Understanding Online Product Presentation Through Mobile Augmented Reality

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Abstract

With the growing need for digital disruption of the online shopping environment using emerging technologies, Augmented Reality (AR) has emerged as the relevant immersive technology incorporating product trials and augmentation of sensory abilities in product evaluation. It empowers the consumers with the ability to overlay the physical environment with virtual elements such as three-dimensional (3D) virtual representation of products. The virtual elements interact with the physical environment in real-time, thereby transcending the online product presentation into fun, interactive, and contextual experience resembling physical shopping environment.

The evolution of web 2.0 to web 3.0 is characterized by the increased use of smartphones and smartphone applications (Shankar & Balasubramanian, 2009; Ström et al., 2014) as well as the integration of immersive technologies with the smartphone applications (Dacko, 2017). In various sectors such as gaming, retail, entertainment, education, AR is enabling smart devices with an enhanced (or augmented experience) of digital services. Particularly, in the domain of mobile commerce, AR applications facilitate smart retail environment by transforming the shopping experience. For example, retail giants such as IKEA and Amazon have introduced mobile AR applications to revolutionize digital commerce and how consumers view products online. The potential of AR lies in providing enough of a “direct experience” with the product that generates an immediate impact on the consumer. Though the research related to the impact of established interactive technologies on consumers is abundant (Agarwal & Karahanna,

2000; Javornik, 2016a; Jiang & Benbasat, 2007; Nah et al., 2011; Suh & Lee, 2005), the potential impact of emerging AR technology on consumers is relatively scant (Huang & Liu, 2014; Javornik, 2016a).

Kim and Forsythe (2009) stated, "up to 78 per cent of online shoppers abandon their shopping carts due to uncertainty about the consequences of the purchase". A lack of sensory experience (similar to the direct product examination) has been attributed to this problem. As a result, online retailers are gradually turning to sensory experience enabling technologies. Such technologies generate sensory inputs through interactive product visualizations (visual support) and haptic interfaces (tactile support) in the online shopping environment. These sensory inputs serve as a proxy for the sensory experience encountered during direct product examination. AR, with its ability to imitate the direct product experience, is undoubtedly a sensory experience enabling technology. However, AR, as an information artefact, has not been explored in the extant literature for its ability to impact the consumers' sensory systems and ameliorate the feeling of uncertainty.

Studying the novelty of AR in augmenting sensory experience and its scope in transforming online product presentation is a broad research gap that needs to be addressed (Dacko, 2017; Yim et al., 2017). More importantly, for AR to be a valuable tool in digital commerce, it is essential to address how the novel affordances of AR can benefit online retailers and product marketers. In this dissertation, we try to address the above gaps by defining immersive technology and its various types (i.e., the virtual reality and augmented reality), elaborating the technological affordances of AR in e-commerce and subsequently investigating their potential in uplifting the online retail value. We focus particularly on mobile AR. The dissertation is divided into three studies, as follows.

The first study gives a brief introduction of AR and its contemporary applications in online retail. Then, using a natural experimental study of the sales history of a popular retail platform,

we investigate the influence of AR-based presentation of different products in online stores on consumer purchase behaviour. Our findings indicate that the immersive experience in AR significantly influences product purchases under the condition of high product uncertainty. Therefore, this implies that AR affordances are useful for online retailers to enhance sales when there is a great degree of uncertainty associated with product purchase.

To corroborate our findings in the first study and unpack the black-boxed relationship between immersive interfaces and consumer behaviour, we conduct a randomized controlled experiment in the second study. Using the second experimental study, we test hypotheses involving various psychological constructs as the dependent variables to understand how AR affordances influence the consumers' internal states and facilitate the product evaluation process. We find that an immersive interface enhances the consumers' feeling about the effectiveness of shopping experience in product understanding and reduces the risk perception associated with the online product purchase. Consistent with our first study, the effects are found to be higher under the condition of high product uncertainty. Therefore, AR-based product presentation stimulates the sensory experience which caters to enhanced cognitive information processing to mitigate the concerns of product uncertainty.

In the third study, we attempt to understand user interaction behaviour during AR experience and its relationship with human emotion. AR transforms the online product presentation from the pictorial representation to virtual interaction with the products. The virtual product interaction facilitates online retailers to detect product-related emotion through affective computing. We use an observational study to analyze user-interface interaction (in the AR environment) and develop predictive relationships for product-related emotion. We observe that the various characteristics of the touch gestures during mobile AR-based product interaction can infer the emotion associated with it. This study highlights how AR affordances can be exploited to improve the overall valuation of the e-retail settings.

Our research contributes to the expanding body of knowledge studying the impact of immersive technology on customer experience. In particular, this dissertation contributes to the nascent and growing body of work exploring the promise of AR technologies for online retailing (Dacko, 2017; Hilken et al., 2017; Javornik, 2016b; Yim et al., 2017). The findings delineate the potential of AR affordances to improve the online product presentation and emphasizes its role in e-commerce. They support the theoretical aspects of AR affordances and reify the understanding of the diverse forms of immersive technology. Our research offers several practical insights for the product marketers, the online retail managers, and the e-commerce platform designers to devise strategies that leverage the potential of AR technology in online retailing.

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