Quality Function Deployment Method and Its Application on Wearable Technology Product Development

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Wearable technology refers to any technical processes, electronic gadgets, devices, or piece of equipment that are wearable on body (Biscontini, 2016). Wearable technologies are being used in different sectors, namely in the fields of health and medical care, fitness and sports, emergency responders, and defense. The wearable technology market is projected to increase from US $20 billion in 2015 to US $70 billion by 2025 (Raj & Ha-Brookshire, 2016). Though having a bright future, studies show one third of the consumers stop using wearable technology products after the first purchase (Fortmann, Heuten, & Boll, 2015). In the competitive marketplace, companies strive to introduce products with cutting edge features ahead of competitors, but it's a question of whether this superior technology fulfills the consumer expectation or not. So, in new product development there must be a synergy between the consumer's expectation and technical characteristics of the product.

This study was designed around the Quality Function Deployment (QFD) framework. QFD is an organized approach to specify the needs of consumer group; identify their requirements, demands and expectation of the products; interpretation of these data into product development to production process (Fisher, 2003). Eventually, QFD transfers consumer demand to technical requirements in the product thus fulfilling the consumers' expectations for the product (Fisher, 2003). The QFD framework provides the mathematical formulas and weighting factors that are to be applied to collected data to determine the relationship between consumer and product developer expectations for various aspects of a product (Cerit et al., 2014; Griffin & Hauser, 2003). This method has numerous applications in different sectors including automotive industries, software products, healthcare projects; but little research has been conducted about its application on wearable technology product design.

The purpose of this quantitative study was to investigate consumers and product developer's expectations of wearable technology products in the context of the QFD framework. Qualtrics online survey system was used to access the product features of wearable technology that both consumers and product developers considered most important. Skip logic in the online survey permitted the participants to receive relevant questions based on whether they identified as a consumer of wearable technology or an industry professional involved in the design and manufacture of wearable technology. Based on the QFD framework questions were assessed on a Likert scale. One open ended question for consumers permitting essay length responses was added by the researcher, "What features, quality, technical parameters or any other attributes do you wish the wearable technology product should have?" and one question was added for product developers "What are the major concerns or limitations about implementing technical requirements in wearable technology product development?". Statistical Analysis System

(SAS) Enterprise 6.1 was used to analyze the data. The open ended questions were analyzed for content and coded using the thematic method.

A total of 378 men and women participated in this study. Consumers of wearable technology comprised 62.17% and professionals involved in product development of wearable technology accounted for 37.83% of participants. Coding of the open ended question resulted in four major themes emerging for consumers and four for product developers.

Results indicate consumers considered the most important feature of wearable technology to be Product Safety. Closely following Product Safety was Product Functionality. In contrast to consumers, professionals involved in the design and manufacture of wearable technology regarded Material Selection as the most important aspect of the product with how the Electronics and Clothing were combined as the second most important aspect of the product. A disconnect between the features consumers and product developers consider most important was also noted in the written comments. For example, when discussing the features they rate as most important in wearable technology a consumer commented "useful, easy to clean, serves a purpose, makes life more convenient, helps me with activities I already do" whereas a product developer stated "interfacing electronics with textile, battery life and durability".

By using the QFD method, this study uncovered a disconnect between consumer and product developer priorities for the features most important in wearable technology. It provides valuable information to industry on the product features most important to consumers and identifies a gap between manufacturer's priorities and those of the consumer.

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