Shopping in Virtual Reality: A study on consumers' shopping experience in a stereoscopic virtual reality

Kung Wong, LAU
Institute of Textiles and Clothing
The Hong Kong Polytechnic University
Hung Hom, Kowloon, Hong Kong
tcrobert@polyu.edu.hk

Pui Yuen, LEE
School of Design
The Hong Kong Polytechnic University
Hung Hom, Kowloon, Hong Kong
py.lee@polyu.edu.hk

Abstract

The popularity of home-based stereoscopic television provides researchers and practitioners with possibilities of bringing stereoscopic virtual reality (StereoVR) at consumers' home. To further the investigation on the potential development of applying StereoVR in retailing, this research focuses on understanding consumers' shopping experiences in this new platform. The research team believes that the use of StereoVR has potentials to become a new arena for interactive business. To explore these potential uses of technology in retailing, the team designed and built a StereoVR, called "FutureShop", for implementing a virtual fashion retailing practices as well as collecting consumers' responses for further development. Participants are asked to complete a shopping process from product selection to purchase in FutureShop. The factors examined in this research included the consumers' purchase intention, interactive shopping and hedonic shopping experience. The findings and implications suggest that the StereoVR can make a significant contribution in creating more interactive experiences for apparel retailing by enhancing consumers' hedonic shopping experiences in the StereoVR.

Keywords: Virtual Reality; Stereoscopic Displays; Consumer Research; Retailing; Shopping Experiences

1. Introduction

Mainstream retailing had been shifting from traditional shopping channels to virtual reality (Grewal, Roggeveen and Nordfält 2017). Virtual worlds (for example SecondLife, See Pantano and Laria 2012) had also been taking advantage of the traditional limitations of brick-and-mortar shops setting, delivering unlimited selections of merchandizes along with various powerful recommendation systems. Obviously, compared to brick-and-mortar shops, all virtual channels offer wider collections, and are not confined to limited shelf space. Likewise, as the expectations of consumers on online shopping platform have been raised currently due to the emergence of diverse digital shopping channels such as virtual reality (VR), augmented reality (AR) and mobile technologies (MT), these platforms are more focused on enriching the consumers' hedonic shopping experiences (Ben-Ur, Mai and Yang, 2015) instead of the following traditional consumers' attributes namely convenience and discount prices that online shopping platform was provided. In this case, it is therefore consumers have found the traditional check-list-based and two-dimensional (2D) display of merchandizes on web-based shopping practices are insufficient to provide them with a hedonic shopping experience as what Goldsmith and Fylnn (2005) have been highlighted earlier. Apparently, online merchandize presentations are normally displayed in 2D images and/or plain texts, which causes discrepancies between the display sizes and the actual size, color and quality of the merchandizes. Some research (e.g. Varajão and Morgado 2012; Ha, Kwon and Lennon 2007; Park and Stoel 2002) have indicated that most of the apparel retailing are still remain 2D presentations. Indeed, these static presentations of merchandizes are difficult to reach consumers' expectation on hedonic shopping experiences.

The rapid development of technologies allow consumers to experience their shopping process from the traditional 2D online platform to a completely new stereoscopic virtual reality. This innovation is potentially attracting new consumer segments that those traditional online business environments might not able to reach. Therefore, the use of StereoVR for retailing is expected to blur the line between real-life and online shopping because of its characteristics such as interactivity, sensory feedback and immersive experiences (e.g. Smolentsev, Cornick and Blascovich, 2017). Some researchers (e.g. Kaewrat and Boonbrahm 2017; Park, Lennon, and Stoel 2003) have

indicated the use of stereoscopic displays may help to reduce the risks associated with purchase decision from the online shopping sites, for instance the product identification. Based on this assumption, retailing business derives benefits from technologies, like stereoscopic displays, that are capable of providing more details of merchandizes, interactive interfaces, immersive feelings and sensory feedback to consumers (e.g. Huang and Huang 2013; Puccinelli et al. 2009; Diep and Sweeney 2008) and more user-centered shopping experience (Newsom et al. 2009). This new virtual shopping process could be expected to enrich consumers' hendonic shopping experiences and help them to reduce perceived risk. Therefore, this research has begun to focus on the studying this new platform in retailing in order to deepen our understanding on consumers' experiences in virtual worlds.

Most of the studies dealing with VR have been technical in focus. Although there are significant advances in both theoretical and methodological aspects of using virtual reality for businesses development (e.g. Smolentsev, Cornick and Blascovich, 2017; Satam, Liu and Lee 2011; Kenkare, Lamar, Pandurangan and Eischen 2008), to date there have been very few attempts of applying a StereoVR in retailing, be specific, apparel retailing. Different from previous research, this research paid particular attention on apparel consumers' shopping experiences within a designed StereoVR. Despite looking at the technological solution of applying virtual reality in apparel retailing, the research team aims to understand the actual shopping experience and the consumers' purchase intention in apparel shopping as well. This research also addressed the differences between online shopping experiences and virtual shopping experience in the StereoVR by drawing experienced (web-based shoppers) consumers in the experiment. The findings are expected to potentially contribute to the future development of apparel and other retailing practices in the StereoVR and other computer-simulated environments.

As mentioned, the research team designed a virtual retailing shop (See figure 1), which is a simulation shop with the application of StereoVR, called "FutureShop". The shop is built with the Autodesk software Maya, which is a software specializing in stereoscopic modeling, animation, rendering, and visual effects. After creating all the hardware inside the FutureShop, the research team used the 3DVIA Virtools to establish the interactive features, which are also the key component of the shopping

experience in the shop, such as the controlling system, interface control of items etc. Virtools is a powerful tool in designing interactive stereoscopic content and building prototype. The overall budget of building this FutureShop is approximately US$ 12,000.00.

In this experimental virtual platform, invited participants were allowed to experience the entire shopping process from product identification to making purchase decision (just like the way they did over the brick-and-mortar shop and web-based shopping platform). The key features of the FutureShop are the stereoscopic displays of merchandizes, real-time interactivity, and immersive experiences. The interaction design are promising to play a vital role in enriching the virtual reality and have profound effects on the user's performance and sense of immersion (Ullah et al. 2009). The level of stereoscopic display of a virtual reality is normally measured in terms of believability, which has the essential elements of immersion, presentation and interaction (Coxon, Kellym and Page 2016; Magnenat-Thalmann et al. 2005). It is therefore essential to increase the participants' sense of immersion in any virtual environment. The interactions in the FutureShop involved not only the stereoscopic displays of fashion merchandizes but also the incorporation of spatial, music and lighting effects in order to enrich consumers' hedonic shopping experiences.

Figure 1. The FutureShop

2. Theoretical Background and Hypotheses Development

Technology and Consumers' Experiences

The emphasis of this research is placed on the setting of visual merchandising within the virtual environments. Pegler (2001) defined visual merchandising as product presentation that communicates product concepts with customers so as to entice them to buy from the store on a sustainable basis. Researchers (e.g. Ben-Ur, Mao and Yang 2015; Pine and Gilmore 1998) argued that a merchandize purchase is not the purchase of a physical product itself but of a hedonic consumption experience that the product affords. Therefore, it is often understood that visual merchandising is not only a

method of product displaying, but also means creating a hedonic shopping experience for consumers. Visual merchandising works effectively in apparel retailing practices. This has also been represented in the retail context by the idea of shopping as solving problems (Sherry et al. 1993) versus shopping for entertainment and enjoyment (Babin et al. 1994). Hedonic hopping experiences that involve positive emotions have been linked to several important outcomes, such as increased time spent in the store, increased spending and increased unplanned purchasing (Babin et al. 1994; Jones 1999). Effective merchandise displays may guide consumers to make purchase decision (e.g. Huang and Huang, 2013; Pegler 2001). Store appearance, functions, store decoration, store atmosphere, lighting effects, music effects, layout, and server installations should be improved continuously to provide a hedonic consumers' experience.

With the aid of virtual technologies including the online and mobile platforms, and other mentioned stereoscopic technologies, the way consumers shop has changed dramatically in the past decades. Consumers are able to shop via the Internet in addition to the brick-and-mortar shops. The virtual technologies has become a major marketing channel to expand business opportunities in all fields. A growing number of traditional companies use the virtual technologies as a channel to support or enhance their marketing and sales practices, and are adopting multi-channel strategies for retailing (e.g. Saren, Harwood, Ward and Venkatesh 2013; Bradford, Grier and Henderson 2017; Müller-Lankenau and Wehmeyer 2005). When compared with the traditional brick-and-mortar shopping channels, information availability and content are perceived as key benefits of online shopping (Kim et al. 2006). There is evidence that window-shopping and finding information about merchandizes and services are significant in all kind of virtual activities (e.g. McKone, Hasleghurst and Steingoltz 2016; Kimiloglu 2004). The current web-based online shopping practices might not fulfill consumers' needs especially in apparel retailing completely. Consumers need information about cost, size, colors, feel and even style trends when they are shopping over virtual platforms. Besides, shopping for fashionable products is a way for consumers to identify their expected lifestyles. Lifestyles are always represented as the patterns in which people live and spend time and money, reflecting a person's activities and opinions, as well as interests (Blackwell et al. 2001 p.219). However, the web-based shopping activities are not the same as their natural shopping activities

over brick-and-mortar shops. Most existing shopping websites provide an effective way of information searching rather than providing consumers with a hedonic shopping experience. The aforesaid quality of information might not be able to deliver to consumers due to the technical limitation of the existing web-based shopping platforms. It is therefore a need to seek for alternative virtual technologies that could possibly "simulate" the consumers' real-life shopping experiences. In this case, the application of the StereoVR and its technologies in apparel retailing could be an innovative attempt, bringing our consumers to a complete new shopping arena with sense of immersion and hedonic experiences.

The StereoVR

The StereoVR is a family member of the VR, but with the emphasis on stereoscopic technology and sense of immersion. VR is defined as a real or simulated environment in which a perceiver experiences (Steuer 1992). Among previous researchers in the concept of immersion, Sherman and Craig (2003) defined immersion, sensory feedback and interactivity as the three key experiences in VR environment. Interactivity, in VR, is often described as the ability of the user to move within the virtual environment and to interact with the objects. Immersion refers to the feeling of being engaged deeply in a virtual environment as if it were the real one, encompassing vision, hearing, taste, smell, and touch (e.g. Elgan 2017; Ragusa and Bochenek 2001; Bystrom et al. 1999).

During the last two decades, VR has been used extensively in various fields of industry (Kugler 2017; Sanna et al. 2004) as well as having been adopted widely in scientific, medical and educational fields. VR can be considered as a meaningful technology for improving the consumers' hedonic shopping experience. VR is possible to address the limitations of web-based e-commerce, and expand the range of e-commerce possibilities. In the early stage, Chittaro and Ranon (2000) indicated four strengths of VR technology brought into effect by retailing and e-commerce practices: (1) the VR shopping experience is more similar to the real-life shopping experience; (2) the VR supports the consumer's natural shopping actions such as touring around the store freely; (3) the VR environment provides more immersive and interactive shopping experiences, and could satisfy the consumers' emotional needs; (4) the VR

environment can improve social communication among consumers, by allowing them to meet and interact with others through avatars or other agents. The StereoVR could works even more by allowing the combination of the stereoscopic spatial illusion, interaction and simulated sensory feedback. However, to date there has been very limited research on the use of StereoVR in apparel business and retailing. The research team believed that the use of StereoVR in apparel retailing could possibly simulates and/or enhances consumers' shopping experience in the real-life shopping.

The Framework and Hypotheses

This research involved the design of the FutureShop and testing its validity in improving consumer interaction in comparison with online shopping. The objective is going to find out how the characteristics/factors of applying the StereoVR in shopping process that relates to consumers' purchase intention. Our team assumed that the FutureShop is able to keep abreast with contemporary lifestyle trends of targets and reflect in stereoscopic product displays, interactive interfaces and a computer-simulated environment, leading to better interactions between consumers and mechanizes. The hypotheses focused on furthering our understanding on the relationships among purchase intention, interactive apparel shopping practices in the StereoVR, and the hedonic shopping experiences.

H1:   The StereoVR enhances consumer's purchase intention in apparel shopping.

Shopping motivation could be used as a basis for the development of any marketing strategies (e.g. Park, 2017; McGoldrick 2002). It is indeed one of the important concepts in research on consumer shopping behavior (Wagner 2007). Hirschman and Holbrook (1982) described earlier that consumers are either problem solvers or seekers of fun, fantasy, arousal, sensory stimulation, and enjoyment while they are shopping. It implies that the consumers' purchase intention in a brick-and-mortar shops or the web-based shopping platforms are influenced by both functional motives (making a good choice) and hedonic motives (enjoyment of the shopping process) (Childers et al. 2001). The hedonic experience during the shopping process has been indicated as an important motivator in real-life (Babin et al. 1994) and web-based

shopping practices (Childers et al. 2001). Moreover, some research in luxury goods and fashion products (e.g. Widyarini and Gunawan, 2017; Nwankwo, Hamelin, and Khaled, 2014) had highlighted the positive relationship between motivation and purchase intention on apparel retailing. Moreover, Pegler (2001) also emphasized that effective merchandise displays can enhance communication about product concepts and eventually guiding consumers to make purchase decision. In the StereoVR, the simulated virtual shop environment is expected to provide consumers with significantly more attractive and enjoyable shopping experiences.

H2:   The StereoVR provides an interactive shopping experience.

Hoffman and Bateson (1997, p.6) suggested earlier, *"when a consumer purchases a service, he or she purchases an experience"*. Thus, consumers' value perceptions are mainly based upon the interactions involving either direct usage or distanced appreciation of goods and services (Mathwick et al. 2001). Consumer's experience is an individual experience, and it is the sum of all experiences that a consumer has with a supplier of merchandizes or services. Differently, an interactive shopping experience is the consumer-oriented experience focusing on the interactions between people and merchandizes, and the hedonic experience that aims to fulfill the consumer's physical and psychological needs. As mentioned before, the entire consumers' shopping experiences should be upgraded from 2D product displays to a stereoscopic display of merchandizes. Therefore, the research team believes, consumers can enjoy the store atmosphere as if they are in the brick-and-mortar shopping practices; for example, they can listen to music, lighting effects, enjoy the communications with other consumers and sellers. Thus, the future development of retail shop design in the StereoVR should be more customer-experience focused rather than drawing upon product lines and standalone retail displays. In this FutureShop experiment, participants are able to change the lighting effects, music, atmosphere and even the visual merchandising setting in order to enrich their hedonic shopping experiences.

H3:   The StereoVR provides consumers with a hedonic shopping experience.

As suggested by Dahan and Srinivasan (2000), a stereoscopic animated presentation

can mimic the consumers' experience as in the brick-and-mortar shop. Most of the web-based shopping interfaces are 2D graphic/photographic displays, this brings a huge visual difference in identifying and exanimating merchandises when comparing to traditional shopping practices. Whereas, with the help of visual, music and hand-held controller, consumers in the StereoVR are able to interact with high-resolution stereoscopic images, hearing stereoscopic sound effects, and feeling and interacting with objects in this simulated platform. Another key feature distinguishing the StereoVR from web-based shopping is the reinforcement of "interactivity" in presenting multi-modal product information. In any virtual shop, modality richness provides a means for mediated forms of communication (Jin 2009). Hence, the virtual reality supports more naturalistic shopping activities than the web-based shopping sites do, and the extent and variety of interactivity in virtual worlds is well beyond that of consumer interaction with websites (Ben-Ur, Mai and Yang, 2015; Hoffman and Novak 2009). It is therefore, the research team tried to understand, to what extend, the interactive shopping experience and the reinforcement of the StereoVR could possibly facilitate consumers' purchase intention and enriching their hedonic shopping experiences. In other words, how H2 and H3 are correlating with H1.

3. Research Method

Research Design

The sampling of this research targeted the populations who have regular apparel shopping habits in both online and offline settings. The participants are shopping for apparel at least once a month, and have rich experiences over web-based shopping practices. There were no restrictions in the participant's occupations, ages or gender. The research team was purposefully chosen pedestrian to approach on the street beginning with a self-introduction. The team then explained the objectives of the project, making sure each participant understand and accept that this is a volunteer participation, as well as the ethnical issues (with a consent form). Thereafter, researcher brought each participant to the laboratory in the University for the FutureShop experiment. A briefing section was offered on the operation of relevant devices before the experiment starts. Each participant was given a 30 minutes visit to

the FutureShop and complete the entire shopping process from (1) customized their shopping environment by changing music and lighting effects, (2) product search and identification, (3) checking product details, (4) comparing products, and (5) purchase the product. Each participant was only allowed to purchase merchandize based on a set budget. In other words, participants were asked to select merchandize carefully based on the offered amount. This act avoided participants to make their decision without deliberate consideration. Then in the second part of the survey, each participant was required to complete a 33-item questionnaire covering the purchase intention and their interactive shopping experiences. The research team targeted to receive about 60 valid questionnaires for statistical analysis (59 valid responses had found eventually). Please be noted that every participant should attend the simulated experiment in the FutureShop before the survey can be conducted.

Building the FutureShop

It is important to understand visual merchandising, product presentation and consumer shopping activities in a brick-and-mortar shop when designing the interface and interior of the FutureShop. As discussed above, visual merchandising could improve the communication between products and consumers in order to facilitate consumers' shopping process. Previous studies have found that the effective merchandise visual displays could facilitate consumers' decision making as well (Pegler 2001). The more information the retailers can offer through the visual displays, the more motivation that the consumer could obtain in their shopping process (Khakimdjanova and Park 2005). The more user-friendly and attractive the virtual environment could offer, the higher the consumer satisfaction could reach (Lee and Chung 2008). The size of the FutureShop was around 1000 square feet in virtual space. The product categories were displayed with a gender unbiased intent. Table 1 shows the products available in the FutureShop.

Table 1. Product categories in the FutureShop

The Experiment

The participants were invited to experience the virtual shopping process in the FutureShop for about 30 minutes. Participants were asked to apply their previous web-based shopping experiences to evaluate and examine this virtual shopping environment. In able to provide participants with a more sense of immersion and interactivity during the process, the participants were given three devices, they are (1) a head-mounted display, (2) a hand-held controller, and (3) an interactive stepping board. The head-mounted display could supply stereoscopic visualized images and the sense of immersion in the VR; the hand-held controller could provide a user-friendly interaction when participants were browsing and exanimating the virtual objects (See Figure 2). Participants were simply move their hand (with the controller) for making commands to the system, for example the participants could select the merchandise, zoom-in and –out to view the product features, rotate and view the products from different angles, buy the items they wanted, as well as changing the music and lighting effects. The interactive stepping board provided participants with a chance to tour around the shop freely. Table 2 summarizes all features are available for the participants' manipulation. The FutureShop contained four features and attributes that allowed the participants to access and change their shopping experiences during their process; for instance, they could change the visual features by rotating and zooming in and out on the selected category of merchandises; they could access the product information including the price, item code, size and fabric details; they could change the ambient manipulations such as preloaded music list (See Figure 3); and they could access the buying features including the shopping cart and shopping list. It is important to note that the research team did not provide participants with a 2D web-based shopping platform for comparison since all selected participants are supposed to have rich experiences over online shopping.

Figure 2. Process of experiment
Figure 3. The details of the clothes
Table 2. Features available at the FutureShop

After the 30 minutes of virtual shopping process in the FutureShop, the participants were invited to complete a questionnaire, on paper, to comment on their shopping experiences. The questionnaire consisted of four sections (See appendix A), they are (1) general information of participants' particulars, (2) post-tour survey of purchase intention, (3) post-tour survey of interactive experiences, and (4) comments on overall experiences. To be specific about these 34 questions, the Section A consisted of general information (7 questions). This section is going to understand the participants' personal information and the previous shopping experiences. The Section B is the post-tour survey on purchase intention with a total of 12 questions on investigating participants' purchase intention in the FutureShop. In other words, the team is looking for the impact of the FutureShop on the consumers' purchase intention. Consumer's purchasing process constitutes of five stages namely Need/Desire, Pre-purchase activity, Purchase decision, Use behavior, and the Post-purchase feelings. In this section B, the team begin with questions Q8-Q11 that asked for the quantity of items bought, types of items bought, as well as participants' opinion on the product range selection and time frame given. Questions Q12 to Q14 asked for participants' opinion on product information adequacy; their attitude in purchasing product with the absence of physical try-on; also their attitude towards the absence of price bargaining. Whereas questions Q15-Q17 focuses on the lack of social interaction such as consultation with sales and friends; brand identity in the FutureShop; and participants' attitude to familiar brands offering in the FutureShop. Q18 asked for participants' attitude toward the purchase intention in the FutureShop with the scale ranging from "difficult and uneasy" to "smooth and effective". Thus, the section B has addressed the hypothesis H1- The StereoVR enhances consumer's purchase intention in apparel shopping.

The hypothesis H2 and H3, regarding the interactive and hedonic shopping experience, would be addressed in sections C and D. A five-point Likert scale ranging from "strongly disagree" to "strongly agree" is employed for the 11 questions (from Q19 to Q29) in section C, and 5 mixed-scale questions have been applied in section D (from Q30 to Q34) to measure the participants' perception of the interactive and hedonic shopping experience. Regarding the use of the five-point Likert scale instead

of the seven-point, the research team is expected to increase the response rate and response quality by reducing participants' choices. The order of questions is divided into two subsections where Q19-Q22 addressed the hypothesis H2-The StereoVR provides an interactive shopping experience, and Q23-Q29 focuses on hypothesis H3-The StereoVR provides consumers with a hedonic shopping experience. Meanwhile, the order of questions in each subsections are asked in a sequence from macro to micro beginning with questions relating to the general feeling towards shopping experience or experience in the FutureShop as a whole, such as Q19 is asking for participants' opinion in the importance of this interactive shopping experience, Q23-24 are looking at the overall hedonic factor in participants' experience in the FutureShop. Then in the subsection of (H2) in Q20-21, the team asked participants' on customization of ambient factors, navigations and information system respectively and correlate with the result in Q24 where the team asked participants whether the FutureShop can provide them a hedonic shopping experience.

The H3 is the crucial study on the comparison of traditional web-based shopping and this new virtual shopping practices, the research team concerns about the lack of social factor in this interactive experience could bring negative influence on the consumers, therefore in Q25 measures participants' attitude on the statement "Your apparel shopping experience in the FutureShop is NOT hedonic due to the lack of interpersonal communication *(e.g. sales, friends, other customers, etc.)*". The Q26-28 measures participants' attitude on the statements "stereoscopic visualization feature of selected product can enrich your apparel shopping experience in the FutureShop"; "A spacious StereoVR can enrich your hedonic shopping experience"; and "our virtual shop is spacious enough". Similarly, Q29 asked participants whether they think all functions (e.g. stereoscopic displays, interactivity, sense of immersion) in FutureShop are equally important to provide you with a hedonic fashion shopping experience.

Last but not least, the questionnaire aims to study the overall hedonic experience of participants in the FutureShop, the key questions are characterized into terms like "Easy"; "Fun"; "Exciting"; "Innovative" and more. The research team also asked for the opinions on the future development of the FutureShop.

4. Results and Analysis

There was a total number of 59 participants invited to participate in this virtual experiential research. The proportion of respondents was 33 females (55.9%) and 26 males (44.1%), which is similar to the ratio of female and male consumers in Chinese societies. In this research, 58 participants (98.3% from 59 sets of valid questionnaires) were in the age group 18-30. 39 respondents (64.4%) said they shop for apparel more than three times a month, and 46 respondents (74.6%) spend under 29% of their monthly income on apparels. According to our research, 46 respondents said they have had rich web-based shopping experiences before, of whom 13 participants (22%) considered themselves to be frequent online shoppers. According to Table 3, most participants described their experiences in the FutureShop as innovative (5.29), fun (5.14), exciting (4.95), adventurous (4.64), appealing (4.64), and free (4.59). There were 40 participants (66.1%) who agreed (52.5%) or strongly agreed (13.6%) that the FutureShop's shopping experience has the potential to outdo traditional web-based shopping sites. 27 participants (44.1%) agreed or strongly agreed that apparel shopping in the FutureShop could supersede brick-and-mortar apparel shopping in future. However it is worth noting that the majority of the respondents thought that their experiences within the StereoVR were difficult; 23 out of 59 reported feeling a bit uncomfortable physically during the visit. 13 participants felt dizzy and 14 reported instability in navigating around the "FutureShop" using the stepping board. Many of the participants suggested that better technology is needed.

Table 3. Data description of the study

The Pearson correlation method was used to explore the correlations between purchase intention and interactive shopping experiences in StereoVR. The Pearson correlation can reveal a linear relationship between two selected factors, with correlation coefficients closer to +1 meaning a stronger positive linear relationship, closer to -1 meaning a stronger negative linear relationship; and closer to 0 meaning no linear relationship. In the following results those with correlation coefficients greater than .500 (2-tailed) will be treated as having a strong tendency in resembling a linear relationship. The hypothesis H1 explored whether product arrangement and enough product information, brand identity and experiential aspects could enhance consumers' purchase intention. The results indicate that 44 participants (72.9%)

bought fewer than 2 items and far below the provided budget during their 15-minute tours. The 44 participants thought that 15 minutes of visiting time within the FutureShop was sufficient, however 33 participants (52.5%) found that the product range provided in the virtual apparel shop was insufficient. The Pearson correlation results show a significant positive correlation between the brand familiarity and the purchase intention ($N=59$, $r = .429$, $p<.010$). This is a strong positive relationship for non-online consumers, ($N=15$, $r=.649$, $p<.010$). For the experiential aspects, it was found that a hedonic shopping experience enhances the purchase intention ($N=59$, $r=.333$, $p<.050$). For the interactive apparel shopping experience in the FutureShop enhanced consumers' purchase intention significantly ($N=15$, $r=.521$, $p<.050$) when comparing to the online shopping. Finally, a spacious enough experience in the FutureShop has positivity enhanced the participants' purchase intention ($N=59$, $r=.329$, $p=.050$) than the online shopping does. With the breakthrough of plaintext and 2D images, this factor was found to be significant for frequent online consumers' purchase intention ($N=13$, $r=.617$, $p<.05$). However, the stereoscopic visualization does not appear to be correlated with purchase intention in this research (online consumers: $r=.221$, $p>.050$; overall participants: $r=.136$, $p>.050$).

Hypothesis H2 examined whether various features in the FutureShop, like interpersonal communication, audio and visual enjoyment, had significant correlations with the interactive apparel-shopping experiences. The participants reported that a shopping experience was interactive and hedonic through music and lighting effects in the StereoVR offered them a sense of a interactive apparel shopping experience comparing to web-based shopping practices ($N=59$, $r=.510$, $p<.010$), which was also found to be a strong positive relationship in this experiment ($N=13$, $r=.778$, $p<.05$). Regarding hedonic experience, a shopping process with fun value correlated for the overall participants ($N=59$, $r=.395$, $p<.010$), as well as for the web-based shopping practices ($N=15$, $r=.558$, $p<.050$), and was close to a strong correlation for the rare virtual shopping practices in the FutureShop ($N=30$, $r=.443$, $p<.050$). Interpersonal communication in the FutureShop correlated with the participants' interactive shopping experiences ($N=58$, $r=.384$, $p<.05$).

Hypothesis H3 explored whether the stereoscopic features of the shopping experience could provide customers with a hedonic shopping experience, and whether the

shopping in the FutureShop has the potential to outdo web-based shopping practices. According to the research results, the interactive apparel shopping experience was generated with positive correlations (N=58, r=.611, p<.010) and a shopping experience with fun (N=58, r=.519, p<.010) were both found to have significant positive correlations with a hedonic shopping experiences. The simulated environment generated a sense of immersion in a spatial environment for all participants (N=59, r=.351, p<.010), while frequent online consumers (N=13, r=.708, p<.010) were correlated significantly. Hedonic experience, such as fun (N=59, r=.519, p<.010) and enjoyable (N=58, r=.281, p<.050) experiences also correlated significantly with the hedonic apparel shopping experience, especially welcomed by the respondents with frequent web-based shopping practices (N=26, fun: r=.689, p<.010; game-like: r=.447, p<.050). The stereoscopic visualization features of selected products (N=59, r=.373, p<.050) and the customization of music and lighting effects (N=58, r=.311, p<.050) also had significant correlations with the hedonic shopping experience in the FutureShop. In addition, a result worthy of consideration is that all participants agreed that shopping in the StereoVR would supersede real-life apparel shopping (N=58, r=.317, p<.050): the 18-30 year-old participants (N=51, r=.360, p<.010), and female participants (N=32, r=.615, p<.010) had significant positive correlations with the statement that the StereoVR has the potential to outdo traditional web-based shopping practices.

Moreover, it is important to note that the results retrieved from Pearson correlation tests were a linear tendency for respondents to agree that the FutureShop provided an interactive apparel shopping experience as well as a fun one when comparing to the traditional web-based shopping practices. A spacious virtual apparel shop and stereoscopic visualization features of selected products enriched consumers' hedonic shopping experience that might not able to obtain from traditional shopping practices. However, it is worth noting that some of the participants thought that their shopping experiences within the FutureShop were difficult, as some of them felt dizzy and found it difficult to control the device. The answers and suggestions given by the participants inspired us a better understanding of the consumer's shopping motivation, shopping behavior and experiences in the StereoVR.

All in all, these significant results obtained through the Pearson correlation provide

useful insights in exploring the consumers' shopping experience in the StereoVR as well as giving researchers many meaningful solutions for guiding the development of the StereoVR. First, shopping with familiar brands, fun shopping experiences, and good spacious experiences may contribute to raising purchase intention in the FutureShop. The results are consonant with the findings reported by other researchers who indicated that brand-name has positive relationships with perceived value, store image and behavioral intention (Park and Lennon 2009). Brand-name mark ups are particularly pronounced in the apparel industry, where functionality is less important than the brand's signal of style and exclusivity (Kort *et al*. 2006). Familiar brands offer participants a sense of security on item selection on top of the stereoscopic item presentation. Second, the FutureShop is able to provide consumers with an interactive shopping experience when comparing to traditional web-based shopping practices. The background music, lighting effects, fun shopping experiences and interpersonal communication in the FutureShop were essential in the apparel shopping process virtually. Third, the FutureShop offers more enriched apparel shopping experiences than web-based shopping. For instance, as indicated before, a spatial environment with an immersive feeling and stereoscopic visualized products can enrich the apparel shopping experience for consumers consumers. The FutureShop has been empowered and reinforced by the features of computer-simulated environment and the stereoscopic product visualization. These features provided consumers with a strong sense of immersion.

5. Discussions and Conclusion

The research explored how to provide an interactive and hedonic apparel shopping experience in order to enhance consumers' satisfaction and raise their purchase intention. The results of this study provide readers with an empirical support for applying the stereoscopic displays, interaction, and computer-simulated environment to future virtual shopping practices. In this research, most of the participants described their hedonic shopping experiences in the FutureShop as innovative, fun, and exciting. The results found that most participants agreed that the StereoVR (the FutureShop) has potential to outdo the traditional web-based shopping practices and will blended the consumers' apparel shopping in the real world. However, there are

still some limitations in this research, such as no significant interpersonal communication in the overall adoption process of the FutureShop, no fitting function and virtual try-on activities provided for consumers during their shopping. Strategies to address these limitations will be developed in our next step of the research. From a managerial perspective, it is also very important that many consumers had indicated that there was no virtual fitting function for them to try on, exanimate the merchandizes during their virtual shopping process. In order to provide retailers with new implications to solve this problem, there are currently many new technologies could possibly embedded into the StereoVR, for instance the stereoscopic scanners, namely the BodyMetrics (Brown 2012), try to help retailers to solve the fitting problems. Product visualization technologies such as Virtual Try-on have the potential to revolutionize virtual apparel shopping (Kaewart and Boonbrahm 2017; Kim and Forsythe 2008).

To summarize, the contribution of this study is its provision of empirical data about an interactive and hedonic shopping experience in the StereoVR (FutureShop). The research findings indicate that the FutureShop is one of the possible solutions, which can;

- Enhance consumers' purchase intention (H1 Accepted)
- Provide consumers with an interactive shopping experience (H2 Accepted), and
- Enrich consumers' apparel shopping experiences in the virtual world with hedonic shopping experiences (H3 Accepted).

The results of this study are consistent with other researchers' findings which reported that hedonic experiences in apparel shopping provided by interactive technologies resulted in stronger purchase intentions than did passive product presentations on the traditional web-based shopping practices (e.g. Tae, Chan and Sukki, 2015; Drake-Bridge et al. 2011; Goel et al. 2011; Nah et al. 2011; Klein 2003; Schlosser 2003). The StereoVR expands the limitations of online shopping significantly in terms of sense of immersion, interactivity and vividness. The technology innovativeness has significant moderating effects on the relationship between attitude and the use of the virtual apparel store.

Future studies could continue the consumers' shopping motivations and compare their perceptions of various product visualization technologies for product evaluation and entertainment in virtual shopping practices. The opinion from store-owner and/or professional computer programmers are also being an essential part for further investigation. Furthermore, a well-organized virtual shop is required to support product presentations and create store atmospheres similar to those in real-life retail stores. Moreover, interpersonal communication and virtual fitting functions will be developed in virtual apparel retailing to improve interactions between consumer–to-retailers and consumer-to-consumers. Nonetheless, it may be beneficial to retailers and other managerial domains to consider consumer's shopping experiences in the design of StereoVR based on the findings of this research. This research demonstrates its value from giving other researchers a better understanding on consumers' shopping experience in the StereoVR. The findings of this research provided academics and marketers with an empirical evidence that the use of StereoVR is promising to enhance consumers' purchase intention and to enrich their hedonic shopping experience.

References

Adner, R. (2002) When are technologies disruptive? A demand-based view of the emergence of competition. *Strategic Management Journal*, 23(8), 667-688.

Babin, B. J., Darden, W. R. and Griffen, M. 1994. "Work and/or fun: Measuring hedonic and utilitarian shopping value," *Journal of Consumer Research* (20:4), pp. 644-656.

Ben-Ur, J., Mai, E. and Yang, J. (2015) Hedonic Consumption in Virtual Reality, *Journal of Internet Commerce*, 14(3), 406-423.

Blackwell, R. D., Miniard, P. W. and Engel, J. F. 2001. *Consumer Behavior,* 9th edn South-Western, Mason, OH, p. 219.

Bradford, T. W., Grier, S. A. and Henderson, G. R. (2017) Weight Loss Through Virtual Support Communities: A Role for Identity-based Motivation in Public Commitment, *Journal of Interactive Marketing*, 40, 9-23.

Brown, R. (2012) Bodymetrics deploys digital matchmaker, *Wonmen's Wear Daily* (March 21).

Bystrom, K. E., Barfield, W. and Hendrix, C. 1999. "A conceptual model of the sense of the presence in virtual environments," *Presence: Teleoperators and Virtual Environments* (8:2), pp. 241-244.

Chandy, R., and Tellis, G. J. (1998) Organizing for radical innovations: The overlooked role of willingness to cannibalize. *Journal of Marketing Research*, 35(4), 474-487.

Childers, T. L., Carr, C. L., Peck, J. and Carson, S. 2001. "Hedonic and utilitarian motivations for online retail shopping behavior," *Journal of Retailing,* (77:4), pp. 511-535.

Chittaro, L. and Ranon, R. 2000 Virtual reality stores for 1-to-1 e-commerce. *Proceedins of the CHI2000 Workshop on Designing Interactive Systems for 1-to-1 E-Commerce*, The Hague, The Netherlands.

Christensenm C. M. (1997) *The innovator's dilemma*, Boston: Harvard Business School Press.

Colarelli O'Connor, G. (1998) Marketing learning and radical innovation: A cross-case comparison of eight radical innovation projects, *Journal of Product Innovation Management*, 15(2), 151-166.

Coxon, M. Kellym N. and Page, S. (2016) Individual differences in virtual reality: Are spatial presence and spatial ability linked? *Virtual Reality*, 20(4), 203-212

Dahan, E. and Srinivasan, V. 2000. "The predictive power of Internet-based product concept testing using visual depiction and animation," *Journal of Product Innovation Management* (17:2), pp. 99-109.

Danneels, E. (2002) The dynamics of product innovation and firm competencies, *Strategic Management Journal*, 23(12), 1095-1121.

Diep, V. C. S. and Sweeney, J. C. 2008. "Shopping trip value: Do stores and products matter?," *Journal of Retailing and Consumer Services* (15:5), pp. 399-409.

Drake-Bridge, E., Strelzoff, A. and Sulbaram, T. 2011. "Virtual retail simulations in second life," *Marketing Education Review* (21:2), pp. 125-138.

Elgan, M. (2017) Why Virtual Reality and Augmented Reality are the Same Thing, *CIO (13284045),* 1-1.

Goldsmith, R. E. and Fylnn, L. R., (2005) Bricks, clicks, and pix: Apparel buyers use of stores, internet, and catalogs compared. *International Journal of Retail & Distribution Management*, 33, 271-283.

Goel, L., Johnson, N. A., Junglas, I., and Ives, B. 2011. "From space to place: Predicting users' intentions to return to virtual worlds," *MIS quarterly* (35:3), pp. 749-771.

Govindaragan, V., and Kopalle, P. K. (2006) Disruptiveness of innovations: Measurement and an assessment of reliability and validity, *Strategic Management Journal*, 27(2), 189-199.

Grewal, D., Roggeveen, A. L. and Nordfält, J. (2017) The Future of Retailing, *Journal of Retailing*, 93(1), 1-6.

Ha, Y., Kwon, W., and Lennon, S. J. (2007) Online visual merchandising (VMD) of apparel web sites. *Journal of Fashion Marketing and Management*, 11, 477-493.

Hirschman, E. C. and Holbrook, M. B. 1982. "Hedonic consumption: Emerging concepts, methods and propositions," *The Journal of Marketing* (46:3), pp. 92-101.

Hoffman, D. L. and Novak, T. P. 2009. "Flow online: Lessons learned and future prospects," *Journal of Interactive Marketing* (23:1), pp. 23-34.

Hoffman, K. D. and Bateson, J. E. G. 1997. *Essentials of services marketing,* Orlando, FL, Dryden Press.

Huang, E. and Huang, Y. (2013) Interactivity and identification Influences on Virtual Shopping, *International Journal of Electronic Commerce Studies*, 4(2), 305-312.

iResearch 2009. 2008-2009 China Online Shopping Research Report Beijing: iResearch Consulting Group.

Jin, S. A. 2009. "The Roles of Modality Richness and Involvement in Shopping Behavior in 3D Virtual Stores," *Journal of Interactive Marketing* (23:3), pp. 234-246.

Jones, M. A. 1999. "Entertaining shopping experiences: An exploratory investigation," *Journal of Retailing and Consumer Services* (6:3), pp. 129-139.

Kaewrat, C. and Boonbrahm, P. (2017) A Survey for a Virtual Fitting Room by a Mixed Reality Technology, *Walailak Journal of Science & Technology*, 14(10), 759-767.

Kenkare, N., Lamar, T. A. M., Pandurangan, P. and Eischen, J. (2008) Enhancing accuracy of drape simulation part I: Investigation of drape variability via 3D scanning. *Journal of the Textile Institute*, 99, 211-218.

Khakimdjanova, L. and Park, J. 2005. "Online visual merchandising practice of apparel e-merchants," *Journal of Retailing and Consumer Services* (12:5), pp. 307-318.

Kim, J. and Forsythe, S. 2008. "Adoption of Virtual Try-on technology for online apparel shopping," *Journal of Interactive Marketing* (22:2), pp. 45-59.

Kim, M., Kim, J. H. and Lennon, S. J. 2006. "Online service attributes available on apparel retail web sites: an ES-QUAL approach," *Managing Service Quality* (16:1), pp. 51-77.

Kimiloglu, H. 2004. "The "e-literature": A framework for understanding the accumulated knowledge about Internet marketing," *Academy of Marketing Science Review* (4:6), pp. 1-36.

Klein, L. R. 2003. "Creating virtual product experiences: The role of telepresence," *Journal of interactive Marketing* (17:1), pp. 41-50.

Kort, P. M., Caulkins, J. P., Hartl, R. F. and Feichtinger, G. 2006. "Brand image and brand dilution in the fashion industry," *Automatica* (42:8), pp. 1363-1370.

Kugler, L. (2017) Why Virtual Reality will Transform a Workplace Near You, Communications of the ACM, 60(8), 15-17.

Lee, K. C. and Chung, N. 2008. "Empirical analysis of consumer reaction to the virtual reality shopping mall," *Computers in Human Behavior* (24:1), pp. 88-104.

Magnenat-Thalmann, N., Kim, H. S., Egges, A. and Garchery, S. 2005. Believability and interaction in virtual worlds. *Proceedings of the 11th International Multimedia Modelling Conference*, Melbourne. IEEE, pp. 2-9.

Mathwick, C., Malhotra, N. and Rigdon, E. 2001. "Experiential value: Conceptualization, measurement and application in the catalog and Internet shopping environment," *Journal of Retailing* (77:1), pp. 39-56.

McGoldrick, P. 2002. *Retail Marketing,* Maidenhead, McGraw Hill.

McGrath, R. C. (1995) Exploratory learning, innovative capacity, and managerial oversight, *Academy of Management Journal*, 44(1), 118-131

McKone, D., Hasleghurst, R. and Steingoltz, M. (2016) Virtual and Augmented Reality will Reshape Retail, *Harvard Business Review Digital Articles*, 9/9/2016, 2-4.

Müller-Lankenau, C. and Wehmeyer, K. 2005. e-Service quality in a multi channel environment: quality management and the web channel. *Proceedings of the European Academy of Management Conference*, EURAM 2005, Munich, Germany.

Nah, F. F., Eschenbrenner, B. and DeWester, D. 2011. "Enhancing brand equity through flow and telepresence: a comparison of 2D and 3D virtual worlds," *MIS quarterly* (35:3), pp. 731-747.

Newsom, M. K., Collier, D. A. and Olsen, E. O. 2009. "Using "biztainment" to gain competitive advantage," *Business Horizons* (52:2), pp. 167-176.

Nwankwo, S., Hamelin, N. and Khaled, M. (2014) Consumer values, motivation and purchase intention for luxury goods, *Journal of Retailing and Consumer Service, 21(5), 735-744.v*

Park, J. H. and Stoel, L. (2002) Apparel shopping on the Internet: Information availability on US apparel merchant websites. *Journal of Fashion Marketing and Management,* 6, 158-176.

Pantano, E. and Laria, G. (2012) "Innovation in retail process: from consumers' experience to immersive store design," *Journal of technology Management and Innovation* (7:3), pp. 194-205.

Park, C. H. (2017) A Count Model of Multi-Purpose Shopping Behavior, Journal of Marketing Thought, 4(2), 25-29.

Park, J., Lennon, S. and Stoel, L. 2003. Internet apparel shopping: The effect of product presentation on mood, perceived risk, and purchase intention. *Proceedings of the Annual Meeting of the International Textile & Apparel Association (ITAA)*, Monument, CO. International Textile & Apparel Association, Inc.

Park, M. and Lennon, S. J. 2009. "Brand name and promotion in online shopping contexts," *Journal of Fashion Marketing and Management* (13:2), pp. 149-160.

Pegler, M. 2001. *Visual Merchandising and Display,* New York, Fairchild Publications.

Pine, B. J. and Gilmore, J. H. 1998. "Welcome to the experience economy," *Harvard Business Review* (76), 97-105.

Puccinelli, N. M., Goodstein, R. C., Grewal, D., Price, R., Raghubir, P. and Stewart, D. 2009. "Customer experience management in retailing: Understanding the buying process," *Journal of Retailing* (85:1), pp. 15-30.

Ragusa, J. M. and Bochenek, G. M. 2001. "Collaborative virtual design environments: Introduction," *Communications of the ACM* (44:12), pp. 40-43.

Sanna, A., Zunino, C. and Lamberti, F. 2004. "A distributed architecture for searching, retrieving and visualizing complex 3D models on Personal Digital Assistants," *International Journal of Human-Computer Studies* (60:5), pp. 701-716.

Saren, M. Harwood, T., Ward, J. and Venkatesh, A. (2013) Marketing Beyond the Frontier? Researching the New Marketing Landscape of Virtual Worlds, *Journal of Marketing Management*, 29(13-14), 1435-1442.

Satam, D., Liu, Y. and Lee, H. J. (2011) Intelligent design systems for apparel mass customization. *Journal of The Textile Institute*, 102, 353-365.

Schlosser, A. E. 2003. "Experiencing products in the virtual world: The role of goal and imagery in influencing attitudes versus purchase intentions," *Journal of Consumer Research* (30:2), pp. 184-198.

Sherman, W. R. and Craig, A. B. 2003. *Understanding virtual reality: Interface, application, and design,* Amsterdam ; Boston, Morgan Kaufmann Publishers.

Sherry, J. F., McGrath, M. A. and Levy, S. J. 1993. "The dark side of the gift," *Journal of Business Research* (28:3), pp. 225-244.

Smolentsev, A. Cornick, J. E. and Blascovich, J. (2017) Using a preamble to increase presence in digital virtual environments, *Virtual Reality*, 21(3), 153-164

Steuer, J. S. 1992. "Defining virtual reality: Dimensions determining telepresence," *Journal of Communication* (42), pp. 73-93.

Tae, H. B., Chan, Y. Y. and Sukki, Y. (2015) The Impact of Augmented Reality on Self-brand Connections and Purchase Intentions, *American Academy of Advertising Conference Proceedings*, 2015, 102-102.

Ullah, S., Ouramdane, N., Otmane, S., Richard, P., Davesne, F. and Mallem, M. 2009. "Augmenting 3D interactions with haptic guide in a large scale virtual environment," *The International Journal of Virtual Reality* (8:2), pp. 25-31.

Varajão, J. and Morgado, L. (2012) Potential of Virtual Worlds for Marketing Tests of Product Prototypes, *Journal of Textile Institute*, 103(9), 960-967.

Wagner, T. 2007. "Shopping motivation revised: A means-end chain analytical perspective," *International Journal of Retail & Distribution Management* (35:7), pp. 569-582.

Widyarini, L. A., and Gunawan, S. (2017) Predicting Consumer Purchase Intention on Fashion Products in Online Retailer: Integration of Self-determination Theory and Theory of Planned Behavior, International Journal of Emerging Research in Management & Technology, 6(9), 7-18.

Figures and Tables

Figure 1. The FutureShop
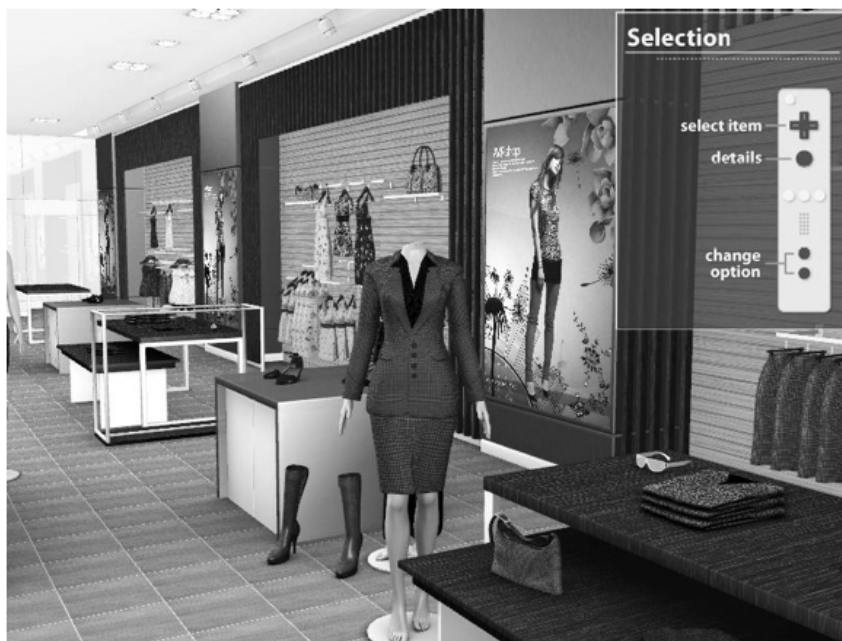
Table 1. Product categories in the FutureShop

Products categories available at the FutureShop			
Tops	T-shirt	Shirts	Jackets & Blazers
Coats	Pants	Trousers	Skirts
Dresses	Leggings	Tights & Socks	Shoes
Accessories	Bags & Briefcases	Hats and Headwear	Lingerie

Figure 2. Process of experiment
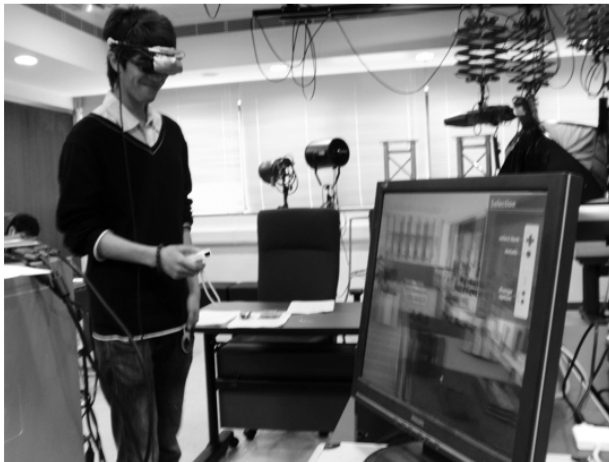
Figure 3. The details of the clothes

Table 2. Features available at the FutureShop

	Features	Descriptions
Visual features	Item selection	Change items within the same category
	Rotate	Horizontal 360 degree
	Zoom	Up to close-up to see fabric textures
Descriptive information	Price and item code	
	Size guide	Conversions between
	Fabric and materials	difference item size in multi-national standards
Ambient manipulations	Lighting	Change intensity scaled from 0 – 100
	Preload music list	Blues, Bossa Nova, Classic, Fast Fashion Beat, Jazz, & Mid Fashion Beat
	Volume Control	Change volume scaled from 0 – 100

Buying features	Add to cart	Make buying decision
	Remove from cart	Delete selected items from buying list
	Check my cart	View selected items
	Checkout	Proceed payment
	Back to shop	Continue shopping

Table 3. Data description of the study

		Easy	Fun	Adventurous	Exciting	Appealing	Innovative	Free	Smooth	Comfortable
N	Valid	58	58	58	58	58	58	58	58	58
	Missing	1	1	1	1	1	1	1	1	1
Mean *(7 point Scale)*		**3.62**	**5.14**	**4.64**	**4.95**	**4.64**	**5.29**	**4.59**	**4.24**	**4.10**
Median		**3.00**	**5.00**	**5.00**	**5.00**	**5.00**	**5.00**	**5.00**	**4.00**	**4.00**
Std. Deviation		1.211	1.099	1.087	1.176	1.103	1.284	1.427	1.218	1.180
Percentiles	25	3.00	4.75	4.00	4.00	4.00	5.00	3.00	3.00	3.00
	50	3.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00	4.00
	75	5.00	6.00	5.00	6.00	5.00	6.00	6.00	5.00	5.00

Appendix A: The Questionnaire

Section A: General Information *(Total 7 questions.)*

Q1	Gender	☐ Male	☐ Female		
Q2	Age	☐ Below 18	☐ 18 – 30	☐ 30 – 45	☐ 45 – 60 ☐ Above 60

Q3	Occupation	☐ Business & Finance	☐ Retailing & Merchandising
		☐ Marketing & Sales	☐ Education
		☐ Advertising & Public Relations ☐	☐ Tourism & Hotel
		☐ Computing & Information Technology	☐ Trading & Logistics
		☐ Design & Production	☐ Web Development & E-business
		☐ Civil Services	☐ Others: …………………..

Q4	How frequent do you shop for fashion apparels per month? *(e.g. shirts, bags, accessories etc)*	☐ Less than 1	☐ 1 – 2
		☐ 3 – 4	☐ More than 4
Q5	How much do you spend in percentage of your monthly income on fashion apparels?	☐ Less than 10%	☐ 10% - 29%
		☐ 30% - 49%	☐ 50% and more
Q6	Do you have experience in online shopping? *(e.g. ebay, amazon, taobao.com etc.)*	☐ Yes	☐ No *(pls go to Q8)*
Q7	Do you consider yourself as a regular online shopper?	☐ Yes	☐ No

❖ Section B: Post-Tour Survey on Decision Making Process *(Total 11 questions.)*

Q8	How many items have you bought during the tour? ☐ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 and above *(pls go to Q10)*
Q9	What kind of product(s) have you bought? *(you can choose more than one category)* ☐ Tops ☐ T-shirts ☐ Shirts ☐ Jackets & Blazers ☐ Coats ☐ Pants ☐ Trousers ☐ Skirts ☐ Dresses ☐ Leggings ☐ Tights & Socks ☐ Shoes ☐ Accessories ☐ Bags ☐ Hats & Headwear ☐ Lingerie

Q10	Do you think that the product range provided in the virtual fashion shop in virtual reality (FutureShop) is sufficient?
	    ☐ Yes
	    ☐ No

Q11	Do you have enough time to shop in the FutureShop within 15 minutes?
	    ☐ Yes
	    ☐ No, please specify your expected duration:…………………………..minutes.

Q12	Product information provided in our FutureShop is adequate for you to make purchase decision. ☐ Strongly Disagree ☐ Disagree ☐ No Strong View ☐ Agree ☐ Strongly Agree

Q13	In the FutureShop, the physical try-on is not available, but we do offer a size guide with measurements of human body for your convenience. How much do you *believe* the displayed product can fits you? *(pls circle the location that indicates your feeling on the scale)* Not believe 1 2 3 4 5 Believe
Q14	The inability to consult opinions from others *(e.g. sales, friends, etc.)* during the fashion shopping process in FutureShop constitutes a problem to your purchase decision. ☐ Strongly Disagree ☐ Disagree ☐ No Strong View ☐ Agree ☐ Strongly Agree
Q15	Brand identity is an important factor influencing consumers' purchase intention in any type of online fashion shopping experience. ☐ Strongly Disagree ☐ Disagree ☐ No Strong View ☐ Agree ☐ Strongly Agree

Q16	Well known luxury fashion brands *(e.g. Prada, Dior, Gucci, etc.)* in FutureShop can raise consumers' purchase intention. □ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree
Q17	Shopping familiar fashion brands in FutureShop can raise your purchase intention. □ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree
Q18	Please describe your decision making process in FutureShop by circling your answer on the following scale. Difficult & Uneasy 1 2 3 4 5 Smooth & Effective

❖ **Section C: Post-Tour Survey on Interactive and hedonic Experience** *(Total 11 questions.)*

Q19	A hedonic experience is essential in every fashion shopping experience. □ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree
Q20	You have a hedonic shopping experience through the interaction of surrounding environment *(e.g. music, lighting effects, etc.)* in our FutureShop. □ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree
Q21	You have a hedonic shopping experience through the interaction of virtual objects display *(e.g. window display, product display, mannequin display, etc.)* in our FutureShop. □ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree
Q22	FutureShop can provide you an enjoyable fashion shopping experience. □ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree
Q23	FutureShop can provide you a fashion shopping experience with fun. □ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree
Q24	The fashion shopping process in FutureShop is an overall hedonic shopping experience. □ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree
Q25	Your fashion shopping experience in FutureShop is NOT hedonic due to the lack of interpersonal communication *(e.g. sales, friends, other customers, etc.)*. □ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree
Q26	Stereoscopic visualization feature of selected product can enrich your fashion shopping experience in FutureShop. □ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree
Q27	A spacious virtual fashion shop in FutureShop can enrich your hedonic shopping experience. □ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree
Q28	Our FutureShop is spacious enough. □ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree
Q29	All functions (e.g. stereoscopic displays, interactivity, sense of immersion) in FutureShop are equally important to provide you with a hedonic fashion shopping experience. □ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree

Section D: Comments on Overall Experience *(Total 5 questions.)*

Q30	Overall speaking, please describe your experience in our FutureShop. *(Please circle the appropriate location that indicates your feeling on the scale.)*

Difficult	1	2	3	4	5	Easy
Boring	1	2	3	4	5	Fun
Unadventurous	1	2	3	4	5	Adventurous
Unexciting	1	2	3	4	5	Exciting
Unappealing	1	2	3	4	5	Appealing
Imitative	1	2	3	4	5	Innovative
Inhuman	1	2	3	4	5	Human
Confusing	1	2	3	4	5	Clear
Restrain	1	2	3	4	5	Free
Lag	1	2	3	4	5	Smooth
Uncomfortable	1	2	3	4	5	Comfortable

Q31	FutureShop will have the potential to excel the web-based shopping sites *(e.g. ebay, amazon, taobao.com, etc.)*.

□ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree

Q32	FutureShop will supersede fashion shopping in real world and become a dominant mode in future.

□ Strongly Disagree □ Disagree □ No Strong View □ Agree □ Strongly Agree

Q33	Do you feel physically uncomfortable *(e.g. dizzy, headache, etc.)* during the shopping process in the FutureShop?

□ Yes, please specify:……………………………………………………………

□ No

Q34	What are your comments for further development of FutureShop?

…………………………………………………………………………………………

…………………………………………………………………………………………

………………………………………………………………