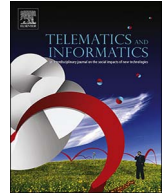


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What drives smartwatch purchase intention? Perspectives from hardware, software, design, and value

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ABSTRACT

Although wearable devices are popular in recent years, the market share of smartwatches is relatively low. The main goal of this research is to investigate the antecedents of the intention to purchase a smartwatch. This research develops a conceptual model and hypotheses based on the theory of reasoned action and perceived values from the perspectives of software, hardware, and aesthetic design. An online questionnaire was developed and distributed on popular websites to collect data, and 260 usable responses are collected from the potential users of the Apple Watch in Taiwan. The thirteen hypotheses were validated by using partial least squares (PLS) techniques. Among the antecedents of purchase intention in the model, the attitude towards using smartwatches was found to have the strongest direct effect. Among the factors of the attitude, design aesthetics have the most significant effect. The results also show that all of the factors about smartwatch attributes directly affected the related perceived values. However, social value and performance/quality value did not affect the intention. The model demonstrated relatively good explanatory power for purchase intention in the context of smartwatches. The proposed model can provide insights to smartwatch vendors to develop their new products and marketing strategies.

1. Introduction

Smartwatch devices have recently attracted a lot of attention in the Internet of Things market. The devices have been widely used in the fields of sports, healthcare, and personal communications. A 2016 report by the International Data Corporation (IDC) predicted that smartwatch sales will grow significantly, reaching \$17.8 billion by 2020 (Maddox, 2016). Smartwatches employ a variety of operating systems, including Android Wear, WatchOS, Tizen, and Real-Time Operating System (RTOS). Of these, Apple's WatchOS, Google's Android Wear, and Tizen are the most popular, with a market share of 52.3%, 22.9%, and 12.7%, respectively, in 2016 (IDC Research, 2016).

Although smartwatch sales decreased in 2016, smartwatches have become an indispensable tool in people's daily lives, and have significant potential for helping citizens in dangerous situations (Cheng and Mitomo, 2017; Yang et al., 2016). Manufacturers continuously upgrade the hardware, software, design, and user interface of their products in order to satisfy users' needs. These are the key factors that can foster a positive attitude toward the product and enhance consumers' purchase intention (Choi and Kim, 2016; Hsiao, 2013). A few researchers have applied the technology acceptance model or value-related factors to smartwatch usage

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behaviors (Chuah et al., 2016; Hong et al., 2017). However, few recent studies have specifically investigated the factors that influence purchase intention in the context of smartwatches, which are relatively new to the market. Since there is a considerable variety of smartwatch applications and hardware, one of the research objectives is to examine the influence of hardware- and software-related factors on consumers' attitude toward the product.

Past research has indicated that various kinds of perceived value are the key determinants of purchase intention (Hong et al., 2017; Hsiao, 2013; Yeh et al., 2016). Smartwatches come equipped with many wireless sensors which can provide value-added features. Some of the sensors can record activity, heart rate or strolling range to enhance users' gamification actions. In light of these multi-functional features, this study aims to explore the influences of various kinds of perceived value on users' intention to pay for a smartwatch. In addition, the hardware- and software-related factors may enhance the perceived values. To gain further insight into the purchase behaviors of smartwatches requires an investigation into the possible relationships between hardware/software-related factors and the values. The investigation can aid the design of highly successful and value-added products. Therefore, the other research purpose is to examine the relationships between hardware/software-related factors and the values.

1.1. Literature review

1.1.1. Smartwatches

Smartwatches are wearable computers can perform various daily tasks to help users to deal with their daily work. They can be installed and run mobile applications, such as schedulers, digital maps, personal organizers, and music players. Most of them have a touchscreen and support wireless communication technology, such as Bluetooth, GPS, and Wi-Fi. The most popular mobile operating systems of smartwatches are Apple watchOS, Android Wear, and Tizen. In particular, Apple Watch which embedded watchOS is the most popular smartwatch in the world.

Although Apple Watch is the best smartwatch so far, the most popular wearable devices are fitness bands. The market share of Apple Watch in wearable devices is only 14.6% during the first quarter of 2017 (IDC Research, 2017). Therefore, understanding why people buy Apple Watch is still an important issue. Recently, researchers use different theories to explore the factors of smartwatch adoption (Chuah et al., 2016; Hong et al., 2017). For example, Chuah et al. (2016) adopt technology acceptance model to explore the factors and found that attitude toward using and visibility had strong direct effects on the adoption intention. Hong et al. (2017) found that hedonic value and utilitarian value significantly affected the continuance intention to use smartwatch. Jung et al. (2016) found that the brand, price, display size, standalone communication, and shape are the five important attributes of smartwatches in consumers' valuation. However, few studies focus on Apple Watch adoption from the perspectives of hardware, software, design, and values to explore the factors.

1.1.2. Perceived value

People evaluate events based on their value system. Perceived value refers to the purchaser's perception of the utility provided by a given product (Hsiao, 2013; Lu and Hsiao, 2010). This perceived value can be enhanced either by increasing the benefits provided or reducing the sacrifice(s) required (Yeh et al., 2016). Following Sweeney and Soutar (2001), we categorize perceived value into social value, emotional value, performance/quality value, and price/value for money. The definitions of the dimensions are as follows.

(1) Social value: the utility derived from smartwatches in enhancing social self-conceptualization. (2) Emotional value: the utility that comes from one's affect or feelings in association with a smartwatch. (3) Performance/quality value: the utility generated by one's perception and/or expectation regarding the performance and quality of a smartwatch.

(4) Price/value for money: the utility one gains from reduced short- and long-term perceived costs associated with smartwatches. These perceived values were adopted in difference contexts to explore their effects on consumers' payment behaviors. In the mobile app context, past research found that price/value for money and emotional value would have strong direct effects on the users' intention to pay for a mobile app (Hsu and Lin, 2015). In the mobile game context, playfulness (emotional value), reward, and price for money were found to have direct and significant effects on in-app purchase intention in paid-player group while only price for money significantly affected the intention in unpaid-player group (Hsiao and Chen, 2016). Therefore, the effect of the values in different user group will be different as well. Some researchers further explore the antecedents of the values. For example, in the wearable device context, functionality, compatibility, visual attractiveness, and brand name would demonstrate to have direct effect on the benefit values (Yang et al., 2016). They indicated that the antecedents of the value will differ in different products.

2. Theoretical background and hypothesis development

Fig. 1 illustrates the study's research model, in which the theory of reasoned action (TRA) and perceived values are used to investigate purchase intention in regards to smartwatches. In particular, TRA is a general model which has been widely used as the basis of consumer behavior studies on topics such as online purchase intention and smartphone adoption (Hsiao, 2013; Ramayah et al., 2009). According to the TRA, attitude is the main factor that determines behavior (Choi and Kim, 2016). However, TRA does not specify beliefs about a particular behavior. Therefore, other salient beliefs need to be considered when adopting TRA to explain different individuals' behaviors (Hsiao, 2013). In the smartwatch context, we expect hardware, software and appearance to be the main factors that drive consumers' attitude.

Because of the smaller screen, smartwatch interface and mobile application designs are different from those of smartphones and tablet PCs. Hence, from the software perspective, interface convenience and embedded features (content) play important roles. In

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