The Effects of Consumers' Perceptions of 3D Virtual Garments on Online Purchase Intention

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In the apparel industry, virtual three-dimensional (3D) technology is most commonly used in product design and development. Computer-Assisted Design (CAD) programs are used to draft, edit, and share patterns, as well as virtually drape and fit garments. 3D is used for fitting purposes during the garment development stages, and for communicating information to other patternmakers, designers, merchandisers, and manufacturers. However, using 3D modeling technology as a means of displaying products to consumers offers many potential benefits to online retailers. That is, using 3D modeling instead of photography sessions can help cut costs, make efficient use of time, and display pressure maps of the body which indicate the amount of pressure and comfort that a wearer would experience. Another way that 3D modeling could contribute to online retail is through sizing previews. Using a graded pattern, 3D technology allows one to preview a garment size set with the click of a button. Extending these sizing previews to consumers could greatly reduce perceived risk, as well as elevate the retailer's image as an inclusive manufacturer in the eyes of the consumer. Altogether, these benefits allow retailers to build consumer expectations which are in line with the actual product, therefore increasing customer satisfaction and reducing product returns. The purpose of the study is to assess the effects of consumers' perceptions of 3D virtual garments on their online purchase intentions. The study also examines the role that consumers' comparison between the photograph and 3D virtual garment play in influencing their online purchase intention.

Literature Review and Hypotheses

According to Fiore (2008), retailers can build this relationship with consumers by providing more information about the product and improving the design of the digital interface. Online consumerism is a two-way street: consumers' behaviors and expectations are a source for innovation; the increase in communication between retailers and consumers has facilitated the rise of mass customization and consumer expectations in this regard (Fiore, 2008). Mass customization offers consumers the ability to control not only the design of a garment, but also potentially the fit. Fiore (2008) also stated that digital consumers have high expectations for "engaging, enjoyable experiences" as they shop for products online. In light of the increasing importance of retailer-consumer partnership, retailers incorporate 3D technology to provide more information to the consumer in the face of rising expectations and frustrations with online apparel shopping.3D modeling is currently being adapted into product development as a means of conceptualizing and communicating information about the garments. The way that consumers

relate to a virtual environment is a crucial consideration when it comes to introducing 3D technology to apparel retail. Wodehouse and Abba (2016) found that ease of use has a significant impact on consumer enjoyment and willingness to use 3D visualization for online shopping. They further indicated that Interaction also plays a large role in affecting consumer decision making and building loyalty. Shim and Lee (2011) also examined the effects of 2D versus 3D product presentation on perceived risk perceived when purchasing apparel and reported that 3D product representations tended to reduce perceived risk by communicating fit, and texture, among other attributes in a more sophisticated way as compared to 2D product representations. Based on literature discussed, two major hypotheses were proposed:

H1: Online purchase intention (OPI) will be influenced by consumers' perceptions of 3D virtual garments as measured in terms of a) perceived garment fit (PGF), b) perceived garment quality (PGQ), c) perceived image reliability (PIR), and d) perceived image accuracy (PIA). H2: Online purchase intention (OPI) will be influenced by consumers' comparison between the photograph and 3D virtual garments as measured in terms of a) perceived image realistic (PIR), b) perceived image quality (PIQ), and c) perceived image accuracy (PIA).

Methodology and Results

In order to test the effects of 3D images versus photographs, four images were procured for use in the study. The images included one 3D image and one photograph of a women's jean and one 3D image and one photograph of a women's tee-shirt. A tee-shirt and jeans were chosen because, not only are they common apparel items, but they also represent a variety of fit and style challenges and expectations for consumers. Photographs of a women's shirt and a women's pant were acquired with permission from Wrangler®'s online retail platform, and those garments' patterns were used to replicate the same image in 3D using VStitcher® software. VStitcher® is one of the major CAD programs which Wrangler® 3D designers and patternmakers use daily for product development and is used in the development of the garments that Wrangler® offers. The company's standard base size avatar was used to render the garment, and Adobe Photoshop was used to add the same hands, feet and face of the model in the corresponding photographs. This was done so that any bias toward the model or other clothing and accessories in the images could be reduced. Participants were asked to view the 3D images on a shared screen and responded to questions (e.g., fit, quality, image accuracy).The participants were also asked to respond to the next section of the survey that revealed the images the 3D renderings, and asked participants to indicate their perceptions of the images with this knowledge while comparing them to the original photographs on the shared screen. All variables examined in the study (e.g., PGF, PGQ, PIA, OPI) were adapted from existing literature (e.g., Shim & Lee, 2011) and were measured using 5-point Likert-type scale. A self-administered survey was conducted using college students in a classroom setting at mid-sized southeastern University, U.S.A. A total of 66 useable responses were collected. Reliability of all measures ranged from 0.68 to 0.84.

A series of multiple regressions were carried out to test all hypothesized relationships. In testing H1, for the women's jean, results showed that OPI was significantly influenced by only PGF, $\beta = 0.39$, $t = 2.99^{**}$ ($F_{(4, 57)} = 2.94^{*}$, $R^2 = .17$, Adjusted $R^2 = .11$). For the women's tee-shirt,

results revealed OPI was significantly influenced by PGF, $\beta = 0.29$, t = 2.25[*]; and PIQ, $\beta = 0.32$, t = 2.00[*] ($F_{(4, 57)} = 7.84$[***], $R^2 = .36$, Adjusted $R^2 = .31$), Thus., H1 was partially supported. When the participants viewed and compared the photograph and 3D virtual garments images, results revealed that for the women's jean, OPI was significantly influenced by PIR, $\beta = 0.26$, t = 2.97[**]; PIQ, $\beta = 0.29$, t = 2.50[*]; and PIA, $\beta = 0.27$, t = 2.73[**] ($F_{(3, 59)} = 31.27$[***], $R^2 = .62$, Adjusted $R^2 = .60$). For the women's tee-shirt, OPI was significantly influenced by PIQ, $\beta = 0.32$, t = 3.25[**] and PIA, $\beta = 0.64$, t = 6.67[***] ($F_{(3, 60)} = 50.97$[***], $R^2 = .72$, Adjusted $R^2 = .71$). Thus, H2 was also partially supported.

Discussion and Conclusions

The study's results revealed that perceived fit of both types of garment (women's' jeans and tee-shirt) played a significant role when it comes to online purchase intention and perceived image quality for women's tee-shirt helps facilitate online purchase intent. However, perceived image quality and perceived image accuracy influenced online purchase intention for both jeans and tee-shirt when the consumers had a chance to view and compare the differences between photograph images and 3D virtual garment images and perceived image reliability is additional influencing factor to online purchase intention for jeans. Based on this study's results, apparel retailers would benefit most from using 3D technology as a supplement to photographs of the product.

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