An Exploratory study on drivers of 3D Simulated Software Adoption in the Apparel Industry

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Introduction: The growth in usage of technology is consistent in the fashion industry. Apparel companies are continuously seeking new software that can create attractive, eco-conscious, and cost-friendly products. One example is 3D simulated software, which allows designers to visualize how the clothing will potentially look without having to create a physical sample. This type of software makes the design process more efficient and cost-efficient, which leads to faster merchandise delivery times and customer satisfaction (Bertola & Teunissen, 2018). Examples include CLO, Browzwear, and Tuka Tech. Given its benefits of demonstrating the products to investors and customers without having to spend money on prototypes (Agrawal & Datta, 2019), 3D simulation software has been steadily making its way into the market. Despite its benefits, the adoption of 3D simulated software has been slow (Bertola & Teunissen, 2018). Some existing studies have examined how users' personalities and cultural backgrounds influence their willingness to embrace new digital applications (Bertola & Teunissen, 2018; Chaudhary, Kumar, Johri, 2020). Previous studies have identified insufficient management structures, low staff productivity, a lack of creativity, poor design and product development quality, and a paucity of qualified specialists and training institutions (Bertola & Teunissen, 2018; Chaudhary, Kumar, Johri, 2020) to be the factors influencing the adoption of digital software. However, very little study has been conducted on how the particular features incorporated in the apparel digital software may affect users' adoption intention of 3D simulated software. Using the technology acceptance model and innovation diffusion theory as underlying logic, this study aims to understand the drivers of adopting 3D simulated software in the apparel industry.

Literature Review: The technology acceptance model explains individuals' adoption of new technology using two behavioral beliefs of perceived ease of use and perceived usefulness (Davis, 1989). Perceived ease of use is defined as the degree to which a person thinks that utilizing software would be easy and PU is defined as users' perception that one could enhance production efficiency (Davis, 1989). Studies have repeatedly shown that these two factors are important in determining one's intention to adopt new technological software. Thus, this study also hypothesizes the following: **H1.** Perceived usefulness of 3D simulated software is positively related to the adoption intention of 3D simulated software. **H2.** Perceived ease of use of 3D simulated software is positively related to the adoption intention of 3D simulated software.

The innovation diffusion theory explains how, why, and at what rate new ideas and technology spread within a social system, innovation diffusion theory must first comprehend the social system in issue (Rogers, 1962). The diffusion of ideas is the process through which ideas are transferred from one society to another, or from a concentration or institution within a society to other sections (Rogers, 1983). The theory also incorporates the pace of adoption; this is the time required for members of a social system to embrace a novel concept (Rogers, 1983). Studies have suggested different factors to facilitate the diffusion of innovation. This includes factors such as relative advantage, compatibility, and complexity. Relative advantage is defined as the degree to which the innovation is perceived to be better than the existing method (Rogers, 2003). Compatibility refers to the degree to which the innovation can be consistent with the existing ideas and experiences (Rogers, 2003). Complexity is defined as rather the innovation that is perceived as challenging and complicated to use (Rogers, 2003). Given that these factors will be equally important for 3D simulated software to be disseminated within the apparel manufacturing process, the following hypotheses to posited: **H3.** Compatibility of 3D simulated software is positively related to the adoption intention of 3D simulated software. **H4.** Relative advantage of 3D simulated software is positively related to the adoption intention of 3D simulated software. **H5.** Complexity of 3D simulated software is negatively related to the adoption intention of 3D simulated software.

Lastly, 3D simulated software is expected to reduce waste by creating virtual samples instead of physical samples. Many 3D simulated software companies promote how the use of 3D simulated software could potentially promote sustainability within the manufacturing process. Thus, those who hold sustainability beliefs are likely to respond more positively to the adoption of 3D simulated software. Therefore, it is hypothesized that **H6.** Perceived sustainability of 3D simulated software is positively related to the adoption intention of 3D simulated software.

Methods: Online survey was created using Qualtrics and all measurement scales used in this study were adopted from the existing literature. The data collection protocol was approved by the IRB. The constructs were measured on a 7-point rating scale. Those who are in the industry with the knowledge of 3D simulated software were recruited for this study. A total of 45 individuals' usable data was collected and SPSS was used to test relationships.

Results: The factor analysis and Cronbach's alpha was satisfactory, confirming the validity and reliability of the measurements. Regression analysis was conducted using the SPSS, and the model was found to be significant. Specifically, the result showed that perceived usefulness was shown to have a significant positive relationship with the intention to utilize 3D simulated software ($p < 0.05$). There was no significant association between the other characteristics and the intention to use 3D simulation software. Thus, only H1 was supported, and the other Hypotheses were rejected.

Discussion: The results showed that only perceived usefulness was found to have a positive relationship with the adoption intention of 3D simulated software. Given that perceived usefulness was found as an important factor influencing adoption, the practitioners should stress how 3D simulation software may be beneficial to their job. It is possible to organize various career seminars to emphasize the benefits of 3D simulated software and to encourage users to utilize 3D simulated software. However, considering that this was an exploratory study with limited sample size, the findings may be deemed to be valid with an increased number of samples. Going further, future research may concentrate on the educational context to better understand how various users decide to embrace 3D simulation software in the first initial adoption.

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