the fastest adopters of the consumer market will behave when using technology. In the long-term, the behaviour of technology confident consumers will diffuse towards late majority adopters. This will demonstrate how other consumer segments may respond to using virtual fitting room technology widely in online fashion shopping.</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>Virtual fitting rooms that are perceived useful to consumers will influence a positive attitude towards the technology. If the technology is useful, the more likely consumers are to adopt the technology and feel positive towards it in online fashion retailing.</td>
<td>As technology evolves and develops, the more useful virtual fitting and visualisation will become. The technology must firstly provide useful experiences (functional) in online retailing for consumers to widely adopt it. The more advanced the technology may become through technology such as virtual reality, the more consumers will use the technology in online fashion retailing.</td>
</tr>
<tr>
<td>Ease of use</td>
<td>Virtual fitting rooms are considered easy to use which mediates the perceived usefulness of the technology.</td>
<td>Consumers with high levels of technology confidence find Metaill ease to use. As the technology develops, ease of use will cascade to a broad base of consumers including late majority adopters. In addition, as consumers become more used to the technology in daily life, enduring constructs such as engagement and loyalty can be measured.</td>
</tr>
<tr>
<td>Playfulness</td>
<td>Consumers are currently open to using technology and are perceiving virtual fitting rooms as playful, gamified technology in online shopping environments. The high levels of gamification mean that the product experience provides experiential benefits and increased engagement for consumer re-use.</td>
<td>As the technology becomes more accurate to human simulation potentially using virtual reality technology, and artificial intelligence, consumers may begin to equate virtual fit experiences with the physical fit experience. Consumers may become more accustomed to the use of virtual methods to assessing fit when purchasing clothing online. The use of fit visualisation could also be applied in the product design process, enabling and empowering the consumer within product design and assisting retailers to create successful product ranges.</td>
</tr>
<tr>
<td>Attitude</td>
<td>Attitudes towards virtual fitting rooms are mediated by the impact of the perceived usefulness, ease of use, playfulness and high technology confidence.</td>
<td>Attitudes towards virtual fitting room technology will continue to develop as the technology is used more widely in online fashion retailing across retailers and through multiple channels. As consumers become used to the technology in Omni-channel fashion retailing, the more positive attitudes will become. Playfulness is key pre-requisite in forming positive attitudes to virtual fit technology.</td>
</tr>
<tr>
<td>Intention to use</td>
<td>Positive consumer attitudes towards the technology influence their intention to use virtual fitting rooms in the future. Additionally, the perceived usefulness and ease of use of the technology will influence intention to use.</td>
<td>If implemented across many fashion retailers, consumers will intend to use virtual fitting rooms in the future. The more useful and easy to use the virtual fitting room, the more likely consumers are to re-use the technology in the future. This demonstrates the need to develop the platforms for retailing through further analysis of consumer response. Virtual fit will become further integrated and tested within online and physical store environments.</td>
</tr>
</tbody>
</table>

The next section will describe the managerial implications related to the product purchased through the Dressipi interface. These results are summarised from the Very.co.uk and Topshop.co.uk products that were assessed in consumer physical try-on. Evaluating consumer...
responses to physical products gives richer insight into how consumers assess products using fit and sizing tools and their real-life reactions once the product has arrived.

10.11.2. Dressipi product managerial implications

Product evaluation of the dresses purchased through Dressipi provide insight into how the interfaces may be developed to better satisfy garment evaluation online (Table 10.4). The influence of fabric information was required to provide the user with more cues on how the garment may fit. Fabric can impact fit based on texture, weight, opaqueness, drape and comfort. Considerations as to whether a consumer will keep or return the garment may be influenced directly by the fabric. For example, if the fabric was not as expected in terms of quality the perception of the product and retailer may decrease. Providing accessible and transparent information regarding fabric pre-purchase will guide consumers in the decisions to purchase. In addition, detailed product information will increase consumer confidence in the interface which may result in higher average transaction value and reduced online returns.

Participants also noted that fabric and cloth tension around areas of the body may influence how a garment may fit. For example, if a garment is particularly tight due to stretchy fabric, it may be uncomfortable for wear. As interfaces develop, technology used in product development to depict fabrics and the body in 3D, will influence how a consumer evaluates product prior to purchase.

Style advice provided was stated by consumers to be perceived as personalised which meant that the consumers would trust the interface and therefore purchase using the tool. Product recommendations interfaces need to be perceived as credible and due to the lack of human presence users may be less likely to trust the system. One way this can be affected in the future is through the consumer-consumer interaction or through conversation with virtual agents. By leveraging social aspects to the interface, credibility can be increased, consumers can gain two-way communication and will be more likely to re-use the interface (Pookulangara et al. 2014). Furthermore, the more users of the system, then the collaborative filtering algorithms can become more accurate.

Dressipi usage also increased consumer brand perception due to providing accurate recommendations. In the future, the tool can provide dynamic personalised product recommendations that can be utilised across multiple devices whilst allowing consumers to shop at multiple retailers. The managerial implications are summarised in Table 10.4.
## Table 10.4 Dressipi product managerial implications

<table>
<thead>
<tr>
<th>Product Evaluation</th>
<th>Short term managerial implications</th>
<th>Long term managerial implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabric information</td>
<td>Fabric information included in product recommendations can provide more positive responses from consumers when garments are received.</td>
<td>The more information provided to consumers in the online stages of product recommendations, the more confident the consumer and less garments will be returned after use of the interface.</td>
</tr>
<tr>
<td>Strategies for better fit</td>
<td>Information on fabric density could positively affect consumer satisfaction with the interface.</td>
<td>As fit interfaces and technology develop, there may be opportunity for accurate computation of cloth tension on the body to be experiences such as through 3D body scanning and VR.</td>
</tr>
<tr>
<td>Style advice</td>
<td>Closely personalised recommendations produced positive responses from consumers to the interface and the garments they purchase using the technology, enhancing loyalty and repeat purchase.</td>
<td>As the interface develops, recommendation algorithms will provide consumers with a highly accurate level of product recommendations and two-way communication with the retailer. This enhances trust of the interface.</td>
</tr>
<tr>
<td>Credibility</td>
<td>The level of credibility of the interface is key to the re-use intention of the user. A lack of social interaction within the platform meant that consumers felt the system was not believable.</td>
<td>By adding a social function to the interface, such as social media or interactions with other users will impact participants’ likelihood to trust and share their experiences and purchases through the style adviser.</td>
</tr>
<tr>
<td>Refining purchase and navigability</td>
<td>As the style adviser provides consumers with the opportunity to refine items to their personal preferences, consumers enjoy the convenience that this brings when shopping online.</td>
<td>As the style adviser builds consumer profiles which increase in accuracy as they are used, personalised and items are purchased, these will continue to get better over time. In the future consumers will be able to access personalised dynamic recommendations from a range of devices and retailers. Further predictive analytics provided through machine learning and artificial intelligence technology will predict and provide a personalised selection of products for future purchases.</td>
</tr>
<tr>
<td>Brand perception</td>
<td>Retailers that provide consumers with product recommendations that are accurate gain elevated brand perceptions from consumers. Additionally, consumers who have not previously shopped with retailers offering the software can gain a better understanding of the brand and the garments that would suit them.</td>
<td>A positive brand perception will ensure that retailers gain more consumers and loyalty is obtained. This may influence more consumers shopping across a range of retailers. This is currently successful for retailers such as ASOS who stock many different brands on one website. Retailers will be able to gain more data power through collaboratively sharing consumer information to better target their customers. The more data obtained, the better picture a retailer can get of their consumers.</td>
</tr>
<tr>
<td>Suitability of style and size suggestions</td>
<td>The more accurate the product recommendations provided to the consumer, the more believable the software is to them. Therefore, more consumers are likely to use the software if it is accurate. Word of mouth and social media sharing will contribute to a larger group of consumers adopting the technology.</td>
<td>As more consumers use product recommendation software, the better the machine learning becomes. This is due to the amount of data being collectively processed making it easier to group consumers based on their preferences. This is also known as deep machine learning. Grouping and connecting consumers of similar tastes by social media can also enhance the collaborative filtering system. In turn, this enhances the platform and increases satisfaction in the interface.</td>
</tr>
</tbody>
</table>
10.11.3. Dressipi interface managerial implications

The product and interface were analysed in the qualitative study (stage 2). The following section discusses the reasons why users would re-use and keep the garment after purchase. The reasons for re-use are related to the satisfaction participants felt with the interface and therefore indicate developments for the interface. The results of re-use intention are mapped into the future research model (Figure 10.5). Positive results of the interface evaluation provides direct feedback to stimulating future interaction with the interface.

The first aspect of Dressipi interface evaluation was deduced through the fit of the product experienced after physical try-on. Overall, the participants that found the garment fitted, intended to keep and wear the garment. If garment satisfaction is maximised, consumers will spread positive e-word of mouth, become loyal to the interface and increase sales for the retailer.

Monitoring product returns could also provide the retailer with information regarding specific products that were dissatisfactory post-purchase. Expert recommendations for body shape were another facet of consumer satisfaction with the interface post-purchase. From the results of the Dressipi study participants enjoyed gaining style advice through the interface. Ease of use was also a prominent finding that was triangulated with the quantitative study. If size and style recommendation technology is designed to enhance usability (Pine and Gilmore 2016), more users will adopt it. Eventually the technology could become an important part of fashion consumer online shopping and decision making.

Dressipi provides users with suggestions to style and was convenient for consumers that were short of time. Recommendations that were suited to personal style and that used inspiring trends and imagery are factors that contributed to consumer trust and credibility of the interface. Due to wide online assortments and discrepancies in UK sizing systems, convenience enhancing factors such as reduction of time spent navigating online websites and recommendations provided based on body shape, can increase functional motivations to use the technology which is also recognised by Bedi et al. (2017). This finding also correlates with the quantitative results regarding functional motivation and perceived usefulness. In addition, as the technology develops the algorithms can improve and provide consumers with enhanced levels of personalisation. Table 10.5 summarises the interface managerial implications for Dressipi.
## Chapter Ten: Discussion and Conclusion

### Table 10.5 Dressipi interface managerial implications

<table>
<thead>
<tr>
<th>Interface Evaluation</th>
<th>Short term managerial implications</th>
<th>Long term managerial implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good fit of product</td>
<td>Consumers that are familiar with Dressipi will feel satisfied with the interface when a garment fits them.</td>
<td>There is mutual benefit for consumers experiencing good fit through interfaces such as Dressipi. 1.) The impact of increased sales conversions for the retailer. 2.) Consumer product and interface satisfaction. 3.) Increased consumer loyalty to both the retailer and the interface through accurate targeted recommendations. These three factors will provide the interface with more data on which the algorithms used to suggest products to consumers can be enhanced. A key consideration for the success of this is the relaying of consumer satisfaction and returns behaviour into the interface. Without this information, Dressipi cannot fully understand the nature of post-purchase consumer behaviour and will not be able to assess the success of the platform.</td>
</tr>
<tr>
<td>Provides expert recommendations on body shape</td>
<td>Consumers that use the Dressipi interface will be introduced to new expert recommendations based on their body shape, providing a service that is unique and provides means to suggesting suitable garments online.</td>
<td>AI will facilitate growth of body shape recommendation. There is evidence of early adopting companies such as Amazon using image recognition technology through their Alexa AI system that provides consumers with body shape and clothing fit analysis. In the future AI will understand body shape through big data and therefore recommendations will increase in accuracy. As late majority companies begin to implement such technology, body shape recommendation will become a method of product evaluation.</td>
</tr>
<tr>
<td>Easy to use</td>
<td>Ease of use of new interfaces is key for early adopting consumers. This enhances user experience and interface satisfaction, encouraging consumers to spread positive e-WOM.</td>
<td>In the future, as e-WOM related to the ease of use of Dressipi diffuses through consumer segments, and will drive more users to adopt the platform. This then builds the use of size and style recommendation into online purchasing behaviour and assists retailers to collect information on their customers.</td>
</tr>
<tr>
<td>Gave new suggestions for style</td>
<td>Providing users with new suggestions enables consumers to be introduced to new products.</td>
<td>Introducing consumers to new products allows for increasing sales, loyalty and satisfaction. Targeted suggestions can also provide the retailer with opportunities to target encouraging consumers specifically based on their previous purchases. This in turn provides the retailer with more information on their customer base.</td>
</tr>
<tr>
<td>Convenient if short of time</td>
<td>As modern consumers are often short of time, any method that can assist with this process will increase the likelihood of purchase behaviour.</td>
<td>Allowing consumers gain access to convenient information that is tailored to them increases the brand perception and potential of re-patronage at that store in the future.</td>
</tr>
<tr>
<td>Suited to personal style</td>
<td>Consumers found they wished to re-use Dressipi when the recommendations were suited to their personal style. This links to the discussion regarding personalisation. It is clear personalised recommendations suited to style influence re-use intention of the interface.</td>
<td>As Dressipi develops, the machine learning algorithms will improve with increased consumer use. Data collected through transactions, likes and dislikes will increase the level of personalisation offered to the user. Personalisation of the interface provides the user with a selection of garments which are suited to their style, what’s available in their wardrobes, events in their calendars which in turn will increase purchase intention.</td>
</tr>
<tr>
<td>Used inspiring trends and imagery</td>
<td>As the Dressipi interface offers inspiring trends and imagery, consumers can perceive their own style attributes with those presented through the interface. This gives an aspirational aspect to the styling interface which influences purchase intention.</td>
<td>In the future as noted above, increased transactions with the interface will assist to develop the personalisation of the interface to the consumer’s lifestyle. As Dressipi expands across more retailers, trends and imagery used can be tailored to specific consumers. As more consumers find the interface relatable, the more consumers are likely to patronage the interface.</td>
</tr>
</tbody>
</table>
10.12. Future applications to technology

As the area of fit and sizing is technologically driven, new technologies in the realm of fashion retailing and personalisation are posited to guide fit and sizing in the future (Telegraph 2017). Drawing from the highlights of the managerial implications the following points proposes how fit and sizing tools could be utilised through future technological development.

10.12.1. Virtual reality

Technology such as Virtual Reality software (Grewal et al. 2017, Forbes 2017a) can be built into consumer use of the interface and will assist to guide the future of visualisation of products and garment fit. According to Mintel (2017) 44% of online shoppers are interested in retail focussed Virtual Reality (VR). As VR technologies become more available to consumers, rendering and visualisation of fit and sizing will increase.


As more users adopt size and style recommendation technology through e-Word of mouth, data obtained by Dressipi in a data lake (data repository) will increase. Therefore, through machine learning, the algorithms used to drive recommendations can improve (Siau and Yang 2017).

10.12.3. Image recognition

Recommendations will suggest products based on consumer lifestyles, personal events, post-purchase behaviour, purchase history, external influences such as weather, what is available in the user’s wardrobe using image recognition and voice activation software (Euromonitor 2017). Evidence of this that has been already launched includes Amazon’s Echo Show (Mintel 2017b). If utilised successfully, Dressipi could enhance sales conversions, reduce returns and increase consumer satisfaction and loyalty.

10.12.4. Artificial intelligence

Interfaces should combine the visualisation methods of Metail with the product recommendations of Dressipi through new technology such as visual search (image recognition) and voice activation in artificial intelligence (AI) technology (Grewal et al. 2017). Early examples of this include Amazon’s Alexa and Stitch Fix. AI can have a significant effect on consumer decision making when shopping, including the benefits of enhanced personalised product recommendations (Grewal et al. 2017). This study demonstrates the need for retailers to invest in digital fashion visualisation and styling tools and use AI to enhance their product offering. AI has been found to be particularly attractive to innovative consumer segments such
as millennials, who would like to use a retailer if they can provide new and interesting product recommendations (Forbes 2017a).

10.13. Future Research Directions

10.13.1. Engagement

This study indicates that gamified clothing fit experiences enhance future technology use behaviour, however aspects such as ease of use should be monitored in the development of future fit technology. Gamification however is not an end in itself, the impact of product evaluation on the gamified experience is integral to measuring gamified experiences to purchase behaviour. Influences of gamification on engagement should be further studied, as engagement provides an idea of longer term technology adoption and gamified experience (Berger et al. 2017) than the constructs of TAM (Yang et al. 2017).

10.13.2. Avatar congruity

Avatar self-congruity has been researched in assistant based or augmented reality retailing technology, therefore the impact of self-congruity as a construct in the TAM model should be analysed for future studies (Suh et al. 2011, Aguirre-Rodriguez et al. 2014, Jin 2010). This is also supported by the growing impact of artificial intelligence and cyber psychology and should be further researched in the development of clothing based avatars.

10.13.3. Demographic generations

Future research may wish to explore other demographics such as generation X, Z, other sub-segments of generation Y and male responses. This is due to evident interest of other consumer segments clear from market research: that around a 10th of older consumers are dissatisfied with clothing fit (Mintel 2017a).

10.13.4. Further technology acceptance models

The framework adopted for the study was TAM, which has several theoretical disadvantages, therefore in the future the use of a more developed technology related model such as the unified theory of technology acceptance and use should be used as a theoretical framework. However, as the study looked at innovative fashion consumers, the UTAUT model would analyse the mediating factors of demographics on consumer adoption of virtual fit (Venkatesh et al. 2003). Therefore, as an initial study of first users or early adopters, the use of TAM is justified.
10.13.5. Social interactions

Consumers are influenced by the opinions of social interactions with peers and currently this is not facilitated on many digital fit and sizing interfaces. It is clear that social influences in online shopping, fit and product recommendation are a key area that should be addressed by fashion retailers (Choi et al. 2011, Wang et al. 2012). Pantano and Gandini (2017) indicate that social interactions are key to generating intimacy and trust in online purchase environments.

10.13.6. Use of the bricks-and-mortar store

Further analysis should also test the tools through different retailing channels which can provide immediate feedback regarding the interface and product, such as the bricks-and-mortar store. In addition, further partnerships should be made with retailers using the technology to measure conversion rate and the impact of virtual fit technologies on sales revenues and product returns.

10.13.7. Application to additional industries

Similar to fashion garments, product focussed industries involve an experiential element of consumer assessment prior to purchase which therefore verifies the use of visualisation of the product. The findings of the study can be applied to research on other retail product-related, consumer facing categories such as online virtual fitting rooms for eye-wear (Rese et al. 2016). In addition industries such as automotive, aerospace, design, sportswear, gaming, footwear and beauty/make-up industries (Javornik et al. 2016) could also benefit from 3D visualisation software. Product development and design can be enhanced through 3D visualisation methods which assist to reduce costs, time to market and product development.

10.13.8. Personalisation and consumer privacy

With increased demand for personalised digital experiences (Pine and Gilmore 2016), retailers must consider the impact of consumer privacy and data regulations when targeting customers through digital channels (Piotrowicz and Cuthbertson 2014). Future research could assess the impact of consumer responses to online security and measure level of consumer awareness of background data collection.

10.14. Conclusion

This research has measured consumer responses to fit and sizing technologies in online fashion retailing. The quantitative study has conceptualised consumer acceptance of virtual fit (Metafit) and the aspects of the platform that are driving intention to use. The qualitative study explores the post-purchase evaluation of the garment received after using an online size and style
recommendation tool (Dressipi) and the subsequent interface evaluation post-use. An additional level to the study is provided through industry perspectives and the triangulation of quantitative and qualitative results. Post purchase reflections are important to understand how consumers will engage with virtual fit interfaces. Real fit experiences drawn from post purchase reflections show that current interfaces only provide limited insights to guide a consumer and fall short of the complex engagement consumers have with clothing. Gamification of interfaces will directly contribute to their success, especially if the interface falls short of allowing post purchase reflection, which is the case with Metail. In the future fit and sizing technology could combine the benefits of fit visualisation interfaces with the benefits of size and style recommendation and will provide engaging, personalised experiences for consumers.
References


References


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References


References


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References


References


References


References


References


References


References


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References


Tyler, D.J. (2003). Will the real clothing industry please stand up! *Journal of Fashion Marketing and Management, 7* (3), pp.231-234


References


Appendix

Quantitative survey images

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About the Research

Who will conduct the research?
Sagithe Ndlovu PhD Researcher, Pro Design and Fashion Business, The University of Manchester, Sackville Street Building, Sackville Street, M1 3BB.

What is the purpose of the research?
To model consumer responses to new, virtual fitting websites that may exist within a retailer's website. This requires studies to assess virtual fitting websites to determine whether consumers feel they are useful in simulating the fit, size and style of the garments that they would like to purchase.

Why have I been chosen?
You have been chosen for the study as you are female, live in the UK, and you have stated you have previous experience of shopping for fashion online.

What would I be asked to do if I took part?
If you take part you would need to complete this research questionnaire which will ask you basic questions such as your age, income, and how often you shop online. Then you will be asked to try out a virtual fitting website called IdealFit, and create an avatar, provided by a link in a separate window to the survey.

N.B. If you create an avatar, you will need to enter your height, weight, and baseline. This information is confidential and is not available to the researcher.

There will be further questions after the task regarding your experience using the website.

* Indicates that the question is required and you must provide an answer.

1. Do you agree to take part in the project? *

   ○ Yes
   ○ No

---
Appendix

### Metal Virtual Try-on - copy

#### About you
- **Do you consider yourself...**
  - Yes
  - No

#### What is your gender?
- Male
- Female

#### What is your age?
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65+

#### How frequently do you consider fashion websites?
- Frequently
- Occasionally
- Seldom
- Never

#### How frequently do you consider fashion websites?
- Frequently
- Occasionally
- Seldom
- Never

### The University of Manchester

**Metal Virtual Try-on - copy**

#### About you (continued)
- **What is your education level?**
  - School
  - College
  - Graduate
  - Post Graduate

#### Please select your income bracket
- Less than £20,000
- £20,000-£30,000
- £30,000-£40,000
- £40,000-£50,000
- £50,000+
Appendix

Enabling the Digital Fashion Consumer through Gamified Fit and Sizing Experience Technologies
Appendix

To use Metall, please take the following steps in the image and the text below.

1. Click. Once you click on the first tab below, you will be directed to the desired area.

2. Create Avatar. Once you are directed to create an avatar, ensure the right hand side of your browser window open up.

3. Fit. To measure yourself, simply click or hover the mask that fits your body. We will then record your measurements.

4. Finish. To record your measurements, click the 'Finish' button above your avatar. Better body measurements will be taken as you move.

5. Finish. The 'Finish' button will allow you to password your avatar by adding your own design, style and size name. Following this, you can enter your 'Total and Fit' measurements and finally, you can choose your avatar name, surface appearance, e.g., skin tone and hair color.

6. Finish. Once the avatar has been personalized, your avatar will be finalized. Click for further details in the top right of your avatar, and you will receive your size and fitting information.

7. Finish. Once you have completed your avatar and moved to the clothes, please click on the avatar. Created in the previous browser tab, when model style will be asking you some quick questions relating to your experience. Thank you.

>>> Click here to use Metall <<<

---

Metall Virtual Try-on - copy

Metall Task Confirmation

This is a mandatory part of the survey and must be completed before continuing the survey. Thank you.

12. Have you completed the Metall task on page 35?
   (Including trying on some virtual garments on the avatar?)

   - Yes
   - No

---

Metall Virtual Try-on - copy

Perceived Usefulness

This page asks you about how useful your brand Metall.

Please answer these questions relating to online fashion viewing technologies (e.g., Zoom, Spin and Catwalk videos) that you have used...

13. I would find Metall helpful when shopping online:

   - Strongly agree
   - Agree
   - Undecided/neutral
   - Strongly disagree

14. Use of Metall could increase the quality of my online shopping:

   - Strongly agree
   - Agree
   - Undecided/neutral
   - Strongly disagree

---

Enabling the Digital Fashion Consumer through Gamified Fit and Sizing Experience Technologies
Appendix

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Appendix

Perceived Usefulness

This page asks you another question you can be using Metall.

Please answer these questions thinking of Metall in relation to online fashion viewing technologies (e.g. Zoom, Spin and Catwalk videos) that you have used.

24. Using Metall is fast?
   - Strongly agree
   - Agree
   - Neither agree nor disagree
   - Disagree
   - Strongly disagree

25. Using Metall is effective?
   - Strongly agree
   - Agree
   - Neither agree nor disagree
   - Disagree
   - Strongly disagree

26. Using Metall saves my imagination?
   - Strongly agree
   - Agree
   - Neither agree nor disagree
   - Disagree
   - Strongly disagree

27. Using Metall eliminates my curiosity?
   - Strongly agree
   - Agree
   - Neither agree nor disagree
   - Disagree
   - Strongly disagree

Metall Virtual Try-on

Attitude

This page asks you about your attitude towards using Metall.

Please rate Metall with the adjective pairs below. For each pair of adjectives, rate the number that closely measures your attitude.

28. Using Metall...
   - Easy to use - 1 2 3 4 5 6
   - Fast - 1 2 3 4 5 6
   - Effective - 1 2 3 4 5 6
   - Time-efficient - 1 2 3 4 5 6
   - Easy to use - 1 2 3 4 5 6
   - Engaging - 1 2 3 4 5 6
   - Easy to use - 1 2 3 4 5 6
   - Usable - 1 2 3 4 5 6
   - Easy to use - 1 2 3 4 5 6
   - Useful - 1 2 3 4 5 6
   - Easy to use - 1 2 3 4 5 6
   - Reliable - 1 2 3 4 5 6
   - Easy to use - 1 2 3 4 5 6
   - Accessible - 1 2 3 4 5 6
   - Easy to use - 1 2 3 4 5 6
   - Accessible - 1 2 3 4 5 6
   - Easy to use - 1 2 3 4 5 6
   - Accessible - 1 2 3 4 5 6
   - Easy to use - 1 2 3 4 5 6
   - Accessible - 1 2 3 4 5 6
   - Easy to use - 1 2 3 4 5 6
   - Accessible - 1 2 3 4 5 6
### Appendix

**Intended Use**

This page contains questions assessing the products available on Intel's suit against non-functional needs...

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>30. I would be likely to try similar or similar fashion technologies again in the future.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
</tr>
<tr>
<td></td>
<td>Agree</td>
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<tr>
<td></td>
<td>Somewhat agree</td>
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<tr>
<td></td>
<td>Neutral</td>
</tr>
<tr>
<td></td>
<td>Somewhat disagree</td>
</tr>
<tr>
<td></td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>31. I would be likely to visit websites that use similar or similar fashion technologies for fashion shopping.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
</tr>
<tr>
<td></td>
<td>Agree</td>
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<tr>
<td></td>
<td>Somewhat agree</td>
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<td>Neutral</td>
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<td></td>
<td>Somewhat disagree</td>
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<tr>
<td></td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>32. I would be likely to purchase fashion from websites that use similar or similar fashion technologies.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
</tr>
<tr>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td></td>
<td>Somewhat agree</td>
</tr>
<tr>
<td></td>
<td>Neutral</td>
</tr>
<tr>
<td></td>
<td>Somewhat disagree</td>
</tr>
<tr>
<td></td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
</tr>
</tbody>
</table>
Appendix

**Very Style Adviser Questions**

<table>
<thead>
<tr>
<th>Dressipi Question</th>
<th>Answer options</th>
</tr>
</thead>
<tbody>
<tr>
<td>What colour are your eyes?</td>
<td>Blue, Grey, Green, Hazel, Amber, Brown</td>
</tr>
<tr>
<td>What is your current hair colour?</td>
<td>Platinum or very blonde, Baby blonde, Ash blonde,</td>
</tr>
<tr>
<td></td>
<td>Medium natural blonde, Dark natural blonde, Strawberry blonde, Red or Auburn, Mahogany red, Chestnut, Golden brown, Light brown, Medium brown, Dark brown, Nearly black, Black, Grey, White</td>
</tr>
<tr>
<td>What colour is your skin</td>
<td>Very fair, Fair, Medium, Olive, Ochre, Brown, Black</td>
</tr>
<tr>
<td>Take a look at these colours below, are there any you don’t like?</td>
<td>Navy, Blush, Pale blue, Pistachio, Coral</td>
</tr>
<tr>
<td>Which colours do you love the most?</td>
<td>Whites, Pinks, Reds, Purples, Blues, Turquoise, Greens, Yellows, Oranges, Browns, Neutrals, Metallics, Greys, Greys, Blacks</td>
</tr>
<tr>
<td>Which body shape is most applicable to you?</td>
<td>Shoulders equal to hips, Large, Medium, Small</td>
</tr>
<tr>
<td>In proportion to your frame what size is your bust?</td>
<td>Defined, Round, Undefined</td>
</tr>
<tr>
<td>How defined is your waist?</td>
<td>Height/Weight, Dress brand/Dress size</td>
</tr>
<tr>
<td>What’s your height and weight?</td>
<td></td>
</tr>
<tr>
<td>Please select a brand that you usually wear and your size</td>
<td></td>
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</tbody>
</table>
### Appendix

<table>
<thead>
<tr>
<th>Question</th>
<th>Option 1</th>
<th>Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would you like to reveal or conceal any parts of your figure?</td>
<td>Reveal/Conceal</td>
<td></td>
</tr>
<tr>
<td>How would you describe your style, reserved or adventurous?</td>
<td>Reserved/Adventurous</td>
<td></td>
</tr>
<tr>
<td>Would you like a few fashion tips or a full style makeover?</td>
<td>Fashion tips/Make-over</td>
<td></td>
</tr>
<tr>
<td>Do you buy clothes with confidence or do you find it difficult?</td>
<td>Very unsure/Confident</td>
<td></td>
</tr>
<tr>
<td>Do you find shopping stressful or is it a pleasure?</td>
<td>Very stressful/Please</td>
<td></td>
</tr>
<tr>
<td>When do you like to get all spruced up?</td>
<td>Casual evenings out</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Romantic nights out</td>
<td></td>
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<td></td>
<td>Black tie events</td>
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<td></td>
<td>Work functions</td>
<td></td>
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<tr>
<td></td>
<td>Other</td>
<td></td>
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<tr>
<td>How do you spend Monday to Friday?</td>
<td>In a uniform</td>
<td></td>
</tr>
<tr>
<td></td>
<td>At home being a mum</td>
<td></td>
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<td></td>
<td>In education</td>
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<tr>
<td></td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>How old are you?</td>
<td>Tunic top</td>
<td></td>
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<tr>
<td>Which of these would you not wear?</td>
<td>Maxi dress or skirt</td>
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<tr>
<td></td>
<td>Mini skirt</td>
<td></td>
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<td></td>
<td>Pencil skirt</td>
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<td></td>
<td>Biker jacket</td>
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<tr>
<td></td>
<td>Bootcut jeans</td>
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<td></td>
<td>Very high heels</td>
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<td></td>
<td>Skinny Jeans</td>
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<td></td>
<td>Crew neck</td>
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<td>Body con</td>
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</table>
## Topshop Style Adviser Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Option</th>
</tr>
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<tbody>
<tr>
<td>How old are you?</td>
<td></td>
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<tr>
<td>Whose style do you like the most?</td>
<td>Alexa Chung (Cool girl chic)</td>
</tr>
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<td></td>
<td>Beyonce (Polished glam)</td>
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<tr>
<td></td>
<td>Kate Moss (Rock girl edge)</td>
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<tr>
<td></td>
<td>Florence Welch (Eccentric cool)</td>
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<tr>
<td></td>
<td>Cara Delevigne (Laid back tomboy)</td>
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<tr>
<td>How adventurous is your style?</td>
<td>More classic 1</td>
</tr>
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<td></td>
<td>2</td>
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<td>3</td>
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<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>More out there 5</td>
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<tr>
<td>What words best describe your style</td>
<td>Classic</td>
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<td></td>
<td>Tomboy</td>
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<td>Androgynous</td>
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<td>Minimal</td>
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<td>Geeky</td>
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<td>Chic</td>
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<td>Laid back</td>
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<td>Casual</td>
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<td>Low maintenance</td>
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<td>Fashion forward</td>
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<td>Statement</td>
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<td>Sexy</td>
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<td>Adventurous</td>
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<td>How confident do you feel about your style?</td>
<td>Not confident 1</td>
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<td>3</td>
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<td></td>
<td>Very confident 5</td>
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<td>What do you want to get out of this quiz?</td>
<td>A complete style overhaul</td>
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<td></td>
<td>Recommendations to suit my current style</td>
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<tr>
<td>Which of these styles do you like for the weekdays?</td>
<td>Casual and comfy</td>
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<td></td>
<td>Edgy and clean</td>
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<td>Chic and girly</td>
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<td>Smart and polished</td>
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<td>Glam and sexy</td>
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<td>Smart and fashion forward</td>
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<td>Which of these styles do you like for weekends?</td>
<td>Urban and cool</td>
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<td>Girly and pretty</td>
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<td>Edgy and fashion forward</td>
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<td>Retro and preppy</td>
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<td>Laid back and chic</td>
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<td></td>
<td>Smart and clean</td>
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<tr>
<td>Which of these styles do you like for a night out?</td>
<td>Smart and directional</td>
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Enabling the Digital Fashion Consumer through Gamified Fit and Sizing Experience Technologies
<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
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<td>Glam and polished</td>
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<td>Minimal and sexy</td>
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<td>Glam and girly</td>
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<td>Statement and fashion-forward</td>
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<td>Pretty and feminine</td>
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<td>Which colours do you not like to wear?</td>
<td>Greys</td>
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<td>Neutrals</td>
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<td>Pinks</td>
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<td>Turquoises</td>
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<td>Which of these do you like to show off/cover up?</td>
<td>Arms</td>
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<td>Chest</td>
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<td>Stomach</td>
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<td>Legs</td>
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<td>How much do you enjoy shopping?</td>
<td>I don’t enjoy it 1</td>
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<td>I love it 5</td>
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<td>How organised is your wardrobe?</td>
<td>Not very 1</td>
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<td>Very 5</td>
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<td>Would you wear these styles?</td>
<td>Bodycon dress</td>
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<td></td>
<td>Fit and flare skater dress</td>
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<td></td>
<td>Bra-top</td>
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<td>Crop-top</td>
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<td>Pencil skirt</td>
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<td>Maxi dress or skirt</td>
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<td>Mini dress or skirt</td>
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<td>Crop jacket</td>
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<td>Boyfriend jeans</td>
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<td>Very high heels</td>
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<td>How tall are you?</td>
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<td>How much do you weigh?</td>
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<td>What size do you usually buy</td>
<td>Dress brand/Dress size</td>
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<td>Jeans brand/Jeans size</td>
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<td>Top brand/Top size</td>
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<td>Bras</td>
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<td>Which describes you best?</td>
<td>Hips wider than shoulders</td>
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<td>Hips same as shoulders</td>
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<td>Shoulders wider than hips</td>
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<td>Which best describes your waist</td>
<td>Defined</td>
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<td>Undefined</td>
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<td>How much would you normally spend on?</td>
<td>Going out dress</td>
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<td>Pair of heels</td>
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<td>Leather jacket</td>
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<td>Knitted jumper</td>
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<td>Leather bag</td>
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<td>Winter coat</td>
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<td>You are the…girl:</td>
<td></td>
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Appendix

Very Transcripts

P001 (a)

‘The dress fits fine along the body’ (0.05) – silhouette
‘Waist and the length I’d probably say it’s perfect, just across the arms I can’t move my arms at all’ (0.24)
‘For fit, I don’t think it’s that true, I haven’t got that much of a big bust, so I don’t understand why it’s that tight around this area.’ (0.40) – Product expectations
‘It normally is hard to find [garments that fit in the shoulder area], because I am larger here [shoulders] but I am normally a size 10 in most shops and this is a 10, so I’d have to try a size 12’ (1.15) – High street size comparison, Size congruence
‘I would use the style adviser again, based on the style of the dress, and where it covers [as this aligns with input preference], but obviously the fit I’d have to probably buy the 10 and 12 and see which fits better’ (2.44) Would return.

P001 (b)

‘It fits fine, it’s got a nice cuff above the wrist section’ (0.10)
‘Okay length, I would wear tights as it’s probably a winter/autumn dress’ (0.30)
‘I feel like it makes me look like I’ve got a waist, it goes in at the smallest part of myself’ (1.33)
‘I like how it’s incorporated all the colours I said I liked’ (2.19) Would keep.

P002 (a)

‘I thought it would be jersey but it’s actually woven, so it’s not what I expected’ (0.22)
‘I like the shape but it doesn’t fit me at the top around the boobs, it’s too big here, but that’s generally what I get because of my body shape’ (0.30)
‘I feel like I want to try on the bigger size’
‘I can never get anything to fit my shoulders or the boob area’
‘It looks like it fits me but I can’t move with my arms’
‘I think I’m a medium large bust’
‘I don’t know that the body shape I chose was correct…I feel like I’m in between’
‘I love the print’
‘Arms need to be bigger’
‘Waist needs to be higher up for me’
‘I’m really fussy, I’m a more of a store shopper because I like to try it on, I like to feel what it’s like’ Wouldn’t bother to use style adviser again, because knows shape would pick. Works in retail, knows product, can predict her own styles.
‘Didn’t feel body shape linked directly to the solutions that it gave her, in terms of what she likes. Doesn’t’ know if there’s a miscommunication. Body shape might be more important to colour and location. Fabric, waist, what the fabric is.’
‘If they’d measured me they would’ve got something more relevant. I know it’s meant to be fitted but it’s restrictive because it’s woven.’
‘Length is perfect, not too short, not too long or frumpy’
‘I like this dress’
‘If I was buying it for a lecture I would keep it’

P002 (b)

‘It’s not clinging as much, it feels better here [on the hips]’
‘I get scared when I put woven on in case I get stuck in it’
‘I think it fits quite well actually, in terms of being a fitted dress, but the arms are still a nightmare’
‘I still can’t move my arms’
‘I feel this print makes me look fatter…because this is quite busy’
‘This is what I’d thought it would be’ [in comparison to the picture and the model]
‘Nice fit visually, but I’d probably want to put a belt on it’
‘If the style adviser was to calculate it, in a way that, because I like things that are measured, if I’d put the measurements in I know that I’d believe it because I know that it’s algorithms I don’t believe it’
‘I don’t like things that take a long time to do’
‘If I was just shopping casually, watching tele or something like that, I’d probably take more time and I’d try to use it for new ideas, but because the way I shop is for a specific thing, I’d literally go for a type of dress and then look at different sizes’
‘If they [style adviser] could analyse what I do, not what I’m telling them…what I’ve purchased recently and then compare it as that would probably be more accurate to me’
Appendix

P003 (a)

‘It fits me fine’
‘I didn’t think it would fit me, but it does fit fine’
‘Usually I click 6 because that is what I am in most shops, so I would’ve just filtered this out because it’s in an 8
and I wouldn’t have looked at it twice being an 8’
‘You can adjust the waist and it’s quite a stretchy fabric, so it would fit and 8’
‘I like the colour’
‘I wouldn’t wear it, it’s not very me and I don’t like the fabric or length’
Return
‘Didn’t like the options that came up based on style and colour’
‘I thought I would prefer this one to the first one and I do’
‘Creates a bit more around the bust area’

P003 (b)

‘Fits okay, don’t know if it’s the fabric that makes it feel like….I think it’s the way it hangs on me’
‘It’s a bit tight under the armpits’
‘I don’t like the fabric, it looks like gym fabric’
Wouldn’t keep

P004

‘It fits really well, it’s quite figure hugging on the waist but it’s also quite flattering on the hips as well’
‘It covers my tummy, although because it’s quite a think material I would want those control pants because I feel like that’s unflattering’
‘Definitely the perfect size, I think I prefer it more than I did online, because online it looked not as young and sexy and the fabric looked a lot thicker, whereas in person it looks much more slinky and fits me much more nicer than it looked on the model’
‘I can be unsatisfied because often they don’t fit me around the waist, whereas this one fits me in all places’
‘Really like the colour’
Keep based on the underwear, effort and expense to get appropriate underwear.
‘Put something in about which fabric that you prefer, whether you want something that’s thicker and more structured or whether you’re happy with a more, think revealing fabric because obviously it does impact how it’s going to look on you and how it’s going to fit.’
Would use style adviser again based on this experience.
Advised fit and flare, should avoid tight mini dress – Disagree, loose across smallest part and does not show figure.

P005

‘It fits really well, it’s kinda fitted on top around the arms then it kinda drapes’
‘Unless I gained significant weight, at least it’s one of those dresses it’s guaranteed it’s going to fit comfortably’
“It hides my stomach as well, which is good so you can’t see where it’s bulging, but then I suppose it has more of my legs are out, it’s kinda nearly knee length it’s not like a mini dress, so it’s not like I’d have a problem with this kind of length’
‘I’m more concerned with seeing my upper thigh and ass being revealed kinda thing’
‘I really like that it comes longer at the back…..it gives you a bit more of a safety net around your bum’
‘I could go to a 10 to be fair, it’s fitted but I just don’t know how baggy it would be as it’s already like a tent dress’
‘It is comfortable, I’d be happy with sticking with this size, it’s just a consideration of trying a 10 just if it’s more breathability, I think that the fact that it is just stretch even in an 8, is very comfortable’
‘I think it would be more restricting if it was a different type of fabric’
Free returns policy would affect my choice to try two different sizes
IMAGE or photo of model – ‘pretty accurate’
‘Chose it because it’s one of those safe, guaranteed to fit anyone, to be fair I don’t have a very big bust, I know this type of dress won’t stick out over my boobs too much’
This style is her go to
‘Like this fabric because it is stretchy because you can wear it throughout the day with trainers and in the evening you can stick some heeled boots on.’
Comfort is rated over style
‘Not a pink or floral person’ Like the style but doesn’t necessarily like the print, brings out eye colour.
Keep for summer
Return for winter season, wouldn’t wear with black tights.
Keep based on size and fit
‘The style adviser does help to narrow down, I’m against pinks and metallics…certain fits I want to avoid, it helps to narrow down as you’re not having to traipse through thousands of pages’
‘I get bored and distracted very easily’
Appendix

‘It would be quite nice, say if I was looking for an evening garment or a casual garment…this I don’t think I’d wear it to a nightclub, drinks or cocktails, I think it is more towards the casual side of dresses…if there was a way to select what you are looking for’

Option to eliminate sale, or previous seasons, e.g. winter wear.
‘It’s recommending me to buy something now, that’s really two seasons gone’

P006

Size 12 – recommended as participant entered their size as 12 in Warehouse, although usually a 10 everywhere else
‘I know as a customer to take into account brands and how they would vary as a size and I also know the shape of my body, for example this dress I would need it fitted round my waist and then the fact that I’m usually a 12 on the bottom doesn’t matter because it is a flared style, I’d need it smaller on the top, so I think it would be more accurate if they took that that into account’
‘Comparing the fit of the dress to perhaps your biggest size could help, so top size 10-8, and it’s a fitted dress at the top only, then recommend an 8. Whereas if it’s a bodycon, and you selected a 12, then you’d need to consider a 12.’
‘I know on other websites for example ASOS, sometimes it says size up in this brand, size down which is really useful’
‘I like to reveal my lower half a bit more than my top half, but I also like to wear body con dresses, I find it difficult to find dresses that fit me well on the hips without bagging around the tummy’
Avoid tight fit mini dress – participant likes to wear this
‘It’s thinking that women always want to look slimmer, but I’m not really bothered about looking slimmer, it’s just what I want to wear’
‘It did ask me what I wanted to reveal, but I don’t think this reflects what I asked for’
‘I don’t think the colours were what I was expecting from the picture’ more subdued and less pigmented ‘picture has been enhanced’
‘I like the fabric more than I did online’ ‘Didn’t realise the burnout would be sheer’
Return and exchange the size, I’d get an 8.
‘Normally when I shop I buy two sizes [10,8], unless they don’t do free returns and then I look at the measurements a bit more carefully.’
‘Don’t think would use it for Very.co.uk…not given a good enough selection of what I’d want…the fit of it, seems like it’s recommending sizes to slim me, which is not high on my priorities.’
Improvements: ‘Giving fabric information, this type of dress and especially body con I’d want to know the fabric specs, and for third party brands they don’t do that’
‘I’d like to know the height of the model’
‘Add questions about personal style’
‘They have recommended me this dress that I wouldn’t normally pick, so in that sense it’s kind of working’
‘Found it hard to distinguish style tips, I don’t think they know enough about me to give me style tips, so more recommendations on what I’d usually wear maybe change the term’
Works better for loyal customers.

P007

‘It’s a really good fit, it fits really comfortably in all areas’
‘The length is really good it fits really nicely on the waist, there’s not too much space or room and accentuates it enough but not too much, the sleeves are a good length, with this style of the sleeve (bell sleeve) sometimes they can be too long but it’s a really good length for my arms’
Quite accurate reflection
‘It’s more casual than I thought, I thought it would be a bit more smarter than what I saw online…possibly due to the styling, the styling of the model possibly associates it with being more dressy’
‘I did think it was going to be jersey, but it is thinner and slightly better quality…based on the fact that I thought it would be dressier than it is’
‘Would describe as a basics item, a bit pricey for basics’
Normally satisfied, has quite a lot of dresses in this style.
‘The fact that it is stretchy fabric helps the fit’
Keep based on fit, comfort, movement, even though suitable for work wear you don’t have to sacrifice comfort to look the part’
Would need to do style adviser again to make decision to use in future. Good way to narrow down.
‘I would consider Very.co.uk now, based on the good fit of the garment, would look for similar styles knowing it is a good fit.’
More tailored questions, break down the areas further, be more specific.
Looking for an event and you want something to wear to.

P008

‘Very comfortable fit, consistently the same size all over the garment…the bottom half is balanced with the top half’
Enabling the Digital Fashion Consumer through Gamified Fit and Sizing Experience Technologies

Appendix

‘Normally I get a ten because my top half is a bit wider whereas the rest is usually a bit looser. I definitely couldn’t have worn an 8 in this’

‘I’m very satisfied with it, I probably wouldn’t have chosen the style if it hadn’t have been recommended to me but I actually might buy it’

‘It was a good suggestion from the website’

‘I didn’t think it would fit as well as it does, and that I would like the style as much as I do’

‘Lightweight fabric, likes the lining, nicely made garment’

Would use again, ‘happily surprised they made a suggestion I wouldn’t have normally picked…nice way to vary your style’

Would purchase and shop at Very again.

Improvement: ‘If you didn’t like your selection of clothes t be able to go back and change one of your answers’

P009

(3rd Party Garment)

‘I think it’s a bit big, there is quite a lot of room. I really like the dress, I would probably send it back and re-order in the next size down’

‘I’m working towards losing weight, so maybe I’ve got to that in between-y bit so I’m not sure, but generally yes everything else is a size 14’

‘I really like it, I like the length of the arms because they’re not really long, I like the ⅔ length, I like the shape here [bust] and I like the length, it’s not too long, it just about skims my ankle, which means with a heel it would be just right’

‘If anything I usually find them [dresses in the waist region] a bit tight’

‘I always take into account length, because sometimes I shop petite, but petite dresses don’t account for big boobs, so it’s a toss up’

Recommended wrap or faux wrap dress – style advice was accurate.

Would use in future, liked the things that were recommended and recommended things that would not have picked out for self.

Quite in-depth questionnaire wasn’t basic. Was trustworthy,

‘The more it asked I thought it would be definitely tailored to me and not just a generic answer’

Would shop at Shop Direct and order dress

P010

‘It fits me well round my waist, it has a really nice neckline and actually the length’s nice, although for me I’d probably wear it with some sort of heel just because I’m short’

‘The sleeves are too flared for me, I couldn’t see it too much on the picture which is why I didn’t think it would look like that, but if the sleeves were tighter I’d go for it’

‘I would choose something like this in a store, if I walked in and liked it, there’s a lot of styles out this season that you can tie a belt round your waist and I like those the most because I think that would suit me more’

‘The size is really accurate because of the fit, and the fit is really nicely fitted’

‘It fits how I wanted it to from the image, the sleeves are slightly different to how I perceived, but I would see that through other images, and that would be something that I would check before ordering the garment anyway’

On the product image – sleeves look flared.

Myleene – slightly curvier on top half, so would fill it more than her.

Felt like the style adviser knew she liked prints and colours.

Return due to sleeves, keep based on fit. If sleeves were smaller would keep.

‘Would definitely use the style adviser again, guarantee to look nice and fit well for an occasion. If I’m looking for something really different maybe I would go out and try stuff on.’

If wanted a particular style, it wouldn’t recommend due to preferences mentioned about her personal body shape.

Search through sale better. Know that it’s worth looking through, bargain and nice.

Coats would be great.

Would be good to consider the things you already have.

P012

‘It fits the recommendation, it’s a fit and flare dress that I’ve got on’

‘It wouldn’t necessarily be something that I’d actually choose to wear…it may suit my figure but it’s not something that I feel comfortable in’

‘I feel it makes me look older than my age’

‘It doesn’t suit my style’

‘It looks nicer on the model’

Return it, ‘just not feeling comfortable’

It is the right size.

Would use technology again if it was more personal. Possibly more questions, what garments shapes do you wear already, what do you feel comfortable in, what would you wear.

Colour and print questions. Wouldn’t wear prints but was recommended.
Appendix

P013

It’s tight around the arms and back
Would go for similar style
‘If it wasn’t for the arms [tightness] I’d stay with this size
‘It’s baggier on her arms [model]’
‘Considering it’s a cheap dress, I don’t think it looks cheap’
Length is perfect
Colours are accurate to what it’s recommended.
‘If it was going to be a day event [wear] then I’d send it back because it would probably be too tight on the arms, erm but if it was only for a few hours then I might keep it’
Would use the technology in future
‘Good to see what the expert say your body shape would be wearing, we all have an idea of what looks good on us, but that’s not always what actually looks good.’
‘I remember I put that I didn’t like red and it recommended me red dresses, so just more concise recommendations at the end of the process’
The sizing ‘things aren’t tight on my arms that often’

P014

‘I feel like I was expecting it to be a bit tighter and shorter’
Normally buy size 8.
Like style
‘In the picture it looks a bit shorter’
Thought it was more of a going out dress.
‘Sometimes I’m not satisfied with the length, because my legs aren’t the longest…it’s quite hard to find a dress that satisfies’
Fit is fine.
Normally go for black
May differ if wore heels.
Return it and try a 6
Would use again, took into consideration personal style
‘Its probably my fault that it doesn’t fit as well because I’m really indecisive’

P015

‘It fits well on top and across the shoulders, but then its really quite big around the waist and the bottom half’
If sized down would be too small across the shoulders.
Like style but really quite big around the waist
Not fitted enough
Has same problem quite often – too big at waist
Return, too big on waist
Would use because does help, ‘until you try on you don’t really know’
More specific questions about body shape.

P016

‘The fit I feel is really good on the waist, especially on the upper waist…but just below my breasts I feel like the dress if coming off my body’ (0.15)
‘I really like the length of the sleeves’ (0.41)
Shirt dress is perfect or soft a line
Wouldn’t have chosen all red pattern
‘Too revealing on the bust’ (2.47)
Would’ve expected it to be a bit tighter around the bust
Often finds with dresses that they don’t fit in the bust region
Low washability
‘Good idea how they asked about face features, eye colour…you can tell what they look like and might like’ (7.00)
Wasn’t as huge a variety as would’ve liked, wanted to see more recommendations (only had 2/3 pages)
‘Would shop again, would try it, if the second dress ordered would not have fit then would not use it again’ (8.05)
For the price it’s a good value, would keep it. If used for special occasion, could get better fit and a dress that could last longer.
To get an idea but not always use.

P017

‘Too loose on the back’ (1.42)
‘Would be quite uncomfortable to walk in’ (1.50)
Too much fabric over bust region
Appendix

Doesn’t like sheer fabric at the bottom, but likes it at the top.
Arm length is good, shoulder width is pretty good.
‘Didn’t have too much expectations as don’t buy from Very…never bought from very, didn’t know what to expect’ (3.50)
Very don’t do anything smaller than an 8
‘I’d probably keep it but alter it myself…put darts in on the waist’
Not use again
Prefers scrolling through garments, and doesn’t think it’s representative of actual style
‘Garments on there aren’t ones I’d particularly wear so the suggestions it was coming up with, but it probably was quite representative of what I’d answered (8.05)
Don’t understand the combination of hair colour and eye colour and then what colours you would wear.

P018

Really impressed with the length as quite tall, ‘it’s a really good length I could even wear heels with it and it would still be a really good length’
‘Too big around my bust and waist area’
Fits nicely and drapes really well
Would size down to size 10
‘This style dress I would have got a ten, just because I know that my top half where this dress clings, is smaller than my bottom half’
‘Matches expectations [of fit of the dress on model] if not exceeds’ (2.50)
Keep a size 10 – wear on quite a few occasions.
Use style adviser – really informative to see what suits me, ‘I can be quite focussed on what’s trendy and what’s hot at the moment, whereas actually knowing what suits you is more important’
‘That makes you think about how others see you’
‘The CADs of the silhouettes of the dresses, they were quite old-fashioned and that put me off’
Really thorough.
Include sport option and nights out.
Appendix

Topshop Transcripts

P001

‘I don’t think it fits very well around the boobs’ (0.53)
‘It fits on the waist and it’s nice on my arms’ (0.55)
‘It is a nice length as well’ (1.08)
Too loose
Would size up
‘I like the arms’ (style) (1.40)
‘I thought it was more erm, darker than this…I don’t know if it makes me look washed out’ (1.50)
Assumed it would fit
‘I believe if I got a medium the bust would still be too big’ (2.20)
Often finds garments don’t fit in the bust region
‘I like it [the fabric] it’s really soft to touch’ (2.40)
‘Erm I’d probably wear this on a night out, or to a nice meal with high heels’ (3.03)
Return it
‘I didn’t feel comfortable when I was first putting it on…because it was quite erm, hard to put on initially’ (3.20)
Would use style adviser again – ‘I would use it because I did like quite a lot of the outfits that were shown’ (3.47)
Quite easy process, related well to it
‘Easy to navigate as well’ (5.03)

P002

‘The tops fine, but it’s just getting it shut’
‘The boobs is fine it’s just everything else’
it’s not suited to me [proportionally]
‘That’s why I have things that kick out’
it didn’t look like a Body con online’
The thing is I don’t have that wide hips in proportion to everything else’ (1.30)
Dislike bottom fabric
‘If I thought it was going to be this fitted, I wouldn’t have chose it’
Return it
Not personal
Only had three choices.

P003

‘Yeah I like the fit, I like the colour and the erm print but I don’t like the style on me but I think that personal preference’
‘I think it looks quite high up here, but erm it fits well, I think if it was a different style I’d buy it’ (0.10)
‘Different length’
Doesn’t like style due to length, neckline and the sleeves
‘fits well’ (0.20)
‘I expected this style to be my size (4)’ (1.11)
The colours definitely, creams and blacks, but maybe not the print so much’
‘I don’t mind this you know [bold waistband] I wouldn’t normally go for it but I think it’s nice’ (1.30)
‘Feels nice’ (dress)
‘I would prefer it to either be a bit longer, or a bit shorter, I don’t know if it’s just me’ (2.10)
Return it based on Style
‘I wouldn’t normally go for this bright colour (said wanted new suggestions and it’s taken that into account)’

P004

‘Its lovely really really nice, I think its definitely the right size and flattering on my shape’ (0.25)
‘0.55 – I think it fits better than I thought it would, I was a little bit concerned about the, obviously it’s got a really deep, but I think just obviously with the lace it’s not too overly revealing, so better than I thought it would be’
‘It skims my body quite well’ (1.19)
‘I like the lace detail, nice and slinky’
‘Evening out or a night out’ (1.38)
‘Can’t go wrong with black, and length is perfect’ (1.50)
Keep it
Would use style quiz again
‘Process was really good, especially compared to other ones, I really like how it used images to portray what it was trying to say…what’s your style, to make sure everyone’s on the same page, so what I might think is girly, they might not think is girly’ (2.22)
Simple and easy to do.
Appendix

Enabling the Digital Fashion Consumer through Gamified Fit and Sizing Experience Technologies

P005

‘In terms of picking the styles out I think it’s good’
‘Much more fitting’ (0.40)
‘Still it’s quite large here, but I do have a really small waist, but it’s not so bad here, it still is a bit gapey’ (1.15)
‘It is still quite gapey there [shoulder straps] which I don’t like’
‘I really don’t like the front of it’
‘It doesn’t help that it’s not very ironed on the top section’ (2.02)
‘I wouldn’t necessarily say I have small boobs, but if I did have any smaller boobs this would be massively worse and I have got a bra on which I wouldn’t necessarily wear with this sort of dress…which would cause this to gape even more’ (2.30)
Likes colour
‘Really like the length and I like how it goes in narrower, because sometimes…they can be quite wide at the bottom’ (4.00)

P006

‘I like the fit and I didn’t think I would’ (0.02)
‘I like that it is oversized…it doesn’t look that oversized’
‘At the back it’s quite boxy and at the front it’s quite fitted’
‘I like the length because it means that I don’t have to wear tights, its not too short’
‘I did think the fabric was going to be stiffer online when I saw the photo, but I like that it’s thinner, it drapes nicely’ (0.40)
‘The size is perfect’ (1.00)
‘I do like the wash, it’s a bit flat, that’s one comment but it wouldn’t put me off buying it’ (1.50)
Keep – comfort and fit
Would not use again
‘Just the amount of time it takes, it’s too long, I could just refine the options on the actual dress search and it would be much quicker’ (2.00)
‘If I really wanted one thing out of the style shop, it would be more options on how to wear things, or what they’d pair it with, because online you don’t get all the visual merchandising to do that for you, if you’re looking for dresses and stuff. That’s what I would want as a confident shopper who knows my style’
Mood board or collage
‘There was too much on the page in terms of, because there was so many options and so much information they were trying to put to you, it was like learning to online shop again’ (3.20)
‘That threw me a bit I didn’t know what to click on and I almost could’ve missed what they had put to me’ (4.00)
‘I don’t think the recommendations were very Alexa [Alexa Chung], and I selected Alexa’
‘Daywear’ (4.20)

P007

‘It’s like really ill-fitting in all the wrong places, round here, ern it’s alright around the waist’
‘Its tight around the joints on your arms, and round the shoulders as well’ (0.25)
‘It’s quite a thick material, and there’s quite a lot of layers to it’
‘You can feel that it doesn’t fit very well, it’s just not very movable really’ (0.40)
‘It’s quite formal’
‘I like the style and I like the colours’ (1.00)
‘I like the lace itself, the design of it’ (1.10)
‘Its like slightly bigger florals to this bit’
The fabric ‘it’s not movable’
‘There’s just no stretch in the seams, so it would be quite uncomfortable to like wear for a long period of time’ (1.30)
‘I would try a different size, it feels like the style of it the way it fits on certain parts, I feel like it has to be quite fitted because the style is body con’ (2.10)
Nice length on the legs
Shorter on the arms likes
‘I did think when I chose it, I thought maybe it might be like that’ (small) (3.55)
‘For that money (£85) I would want to feel comfortable and for it to be perfect fit (3.11)
Return but try a 10
‘Recommendations for me were actually quite good, I would’ve worn a lot of them’ (3.48)
‘If I was really looking for something quite specific and I didn’t have a lot of time I would use it’ (3.50)

P008

‘Better with a strapless bra’
‘I like it’ requires more appropriate underwear
‘Not a massive fan of the colour, I think I’d prefer it if it was a bit more beigey, it looked a bit warmer in the picture’ (0.40)
Appendix

‘Really like the off the shoulder style’
‘I don’t really like the leg cut to be honest’
‘I thought it would be a bit longer actually’
‘It’s a bit see-through’ (1.30)
I think the top half is really good, but I’m not a massive fan of the bottom half’ (1.20)
‘It’s a lot more see-through than I expected I think it should probably have a lining’ (1.40)
Return it
Liked the questions
‘Did ask you quite a lot, so it kind of got a good variety of things and I like the fact that it suggested you with lots
of different options, they weren’t all the same, they were all very different styles’
more suited than very options

P009

‘Too small, too tight especially around the middle’
‘Not too bad around the top and the skirt but the mid-riff is very tight’
‘Not too long’ (0.30)
‘I didn’t think it would be as fitted’
Often struggle with middle area in fit
Wear to a conference to a dinner afterwards
Wouldn’t use again
‘It didn’t give a lot of options and the ones it did, wouldn’t be ones I would wear’ (1.50)
‘I really struggled to find dresses that I would’ve ordered’ (2.00)
‘Give a few more options’ (2.10)
Didn’t feel as confident with choosing
‘Not one of the places I usually shop, mainly because I tend to find their sizes are quite small’ (2.30)
‘Depressing to go in and see all of the size 4 stuff’ (2.50)

P010

‘I don’t really like it, I think it’s way too long on me, literally it makes me look so short, it sort of comes just below
my knees because there’s a part that’s asymmetrical coming down that bits even longer’
‘On the site it looks way more a-line, it’s still a-line because its got the band round the waist, it just kinda looks
awkward red-riding hood’
‘It fits really nice, in terms of the…the way it hugs the body its nice’
‘Subjectively don’t like it’
Ticks the boxes, but too long
‘If I put this on I’d be like no it’s not me’
Style dislike
‘I thought it was going to be so much shorter, and I don’t know whether that’s because on the site it wasn’t on a
person, personally didn’t look at the measurements’ (1.40)
‘I’d usually go for this sort of style in terms of the way it fits with the waistband, its just…this bit hanging in front
doesn’t do anything for it, the length is wrong on me just because I’m shorter’
‘Love this colour’ (3.01)
‘I think the cut was interesting to me and I love this colour anyway’ (2.50)
Doesn’t find issues with length normally
Return based on style
‘I don’t look in the mirror and don’t feel confident about wearing it and I think that’s massive for me’ (4.29)
‘Because I’m a consumer of them [Topshop] I get what they’re about, in terms of them asking me who my style
icon is, what sort of thing I’d wear on a night out and having item options there, is something that I would go for
anyway because I shop at that brand’

P012

‘It fits I was quite surprised, I was a bit worried because it’s an 8’ (0.02)
‘I normally wear a 10 in Topshop’
‘It’s different, I wouldn’t feel comfortable selecting it’
‘The only trouble is, [underwear] I brought something to cover me [wearing a bandeau]’ (0.30)
‘it might be worth them saying in the description’ (0.50)
It’s quite see through
‘I knew it was going to be body-con’ (1.20)
It looks a bit cheap where it joins there [the seam is exposed]
‘I like it though’
‘The lace is quite soft’ (2.00)
‘It sits nicely’ (2.10)
‘A good length for me, I don’t like having my legs out much’
Keep it ‘if I had an event, a birthday or a nice night out that I would spend some money towards’
Would use again
More accurate
Suited to her, more personalised I felt

P013

'I am shorter than the model, I think it came to just above her knee, obviously it’s just below mine’ (0.16)
'Backs a little bit baggy…its not as bad as I thought it was gonna be’
The darts help – in the right places
Stay with current size
'I’d prefer it if it was in black…because I think this is quite an unforgiving colour’ (1.00)
'Quite nice quality, I thought it was gonna be completely see-through, but it’s not that bad’ (1.50)
Baggy at the back – I get that a lot
'I don’t think I fill things out at the front as much as I should’ (2.20)
Not sure what thinks of fabric
'I’d get it taken up’ (2.53)
I’d return it
Wouldn’t use the style quiz again
'More questions and it was more in-depth but I said I didn’t like red and it gave me red’ (3.20).

P014

'Perfectly’ – the fit (0.04)
'The bust area is really nice it’s not tight but not loose’ (0.017)
'The length is a good size as well’ (0.26)
'It fits around the waist good’ (0.38)
'Perhaps to a posh restaurant, or maybe if I went on a night out with heels’ (0.47)
Didn’t expect it to fit as well when chose it online
'I didn’t know if it was going to fit me around the bust area, and also around the waist if it was going to fit me very well’ (1.04)
Those are the problematic areas
'(1.23) ‘it depends with Topshop the sizing is a lot different for me I could be different sizes with everything I choose’
'The style mostly’ [dependent]
'It feels quite thick…it fits the price of it anyway’ (1.47)
If I was wearing heels it would be perfect’ (2.07)
Keep
'It took into account the sizing and the styles that I go for’ (2.35)

P017

'I really like it’ 0.28 ‘I don’t know if you’re meant to wear underwear with it though’ (0.48)
'It’s almost a tiny bit tight on the top half which is quite rare for me’ (0.37)
'I’d try a size bigger, just to see what it was like on the top’ (1.05)
10
'I think the fit is nice, but it’s quite long, but I’d usually wear heels with it, so by the time you’re wearing heels with it, it would be just right’ (1.15)
'I like black’ (1.58)
Wasn’t that helpful
'Some of the stuff that came up was really good but there was so much of it it was a bit overwhelming’ (2.28)
'The ones that are most specific to you, rather than ones that you might like’
'It was quite long, if I was doing it as a general consumer I would probably get quite bored’
'I really like the fabric and it feels soft’

P018

'It’s very short but I am taller than the average woman’ 0.21
'It's very tight around the bust area which I wasn’t expecting because I’m normally a size 10 in Tops in Topshop
(0.30)
'Sometimes a tall can be too tall on me or too wide on me, but it really varies per product’ (0.50)
'It feels quite tight around the Top, maybe it comes up smaller than other products in Topshop’ (1.00)
I would probably size up
'I think it’s quite a cute dress, its very versatile you could wear it casually with a t-shirt underneath or perhaps dress it up a bit’ (1.30)
Fabric’s nice like frill around bottom
Lace is good quality
'I thought it would be quite tight on my hips and loose on the top, so It’s complete opposite, it’s loose on my hips and tight up here on the bust area [boobs] (1.50)
Return for a 12
Appendix

Use again
'I like the fact that it gave you different trends and different fashion personalities to match with'
'Used good imagery to represent that, and I think that was really good inspiration and helped you see what category you might fall in to' (3.00)
'Exit out a mini skirt if you didn’t want to see a mini skirt…it completely filters it all down for you' (4.00)

P019

'It’s a bit wide on the hips…length is too long for me’ (0.21)
'I would make it shorter, go to the tailor'
'The website advised me a size 12, but I still believe I am a size 10’ (0.40)
'I like the style, but maybe I’d like a deeper cut here (chest)’
'I would wear it to a nice occasion'
'The back is really nice, at least the back is open and the colour is very nice’
'The model is taller, it fits her better’
'The fabric is dense, it’s good so it will not crumple’ (2.00)
'Normally garments are not loose in the hips area’ (2.45)
'On the model it’s supposed to be tight, so that’s why I think it doesn’t fit me perfectly’ (3.05)
Return to change for her size to a size 10
10/8 in Topshop
Would use again
‘Definitely helpful if it’s to find the right size’
'I know my body better, they didn’t get my size so I wouldn’t go a second time’ (5.00)
More store options to choose sizes ‘higher variety of shops’ (5.15)
'Cheaper shops, cheaper price, most people go in there' (5.45)
Maybe the higher variety would help, or maybe I would just put in parameters in centimetres’ Body scan helpful, so put this in. (6.00)

P020

‘Okay everywhere apart from around my boobs’ (1.15)
‘Too small, I’d say where it looks like it should cut it just kind of sits flat’ (1.22)
Unsatisfied in bust area – often Topshop
‘I find what fits me on the top doesn’t fit me on the bottom’ (2.05)
‘It’s quite different to anything I have seen in the shops at the moment, even though it’s quite a popular style they’ve made it much more unique, I like how they’ve put the top in with it to make it more versatile for winter as well’ (2.20)
Try size up
'I think it fits better everywhere else, (0.30)
'It just fits on my hips, if I wanted more give I’d probably go for a size up (0.37)
'I didn’t expect the top to be so small, the bit around my boobs’ (0.40)
'I thought it would be more basic and cottony, but this is much nicer and it feels more expensive and nice on the skin’ (1.11)
'Match what look like on website quite well’ (1.40)
'Keep it if I had a bra that would make it look like it would fit better on the top’ if not I would probably return it’ (2.50)
Would use again
'Helpful to narrow down [mass amount of products] with your criteria to see, it makes it easier to shop, especially if you’re looking for something’ (3.02)
'Perhaps if they emailed with things that come in, so it’s more personalised and if they retain that and like ask you to update it when there’s new styles’ (4.00)
The thinks it works well for Topshop brand

P021

‘I think it fits well’
‘Shoulders are a little wide’
'Maybe I would try sizing down’ (maybe 8) (1.00)
Likes the flattering silhouette
Wear on weekend
'I expected it to be a bit smaller’ (1.41)
Usually fit in shoulder region
'It’s comfortable’ (2.48)
Size down
Would use again
‘Because I probably wouldn’t have picked this out if it hadn’t recommended it to me’ (3.13)
Industry Interviews

Interview 1

A: I look after all of women’s wear from a quality and innovation point of view, so that is basically every product that we sell to women excluding intimates, so bras, eyewear and swimwear. Within that remit I predominantly head up fit, and as part of my quality and innovation remit I will cover new advancements in technology so things like virtual fitting, online fitting, body scanning etc. I’ve been in the industry now for twenty four years, left school straight at the age of sixteen went straight in to manufacturing and I’ve been doing it ever since, I’ve got a degree through the evening and day release work so. I was a fabric manufacturer in my early days, as a sixteen year old boy, in Leicester, a company called Park Fabrics and then I moved into dyeing and finishing, then I went into clothing manufacture and then I had aspirations to then get into retail so then moved into retail at some high end fashion places Aquascutum and err,

B: So you were there when X was there?

A: No, I was there before so yes its pretty much all I know. This industry has a great habit of sucking you in and getting you addicted erm, so we’re doing quite a lot of searching and observation around Virtual Fit at the moment and er it’s interesting hearing your views and how your basing your PhD because obviously these are all the challenges that we’ve come across. Does it technically work, does it add to the style thing, does it then answer the interpretation of what the customer’s expecting, and it’s also something that is exponentially growing, there are more and more start-ups there are more and more companies that are erm looking to solve this problem so the noise on it is enormous, and then in terms of maintaining focus on it, it becomes even more difficult.

C: I think it’s interesting because it’s different interface and platforms out there, which will be suitable for different segments as well, and how they convey fit or drape all the different aspects of clothing that is really hard to capture in a digital way, so yeah. I can give you a bit of an overview of what I have found so far in my research. I’ve got some questions and a basic structure so. Basically what I’ve come up with from doing content analysis of the interfaces that are available, so looking at how they’re designed, how you can make it personal, if you can change the avatar, if you can have a style or size advisor through an engine or something like that. So we’ve come up with three areas, that’s fit recommendation, size recommendation and fit visualisation and these are three areas in which the interfaces fall within. And then from there we’ve got aspects of marketing concepts, which are related. So we’ve got these aspects, which feed into.

B: So you’re trying to create one thing

C: So we’ve got the idea of Omni-fit which is similar to omni-channel so ideally a new platform or the most effective platform should combine areas of these aspects here which is what we’ve had a look. So they’re trying to reduce perceived risks and these are the aspects that feed into it, we’ve then come up with a new model from there which sort of explains the consumer journey and the measurement model. So we’ve got Telepresence and Personalisation, Image Interactivity Technology, and ultimately you want to, I feel, I predict that consumer power would be something that is increased.

B: You do read quite a few articles that say, we know it doesn’t quite work like that as you well know.

A: There is a big recent push to standardise fit

B: Yes to standardise fit

C: A lot of research my supervisor Simeon has done and he’s got a clothing technology background, he’s looked at the sizing charts he’s done body scanning

A: Oh I’ve met him, I’ve seen his work

C: So yes that’s his sort of sizing work and that informs what I’m doing to an extent and my other supervisor is marketing, consumer based um but I’ll finish explaining this.

C: So what I’ve been looking at it how big data informs these aspects so informative content on the interface so the personalisation of their experience, what they’re looking for, crowdsourcing that is a sort of strategy within itself so you’ve got interface involvement through Telepresence if they can see themselves within the experience, they might not think it’s believable but some market segments might not want to see their body scan, so it’s being sensitive to that and that’s through image interactivity technology, the ability to spin the ability to zoom. So that all goes into the omni-fit idea of reducing perceived risk and hopefully increasing consumer power. So that’s the start of what I’ve been looking at and I’ve had a brief chat with X and I think there has been a push at the moment towards a personalisation and creating this consumer profile almost like a consumer profile so you’ve got all this data, this consumer information potentially through a body scan or just through their previous shopping habits their...
experiences and tailoring their fit and style experiences through them and I’ve looked at Dressipi and I’d like to
ask you a few questions on it and how you’ve come up with that and how it works for your consumer, because it’s
very interesting and I like the way it combines the style aspect, unique in that that it has that.

B: We’re most probably not the experts but we most probably can point you in the direction of someone who is,
we’ve had some insight into it. I’ve arranged to see X this afternoon so I can grill her on that.

C: So ultimately I wondered about how you feel the online strategy is important to fit and how you may have seen
that grown. And especially with your product development background?

A: Tonnes.

B: What we have seen it’s not just the online strategy it’s the online imagery that you’re creating is very important
that is fits beautifully on the model, because we do find that if it doesn’t then the customer is disappointed when
they’re purchasing, so that leads to a high level of returns, so there is a correlation between you know, something
fitting well on the model and the fit comments. We do monitor customer review and Karl is doing a review of the
product reviews, I’ve seen that you’ve got 60,000. The important bit about intelligence is that if you look at fit

A: Enormously so, so we put in there a five star reviews on fit and style and from that we can then drill data. I think
what’s interesting which you opened up there X is that in a lot of customers minds they’re not splitting style and
fit in terms of technical so it’s all getting wrapped into that fit so I think a lot of them are actually feeding back into
style, right I like it I’m looking online I like that style I’m going to buy it so I’ll give that 5 stars. I then get it home
try it on and it doesn’t then meet my expectations of what it is, I can’t carry off the oversize style. And therefore
I’ll downgrade it on fit, so it can become challenging but it also proves your point there of how important is the
strategy there, hugely so, but there’s many facets of it, it’s not just fit that’s the communication it’s the photography,
it’s how it looks.

B: I think what’s really important I think when were defining the product it’s really important we actually say it’s
oversized, it’s meant to be oversized, so there is a strategy in terms of communicating how to carry off that look is
really quite important and whether a product comes up true to size.

A: What we’re looking at now is trying to get in there some categories of fit, so if you look at menswear it’s a lot
more simple, I can say that because I’ve come from menswear, so you’ve got slim fit, regular, slim and tailored or
classic. Women’s wear you don’t really have that it’s a lot freer and we’ve now pulled together these seven
categories we’re trying to categorise everything under in terms of communicating.

B: I think in menswear you generally know, I am a slim fit or I’m not a slim fit and we’ve got a classic cut with a
generous block and that’s actually worked very well with menswear and the customers start to realise the sort of
look they want to create. As you said with womenswear it’s the standardised sourcing of 8, 10, 12, 14, 16 and we
obviously carry a broader church of fits for the women size 6-24. Not in everything, and we’ve just introduced
sleeve lengths, in menswear we talk about sleeve lengths and actually trouser lengths too.

A: We’ve got a broad offer of trouser lengths and we’ve also been looking at dress lengths.

C: So the research I’m looking at doing is the post-purchase evaluation through using the virtual fit tool and seeing,
a lot of research will stop at purchase intention and a lot of post-purchase as you say is actually, once they’ve
received it is to meet that expectation and measuring that, and as far as I’m aware that hasn’t been done before.

A: There’s definitely no major

C: You could buy something and it could be in your wardrobe for several years and it’s about having that experience
with fit and remembering I bought that dress and you could wear it again and it’s memorable. I think the input of
body shape categories I think the scanning research they’ve been doing is putting body shape into category to make
it more effective to large populations of data because obviously we are so subjective and the only way of doing that
is to put categories to hip shape.

C: So you’ve noticed the difference with online reviews and that’s fed back within the supply chain.

B: I think every week an online report they talk about the context of the reviews so actually we are measuring that
and reviewing it on a very regular basis

C: So is that done semantically through data, so you’ll know how many five stars reviews you’ve got then

A: You can then manipulate that data in terms of what you want it to report.

C: So with regards to not just style and size, fit becomes synonymous with that so how do you tackle the cut and
fit, and quality
B: We’re working with two partners around algorithms so generally we believe that with woven we’re there or thereabouts but jersey is far more complicated because there far more stretch in it, there’s a lot more fluidity and there’s a lot more drape and the fibres chosen have a far greater effect on jersey than they do on woven. We’re working with two partners at the moment, so one partner has developed a machine that can assess technically, assess and give a read out of drape, lustre and handle. We’re working with another partner of how we can then put in certain core/key bases in terms of scanning that data and getting it into a virtual fit world to try and combine the two. By no means have we solved it, but that’s what we’re working on.

C: I’ve seen the modaris 3D, is it along those kind of lines.

A: Yes, so one of the ones we’re working with we’ve looked at Modaris, the other one is Optitex, the fabric scanner people.

C: How do the algorithms develop from that then feed, is it anything to do with the bra fit app with X that is very successful?

B: Have you spoken to her

C: Yes, yes I have, I met her at a conference it was around March, the time it was being launched

B: It’s been a great success in terms of allowing customers to be more precise in terms of their online shopping.

S: I think all the cultural research is really interesting.

A: We’re then looking at that further as how we can then use that in a clothing world where it becomes a little bit more in clothing is that our bra range is strategically bought and planned for based on shape, size and look. So do you want a push up, there are various different solutions in the lingerie world that lingerie can deliver, so therefore the range exists there so you as a consumer say right I want it to do this this and this, then we say right shop in those ranges there. The problem or the difficulty in clothing is we don’t strategically develop, construct and buy our ranges with that level of choice in mind. So we’ve got at the moment one fit which is based on an hourglass shape, so then if you’re all of a sudden a rectangle an apple or whatever, it’s more difficult to then point you in that direction. Yes technically we think we can do something along those lines but it’s what solutions we offer is broader at the moment.

C: Far broader, and there’s a lot of other aspects to it. Yes I think, so I with the scanning aspect of it do you use scanned fit models or did scanning input into the Dressipi design.

A: Most definitely yes, we are using a combination of live models and mannequins,

C: So how are they selected, how strategically?

A: Models?

C: Yes

A: Very strategically so they are selected on shape, age, posture, volumetric measurements all of them have been scanned and measured, we check them every week. We then used scan data of 2500 people in the creation of the mannequin we’ll then do the live model to give feeling feedback we like the mannequin to deliver consistency.

C: So the research you did with X does that go into it?

B: We’ve done a lot of work with them

A: We’re revisiting that now to see if there are any strategic opportunities out there around shape, again we will look at that, we have had successes in the past with things like body shape denim, that was a great success almost failed through it’s own success it became too much of a beast in store to manage. Erm but we are now looking at how we can offer them shapes and solutions as well to cater for different body shapes.

C: So when you’re looking at, going back to post-purchase side of things do you focus groups or interviews with ranges and units and have a very

A: Customer insight unit, and obviously we’re not just looking at fit we’re looking at all aspects of the shopping experience so we do pick up on that and then in terms of fit, that’s on reason why were pooling together the body shapes is the danger of doing too small focus groups on fit is your very influenced by other people where as actually really it’s much more precise on specific fit is to actually use a database driven process which is why we’ve moved away from using as many fit models

B: Absolutely
Appendix

B: To using 3D models.

C: So in terms of Dressipi do you measure returns against it.

B: We will have a team that does that

C: I can ask annalaise about that

A: Yes we look at all of our ecom returns fullstop but yes the Dressipi side they will have a log on how well it's performing but I’ve not those details.

S: Did you have input towards the choice of Dressipi. I know X there’s Debenhams and House of Fraser using X I think. So was Dressipi selected against the consumer.

A: Dressipi was selected so that we could combine fit and style

B: Yes

A: and we had then an overall package which at the time we felt was the best. Now we launched Dressipi crikey, nearly three years ago now, and we’ve made a lot of improvements to it you know, it was not right when we launched it we’ve made lots of changes to that now to make sure it’s tailored towards the persons needs and what they put in and I think the results are a lot better on it and I’m sure X will be able to tell you about that. We’ve looked at X, we’ve looked at Y, we’ve looked at Z, we’ve looked at lots of them. I think the problem is they al have fors and againsts and there at the moment I’ve not seen one thing that has the whole solution, personally I think in terms of virtual reality in terms of likeness to product, closeness to product X is the best but it’s commercially a disaster to run it, you’ve got to send every single garment to Croatia and have them photographed on mannequins so it’s a commercial, crazy. If you could execute that X reality based on algorithm then bingo you’re off to the races but we’ve not discovered how to do that.

C: I think so with your scanning you have done with the denim are you going to be putting more scanning towards product based lines or would you be putting scanning within Dressipi further, pushing that

A: I think we would be using scanning to give us a foundation of fact to build a strategy I don’t think there would be any view to expand scanning any further into the online solutions that we’ve got because honestly I don’t think there’s enough known about it. You’ve got all these apps around mobile scanning, ipad scanning, how accurate is that going to be and how, based on our size can you control that globally really.

B: and that does only give you one dimension doesn’t it, it gives you the fit it’s about correlating the style with the fit which is so important and giving the consumer the right variety because in many cases sometimes the look is right but it’s too long or too short which takes in that subjective size.

B: We’ve recently gone back into Petite and plus and that’s been very well received by customer and we sell the most sizes on the high street anyway and actually petite is a different block, plus is a different block and that’s also important in giving the customer real choice and trying to get to that great fit.

C: And you’ve got a fit development team

K: Based upstairs on the tenth floor

C: They’ve resulted in 20% in fit complaints

A: It’s actually more than that if you take it from the customer services team it’s actually more like 50% through the amount of physically complaints we’ve received through customer service departments.

B: So fit complaints is way down, now that is down to informing the customer in a way of how thing are supposed to fit, where we’ve had our biggest challenge is where we’ve bought new fabrics or where its been designed to be oversized

A: Some of the challenging fashion shapes have been difficult to execute

B: one thing you need to realise is you can make this a a science up to a point but the rest is art and when trends are maybe cocooning, trends is to wear a big oversized coat, you get that if you are informed, if you’re not informed as a consumer you go to your normal size but you think this is swamping me but that’s kind of how it’s supposed to be worn so a lot of it is about making sure there’s some pictoral references or at least online therers some script and ideally in stores educating our staff and being able to say that coat is great but you are supposed to wear it oversized but of course if you don’t want to you just go down a size, but of course that’s where fashion everything is supposed to be skinny and tight we’re quite good at making sure we’ve named garments like that high waisted

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skinny jean in limited is what it says it is high waisted, it’s meant to be high waisted, it’s got quite a long rise and it’s a skinny jean. So you know getting over the terminologies, almost giving the garment a name because it helps how it’s supposed to be worn. We’ve had challenges with oversize, cocooning is a good example of a trend where some customers might not be aware of the trend or sometimes lacking in confidence in terms of how to wear the trend or needs some help.

C: I think that’s very interesting because some of the other platforms they leave it to the consumer and what I was saying with the consumer power thing that it is to do with the fact that they need that information, they need to be guided to an extent but they can make their choice.

B: That’s where mannequins in store or equally imagery online actually to show you how to wear it, whether that blouse is supposed to be. I was in store recently and a customer was saying that blouse supposed to be worn in or out, you can either wear it in or out, do you wear it done up or do you wear it unbuttoned you know it’s almost like how do you create the look and it’s almost where we have to give our customers a bit more advice. And the fact that we’ve got sleeves that you can roll up or roll you know it’s some of those styling features, that really isn’t about fit much but the customer will go to help her think that’s a great fitting garment. So you know and fabric plays a big part in fit as we know, and things like linings do as well, so stretch linings, we just introduced our secret slimming dress and cool comfort lining, a lot of that is about some of the other componentry of fabrics can go to enhance the fit.

A: I think as well it builds the consumer power, once you find that favourite piece, not just through one thing but through lots and lots of different things where working to improve the garment but you build a great loyalty.

C: Massive trust isn’t there.

B: Footwear is another example where we sell digitally online, big business online, our fit is very consistent we’ve done a lot of work in terms of our footglove and insolia which obviously gives you a much better sort of fitting shoe, erm means that there is that trust factor in terms of if you’re a size seven you can buy a size seven and it will fit.

C: That’s very interesting. I think with the fact that X have this wide consumer base and brand image and different lines that consumers want to buy from and that would relate tot the way they wear it the way they perceive fit and I hadn’t really looked at it in that way, I’d looked at it almost from a scientific view of how do they interact with these fit interfaces.

A: I think you’ve hit the nail on the head there, if it was left solely to me I would put a rule and procedure in place for everything but that’s going to curtail some of X’s flair and

B: how you put the look together really.

A: and there’s the emotional side and the performance side and they come together to create a great style.

B: There’s no point having a great fitting garment but it doesn’t feel right or it doesn’t look right, you know erm and you’re more likely to think something is working well if it actually looks good. It could be every it could be absolutely on point in terms of every dimension being absolutely spot on but actually if it feels too tight you’re not going to wear it.

K: or you think you don’t look good in it

B: Yes and actually you know sometimes I do say to people you might be better off going up a size actually because everyone wants to look thinner lets face it, and younger and if you wear slightly bigger size actually it’ll look slightly better than if it looks too tight. So it is about the absolute measurements and it is about how things fit and fit is a much broader term than it meets the criteria. And also I think with fabrics now and the development of fabrics so many fabrics having elastane and stretch in them that actually some of that has to be taken into account and as I say linings are in that factor too.

A: It’s always been a hugely important field but I think in these last ten years its become even more you know, so as things like the availability of information and therefore trends or what to wear has come along, fabric enhancements

B: Yea I think people are demanding, we all want things to feel great

A: And it’s almost ultimately creating this perfect storm of how do you crack this problem.

C: and I think there’s been a big increase of bedroom fitting where people will buy several sizes

B: Yes, stand in front of the mirror at home with the shoes on and a bag and work out which one they’re going to buy and send back the other two.

C: and that has implications too.
B: Yea it has cost implications, dresses is a category which people generally buy more than one size,
C: that’s what we’d be looking at as a methodology within my PhD looking at dresses as a product type but I’d like to do some experiments on looking at men as well within the equation as I think they are a neglected area, and I think mens interest with virtual fit and their technology adoption with virtual fit
B: and they tend to also be, once they adopt a certain ambient shopping they tend to stick with it,
A: loyalty is greater
B: Loyalty is greater with men, if I’ve always bought my trousers from this I’ll go back and buy another pair there tends to be more repeat purchase on mens than there is on womens. There is on womens certain staple items but I think on mens in particular
A: I think you’re right I think as well though as an industry we have neglected the male shopper a little bit as well, a prime example of that I would say is stretch.
B: Stretch, yea
A: whereas I think there’s this feeling no you can’t put stretch in guys don’t want to wear skin tight, it’s not about that it’s about ease, comfort
B: relaxing
A: whereas womenswear you know we’ve got to a point now where 99% of our denim has stretch in it. Conversely menswear’s completely the opposite erm. So yeah I do think there is something in that at industry level.
B: If you want to meet with one of our male technologists in menswear, suitng, tailoring,
A: It would be X and X and it would be good to meet X in our fit development studio,
C: Yes that would be good because I think a lot of the existing interfaces you’ve got engineers you’ve got you know computer scientists it is that art side of it.
B: you can be very scientific and you can be all of, you know, it doesn’t fit, or you can’t move your arm.
Appendix

Interview 2

A So if you could just start with an overview of what you do, your role with Y and your background

A: Okay cool so I’m what we call a product owner which is part of the agile framework of working erm so my role it’s a bit weird title, my role is to look after features on the website ‘products’ erm and work with a team of software engineers and UX designers to optimise them and continuously improve them basically. So erm my job really is to plan, well I speak to a lot of the stakeholders in the business, (It’s really weird holding it like this laughs) erm speak to all the stakeholders in the business who’ve got a vested interest in erm so Y is only one of ten products on the website so my role is product owner for conversion tools. Erm so it’s just helping people buy things on the site, so added extra services.

B: Yeah

A: Yeah so Y is one of them, so I speak to stakeholders who are interested in Y erm get their thoughts on how it’s performing what they think it should be doing as business, I will work with a team to put together a vision for the product

B Right

A: Erm so where do we want it to go, we then build a road map of feature and say over the next 12 months we want to do these things, we want to improve the data we send them, we want to add additional functionality, things like that and then we split those down into what we call epics, I won’t go into too much detail about the agile way of working because it’s quite boring but, well it probably won’t be relevant to what you want, what you want. We split those down and I prioritise how they get built, erm and then we release them.

B So do you have a computing/design background? Or not at all

A: No I come from a marketing background so product owner role is a fairly new role for the industry, for businesses I guess, it’s probably been around for about ten, no less than that, about 7 years, erm as a commoditised job title, so it’s software development as a function but yeah people who are product owners come from all sorts of different backgrounds they might have come from software development they might have come from marketing, they might have come from project management, they might have come from digital like you can, it’s all about mindset basically, having a low ego erm, making sure everyone works together, rather than a hierarchy type thing so

B Okay, So Y specifically was it decided for the X consumer or was it a pre-developed system?

A: It was a pre-developed solution

B It’s a pre-developed company

A: Yeah

B What about any nuances that were needed for the X consumer?

A: So Y and X I think have been in partnership for about 3 years, erm I’ve only been in the business for three months so I’m still new to it and learning all the history but erm X were there first big client and we, basically Y host the service and the interface, they host all the codes and its served to us on an iframe on the site which basically we take a window of their system and puts it on our site.

B So the user has an account with Y

A: Yes it’s a separate account,

B So do you think that has implications to how that data is used? Ultimately there’s important data there

A: Yes, yes, so erm when customers sign up in the sign journey to Y it’s collecting all their data and it drives the algorithm for recommendations, they have to create an account for Y, it’s not an X account, you can access Y from your account on X it’s just a basically separate call that’s made. So Y hold all the customer’s data, they also take our product feed um, so we send them a big batch of data and say here’s all our product here’s some images of them and then add extra tagging to say that okay we know this dress is a fit and flare dress, it’s in these colours, erm, it’s made of this fabric, it’s got this neckline and these erm because we only send them like here’s a dress and we might say its fit and flare but we wont say, like your dress for example it’s got you know short sleeves, it’s in at the waist, it’s got a different neckline they don’t, we don’t tell them any of that, they have to add all those attributes on to the products, erm and then that gets put into their algorithm and spat back out again in the recommendations. Erm so in terms of customisation it was a custom build solution for us, they custom build for
everyone though, so it’s not just off the shelf white label software it’s what do you need what data can you give us lets build something bespoke.

B So I’m guessing that was trialled with X consumers or not?

A: I think it was, yeah, I think X were their first big win, they’ve got lots of other companies now signed up

B: I’ve got Very erm,

A: So all of the Y brands, all of the Y group so X they’ve just gone live with X, not just gone live, maybe about 2 months ago, the X one is amazing

B Is it? I haven’t checked it out

A: Just, like you’d be able to find it on their homepage just scroll down and it’s like take your fashion quiz, it’s really cool we basically want to copy a lot of what they’ve done, but you’ll notice how different the sign up journey is, X is all about choose what images you like and what celebrity styles and shapes and things and ours is just about your colouring and yeah

B So with regards to that you’ve also got the bra-fit app, okay so with that the algorithms were developed specifically for an X consumer? So I’m wondering if they’ve fed into one another in some way?

A: No so bra-fit is built in house, completely in house, so no, Y haven’t had anything to do with Bra-fit, erm it was built with our lingerie technologists who know a lot about bra-fit and how that works, and all the bra fitting staff in store were asked to give feedback and yeah they built the algorithm in house basically, it’s quite cool.

B Erm do you know what inspired the research or the decision to

A: I don’t actually I think they probably approached us, and we know our consumers have got low fashion confidence and they like help choosing something and I think at the time there would have probably been a need for some kind of styling advice on site and sort of personalised recommendations erm and Y must’ve come to us and said we’ve got this solution would you like to try it this is how it works, it was probably a mutual, us identifying a need and them saying we’ve got this solution

B Yeh, so what I’m looking at is what virtual fit, what came up earlier is something that I’m quite interested in because I’ve got a retailing and science background to what research has done at Manchester is that styling advice is quite unique because in other virtual fit it’s very left up to the consumer, so by guiding the consumer through the style, it’s important to give them some guidance otherwise they are sort of lost if you know what I mean when it comes to the trends for fashion specifically

A: Yeah absolutely I think that’s the biggest thing really, because we are looking at other tools on the site, have you heard of fit analytics? Yeha so were looking at those at the moment just to use on our product detail pages, for what size should I buy but that’s very that’s just body shape that’s nothing else about colouring or your lifestyle or your age and Y obviously takes all of that into account and it’s constantly learning it’s looking at people like you okay so what are you buying, what are you returning, erm and it well at the moment we aren’t passing the returns data which we absolutely need to do.

B Your what?

A: We’re not passing the returns data, yeah

B So returns aren’t fed back

A: Not at the moment we are getting that set up, that’s in the backlog for the big data people to do, the difficulty we’ve got with returns data is that, only a small proportion of our online purchases are actually returned to us via post, that gives us a reason code, a code for why you’re returning it, the vast majority take them into store where the reason for return is not captured at all. So that’s pretty bad but the data we have got erm is gonna be fed to Y so they’ll be able to see, they’ll just be able to like erm extrapolate what’s been returned at a high rate, therefore they shouldn’t be recommending it particularly if it’s trended towards certain shapes and sizes. So yeah

B Erm so how important is mobile compatibility?

A: It’s very important we don’t say that’s next

B I was thinking that, I took a few screenshots of reviews on the app, and looking at what people felt about it, and I think what’s important is the need for personalisation within most of this virtual fit experience within any retailer or any interface and it’s using the data that’s produced from it to feed back into the supply chain to eventually reduce that gap of returns, but there’s a lot of subjective factors that people will have dysfunctional online buying
habits, buy three sizes and try and find the right one, they’ll try and get round it in certain ways depending on consumer age demographic, experience, previous purchase.

About my research

B So I wanted to know about whether you feedback clothing reviews from Y specifically or the reviews of Y as an app and the way it flows.

A: no we don’t, not at the moment there’s no ability to leave reviews about the Y function on the app, because it’s not part of the app iphone and android, there’s no ability to leave reviews about it so, I think if we add it to apps and mobile web we may add that feature, actually the most important thing about reviews, so we’re changing how we collect clothing reviews slightly, at the moment we just ask whether something is, we ask customers to rate fit and style out of 1-5 which is stupid, this is what they were saying earlier, so if you get a 5 star review of fit,

A: What does that mean? Nothing. Erm we also got a true to fit indicator which is a scale of 7 points, that’s the most interesting thing but it’s completely useless if we’re not capturing what size the customer actually bought, so um, that’s what we’re gonna be adding in the near future, we’re gonna take away style and fit as a quantified rating, it’s meaningless, within product reviews. We’re gonna capture size bought and whether it’s true to fit or not. Those pieces of data combined we can then pass to Y and say okay, we know that those who have bought this item in a size 18, they’re saying it’s true to fit, therefore you should be

B then again what’s true to fit, a size 18, you could have six size 18 models all with waists at different levels.

A: Yes yeah, that’s completely right but then we can’t

B But then I’d also argue that you can only categorise as we’ve got such a massive spread of consumers, but within sort of body scanning and metrics you’d have to make classifications.

A: Yeah I mean if we were making custom made clothing for each individual customer, then yes, but it’s a high street brand right. Everyone knows which size they should be and which size they should buy so it’s whether it fits within their perimeters of that size. So I know I’m a 10 on top, if I buy something that supposed to be a 10 but it’s actually a size 6, actually in fit or it’s a size 18 and massive or it’s too tiny, I will likely rate that it’s not true to fit, it’s slightly too big or it’s very small or whatever.

B And then there’s descriptors around how something is going to fit, I think style notes that kind of thing as well, I mean I haven’t classed them within my research as virtual fit interfaces, but they are something that would feed in, I see virtual fit as something more than written communication

A: Absolutely and that’s something we’re looking to add as well as additional descriptions on the site to say this is meant to be tight or meant to be oversized or whatever, because we don’t tell customers at the moment it’s everything is regular fit. And that means nothing. So it’s just not, it’s setting false expectations to customers to how it should be. Because somethings are supposed to be baggy, but customers don’t get that.

B Yeah and how fabric affects that,

A: Yeah

B Erm so how does body shape such as shoulder width and waist shape relate to the different X consumers decision, or that wasn’t your that was Y’s own development

A: Yeah that’s all of their own, algorithm that does that, they’ve got lots of data scientists and styling experts that work together to build those sorts of things so yeah, it’s a very much Y driven thing.

B But it’s that need for the multi-disciplinary areas, so a lot of what I look at is the need, is lacking garment product development knowledge and garment technology knowledge because it’s not just subjective to the consumer but the garment you’re wearing and how that would drape.

B Have you done any post purchase evaluation and satisfaction of consumer purchases that are used?

A: No, not that I’m aware of anyway. It’s something we need to do, the next big thing for us is doing some user testing on, we want to redesign the whole thing

B Do you have a time frame for that?

A: No, because we work in agile so we don’t give timeframes, so I know that sounds ridiculous but one thing we have to be adaptive to change and I look after the ten products. And it’s really what’s the most important thing and what I’ve got resource to do. Erm so, which is very frustrating for the rest of the business because they don’t really understand that
Appendix

B As a researcher I do periodically look over them and what’s happening. Actually I think I’ve gone over a lot of what I wanted to ask I’ll just go back and check. Do you know anything about the influence of the older segment and their increased mobile usage and if that’s being looked at at all?

A: I think for Y in particular we know it’s not on mobile and we know we need to put it on mobile, we haven’t started, we’re not erm catering particularly to the older markets we just know it needs to go on mobile. We get almost an even split between desktop and the tablet, erm tablet browsing we know that the average age of Y users is about 51, but there’s people who are older. There isn’t any particular tailoring at the moment for those who are younger or older in the sign up process but the recommendations are different. So yeah we’re really aware that older people are becoming more used to mobile, we’re aware that all of our customers would love to use the app on mobile not all of them but those that are interested in it. But it’s just not there at the moment.

B Yeah

A: We just need to get it live on mobile, we’re not there in terms of understanding the split between who would use mobile or not. In terms of age range as it’s just not live, because we don’t have that data.

B I think in a way because tablets are getting bigger, that’s increasing convenience for consumers to use such an app, and obviously like men are a very neglected demographic segment when it comes to looking at things like this because part of what my content analysis looks at whether they have got male compatibility but a lot of them are targeted at women, but male technology adoption is fast and they’re very loyal. So actually results from looking at a study of men may be use for Y if they design something new.

A: It is something that they are looking at, they’ve not developed it yet for men.

B With younger consumers how they’re interacting with fit, there’s Fitbay

A: Okay.

B Have you heard of it?

A: We’ve been doing some research on outfitting on the site, so we’ve got one of my other products is style board. Which is, it’s like a polyvore for X. We’ve just built this as a little test really. It was launched on some of our social media channels earlier in the year, it’s still there but it’s got lots of now old stock on it but it basically allows customers to build their own style boards. When we’ve thought about how we could use this on the site to give outfit inspiration, because really that’s what we’d have it just integrated into X.com through the shopping journey and you know if someone’s looking at this jumpsuit, we are also showing them the things that go with it at some stage. Whether it’s whether they’re in their browse phase or buying we’re not quite sure how it works but we’ve been testing some different concepts. And erm what’s really interesting is that all the testers we’ve had in who are from about, they’re in our key market so about 45 upwards they’ve all said they’d love this if it was built by X experts, if it was built by the customers they would not like it, and they wouldn’t want, they would trust suggestions to be built by X, they wouldn’t build this themselves, most of them wouldn’t come in here, pick an outfit and post it and they wouldn’t expect their peers to build things. They’d be like no I don’t want to look like anyone else, I look at other women my age group and I think what are you wearing? They just don’t trust other people so that’s really interesting. As you get older I think your fashion confidence does go down or the majority of people it tends to. So they don’t trust themselves and they don’t trust other people they want expert advice so it’s interesting whether X would work something like X would work. Because we thought about adding in selfies to reviews, how did you wear this.

B: but you feel like there’s lacking in confidence there that they wouldn’t engage with it. I think cus X is an older demographic for what I’d look at, I’d probably look at examples of ASOS and things like that very innovative.

B So this isn’t going to get any further implementation then?

A: Not any further, it’s on a separate domain at the moment we are, we would like to integrate it into X.com. We’re thinking maybe into the style and living section, where

A: So if you’ve got one specific item of clothing like, if you were on this page for example, the party ready jacket you might have some content slots here with style this with and maybe something like that inserted there or whatever, that’s just one of the ideas. Another one is actually going into a erm, going to an actual outfit or product detail page (PDP) erm clicking add to bag and having going at a page where it’s users who bought, customer’s who bought this also bought these items to go with it. Or here’s some other items that you’d style it with. That kind of thing, we’re not quite sure yet, we need to do some more research about how it could work. We know that people who do use style boards just as a consumer using it not building their own. The results are amazing they buy about four items more than they normally do than if they use the normal X website, the average order value is much higher so.
Appendix

B So that’s the power thing as well, it’s the discourse between having a consumer that is willing to be, so would you think about having key lead consumers or people that, cus it’s a different demographic, but ASOS have got their style muses.

A: Yes, where are this demographic is very different, their style muses are like twiggy, we use her a lot for design.

A: Creating a board, but the overwhelming evidence is we want you to tell us how to wear this. We don’t trust ourselves or others who aren’t experts.

B So that’s kind of what came through earlier with the X consumer, because they aren’t fashion innovators, they’re not going to be leaders of the market they’re gonna follow with guided inspiration.

A: Yeah it’s a very different end to fashion basically, because you’ve got young people who are leading and styling and being innovative and unique and then at the other end you’ve got women who are trying to keep up with the latest trends but they know what works for them, and that’s the overwhelming thing as well, is I know what suits me my body shape, I know I’m definitely not going to wear any of these things erm, but they get stuck in a rut, because they’re just sticking to the same stuff, they just want a little idea and inspiration about how to keep up to date.

B I think you can even see that in media, with Gok Wan, I know that’s very commercial but being able to guide people that get to that stage. That’s a whole phd in itself. Yeah that’s really interesting thanks.
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Interview 3

A: So basically about 18 months in erm and the focus on the project is to look at the available websites in the area of virtual fit e-size and style and how consumers are interacting with them and measure that. So I’ve looked at a lot of previous research into body scanning, garment technology and a few theories to do with body shape, because obviously there’s quite a lot of different interfaces out there at the moment so erm getting to a point where the previous research links to things but also where it’s relevant to all the different formats and how things are evolving.

B: Are you interested in erm, is it how they’re doing commercially, or is it how, what angle are you coming at?

A: So a bit of both really, so I’m looking at company structure, expertise background, how there’s emphasis on perhaps certain areas, some are more data driven, others are more visualisation and very big on technology for example body scanning backgrounds that kind of thing. Erm so I’m looking at that and how that does influence the consumer and the effectiveness of lots of different approaches so I’m testing a few different sites. Metal being one of them, and against that I’ve got constructs where I measure erm that persons engagement how they feel visually, 3D presentation, and a lot of that follows how body scanning has evolved. So how some one sees themselves in 3D and the implications of that. Erm so ultimately what I’m going to do is get users to try the websites out and they’d be trying the garment on in real life. So I’m actually testing the virtual garments and the real garments. And I’m working with one retailer who are providing me with those garments, however that’s just one retailer and in size recommendation so I’m quite interested to talk to you guys because of the visualisation avatar side of things which is a different approach.

B: Yes okay. Let’s talk away.

A: So could you give me an overview of the company and what led you to take up a role in a company like this?

B: Erm, yeah X been around for about 8 year, X is our CEO he originally, his wife was having trouble buying clothes online just the classic stories of buying several sizes, or not knowing if it fits so he worked with the guys at Cambridge university, who he had a relationship with and started building up the technology. Y I think what’s made us unique is that the others don’t go for the visual. We’ve seen a lot of companies just trying to do size advice, I don’t personally think it will ever be enough just to have, just to know you’re a medium or a size 12. I think we talk about what problems are we solving and I think at the beginning Y thought it would solve returns probably as one of the stronger problems, you don’t know what size you are. You don’t want to have to choose three sizes and send two back it’s a pain. It’s a pain for you and it’s worse for the retailer so the margin is getting slammed. Erm, in effect, in reality we have effected returns slightly in a good way, but it hasn’t been a huge, but it isn’t actually the problem we’re solving. I think actually what our visualisation does is, lets you play and imagine and create outfit combinations and imagine yourself and your future self wearing the clothes a little bit more. So we’re more interested in the sales uplift, the increase in sales and the increase in traffic we can drive retailers through having this technology on their side rather than returns.

A: So how do you monitor that then if it isn’t a direct outcome?

B: We’ve been, returns are quite tricky actually. There’s a lot of different systems, you need them to share all their returns data which usually sits under everything else so that’s been quite painful. We have got returns data, like a year a go we were running everything as an A/B test. So when you arrived at the site a percentage of traffic saw Y and a percentage of traffic didn’t see Y, but the problem there would be they couldn’t do a proper marketing campaign if 10% of people couldn’t see Y. Erm, so we’ve arrived at the place with a couple of our partners where were on 100% but every three months we’ll drop off 10% of traffic so we can see what effect were having. Then that effect then sets the benchmark for the next three months. So a quarterly review of how were doing by an A/B test. Erm, with another set of customers, so increasingly our customers are in brazil, we have a big customer in India, a big customer in Brazil a big customer in Korea. A smaller customer in Taiwan, Thailand, Singapore, two customers in the UK, SO we’re quite a distributed company globally. Increasingly customers in asia are seeing us as a differentiator. It’s a cool feature that drives traffic in quite a busy market. And that’s all down to the visualisation over the size advice. In our user testing that we do fairly frequently, it’s probably a 50/50 split, if it’s a visualisation and play and the fun side or if it’s helping them find the right fit of the garment. So yeah, it’s quite torn.

A: that’s quite interesting so as part of my development of my questionnaire and something that I want to measure quite importantly is that the balance between that hedonic play and the facilitation of purchase and being something that they can go back and use.

B: We talk about erm if this is a buying funnel down to purchase here, at the moment we’re on the ecommerce side, say this is ecom at the bottom, of all of those people if this is ecommerce, of them maybe a percentage will choose to engage with Y and this becomes our funnel. When we talk about our funnel, through user first clicking on it, to building a model to trying on garments to purchasing something. This is a little bit of the funnel that my team care about and how do we get our site so that 100% of users are engaging with the X which we spend a lot of time thinking about. How we take over this bit, but increasingly now we’re talking about before they get to that e-com
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point, or before their buying intent is quite high what’s happening in the wider discovery world and that’s where we’re getting quite excited. About how we can enable more play, deeper new ways of engaging and discovering. Using the X. So play is definitely becoming a stronger and stronger thing. Doing the size is really tricky, doing it well is really hard. We’ve just changed our algorithm for the size advice, so it does a machine learning thing. We suggest a size to them, if people keep choosing a different size than the one we suggest that goes into our algorithm and improves it and equally if people return garments they didn’t want that goes into the algorithm. We’ve invested heavily in the last six months improving that, but it’s still imperfect. We ask for your height weight and bra-size which isn’t a huge number of inputs so we don’t have your exact leg length, we don’t have your exact neck whatever else. We also don’t know the particular distribution of fat which you might want to know about. I would say ours is, we say it’s 97% accurate but probably off the record I would question that. For some people it’s 100% accurate but for others it’s not.

A: So have you thought about increasing the erm accuracy by including a few more measurements. I know there is options to tweak.

B: We do height weight and bra and from that we give you your waist and hips, we guess them for you, we used to ask you to put them. Basically you need all five to make a model.

A: how come you picked those three.

B: Obviously height and weight, gives you your BMI but it gives you an estimation of the size of the person making assumptions of fat versus muscle. And then once you have the bra it constrains you and your cloth and then we know where to distribute the weight top to bottom roughly. But with two more measurements we can do that more accurately and bring your whole body in.

A: How do you define hips and waist?

B: There’s instructions where we consider them to be.

A: Do you think human measurement is accurate? Or do you think people know their shape better. I think by looking in the mirror you can probably relate to those shapes that we have. Like hourglass, I think we when get people to measure do you think that makes it a lot more problematic.

B: We were looking at asking after this. You couldn’t just ask them. It’s a lot about perception, that’s something we grapple with. People’s concept of themselves and what they actually aren’t the same. You might see your X and think that’s not me. I’ve seen that before and thought ‘that is you’ but you don’t particularly with weight, and we only do women. I think there’s a lot of pressure to conform, there’s a lot of pressure on everyone but er, so people will reject their X emotionally even though it does look like them. Which is interesting. If you ask them straight are you a triangle an hourglass, rectangle. We in effect we’ll know which one you are, like roughly assuming you’ve put in your waist and hips correctly. Because the bust gives you your chest, so if we know your chest is that big, we know your waist is that big, we know your hips are that big, we know you’re probably a rectangle. We could tell you you’re an hourglass or a rectangle at the end of these five. Erm, it all assumes they’re putting good inputs in, that is the challenge. So what would you hope to achieve by asking them which do you see yourself as, because it doesn’t get you any closer to knowing if they’re this tall or this tall.

A: Because how do people in general group themselves, it’s very difficult to put two people that would have the same size band, they would both perhaps fall into a size ten but look completely different, the distribution is different. Just from looking at some virtual fit companies there are ways that have been addressed, like how people can group themselves based on similarities they see in one another. So one is where they look at, you go on Fitbay and you can compare yourself as a percentage of your body shape with another person. So how you then able to look at what they’re wearing. So there is a social factor in it, and it’s not all in my opinion just science because people, even if we put them in the same band plus the sizing is so different and you’ve got self-congruity issues so. I think, the only thing I was trying to get at is the adoption that the person has to the process, so whether the measurements are a bit complicated and someone doesn’t really know how to measure their waist or where the real waist is. In garment technology there is so much stuff debated about it. But perhaps these few measurements work well enough, that these nuances aren’t so crucial.

B: Fitbay have moved towards more sort of selfies. I joined here about 14 months ago, when we’re going up in to this area, you start thinking more B-C more direct where you can choose from lots of retailers and use your X as the central point to try everything on. So we looked at length at Fitbay and it was an interesting model, they put you with other people that are similar. Body shape.

But I think they’ve stopped doing that right? Because I don’t think it worked, and I don’t think it works because I think fashion is so about aspiration and what you want to be, and it’s so much about your own perception of yourself and you’ll squeeze into things that you’re probably, objectively might not look that good, but it doesn’t even matter if you think you look good. It’s all in the mind. It’s like a deeper, and I think style and aspiration just trump body shape. Perception of yourself and perception of style and what you want to be is more important than your body shape. So grouping with other people who are 5 ft 9 and 70 kilos doesn’t really, I don’t. I actually want to be with
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people who have the same taste as me. It’s more important to be inspiration of ideas around taste and I think that’s why they struggled. Whatever your style is, you want to see people of that style more and you’ll fit that style to your body shape. You know your own limitations, I know my neck is skinny so I don’t want to emphasise that. I think you adapt the style to fit with you rather than the body shape isn’t what defines you, it’s something you work around. I think that’s how we think about it. So this is really interesting I think we talk about there being three problems we solve. We solve the problem of fit, should I buy a small, medium or large. We talk about helping you with style, will this suit my body? That’s slightly different question. Erm and then we talk about there’s a complete absence of play and fun in a lot of E-com it’s quite functional and how can we bring more fun and play into it. And the fit part is probably the least out of the three in importance to us right now. I think retailers have made a bit of a problem for themselves by making everything free to return anyway. The consumer generally will use, you’ll have brands you know, you know you’re a size x in a certain brand. So if you’re ever shopping for their brand you don’t even need any help with fit.

A: So loyalty has a massive impact. Have you tested with brand loyal customers of the retailers that you are partnered with? So did you have people who are loyal try it?

B: I think we could do a lot more, a lot more scientifically.

A: See that’s what I’m doing.

B: I think to be honest, we are data-driven we have a shit tonne of data and five data scientists up in Cambridge crunching it all. We’re doing a project now, where we’ve picked lots of axis and we’re grouping our user behaviour onto the axis and we’re looking at clusters to try and understand our users better.

B: So what we do see a lot, so I spoke a bit before about a/b testing, the global on and off. With our partner in India, they didn’t want to a/b test. They wanted to launch a new website so it was all about marketing it and differentiation so they we’re like we don’t want an ab test. But 5/6 months later they want to know how they’re doing so we’ve just been comparing those who engage with us against those who don’t engage with us. Let’s say 5% of users engage with us, slightly higher it’s maybe 10% choose to try stuff on. That small percentage, that 10% are responsible for about a quarter of all the purchases. SO obviously we’re like great that’s us. But then you look at it scientifically and there’s probably a lot of self-selection going on. These are the sorts of users who would probably try a new feature, so the fact they try a new feature makes sense. They’re also, I think we probably are, our hypothesis is they are they’re bigger fans of abof, so they’re more engaged more loyal fans of abof and they are generally more people who purchase anyway so they will try this new feature and they’ll probably like it. Whereas the guys who come in on a quick whim and don’t have the loyalty with abof I think don’t engage as deeply with us.

A: Yeah that’s something that I want to think about, in terms of the sample. You really need people who shop on that website, but then there’s an argument for the fact that people are going to use the technology how they would if they first discovered it so that new interaction despite the fact that they might not be habitual to it doesn’t make the data any less valuable.

B: So one of our challenges is that the clothes have to be digitised on our rig which I’ll show you so yeh our bigger partners India, Brazil, Korea, they have a rig there in their operations so as everything comes into their warehouse they photograph them, because they’re photographing them on their own anyway. X are tiny and they’re like ten people, and they send the clothes up here and we photograph them in this studio. Because they’re such a small team, it’s like oh shit no one’s sent anything for a month. So we might’ve dropped off or be a few pages under. So we talk a lot about, when we’re trying to measure our success about coverage. So we can’t digitise all types of garments, we’re not very good at certain types of garments and we don’t do men. So erm, sometimes our coverage is quite low as a percentage of total clothes which starts to have an impact on the users understanding of what we do. And more we’re talking now about visibility, so even though we’re covering about 60% of their stock, sometimes were not on a higher enough number of the new clothes that dominate all of the initial pages. So we might be four pages down. So visibility and coverage have become quite important metric to measure because the product team are worrying about acquisition, activation and retention, coverage and visibility is low it’s a struggle.

A: Fashion changes so quickly, and I think as well it’s the flow experience that that person has on the website. SO if they’re going through and it the perspective they have of the brand is related to their experience of Y, so I think in a way that relationship sort of what I’m looking at has to be quite synergistic.

B: Try Y we don’t do any user testing because it’s not got the complete journey, but we’ve discussed internally about using the data from there, trying new features. But I think there’s a couple of thousands of people a month go there. It still is our flow, when they’re organically arriving there they’re not the same as an e-commerce purchaser. Z is a 50/50 A/B test so half the traffic doesn’t see us, so you’ve. I can give you a link that forces you in. I can send you one after this, Kerry our account manager is on a half day she’s not here. So then you’re asking, you’re following how many people are you doing?
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B: Wow

A: So I’ve got 50 that I’m analysing next week

B: Can you share our data back with us?

A: Yeah sure

B: We’ve got a team in Korea, we’re trying to break Korea, we’ve got a partner there who is enormous and has the scale of a retailer under their bat to take us across multiple shops. Rather than just one, and when we’re on one the Y brand can only add so much value. So it gets a lot more exciting when all of your favourite retailers have this little model popping up and it’s all the same wardrobe and you can start to outfit between them.

The guys are in Korea now and they’ve been user testing all week, so we do quite a lot of that as you were asking. They would of probably interviewed 50/60 people in Korea, and we’re trying to come up with Korean specific, sort of Koreanisations we can do to help dominate that market better.

A: In order to create the parametric avatars, do you have a database of scans or is that a range of?

B: We have the CESAR data, we pull. I think it’s European ethnically, I think someone said there is a heavier weighting to Italian and Dutch or something but yeah that initial data set trained everything.

A: Okay and do you update that at all or are you looking to create more?

B: Yeah we did a big size study in India that has helped, and we’ve effectively tweaked the body for India and we’ve effectively tweaked the body for eastern Asia…the Far East.

B: So Chinese Korean seem to have shorter legs so weight is distributed a bit more up here. But the difference has been quite small. Our tech we have actually two different algorithms going on. So you put in your height, weight and bra. It estimates your waist and hips which you can nudge so ideally you’d measure that but we can estimate them for you. And from those, it goes off to build your visualisation and another algorithm goes off to estimate which size you should buy of each garment. As you try garments on you’ll be looking at that or the garment is stretched to your body. It’s not a particular size of a garment. I don’t know if you would have picked up on that. This t-shirt would be put on you and then we scale it to you, then we scale it to someone else and scale it to them. It’s not actually a small medium or large t-shirt you’re seeing on you, it’s just the t-shirt scaled to you. Then as a separate algorithm you then say what size should I buy which will then separately tell you you’re a small medium or large, 8, 10, 12. So there’s two separate algorithms going on. So even when we tweak the visualisation it doesn’t affect the size advice. And we can make the size advice so they use the same inputs and these derived and these input measurements, but you could’ve done them. I forget which ones Y and W have?

B: So there’s another one out there who shot each size on a mannequin that filled up, mechanical mannequin.

A: That’s fits.me

B: I’ve been on one of their sites and you can swipe, let me try that size and it will go…and your trying to work out the difference. Is that too tight now, or is that too loose but you can’t really tell because you feel that on your skin. You can’t really tell it on that. So we’ve decided that visualising the fit to that degree isn’t helpful. So we will basically show you an estimation of your body with the garment like stretched to fit that body. SO you can see how that garment would look on you. So we have problems where like, say this person is tiny, they’re petite and like size 6, erm we shoot all of the garments in one size. We shoot it as the average size so if you’re selling 6-18 we’ll shoot like a 12, and we scale that up to the bigger sizes and squash it down to fit on the petticoats but it’s possible this person could try on a petite. This petite person could try on a dress and they can see it on themselves but when they click size advice, when they try to buy it the size advice might say it only comes in large. So it can’t fit you anyway.

That’s one of the problems with the two algorithms being separate. So we’re working on improving that messaging when there’s no size will fit you. When there’s no size to fit you when you’re between sizes is a really common one. You’ll be on the edge of two sizes and at that point we tell you, your bust, your hips, and your waist where we think it will be tight. The perfect fit or a little bit too tight. We do the messaging there, but sometimes if you’re in between sizes it’s impossible to recommend one. So we’re working on improving the way we phrase all of that.

A: So do you think when the algorithm isn’t giving a size directly I’d imagine that that’s actually quite a positive thing, because people don’t necessarily want to know straight away oh you’re a 14.

B: Yeah, like fundamentally we’ve made some decisions about how we do this. So to keep our costs down we do sizing of garments really cheap because we do each garment once. We don’t shoot multiple sizes and we’ve got that down to the lowest cost per garment which makes it scalable and realistic for retailers. You could maybe make something that’s more accurate and scientific but I think it starts to fall apart commercially. But by taking that fundamental decision to do it the way we have it does have limitations. We used to let you choose small, medium

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or large or 8, 10, 12, 14 on the same screen as your visualisation and people would choose a size 8 and expect the clothes to change but they’re not because it’s just a representation. Erm, pros and cons but to keep our to make the costs scalable, to keep the cost side realistic and operationally scalable that’s sort of the route we’ve got.

B: Time will tell if that was the right decision. I think fits.me in a way is probably more accurate, but once you have them visuals in front of you, you probably make as many wrong decisions picking between. I’ve jumped back and forth on shirts for ten minutes and you can hardly tell the difference so if you’re trying to solve returns I don’t know if either approach really nails it.

Something we’ve talked about the concept of, we’d love the X to become the norm and you’d start to use it across all of your retailers and I think at that point. Right now we have to keep this minimal just to keep them engaged. So we’ve gone for the get them in, I like the idea if we were everywhere, eventually, you could them invite people who were really engaged with you to start to add more to their X. So you could say enter, it would be like a profile builder. You could expand it out and say now measure this, now measure this so for those who really care about fit we could get a lot more accurate.

A: And also across channel as well, there could be the potential to use barcode scanning on their mobile and have that pop up which could eliminate the need to use the fitting room.

B: That’s err, we can do that now, we have a project, I mean a barcode is just a URL in a different format. But I mean the X still has the accuracy issues until you ask for more input.

A: So the beta testing you did with X, so scanning a plus size person is quite difficult and the way in which your algorithm works is kind of not addressing that issue because like you say you have one size and five measurements so has it not become problematic?

B: So X we shot a garment that’s bigger, so I think 18 became the norm so the whole system moves up a bit. Fat an muscle distribution doesn’t come into this and that’s what our tech team who are all PhD Cambridge university types, we’d love to ask people how athletic are you, how frequently do you exercise? Level of exercise, age, probably those two would be really interesting and would help us. If someone had a high BMI and was very muscely it doesn’t really tell us anything about the shape. So with X bizarrely, because we just smooth the fat evenly, we don’t distribute it in a wobbly way they end up with a very flattering X. So it’s like the best, if you’re a size 24, the X you looks a bit better than the real you, probably. Erm unless you’re very lucky or have a lot of muscle which it all goes a bit tricky so yeah so for X for X I think we end up delivering a slightly more aspirational version of you inadvertently.

A: So in research it’s said that people that feel that they might struggle to find something that fits them or is the right size are more likely to use visualisation. So did you get quite positive results, and it’s quite sad. I mean some of these X customers are very big, I mean struggle to get out of the house so they rely on online. They don’t like walking, they prefer to order online so a service like this, or Dressipi’s or fits.me has a lot of value for that sector. But X isn’t doing that well actually, generally. All the retailers are struggling right now and X are struggling, so we’ve got a backdrop of that to be.

A: I think retailers are quite sceptical I think they want something that is going to deliver.

B: Yeah we’ve tried, what we’re going at and everyone has a preconception of what a virtual fitting room is. And so we’ve worked hard to not portray ourselves as a virtual fitting room to potential customers we say we let you try clothes on online. They invariably call us a virtual fitting room and you do get locked in with the other solutions that we think are inferior. Especially when it’s just size advice, which a lot of them are doing. I mean you picked us three but there’s probably 20.

A: I picked you three because of what I categorised, size and style recommendation, fit visualisation, fit recommendation. I’ve had to make sense of a very under-researched area.

B: I think we have the best solution but it still needs a lot of work. I think an innovate UK grant came out the other day and it said can anyone solve size and fit and we’re like Tom’s quite close with Innovate UK, it’s like you’ve just written a brief that is our business. So we’re not quite accepted as the solution yet so were just trying to work on what is it that is missing in the Y experience to get it over the line.

I think the most fundamental decision was to separate out vis and size advice, it does limit what people are doing where you’re promising, it’s like going in a fitting room but actually it isn’t but you try on an item of clothing and it just stretches to you and then as you leave the fitting room it recommends what size you should buy.

A: I think you’re hitting the point where

B: We don’t do small medium or large leg length, that doesn’t come into it. We do work out where the dress falls, would fall on you so that’s quite useful if you’re a short person or a tall person. You want to know where the dress sits. That’s quite a big one.
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We don’t do legs or wrists or arm length very well which bothers me. When we get into men’s clothes I think that will be more important.

I do wonder if someone maybe more photo based or even video based could be the future. I think now we’ve all got used to doing selfies, and you’ve got more used to hey look at me I’m doing something silly. I can’t work out how to do it for clothes.

It’s the style and play and inspiration versus the fit. We’re trying to do all of it. But I feel there are different routes you can go down. You can do a really good fit product, do all the wrists and get really accurate or maybe the bigger prize is up here in helping people discover and see cool stuff? It doesn’t need to be really accurate, it just needs to, and you have your body roughly and try stuff on and express yourself. And maybe it more important if you can pop the collar and roll the sleeves up, it’s feeling like that’s more important to you making a purchase than ‘oh it would be a bit tight here’. So there the sorts of questions we’re grappling with.
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Interview 4

A: I can talk to you strategically about how we think about those and if you need a more detailed technical insight I’m sure we can help you with that.

B: So questions that I’ve got are basically looking at three areas. So you’ve described personalisation as having a big effect on shop direct, and obviously having 1.2 million versions of the website and things like that. Can you explain more about the aspects of personalisation which you’ve worked on and what you’ll continue to work on as you push this forward.

A: In some ways people get very carried away with the technology side of it in some ways the principles are enduring and they’re very long-standing retail principles. Put simply the more relevant the shop is for a customer the more they’re going to buy. And I think the big difference between bricks-and-mortar and online is that Y cannot lay out their Department store differently for every customer that walks in the door, we can. And do layout our shop differently for different customers and that’s the fundamental difference between online and bricks-and-mortar that we are exploiting here and so to enable X to be relevant for millions of people in different ways as remaining true to who we are. So that’s the background to it and personalisation is a new way to get to an old end if you like. Which is making the shop relevant to customers so how do you think about it we think about it in terms of personalising the means of getting the customers to come to the shop in the first place, personalising the shop they see when they’re there and personalising how we stay in touch with them afterwards. So personalising the marketing to bring customers in we now do, we used to do various simple and relatively unvaried email marketing campaigns for example that went out to lots of different customers all the same one. We now next up and now every one of our email marketing campaigns will go to different customers at different times depending on what they respond to best with differing different formats it can be an email or push notification text or even a paper which we still use. So it’s gone from one broadcast marketing two getting much closer to one-to-one marketing and we can see the conversion benefits of that. But what you’re interested in is the shop itself and that’s personalising the features the formats, the elements of the customer journey and doing it anyway that we don’t need to guess what’s going to work for customers we can test and learn which is another great benefit of online. That you can test your way to success that you can get one customer one experience and other customers another see which works and apply it to everybody. And what we’re getting better at doing now is doing A/B and multivariate testing and doing it for different segment of customers rather than just applying the winning. The first part of it is staying in touch with them, personalising how we stay in touch with them after they’ve bought which is more in the field of customer management so that’s where we with selling different messages to different customers at different times. Either promotional messages or different incentives to come back to the shop or just less sales more stay in touch and inspire you and start to build X in your mind as a place where not just a place where you come to shop better place where you can when you’re bored or when you want to be inspired all when you want to think about something.

So that’s the broad framework of personalisation. Bring them in to the shop and how we stay in touch with them afterwards. Specifically about the shop itself what we found we found that you can what we have learnt is here, we want to go at different paces to different destinations and different aspects of personalisation. What I mean by that four example is navigation, if you go into your smartphone and you find a different navigation layout every single time you to very it can soon become disorientating and irritating and customers switch off from that, so you actually want to restrict the navigation personalisation you don’t want to be messing around shifting around every 10 minutes. So we’ve got artificial constraints we only have 12 different navigation variant on the X mobile site. Precisely to stop customers is getting disorientated you however gave another example which is the homepage, there customers respond too what’s relevant To them so we’ll give them 1.2 million variations of that. The more the merrier when it comes to the first page they coming on if they going to search for anything what you put in front of them better be relevant or they going to do something else. The last thing I’d say in personalisation is that this is becoming the prize that is becoming bigger and the need is becoming more acute to personalise the shop with the explosion of mobile. So getting onto 66% of our sales and now on a mobile device

B: that’s incredible considering you come from

A: nothing four years ago. The great thing about mobile is the customer she down all day and so she can shop all day and we can reach her all day and if she shops all day that’s fantastic, she’s carrying the shop around with her. The disadvantage of neighbour is that attention stands have shrunk before you had that three seconds to get their attention before they drift off and do something else. So you better be able to see is that attention, you better be able to presents that customer when she opens up the X app or the X mobile website. What she sees right there in those first three seconds is going to have a Big, big, big part to play on whether you make any money. The personalisation becomes ever more important and the need for it ever more acute.

B: And it’s almost that psychological factor whenever you are in you go into a Department store and people are trying to perhaps doing a hard sell that you’ve got to translate, switches slightly different but still the same principles as giving them that attention and that interest I guess that’s going to pull them in.

A: Will this is what you can and do with you, as you mentioned that, essentially analogies with old school retailing can be quite helpful because what you can do is you can take the intimate personal service that people used to get accustomed to in smaller stores and boutiques where they need the shopkeeper and you have the potential now and
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a mass intimacy in a sense. People say retail has gone through a few phases with the intimacy, but on the plus side with the lack of choice and the lack of value on the downside of the local shop. Customers have got much better choice and value and from the advent of big multiples, take the grocery sector for example people used to go and shop at their local greengrocer or grocery store and go back 50 years with the advent of supermarkets the grocery multiples people got much greater choice and much greater convenience in some ways and certainly much better value by but they lost the intimacy. Now what we have the ability to do is to provide the choice provided convenience and provide the intimacy through the advent of data and technology.

B: Something I was looking at is how the web has evolved and how we buy product has evolved so obviously Y
when it first came out you could buy a book based on a review and obviously books can be less described as less personal as a project that you wear I think it’s fascinating how online fashion retailing is enabling the consumer to interact with brands or have a brand experience where personal products or garments that we wear can be purchased and consumers can feel more confident about buying them. And that’s where I feel my research I am passionate about that part of there because I think translating those personal interactions whether it be with an avatar or even just I know what size am or what I like to fit me or where I and confident showing things off, is enabling to achieve. Or if I don’t know what size I am, it’s giving the consumer the power back.

A: Well your whole area of research is one where online retailers have generically had a particular struggle with. In particular it’s a particular challenge for us while there are some advantages to online retail one of them is not that it’s easy to try something on for fit and feel. So there are some technological ways around that but it’s not just about technology interestingly, if we said that to duplicate the bricks-and-mortar’s ability to try stuff on, we’d head straight towards technology all we’d head straight towards the technological solution. And by the way we are doing that, we will come back to that. There is no point in doing it until the technology works for a start. More than the technology works it works incredibly easily if everybody had a 100% reliable body scanner on the mobile that they just press one button and it pointed at them and instantly gave them a perfectly 3-D rendition of the figure in away that was then instantly matchable to the fit of all of the clothes on the site that would be very interesting. That doesn’t exist to today the body senators exist but not everyone wants to go into the equivalent of an airport security checks to get it done.

B: people don’t like the way they look in 3-D.

A: Well there is that too, and so you have to you balance the fact that if you are going to present an image online you are well advised to make it, I wouldn’t say misleading, it’s relatively flattering in its appearance. Yet it does actually have to match the clothes. There is always that tension there.

A: Before we get to technology as a way of online we have to the customers confidence that’s ultimately what it comes down to confidence because I’m going to buy this because it’s going to fit me. I can buy you because. Like it there are other ways together. For a start, we have our own label I’m branded product. Four example if somebody knows I’m a size 10 in river island but I’m a size 8 in X whatever it might be, if people get to know their sizing and brands are sensible enough to ensure and That this sizing has reasonable that has reasonable consistency incising say that. People end up speaking personally I just by them and reorder them year after year and are sensible enough to have consistency in their sizing. If a customer knows that they are a size 10 in River Island, then when we stock River Island that gives them confidence very bit as much confidence to buy that dress from us as they would to do river island store. That’s one aspect to it. Another aspect to it in our private label is that we need to be able to provide that same level of consistency and that’s an area where many retailers often fall down. They chase a higher brought in margins, they chase lower costs, they chase the suppliers regularly and jumping around between different suppliers everywhere you’re never going to get consistent set and feel so that’s something that we look into. Then there’s the technology angle. In short, we are constantly dipping our toe into the water of various technological solutions to this. We haven’t found one that’s quite ready not quite.

B: I think from looking at the content of some of the platforms, its interesting there’s different areas different types that perhaps some of the best ideas, that perhaps its’ just not one thing not just a virtual fitting room. More of an Omni-experience of fit, where we’re not just constraining the area. It’s as subtle as it needs to be for that consumer and their preferences.

A: Subtle in what way?

B: If it’s a data approach, they don’t want to see themselves in 3d but they have an account the data can be used. I think the approach that Dressipi has by sort of the algorithm process is good. But some people might prefer the virtual fitting room. In terms of coming up with a new solution all three could be more beneficial. There’s a lot of new technology about creating an online wardrobe, I know I’m this size. Technology is definitely there.

A: Maybe avatars will work and I’m sure avatars will get there, the combination of knowing what you’ve got in your wardrobe that being accessible to some kind of digital tool and the peer-to-peer review of your friends to bring social aspect into it say you get validation from your friends so did you get grey in that I’m not sure that works, somehow if we can get those two together and get a peer-to-peer review compared to what’s in your wardrobe compare to what we have got a accessible for you online and then start putting some recommendations together around that that could be very powerful.
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I think that’s one thing that might be potentially looking at there isn’t much social interaction that combined with what could be good would be good for them to use. I thought perhaps the reviews of garments that think they need to think about the fit of garments in the reviews which reviews can look at semantically and think there was a problem here with armhole depth that was a bit tight, the colour is a bit different things like that could really influence decisions and that consumer side of things where people trustworthy consumers A: really much more than a trust all the brands, sadly.

B: It’s the consumer power and social media, I don’t know if you seen fitbay which is another sizing unfit app but it’s a bit like Pinterest I think they might be closing it down now which is quite surprising to me because it’s based in this consumer power thing I think the issue is that they didn’t ever have a commercial partner. They didn’t have any advertising on the newfeed they had nothing it was just based on I’m a size 10 I’ve got this past, waste and height measurement this is a selfie of me and my River Island dress. It was very open to the consumer with no direction. I think there needs to be a level of style and sort of that direction that consumers need. Which is possibly where they’ve not been as successful, but the way they’ve left it up to the consumers.

A: Everyone needs a revenue model.

B: In terms of bringing back that concept of consumer history, so if someone signs in they’re recommended products.

A: purchase history is a massive driver of the personalised response that we give. And in many cases is the biggest single driver. You have to be careful with it because these things can be circular if someone is only ever bought Ugg boots from you, you don’t want to be showing them Ugg boots. There are pitfalls of many machine driven wisdom of crowds personalisation engines you got this so other people say you might like this. In some online sites it’s possible that you’ve bought a dressing and gown and they show you nothing but dressing gowns for the next six months, I’ve already got one you know. This is not a regular purchase for me this is a once every five year purchase so why are you showing me one hundred more. Yes I bought this but it wasn’t for me. So if you knew me a bit better you’d know that I’m a 45 year old man I’m not going to be buying a my little pony pink sweatshirt for myself, so it’s for my god daughter for example. Personalisation that just works on previous purchase history can actually be more aggravating than not doing anything at all. So erm but that said if you interpret previous purchase history right, and you infer from it rather than presenting someone with more of what they’ve purchased already, it is the best single predictor. It’s the most powerful single personalisation predictor.

B: What about use purchase and use is sometimes slightly different.

A: Use as in how they’ve used it?

B: Yeah so, we can buy things that stay in our wardrobes for example and that’s part of my research that I’m looking at so the post-purchase evaluations as well. A lot of what can be something that we’ve bought, a present or something you wear. The way someone uses it, if they loved it and felt amazing and that’s so different to something they’ve bought or a purchase that they’ve bought and couldn’t be bothered to return it therefore that use is different.

A: There’s a couple of ways that we do that and I’m sure there’s other ways that we could do. The first obvious reason that you’ve touched on is returns if something is continually getting returned in a given style or given colour or a given size that prompts action at our end. That the first thing, the second clue. What are the signals we get about use. The other one is what people say about it either a review or on social, so we can get some insight on use that way. Now the next stage for that at some point will be when we can start doing image recognition on video and still photography attached to individuals or attached to individual products and clearly you need to be careful with the permissions on that and at the moment I don’t think people are quite ready for that. Take for example if somebody gave you permission to follow them on instagram on facebook or on whatsapp or whatever it might be and you were wearing a given dress 6x more than another dress and that gives you a clue. More than that what you were wearing it with, what kind of accessories work with it, what shoes work with it. What kind of occasions you were wearing it for and that can both inform your view of what to recommend that person again, but also other people who look like that person. Because that’s when we bring the customer segmentation into it. You don’t just learn from an individual you learn from people who share attributes with that individual. At the moment that’s all in the future, at the moment we only have relatively weak signals.

B: I think blogging could be a good way of looking at that because they are open to being followed and you know around wherever they’re going, outfits as well as well that they link to and that could work. So would that be on mobile?

A: Erm yeah, so this is off site trawling, its technically possible for you to have an AI machine that trawls someone’s social profile or trawls the universe of the internet that sucks up photos taken of women out at night in Manchester and this is what they’re wearing. So that’s a geographical location. Or you can take a demographic profile, so women over the age of 25 or you an take an occasion approach to it so women who are tagging themselves at weddings. You can start to pull in a lot of insight that way.

To be honest at the moment we are better off to assess trends. You can get very carried away with the technology sometimes, which is a) a long way away, b) have privacy concerns attached to them and c) there are simpler ways
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to get to the same insight. You mention bloggers and vloggers if you’re staying close to the ones of those, who you’re customers most listen to and most resemble you’re going to get a closer idea of who your customers listen to.

B: It’s interesting, really interesting. So I think we’ve touched quite a lot on that, and a bit on mobile. So have you been involved in the decisions to do with Dressipi and the technology involved with my research with working with you?

A: Well Dressipi I introduced them to the business because he introduced it to me and I introduced it to the business we had a look at it and the guys came back and gave thumbs up. That’s relatively rare actually, because there’s people in the building much better qualified than me to make these calls so generally no. Generally I don’t get directly involved in selecting partners like that.

A: The one we haven’t touched on that’s going to be huge is VR, that pulls in several different, that opens up lots of several different possibilities and you’re never going to find some oracle or some sia who knows how VR is going to develop in three years time. Nobody knows. But, for us though it’s really interesting. I think one of your other question is about multi-channel. We don’t want shops, we don’t want anything to do with shops except as click and collect points which we have through a relationship with collect plus. We’re very happy staying focussed on pure-play we’ve got enough to worry about with that but there’s no reason why we can’t have virtual shops and back to that thing I said to you before. You can’t lay out Selfridges for every single customer who walks in the door, but you can using VR, and that could allow you many of the benefits of physical retail. As you know there’s touch and feel capability of VR now where you can actually touch and feel the material as well ass people wearing it. You can see your friends wearing it, people can see you wearing it. It’s not hard to at last visualise an outline how VR can become an idealised store where not only can you see, not only is it laid out in the way you want but your friends can be there as well. Your friends can tell you it’s not you its not quite your colour and it could bring to life an idealised physical store and social and personalisation in a way that people have barely begun to think through. In the long term that’s going to be huge for this industry.

B: More to do with what would be the next move in online retailing, do you think it would be VR?

A: Um, well. The next big thing, which is the current big thing but people haven’t really go their heads round it. Is the mobile revelation. The number of online retailers who still design stuff for desktop computers, everything we do here is on a mobile first. If it doesn’t work on mobile then there’s not much point that’s where the customer is. It goes beyond designing the site to work on mobile, it goes to how you get in touch with customers all the marketing is completely different than it is on a desktop and also the UX. All the contextual cues you get to speak to customers is different. That’s the trend that keeps on giving ad that people haven’t quite got their heads around yet. Moving on from that though, what’s many peoples bet for the next big thing is the whole conversational commerce thing and how that changes how you interact with a shop. For example Facebook messenger, before very long Facebook messenger will be a big shop and will have brands like the very app in it and you will interact with very in a slightly different way much more conversational and it will be AI powered.
Interview 5

A: Basically I thought I’d start by introducing my research and stuff and really it’s going to be a sort of chat because I’m super interested in this area of retail and how it links to what I’m doing currently.

B: This area being?

A: So my research is looking at more like virtual fitting rooms and product conversion tools in retailing so specifically a company called Metail and another company called Dressipi.

B: I know them both.

A: So I’m looking at the sort of consumer experience is that and how they might feel that can assist them with their purchase or inhibit them through doing a wide scale survey and also some actual try-ons of clothing. Another part of that I’ve been looking at Industry perspectives on new technology and having spoken to a few retailers and a few companies and start-ups and that kind of thing about their perspectives on it, so I thought that you’d be perfect person to including that.

B: and once you’ve done that what will you get hopefully fingers crossed at the end of it

A: a PhD

B: When’s your defense?

A: I think it will be about November time next year.

B: Okay still got a way to go.

A: Yeah, because I’m at the process of data collection now.

B: we typically have two people doing PhD’s with us at any time. Recently we’ve had a very good relationship with UCL and they pay two thirds of cost of one of their PhDs doing their piece of work in our kind of direction and we give them to X who has a PhD in psychology and they sort of form part of our UX team. And we directionise their work so it is of interest to us.

A: That’s really interesting I think it’s good because obviously a lot of PhDs can be unrelated to real world problems.

B: well that’s the issue and we can tend to become quite theoretical and a little bit less based in reality and I think with a PhD you need both. You need particularly in this kind of area it needs grounding.

A: I think it’s definitely interesting to apply that, my professor said that what would be great would be to put all of these perspectives as a start point and then the research afterward.

A: If you could give me overview of your background, I’m aware of some of it but I’m quite interested to hear your opinion and what led you to this sector.

B: no problem at all, I guess I’ll probably start by saying that I have absolutely no idea in what V is as an organisation. Everyone tries to encapsulate their Company into the infamous elevated Pitch, sort of 15 seconds of who we are. I find it absolutely impossible to do that and the reason for that is this particular topic is that the world in which we are operating and is changing so fast and so rapidly, there’s so many sort of external functions about changing and modifying that space that it is quite difficult to work out what kind of the work we do in a years time so were quite. It’s probably easier to understand what we do and what kind of organisation we are by looking at my three cofounders and who they were before V and why we started V, we’ve all came from luxury. We are all ex-luxury sale directors and we starting V nine years ago now. My colleagues reminded me it was before the iPhone was launched and before Twitter was launched and when Facebook had 1.2 million users, and you had to have Academic email Address to go onto the network it wasn’t fully B-C at that point. We started it simply over a bottle of wine because, and the discussion at a luxury conference that we were all individually attending in Paris because we were very interested in the digital space which nobody really recognised in those days. Many luxury brands, didn’t have any kind of luxury presence whatsoever. And those that did, had a web presence which was more about how to find my shop and supplemented with a few images that had been taken from advertising campaigns so it was supporting the ad campaign and giving shop details and things such as that. We could just see the world was changing and luxury wasn’t prepared to go on to that train and I think we were looking, I mean Amazon had just started and eBay had just started and British Airways ad Easy-Jet had started and I remember talking about that that an extra-ordinary thing that an airplane could have a URL written down the side of it. We were just very interested from an intellectual point of view. We were quite interested on trying to focus on that journey that digital was going to force luxury down and when we went back into our own organisations that were paying our salary we
fund absolutely (not that we didn’t find an interest in it but) we found sort of antipathy towards it and negative reaction that went far beyond digital itself. And a belief that digital was democratising luxury, and that nobody, that digital was a world of teenagers in bedrooms and that no Cartier client, no Vuitton client would ever think about talking to Vuitton digitally and it was all about the weight of the rolex watch or the stitch of the birkin bag. Digital was too impersonal a channel to talk about the really important things that luxury held dear to it’s heart. So we started V simply to understand the space that it’s. And we didn’t think there was the business there we were doing day jobs and this was our nighttime job our let’s have a glass of wine and chat through this kind of job. Where is all this going and I think we started to see digital as simply (and we continue to see digital as a channel for communication) not just as advertising or PR or VM or direct marketing or whatever it is. So the interesting part is not the channel but the content. We get into a much more interesting conversation about content. And that’s kind of where we were and we started to see a few kind of organisation trends popping up, pontificating week by week the future of retail and we were completely turned off by that and we felt that if we were going to, we would just kind of be completely fraudulent if we were just talking about what other people were doing and we thought maybe it would quite kind of fun if we started building things ourselves, sort of sticking a toe in the bath and actually playing the game rather than watching the game. So we started spinning off into sort of projects that became who we are now. And because we were so interested in that journey that digital was taking, I guess to sort of beautify digital so it became relevant to customers, that it would be driven by consumer experience and not by technology because we were interested in that area, we never wanted to have a sort of product: like Dressipi or Metail we never wanted a product, instead we wanted to explore the relevance and because of that, that’s why we’ve done so many different types of project from a wearable piece every year, a fashion show every year for brands. We do big data visualisation, we’ve just done a 3D printed AI robotic fashion show which is quite an unusual collection of ideas. And AR not so much VR, because I don’t believe in it, in retail. And so and all of it’s been driven by a consumer need and a desire to make technology beautiful.

A: I know that you said that about VR, I’m a bit skeptic too.

B: I mean I’m completely pro it, but not in a retail situation. I will be very very interested in the gaming opportunities, I mean people are talking about it from a pornographic point of view and I can see the benefits there. I think a lot of it stems from, again we’ve been on this interesting journey where we’ve worked with brands who are trying to work out what omni channel means. I mean brands that have only needed to worry about the depth of the carpet in the showroom getting fingerprints off point of sale and suddenly they’re beginning to think about mobile and kind of how it all knits together and I think because its’ so new theyre not really sure what the idea is. Historically they’ve come from quite a piss-poor way, and again this is no criticism because all of this is new for all of us we are all exploring we are all discovering and we’re all making mistakes and that’s how mankind learns. Big mistakes is a very important part of that process and I think people look at, look at these channels rather than as one channel and they look at them as three separate channels and they look at how to blur the divisions between them. When they look at blurring the online and the digital space, they think it’s acceptable to lift the online up and put it in the physical space. That’s why you get X taking websites and putting it in to store on huge ipads so that people can shop the whole space without realising that that’s not how people experience the physical store. The physical stores have tremendous attributes around touch and feel and fit and the experience and how’s it look like on me and asking sales people and humanity and social interaction but real social interaction. And a website is very good at sitting on a kitchen table and seeing as many products as you can in a short space of time so, the two don’t work together. And then they’ll do the same the other way, they’ll blur the lines of, the difference between online and mobile by taking a website and making it really really small and dropping it onto a mobile because a mobile is still a really small space/screen, forgetting that, I don’t know about you sophie but I’ve never spent more than 45 seconds on an app. But I’m constantly on an app grazing like some kind of digital sheep you know what’s the latest email, what’s the latest forecast, when’s my train going to arrive, a quick look at the new headlines, quick look at twitter, constantly jumping about between apps but with a very short attention span but often because I’m walking down Holborn with the sun trying to avoid other people so I haven’t got the ability to have a really long sort of in depth conversation with an app. But that’s how retailers do their apps, you’ve got to spend hours and hours choosing products, adding to basket and checking out. It’s quite a long process and I think it ignores the basic psychology that, and I think this ramble is relevant to your phd because it ignores the reason why people go into shops. It’s trying to artificially put in place a different way of shopping into a space where people are very comfortable shopping down one particular route and they’ve done it for years and years. And when we look at the physical space it’s about physical and we often talk about this when we talk to clients. Thinking about fit and virtual fitting rooms such as, I’m very negative at the moment, I’ll be very positive about it 30 years time, I guess my position is that if you walk into a real shop and you pick up a real item of clothing and you go down to a real fitting room and you try that product on. You want to look good looking or sexy or hot, you kind of want to look good. And if you don’t look good, you will absolutely not buy it. You will walk out of that shop as we all do. You will not buy something that doesn’t make you look good so, for me that’s where the bar is set. Not below that, at that point. I’d go further and say, that kind of digital, virtual fit, has no business being in a store unless it doesn’t just meet that criteria but betters it in someway. Otherwise what is the point just pick up a real item and try it on. And so then if we see it in store, then it becomes more of a gimmick, it’s not actually helping the purchase process but it’s a kind of gamification and something that’s fun. Maybe it succeeds on other metrics, it allows a brand to say we’re connected with digital, we’re innovative, there’s fun and experience in the shop all of that kind of stuff but lets not try and kid ourselves that it’s gonna make you more likely to buy something because if the visualisation makes a jumper look like a piece of body armour from a PlayStation four film or the shoes don’t really track you

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and everything is slightly off skew, and a bit plasticky and a bit CGI, you wouldn’t buy that if you put that real product on so I’m quite negative about that.

I’m very positive about the potential end game, but not in a physical store, so take all that technology and put it in your house and make the quality of the rendering outstanding, the tracking amazing, then great. No problem at all. But we are so far away from that, we are decades away from that. And I say that because we tried to sort of do this ourselves, we even started up a separate sub division funded, it did a joint project with London college of fashion and explored how we would do this, and then we didn’t we stuck a toe in the water and then we stopped. We realised how difficult it was and we realised actually it’s a proper grown up company in it’s own right to get all that done, and actually we were too busy doing other things. But there was some seriously odacious challenges that had to be overcome to get anywhere near that Holy Grail of is it does it at least match the real experience and then fits even worse.

A: I think that companies that are investing in the area are having to almost reposition, look at data they can gain, consumer profiling and then using that and the actual problem is that retailers themselves don’t actually record things like returns, they don’t have a big enough picture of the consumer, but they don’t even want to use that information because they would be. They also don’t have the expertise within the company.

B: you said it there, the fact that they cannot justify it on the core reason for why they started up their existence. That’s why I’m fundamentally negative about it at the moment. I’m an old fashioned retailer and analogue’s better in this space. I think there’s another thing, this is what we do this is our world trying to blend digital into physical is kind of what we do here and it’s something that really interests us. I did a philosophy degree and quite a lot of what we were talking about was that weird sort of gulf that medical science cannot bridge, which is the conscious world, I can touch my hand I can map the electrical signals going up my arm, map it going into my brain, I can see the electrical sparks in the brain but then there’s this huge gulf to be suddenly being conscious of the world around me the world between the physical and the subconscious that they’re in separate bits but somehow they’re joined. In some ways digital and physical in the store it’s the same, you walk into argos where it’s all ipads and things and you kind of forget, oh that’s a bad example because it’s kind of books or pads. But you kind of forget that at the end of the digital journey is a real item. I was in Nike in new york and you could customise your trainer and put buy. And then you kind of walk out, because the trainer’s got to be customised and shipped to you in a couple of weeks and but actually physical stores are about the real product and I’ve got to find a way of making digital end up at something physical because that’s what I walk out with and I think a lot of digital solutions forget that. People don’t buy digital products they buy real products and again I worry about that with some of these fitting room ideas.

A: I think the subjectivity of fit, I mean potentially you could have an idea where all your information on your iphone and take it and scan the product and its able to communicate to you how it will fit and I mean that’s similar to fits.me but there’s so many inherent issues with that. The way someone wants it to fit is completely different from telling them that it fits them or doesn’t.

B: I guess there’s other things too with fits.me X you’ve got to manually plug in all your details. Again what is the point, I don’t mean to be negative, I can see the point it’s a very small point. Even if you could scan yourself or be truthful and enter data properly yourself, the mannequin would modify and change it’s self then all you’ve done is basically get your body shape manually into that spot, but that doesn’t necessarily mean that that’s going to fit you because of the variances in manufacturer, you know. It’s interesting because it’s a kind of gimmick and visualised in a nice way, but does it deliver a consumer need, and I don’t mean a bit of fun, but does it really take you on the journey to getting what fits you. I’m not sure that it kind of does.

We were asked to do a project years a go for a jeans manufacturer in LA who basically made jeans for three different shapes and wanted to see if you could use an iphone to understand shape. So we weren’t trying to understand size but we were trying to see are you an apple, or whatever the shapes were. Because of that they gave us access to a chunk of size US data and it was absolutely fascinating and absolutely horrific and really got us thinking about this whole issue and made us realise that we probably better pull out and do some other stuff in another area because this was quite horrific. But as I’m sure you’ll actually know, data driven – actually see it in data form, the difference in sizes is millimetric, I mean of course it’s millimetric, a couple of millimetres here and there changes sizes. I am just thinking about my wife, that tool has got to be absolutely 100% on it every single time because there is nothing more debilitating than being told you’re two sizes too big. Just because the angle is slightly wrong or the lighting was a bit weird or whatever and actually a few sizes too small, but if every time you point your iphone at your self or in the mirror or however that works you kind of get slightly different answers each time. That’s it. That is absolutely it. There’s no way the technology is good enough for that. Not even remotely. This kind of thing isn’t just a gimmick, it isn’t just a nice bit of gamification, it isn’t kind of a piece of technology were’ talking about human beings confidence and their feeling of self worth. And that’s what this is about. It’s like Charles Revlon in the 1920s he used to say he didn’t sell the white cream that came out of the bottle, he sold the feeling that a woman has when she walks down the street and feels brilliant. I spent ten years marketing diamonds for X and you know we never focussed on the shininess of the rock, we focussed on the symbol of love or the symbol of beauty or the symbol of success or achievement and that’s the human motivation. If anything is done to upset, we tried, we spent huge amounts of money to protect the diamond being the symbol of love and this is equally important because you’ve got to look hot.

Appendix

370 Enabling the Digital Fashion Consumer through Gamified Fit and Sizing Experience Technologies
Does it do it no. Not in a month of Sundays.

A: I think it’s quite interesting because 3D body scanning that has informed some platforms has been around for so long early 2000, body metrics were doing the lazer scanning in Y which by the way was absolutely horrendous. We were doing a lingerie product for lingerie try-ons and they went through the body metrics process and they came back traumatised. We had to get the kettle on and have a cup of tea. Take all your clothes off, here’s some white underwear and here’s a huge picture on the screen of you turned into a CAD model.

We have a couple of internal mantras here, and one of them is that it’s not about the technology. The new iphone 7s out and we’ve got one here and everyone is going this is great this is fantastic look what we can do with it, but if it’s anything like the iphone 6, 5, 4, 3, 2 because we’ve done stuff for all of them. Around about Christmas time there’ll be saying its’ good but, I’m not sure, when the iphone 8 comes out it’s got a better processor and whoa what can we do with that. So the technology actually is like the reigns of the horse pulling you back, it never quite does what you want it to do. And even if it does exactly what you want it to do your mind will start to push its requirements further, because if it can do that amazing thing then what can it do if it’s a bit better so. We kind of think of the technology kind of being in the shadow of the valley. It never quite does what you want. A lot of these technology companies celebrate the technology, but it never quite does what you want it to do. And because we work with luxury, luxury has never had any patience at all for the kind of conversation that says look I’m sorry it looks kind of shit but that’s where the technology is mate. They wouldn’t be interested in that. So we’ve kind of always thought well if you’re in the shadow of the valley you want to look up at the mountain top and see the sunshine and it’s kind of creativity that gets you there. So we use consumer experience to trumping technology every time. Consumer experience is the whip that is driving the horse on and in this particular arms race, the whips is stronger than the reigns. Is got to be for these, these are tech start up firms. Will uber is a tech start up firm, ebay is a technology firms. Companies that make microchips are technology firms. When they start talking about themselves as not as a data firm either, when they start talking about themselves as a consumer based experience or something like that then I’ll start feeling happier.

A: I think as well the social side of fit, theres a lot of the psychological effects as well, I think a lot of them fail to capture that or include peers within it.

B: No.

A: Some of them are just isolated. And I think that’s a really important thing. Especially at a younger demographic. Erm it’s just something that when I’ve been looking at results and sort of classified them usability and what aspects they have, it’s a big thing that a lot of them don’t have. I think play if inherently quite social.

B: It is yeah. I mean I think Dressipi, V is doing something with Dressipi at the moment, because it’s all basically photographs and you hide behind a photograph. I’ve got no problem with any of that. But lets try and not pretend that that’s virtual try on. I’m hiding behind a photograph of a nice piece of clothing. I’m kind of seeing myself in the dress that taylor swift wore, but I’m not really seeing it. I’m not talking about fit, I’m wearing something that approximates to the pattern but I’ve got something I can share. But lets not confuse that with virtual try on. It’s something else, it’s social try on. It’s something else. It isn’t up there with what I’d consider virtual try on, but lets be honest with what it is and what it’s not.

A: I think the brand familiarity kind of gives them authority, they feel that they’ve tried X before or they know what size they are. Because I’ve tested W it’s quite an old one I think theyre developing a new one.

B: Whos?

A: Who hosts them, unless you’re loyal then it doesn’t work. I think new technologies and apps are downloadable by anyone and it should work for anyone.

B: I think that’s the issue. So what I would say, I would want to hear from a large number of girls who have the W app and live in it every day. Not once or twice because it’s fun and then I’m going to ignore it, but every single day. That’s what’s amazing about technology that works, its repeatable, you see the value. There’s probably no where on this earth that’s more terrifying or competitive than the homescreen of your phone. Your phone has limited size, limited number of apps, there was a moment not that long a go with the iphone 5 where if I wanted something new I had to throw something away. I was getting quite ruthless about, I didn’t want so many apps, where the hells the train app and then in the end you just cull down and I really looked at every single app and really it would be better if I get rid of as much of it as I can so I’m left with the stuff that I use. So really these apps have got a leap over that kind of criteria.

A: Interestingly W are not on an app

B: because the technology won’t let it work that way.
A: they need the tracking of the algorithm.
Appendix

B: people are already saying about the cost of conversion to a sale online versus an app. Omni-Channel is all of this together.

LFW started today and I’m quite interested to see what’s happening at LFW. We quite often get asked of our views on what’s happening at LFW from a tech point of view and I have to say, err in some ways thank god. But the last two or three years, there’s been very little tech. It was starting to go mad where the press was about what topshop’s doing, what Z’s doing rather than the fashion itself. But both of those organisations were taking start-ups, milking them for fashion week and sopping them immediately. Y are notorious for this, they never pay for anything. But they’ll PR them and they will PR them and they’ll PR them very generously and say where using chirp or whatever it is and as soon as LFW is finished they’re like thank you very much we gave you the PR, we got the uplift of the PR bye.

A: lifecycles in app development are getting shorter and shorter

B: it is, years to build that thing. Chirp was a file sharing device where you take a picture or image and rather than email it, or Bluetooth or airdrop it it turned it into a noise and your phone would hear that noise and unravel it. It was quite fun, but after LFW Y said thank you goodbye. Chirp thought no problem so they went to X they said you did it with Y so were not going to do it. I don’t know. At this London tech week I did a panel show and there was very little, people were talking about how many extra friends they had on facebook. Ideas that were taken and thrown away. And I just hope it kinds of have more longevity otherwise it’s just nightmarish for people such like us. That’s why we don’t get involved with fashion week at that level. We work with the BFC in other areas.

A: going a little bit back to when you said about omni-channel and it’s a discussion topic for undergrads and we walk about what is omni-channel and is it something that is achievable and who is achieving now and who isn’t. Personally I think Z is a really good example I think they’ve got the apple brains behind it for me I think so. Some people think it’s a working towards kind of thing.

B: I’m deliberately against omni-channel strategy but because everybody is for it I’m a marketing director so I’m used to differentiating when everyone think’s its good. One thing I think that is good about Z is that they deliver poorly, but I think they’re fantastically innovative. I don’t think they’re innovative in technology, their screens that everyone talks about are very simple and don’t work in their shop. But I think they’re fantastic at innovating in ideas. They’re a client of ours and X was talking to me a couple of years ago about how he saw Z as only online. I was like really. We are like net a porter and asos that we are an ecommerce company. And I said well you’ve got these shops, he said well the shops I see the shops as supporting the online. In the Z shop in regents street they have pop concerts and fashion shows and he described it as almost like a recording studio like bbc world where you can get content and push them through your digital networks and nothing can change, he still had physical stores that were selling products, he still had online presence but he swapped them around in a really smart kind of way that suddenly meant Z were different to everybody else. They are amazing at that. But I’ll be honest, when I walk in to Z and the first thing that happens is that somebodys shows me an ipad. Suddenly were looking down when we should be looking up at this architectural space that they’ve created and around at the product, we should be picking up handbags. We should be having that conversation in hyde park and yet we’re in the shop and by the way that’s not a criticism of them because everyone does it.

I’m a massive fan of newton’s third law of motion and that every action has an equal reaction. We saw luxury slowly following other markets and segments and sectors and become completely digital. The pendulum has gone too far digital and I think it’s going ot com back.

There was an amazing I read a fantastic blog a couple of years ago at Christmas and it was by Mark Zuckerberg, and he was talking about this is incredible thing he just discovered called the book. A real book. And he was like oh my god you can pick it up, you can turn pages. I kept putting it down and wanting to pick it up again. I love books. I think the pendulum is going to come back so we end up with a much more democratic Digital physical space. Where physical spaces celebrate to the physical and the digital but there is a genuine justification for each of those. The two are not fighting or trying to replace each other but working in conjunction. That no one is doing it yet and that’s fine it will happen.

A: So you think it will become more utilitarian in that way?

B: Well people talk about the end of physical Store people have been talking about the end of the high-street for years and years it’s not happened yet but not only that I would argue that Net-a-Porter and ASOS are not innovative companies at all, they were celebrated as innovative companies but they were celebrated it because they were online and e-commerce. Well, W is online and e-commerce and they’ve got a very successful site and they’ve also got these incredible stores too. By the way Net-a-Porter and ASOS don’t have. So I think that everyone else is caught up with functionality of the Net-a-Porter’s and the ASOS’s of but they’ve actually brought along with them something even more beneficial which is the physical space. Net-a-Porter and ASOS have been talking about getting physical stores for ages. eBay have their pop-up stores and so it is ironic that they’re looking for physical buildings. The people that disrupted retail online they’re now going I’m missing there’s a side to my personality that I am missing. So I think physical is the new sexy thing.
B: Virtual reality is the problem with digital is that 80% of the examples that I see in the high-street I think it does exactly the opposite of what it was designed to do. It was designed to break down the barriers and immerse customers a retail but I think it puts barriers in their. I just think that what is the point of saying to somebody that I’m going to draw you closer to the shop and then put this helmet on and cutting themselves off. And not only cutting themselves off from the shop but cutting themselves off from everybody else and making them look like idiots. And actually that’s not going to get you to that physical product I just don’t get it. There was a VR did you ever see any of the Z

B: They did they did Y. It’s not VR using headsets but you could walk through again I was having a long conversation with Y about this because I because what is Z it’s trying to it’s saying it’s making the physical accessible on a laptop that actually all it is doing is being another way of searching, it’s search engine. Say whereas on normal website you type in socks, and you’ll find socks using X you’ve got to walk into the shop and think socks probably probably downstairs click click walked down walked down walk down right Zoom left socks no zoom right. It forgets why, and you can’t pick up the socks, it kind of forget it’s that whole issue of of Actually the website does what it’s designed to do really really well from your kitchen table which is get to products really really quickly. You can’t get to product really really quickly in the physical store. You’ve got to walk around it but it gives you other benefits but just being able to walk around by the way you’re not walking around X you’re still at the kitchen table. So even if you could VR helmet on and walk around X people say and you’re walking around W but your not you’re sitting on the sofa on Saturday morning in your pants with some cornflakes you are not in W and the whole conversation with VR comes back to contents because did you ever see that film inception it’s really good film but I was completely I moved by CGI I saw the CGI and I’d go that’s very clever CGI but I didn’t feel like the whole world was changing and morphing I just got there the CGI. So even though it’s an amazing film the immersive elements to me just left me kind of cold. I was impressed I didn’t kind of feel that’s because the film didn’t draw me in the storytelling of the content didn’t draw me in. And I was watching 1930s King Kong with the kids and you really getting there. JJ Abraham when he shot the last Star Wars film said that most of it that he shot using models. Because when you take a kind of model of the spaceship and you put lights on it it kind of looks real but he said CGI often looks kind of flat and I think it’s the same with all of these things. The fact that as a girl from Samsung on the panel I was speaking on was saying that you could have a fashion show on the moon my response was first of all, explain to me why it’s good to have a fashion show on the moon, but secondly you’re not I moon. I know I’m sitting on my sofa and that’s quite a difference Y I don’t think Will survive I really don’t it’s a one trick pony.

S: It’s interesting how a lot of retailers scrabble towards that’s next that’s me but like what you’re saying it’s almost like a much more thought out process that needs to go into it.

B: If every retailer had X then I’m wrong that’s not happened and that’s not going to happen and they’ve got a few clients. I mean knowing W they probably did it for free offer very little cash. When somebody says do you know I don’t want to typing socks into a search engine I will shop from W because I can walk into that physical shop and buy. When that happens I am wrong, but I not seen That happening yet it’s just putting up barriers putting more steps and it doesn’t do with the physical Store does. I don’t smell I don’t see it I don’t feel I could be watching a YouTube video.