

Comprehensive Influences on Consumers' Acceptance of 3D-Printed Apparel

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In recent years, the use of 3D-printed apparel has risen rapidly. Although the prime objective of businesses is to attract consumers (Murali, Pugazhendhi, & Muralidharan, 2016), no study has examined consumers' acceptance of 3D-printed apparel. In addition, no study has investigated how factors comprehensively influence consumers' acceptance of a technology. Most studies have only investigated certain paths based on individual research questions (e.g. Hwang, 2014). Because not all possible paths were investigated, studies have reported different results and might overlook unidentified relations. For example, one research directly links a variable with behavior intention and reported a direct relationship. Another study indirectly links the variable with the behavior intention via a mediator and reported an indirect relationship. In this case, readers are confused about what exactly the relationship is: is it a direct or an indirect relationship? Therefore, the purpose of the current study is to incorporate an extended technology acceptance model (TAM) (Davis *et al.*, 1989) and examine how factors comprehensively affect consumers' perceptions, attitude, and usage intention of 3D-printed apparel. Specifically, this study examines comprehensive relationships among 1) external variables, 2) external variables and TAM variables, and 3) TAM variables. In addition, this study also examines 4) the determinants of TAM variables.

Theory. TAM was the theoretical framework (Davis *et al.*, 1989). Tech optimism, perceived aesthetics, and perceived performance was chosen to extend TAM (Hwang, 2014; Parasuraman & Colby, 2001). Relationships among the external variables and TAM variables were proposed.

Method. An online survey was designed using established measures (Davis *et al.*, 1989; Hwang, 2014; Parasuraman & Colby, 2001). A total of 1,002 participants were recruited from Amazon Mechanical Turk, including about 51% males and 49% females. The age ranged from 19 to 84 with an average age of 35.47 ($SD = 11.08$).

Results. The structural model also had good fit indices (Figure 1). A total of 16 out of 21 hypotheses were supported. The results indicated that consumers who had more positive tech views also rated aesthetics of 3D-printed apparel higher ($\beta = .34$). Consumers believed that aesthetically pleasant design also had better performance ($\beta = .57$). A pleasant design ($\beta = .57$) was more important than a positive technology view ($\beta = .13$) in predicting performance. In addition, beyond all indirect influences, tech optimism still moderately influenced ease of use ($\beta = .23$), but weakly influenced attitude ($\beta = .08$); aesthetics still strongly influenced usefulness ($\beta = .26$) and attitude ($\beta = .42$), but weakly influenced usage intention ($\beta = .10$); performance was still strongly related to ease of use ($\beta = .44$), usefulness ($\beta = .43$), and attitude ($\beta = .32$). In

addition, only indirect influences came from tech optimism to usefulness and usage intention, aesthetics to ease of use, and performance to usage intention.

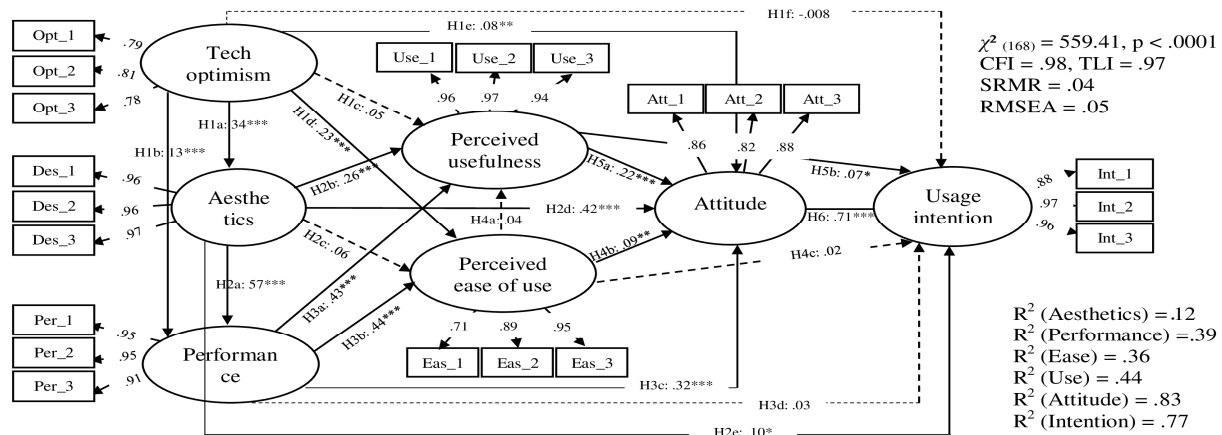


Figure 1. Structural results.

Furthermore, consistent with the original TAM, usefulness moderately influenced attitude ($\beta = .22$), but weakly influenced usage intention ($\beta = .07$). Attitude strongly determined usage intention ($\beta = .71$). However, ease of use did not contribute to usefulness ($\beta = .04$) and was only weakly related to attitude ($\beta = .09$). Finally, usage intention was mostly driven by attitude ($\beta = .71$), which was mostly decided by design ($\beta = .42$), performance ($\beta = .32$), and usefulness ($\beta = .22$). Consumers may want to accept 3D-printed apparel only because it is beautiful ($\beta = .10$), although the possibilities are limited. Consumers may also have small intention to accept 3D-printed apparel as it is useful ($\beta = .07$), which was influenced by aesthetics ($\beta = .26$) and performance ($\beta = .43$). However, good performance could not lead to usage intention ($\beta = .03$). At the same time, ease of use, which was contributed by tech optimism ($\beta = .23$) and performance ($\beta = .44$), was not sufficient enough for usage intention ($\beta = .02$).

Conclusion. 1) All external variables were related. 2) External variables and TAM variables had complicated relationships. 3) The TAM relationships were mostly confirmed, excepted ease of use to usefulness. 4) Usage intention was limitedly contributed by aesthetics and usefulness, but mostly determined by attitude, which was largely influenced by design, performance, and usefulness. The present study explicitly showed a complete picture about all possible influences among factors. Business managers can make strategies to meet consumers' needs based on the current study without worrying about overlooking any possible effects.

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