Interactive Virtual Reality Shopping and the Impact in Luxury Brands

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Abstract. This paper investigates the impact of human-computer interaction in virtual reality online shopping interface on the consumer experience. In particular, it measures the effectiveness of visualising a three dimensional photorealistic item, the real-time interactivity with the product and the real-time, fully interactive product customization service. The proposed VR system employs a sophisticated approach of interaction with primary objective to simplify and improve the user experience during online shopping. The proposed interface was evaluated through a preliminary questionnaire designed to simulate the typical decision making process prior to a luxury object purchase. The paper presents the outcomes of this usability trial on a group of ten luxury brands customers, the challenges involved in the HCI design are discussed, the visual components of the interface are presented in addition to an analysis of the system evaluation. Adhering to the derived feedback, our future plan of work entails additional development of the interactive tools with a view to further enhance the system usability and user experience. Furthermore we aim to introduce more object choices and customisation covering a larger group of luxury brands.

Keywords: Virtual Reality, HCI, 3D Visualization, Luxury Marketing, Luxury Brands.

1 Introduction

In the twenty-first century, technology has become an essential part in people's daily routine contributing to the quality of life and well-being of modern societies. E-commerce, which is a relatively new form of commerce, utilises the online obtainable technology and offers the opportunity for customers to have a round the clock access to selected services. The capability of being available everywhere and anytime for customers is achieving impressive results in increasing sales profits. However, for luxury brands, a particular challenge for e-shopping stations is preserving their

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prestige amid their faithful customers, whilst simultaneously providing competitive services. Accomplishing individual desires is a major interest of luxury houses, therefore they provide their clients with made to order service to allow integrating sides of the customer personality within the end product for ultimate satisfaction. Only a small number of luxury companies has already launched online product customisation, however, the presentation and extent of available options for visualisation and customisation are not quite there yet. Along with the aforementioned facts, the visual display units have improved greatly in recent years. The three-dimensional visualization feature elevated the display monitors up to an advanced stage. The technology used in these monitors is constantly improving and the accompanied image-translating tool is progressing remarkably.

To this end, the paper introduces a novel HCI e-purchasing interface for luxury brands with embedded 3D Virtual Reality (VR) real-time interactive product visualisation and customisation service. Furthermore, the system is designed to be presented in 3D enabled monitors to utilise the huge capacity in drawing advance technological experience for the customer. In order to primarily assist the usability of the trial version of the system, 10 users whom represent the expected customers have evaluated the interface. Qualitative and quantitative feedback has been acquired, in the form of questionnaires, video recordings and eye-tracking (and interaction detector) methods. The analysis of the data offered promising results and insight to potential improvements required.

Overall, this paper discusses the implementation of a VR (HCI) interactive interface for luxury brands e-commerce for 3D monitor presentation. The paper investigates the current luxury online trading trends and the expected future orientation. The following section describes the system rational and outlines the issues. Section three describes the system design, the hardware and the software requirements. The fourth section evaluates the system and analyses the result of the trial.

Finally, the evolution of the system design as a result of ongoing evaluation and user trials is discussed with suggestions for a tentative plan for future research work.

2 Luxury Marketing Trends

Purchasing luxury products intentions and motivations have various social, economic and psychological destinations. Brand knowledge [7], purchasing convenience, products availability, purchasing timing and place [16], sales interaction by sale person and point of purchase stimuli [17] are some of the factors that affect decision making in buying products. However, beside these facts, although luxury brands' consumers share similar motivations, they seek to differentiate themselves from others and like to be treated uniquely. These are exactly the concerns of high-end brands marketing, to be always accessible but exclusive [9]. The demand of the online distance shopping has become essential for those people who look for convenience,

time saving, limited social interaction, and an extended time to compare and contrast products [8]. In 2010, e Marketer predicted that the digital retailing in the US will reach 223.90 billion Dollars revenue in 2014, which is about 0.7 times higher than that in year 2010 [3]. In international level, a study carried by Bain and Company in 2011 compared the e-shopping average to the total retail in six countries for the period between 2005 and 2011. The percentage have been increasing proportionally, while the United kingdom has witnessed dramatic increase to reach almost 9% of the retail percentage, which is 3 times higher than most of the other countries for the same period [2].

Even closely the luxury brand online market has also witnessed spectacular expansion and the targeted audience in particular have presented heavily in online environment. The luxury items internet shopping registered 9.5 million in 2008 and the expected increase was 27+ per cent growth annually. With 6.6 billion Internet users, 0.6 were luxury purchasers [11]. Relatively, figures show that up to 90% of affluent consumers frequently buy products online [9], and they spent 9% more in 2012 than they did in the year before [2].

This adoption also benefits the brands themselves since it opens a wider gate for loyal customers around the world to purchase with considerably less cost and effort. Luxury brands create strong relationship with customers through commitment and trust, however in electronic shopping by nature; these two factors are less easily maintained and might lead to uncertainty [13].

3 The Impact of HCI in Online Luxury Trading

A website has a non-physical presence, however a functional and uncluttered web application that provides useable and clear information is deemed essential if used to represent a company that would traditionally base its customer retention on excellent customer service and interpersonal relationships [13]. Furthermore user-friendly interface design, easy navigation methods and guidance as well as attractiveness are important website features that enhance online shopping experience and affect consumer shopping motivations [14]. Sejin and Stoel [15] identified four main factors affecting the perception of the e-shopping site apparel quality: website content, functionality and atmospheric/experiential value, which have the greater stimulus on shopping satisfaction and contribute in electronic shopping intention, in addition to the security, privacy and customer service, which affect the intentions only. Okonkwo outlined some of the main factors that had impact on the online luxury brand customer in particular. The Internet availability and the easiness of access, digital technology and interactive media as well as the social web influence facilitates much closer relationship with brands and the brands' fans [12]. A succinct description of the aforementioned factors is presented in figure 1.

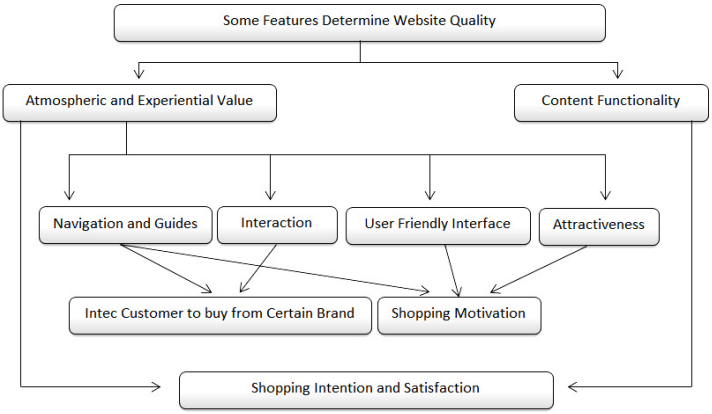

Fig. 1. Main Factors Affect Shopping Decisions in Virtual Shops

4 System Rationale

To this end, the online presence and services were readily attainable for such companies; however, the main challenge is serving the luxury concept and providing special services. As such it became essential and imperative for high-end brands to adopt new approaches using up to date technologies to engage the consumers and increase the attractiveness of their e-commerce sites aiming to ultimately create a large loyal group of customers. It is evident that firms should deliver exceptional experience and services in addition to unique products as the customers expect the virtual experience to be as immersive and simulating as a physical one [12]. Proceeding from the purchasing decision motivations and products value estimation considerations, the customers need to saturate their demands and desires to get the best of their journey in the web shopping. Using 3D visualization is estimated to be an effective way that enhances the characteristics and the features of products visualization in the consumers' conception. Previous studies proved that high level of fidelity 3D virtual model improves audience reaction towards e-purchasing [10]. Furthermore it helps in the imagination of the products as well as decreases the expected risk [11].

Algharabat and Dennis [1] classified the effect of 3D products authenticity on value opinion; on utilitarian value and on hedonic value. Enhancing the consumer awareness towards products' features, attributes and characteristics [4,10,18] and improving the customer involvement in seeking and gathering extra information about the product [4] all enhance the utilitarian value of 3D models.

On the other hand, it is claimed [5,11] that the gained hedonic value in 3D product visualization is superior to the capability of utilitarian value production. The higher interactivity the consumer gets with the web graphics, the higher the expected hedonic

value perceived [4]. The main attractions for the customer towards the 3D products are entertainment, enjoinment and fun [10]. In comparison with multiple-pictures and video-clips interfaces, 3D VR interface produce greater Telepresence for consumers [18]. High level of interaction, possible dialog and communication, collaborative features such as customization and co-creation are key things to engrave the company name on the most favorite list [12]. Okonkwo suggested that offering services like personalization or bespoke features would enhance the client self-expression. In addition to the spoiling treatment the consumer gets from the luxury brands, they seek to have made-to-measure and customised items specially for the maturity consumptive clients [12]. 34% of the luxury customers believe that products and services should be customized to their needs and desires [6].

5 System Design

In view of the aforementioned facts and observations, the paper proposed HCI for online luxury brand through fully immersive VR customer service points that have been designed for 3D monitor representation. The intention behind the system is to enable the potential user to obtain more comprehensible and clear information through real-time 3D investigation of the photo-realistic virtual models. The 3D content has been generated in Autodesk 3Ds Max software. Adobe Photoshop has been used for editing and refining HD photos of actual products material to be used in shaders and normal maps to obtain high detailed realistic textures. Consequently, the scene has been exported to Unity 3D to create the real time virtual environment as illustrated in Figure 4. The real-time interface functions were built with C# programming language.

Evidently customers' adoption of shopping luxury brands online is mostly acceptable as these names have a global well-known reputation and trustworthiness which is an influential factor on online-purchasing intention. The Louis Vuitton brand has been chosen for our prototype interface design as they are highly associated with luxury, have a great historical presence within the fashion world and in addition are well known for their innovative techniques used to advertise their products. The precise and photorealistic visualisation of a specific group of objects (i.e. travel bags) from only one brand offered a more controllable environment for context development. Obviously the system uses the specific brand as a sample case. The main objective of this virtual reality interface is to identify the efficiency of such system and highlight the positive or negative impact it might have in the decision making process of the potential luxury brands customers.

The customization menu is placed in the right hand side of the screen, where the user can choose between 3 types of material and 3 vertical hierarchy choices to customise the front compartment of a travelling bag as depicted in figure 2 below. The interaction with the product can be made either by the control panel on the left bottom of the screen or directly with item by click and drag the mouse to rotate and zoom in and out of the product as presented in figure 3.

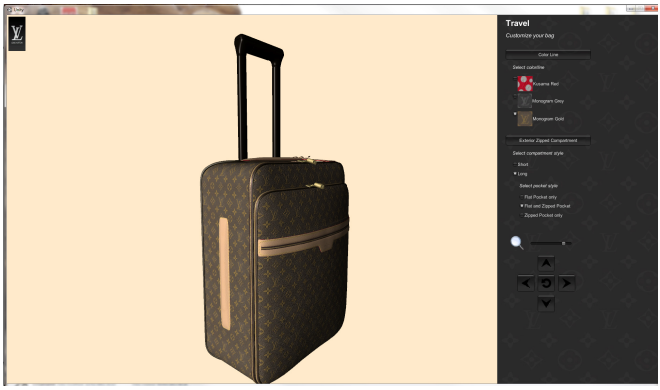

Fig. 2. Screenshot of the prototype VR interface

The system was evaluated in the Virtual Reality and Simulation laboratory (VRS lab) of Glasgow Caledonian University (Glasgow, UK). The particular testing environment offers state of the art equipment such as HD/3D projector, 3DTV, and surround audio, all supported by custom-built workstations which entail NVidia Quadro 4000 Fermi graphics cards. A wireless Bluetooth mouse was used in this case as the mean of interaction with the Virtual Reality environment as it was deemed the simplest and most cost effective way.

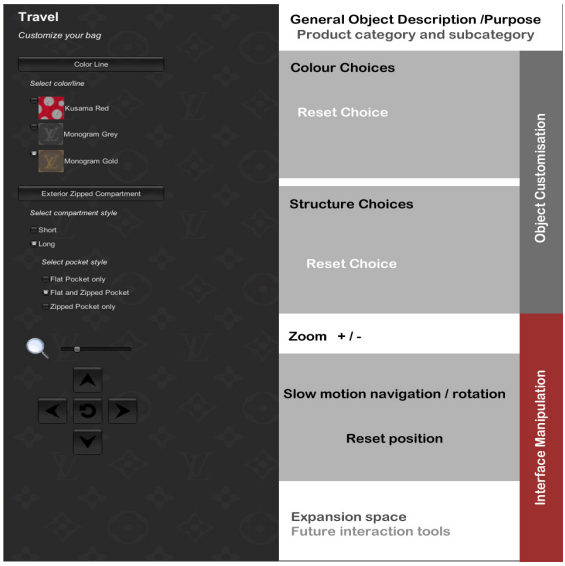

Fig. 3. Analysis of proposed VR interface components

6 Evaluation

In order to evaluate the plot system, 10 users who represent the current customer of the online luxury shopping have tested the system and answered a pre and post-test questionnaire. The aim of the questionnaire was three fold. Firstly, to identify the current actual shopping tendencies of the local population with regards to luxury brand products; Secondly to measure the efficiency of the proposed interface through customer satisfaction; Lastly, to receive further feedback regarding the interface design and functionality. As such the questionnaire had three distinctive set of questions. In this paper we will focus mainly on the second set of questions related to the interface performance and usability. The participants were asked to build a bag of their preference in all three colour schemes available. As such the users had the opportunity to investigate the VR environment through a task, imitating a typical customisation online process of their favourite products.

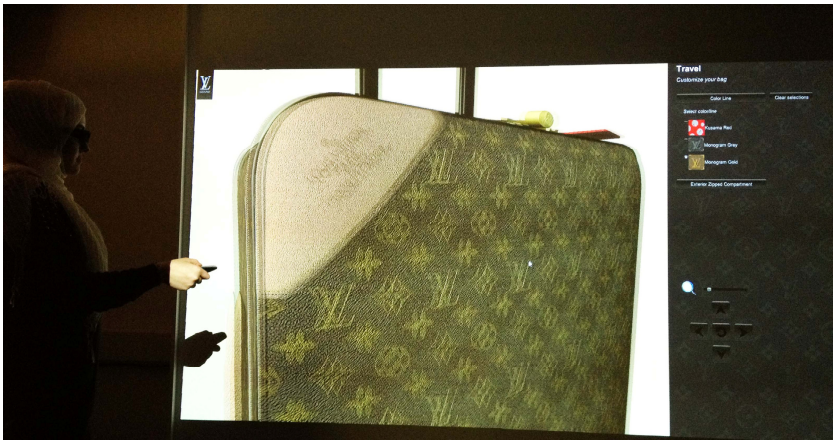

Fig. 4. Screenshot of the user during the trial session

7 Results and Discussion

The results of the second group of questions of the adapted QUIS (Questionnaire for User Interface) presented a positive initial appraisal of the system. The questions were marked in scale of 1 to 5, with 1 representing "*Not satisfied*" and 5 "*Extremely satisfied*". The main set of questions and their scores are presented below in figure 5.

Notably the system scored particularly well in all seven interface related questions with the lowest average of 78% for Q2 and highest average of 96% for Q6. The latter is in contrast to the typical performance of the majority of online luxury shopping experience which is usually hindered by overloaded graphics' context and elaborate animated introductions. As such the users in this trial appreciated the speed and the simplicity of the information provided. The lowest score was mainly due to the

conduit of interaction which was a Bluetooth wireless mouse. The specific device although offers freedom of hand motion it is very difficult to point out and activate menus due to the motion sensitivity. As such we currently investigate alternative methods for navigating freely in the virtual environment, with the use of Kinect tracking device.

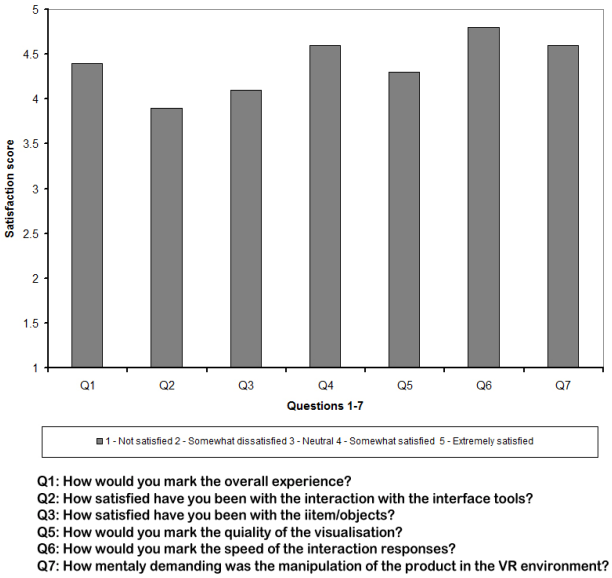

Fig. 5. Graph of User Experience satisfaction score with the use of VR shopping environment

Further thematic analysis of the open questions elucidated a number of intriguing themes useful for further development. In particular, 60% of the users responded that they would prefer to do online shopping for luxury brands. The main reasons described were split equally between better prices and more options available.

Almost 80% of the participants responded that the would like to see this system applied in other products even non-luxury ones.

The users also responded unanimously that they would prefer to do online shopping in a website that offers this 3D real-time visualisation and customisation experience as it offers significantly better quality of visual information regarding the product. The same positive response applied to four questions investigating the proposed system acceptability and user future preferences. As such the users were in favour of the system over traditional 2D image depictions, animations and videos. Furthermore they stated that such application would increase their shopping motivation of high-end brands as the real-time 3D visualisation and interaction elucidates clearly all the aesthetic and functional aspects of the product that they would like to buy. This is not possible currently with the use of the traditional online illustrations and for this reason the majority prefer to identify the product online, visit the store to experience the real-product and return to online shopping to complete the

transaction which is usually of better price. Our proposed system circumvents this intermediate level and offers a photorealistic experience to the user.

Notably the system lacks any tactile interaction or appraisal capacity of object's weight. This drawback is inevitably the only weak point which cannot be simulated in a cost efficient manner. As we opt for off-the-shelf 3DTV hardware in order to improve the cost-efficiency of the system, haptic devices (i.e. Phantom arm, or cyber-gloves) are prohibitive. In contrary, the rapid market distribution of large scale 3D TVs is providing an excellent opportunity for such online applications which could visualise photo-realistically and in scale 1:1 the vast majority of the luxury brand objects (i.e. bags, shoes, clothing, watches and other accessories).

8 Conclusions

Overall this paper presented the design considerations and development process of a novel VR interactive environment designed particularly for luxury brands shopping. This novel application aims to improve the speed and volume of online shopping through clear, photorealistic and fully interactive object 3D models which will enrich significantly the user experience. The clarity of visual information aims furthermore to enhance the trust towards the online information which are typically scrutinised by the online shoppers during their purchases of high cost luxury brand products. By improving the above, our hypothesis is, that we can further improve the decision making process of the user which will conclude with a successful purchase. As such we evaluated the proposed VR system and received feedback from ten users.

A concise but enlightening appraisal of the proposed VR shopping environment and advanced user-interface was provided throughout this trial. The paper presents the qualitative information, explores the empirical evidence regarding 3D visualisation and analysed the user suggestions and future tendencies regarding such type of interaction. The encouraging feedback and the suggestions derived will further be transformed to interface solutions in order to accommodate a more flexible and functional interface. Our future plans entail a number of additional yet simplified interaction tools, that will increase significantly user's purchasing confidence and will enable the user to investigate extensively the potential product prior to purchase.

References

1. Algharabat, R., Dennis, C.: 3D Product Authenticity Model for Online Retail: An Invariance Analysis. Journal of Customer Behaviour 9(2), 97–155 (2010)
2. Bain and Company (2012). Online Retail Sales Growth, by Country and by Category, Front Of Store, (December 27, 2011), http://frontofstore.org/2011/12/27/online-retail-sales-growth-by-country-and-by-category/
3. Marketer, E.: Retail E-Commerce Resumes Double-Digit Growth (April 1, 2010), http://www.emarketer.com/Article.aspx?R=1007605

4. Fiore, A.M., Jihyun, K., Hyun-Hwa, L.: Effect of Image Interactivity Technology on Consumer responses toward the online retailer. Journal of Interactive Marketing 19(3), 38–53 (2005a)
5. Fiore, A.M., Jin, H.-J., Kim, J.: For Fun and Profit: Hedonic Value from Image Interactivity and responses toward an online store. Psychology & Marketing, zurseasons (2005b)
6. Fourseasons: The Luxury Consumer in the New Digital World: Then and Now (2012), http://www.fourseasons.com/content/dam/fourseasons/web/pdfs/landing_page_pdfs/2012_TRD_Report_final.pdf
7. Guizani, H., Triguero, H., Valette-Florence, P.: Development of French consumer brand equity scale. Advances Cons. Res. 2, 198–199 (2008); Guizani, H., Merunka, D., Valette, F.: The impact of brand personality and sales promotions on brand equity. Journal of Business Research 64, 24–28 (2011)
8. Hassouneh, D., Brengman, M.: Shopping in Virtual Worlds: Perceptions, Motivations, and Behaviour. Journal of Electronic Commerce Research 12(4) (2011)
9. Ikeler, M., Jackson, P.: Digital Strategies for Luxury Brands: Insights, Examples, and Implications (March 01, 2010), http://www.slideshare.net/marciikeler/digital-strategies-for-luxury-brands
10. Kim, J., Forsythe, S.: Hedonic Usage of Product Virtualization Technology in Online Apparel Shopping. International Journal of Retail and Distribution Management 35(6), 502–514 (2007)
11. Kim, J., Forsythe, S.: Hedonic Usage of Product Virtualization Technology in Online Apparel Shopping. International Journal of Retail and Distribution Management 35(6), 502–514 (2007)
12. Okonkwo, U.: Luxury Online: Styles, Systems, Strategies. Palgrave Macmillan, London (2010)
13. Park, C., Kim, Y.: Identifying Key Factors Affecting Consumer Purchase Behaviour in an Online Shopping Context. International Journal of Retail & Distribution Management 31(1), 16–29 (2003)
14. Roy, M., Dewit, O., Aubert, B.: The Impact of Interface Usability on Trust in Web Retailers. Internet Research 11(5), 388–398 (2001)
15. Sejin, H., Stoel, L.: Online Apparel Retailing: Roles of e-Shopping Quality and Experiential e-Shopping Motives. Journal of Service Management 23(2), 197–215 (2012)
16. Singhavolakul, N., Lee, T.: Identifying types of stores in commercial zones and their marketing strategies. Int. J. Enterprise Network Management 4(3) (2011)
17. Solomon, M.R.: Consumer Behaviour: Buying, Having, and Being, pp. 291–322. Pearson Education Inc. (2004); Singhavolakul, N., Lee, T.: Identifying types of stores in commercial zones and their marketing strategies. Int. J. Enterprise Network Management 4(3) (2011)
18. Suh, K.-S., Chang, S.: User Interfaces and Consumer Perceptions of Online Stores: the Role of Telepresence. Behav. Inform. Tech. 25(2), 99–113 (2006)