Consumers' acceptance of wearable technology: Antecedents in a technology acceptance model

Chanmi Hwang, Iowa State University, USA

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Unlike mere technological devices, wearable technology is complex, since it is considered both a device and a garment, integrating attributes of clothing and technology with the human wearer. Despite the increasing attention to the development and commercialization of wearable technology, only few studies on consumer response and acceptance of wearable technology with entertainment functions (e.g., MP3 player jackets and Music-Prism T-Shirt) have been conducted. Thus, further studies are needed to fill a gap in the literature on consumers' acceptance of the multi-disciplinary nature of wearable technology. As Technology Acceptance Model (TAM) by Davis (1985) suggests that external stimulus consisting of the actual system's features and design characteristics influences user motivation to use the system, this current study considers functional, expressive, and aesthetic (FEA) attributes from Lamb and Kallal (1992) as external stimulus to TAM that influences early user motivation to adopt wearable technology. Thus, based on the extended TAM, the study examined the effects of technology acceptance variables, FEA variables, and environmental concerns on consumers' attitude towards purchasing solar-powered clothing. Solar-powered clothing was chosen as the topic of this research due to the increasing focus and development of the product by researchers (Cho, 2010) and the pro-environmental attributes of the product. The findings address the gap in the literature by investigating the complex nature of wearable technology and are useful to current researchers and apparel industry members who promote products, which inherently require both technological and clothing attributes.

A convenience sample of college students and faculty (N=720) was recruited for the web-based survey with both open and closed-ended questions. A detailed information page describing solar-powered clothing was provided at the beginning of the survey to give participants a clear understanding of the product. A confirmatory factor analysis (CFA) for the full measurement model provided a good fit (CFA, $\chi 2 = 679.361$, $df = 288$, $p < 0.001$, CFI = 0.975, SRMR = 0.035, and RMSEA = 0.044). All indicators loaded significantly ($p < .001$) and substantively (standardized coefficient > .5) on their respective constructs; thus, providing evidence of convergent validity. Cronbach's alpha coefficients for all nine constructs were acceptable, as they ranged from .82 – .95. A Structural Equation Modeling (SEM) was conducted using MPlus and fit indices of the model test revealed an acceptable model fit, $\chi 2 = 889.447$, $df = 301$, RMSEA=.053, CFI= .962, SRMR= .054; the chi square to degrees of freedom ratio was 2.95. The results of the SEM path coefficients and model fits for the proposed model are illustrated in *Figure 1*.

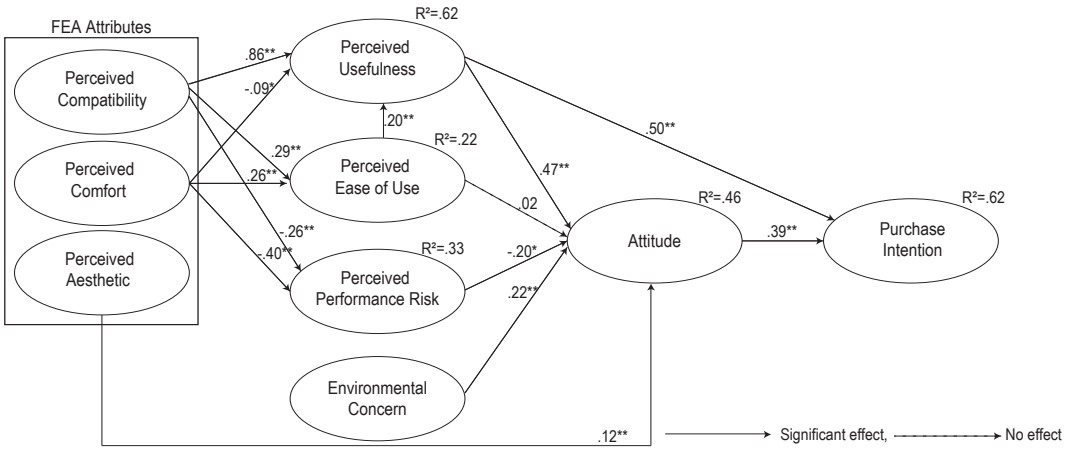

Figure 1. SEM path coefficients and model fits for the proposed model
Note: $\chi 2$=889.447, *df*=301, *p* =, RMSEA=.053, CFI= .962, SRMR= .054, *p<.01, **p<.001

The results of this study indicate that the technology acceptance variables, specifically perceived usefulness and perceived performance risks are important factors influencing the acceptance of wearable technology. The non-significant effect of perceived ease of use on attitude confirms the mixed results from previous studies (e.g., Moon & Kim, 2001), which warrants further investigation. Further, the results confirm that external stimulus of FEA dimensions significantly influence user motivation to use solar-powered clothing. This shows the importance of wearable technology compatibility with current fashion and clothing attributes. Specifically, perceived comfort significantly influences perceived ease of use and performance risk, confirming the importance of utilitarian aspects of how a garment interacts with the body. This emphasizes the shift from a technical concern to a user-centered one for marketability and requires greater mobility and comfort as previous studies have suggested. Lastly, the distinct aesthetic features of wearable technology should be attractive so that consumers can use advanced technology without losing their fashion sense.

This present study contributes to the growing body of research on development of wearable technology and confirms the important influences of multiple dimensions on wearable technology. Further, this study validates the TAM model in explaining new technology adoption in clothing and the importance of the FEA attributes. The results provide a foundation for future research related to adopting wearable technology and the effects of both clothing and technological attributes. Wearable technology is currently at the forefront of consumer products; therefore it is critical to understand the interconnections of technological and clothing attributes in developing and marketing products that meet the needs of consumers.

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