

# **A Study of the Acceptance of Wearable Technology for Consumers**

## **— An Analytical Network Process Perspective**

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### **ABSTRACT**

Wearable technology is one of popular emerging trends in 2014 Consumers Electronic Shows, which can be applied in many devices or gadgets and added some functions to create innovative and diverse services or goods for making people's life quality better. However, SPOT, a prototype of smartwatch, was introduced by Microsoft in 2004, but it has not been popular because of lacking appealing and replaceable contents. Now, the wearable technology is noticed again. Will it be successfully attract consumers to accept it or not? Traditionally, many studies of predicting a new technology being accepted usually utilized Unified Theory of Adoption and Use of Technology (UTAUT) model which was proposed by Venkatesh, Morris, Davis and Davis in 2003 and viewed as a better robust model than the others with similar purposes. Besides, the original contents of UTAUT, Analytical Network Process (ANP) can further examine the detailed priorities of factors inside the dimensions or clusters. These detailed results are benefit of the firm which tries to understand the acceptance of wearable technology in the market in the future. Therefore, in this paper we exploit some key influential factors of the using intention and actual using behavior of customers on wearable technology in Taiwan by applying ANP under the structure of UTAUT.

Keywords: Wearable Technology, Technology acceptance, UTAUT, Analytical Network Process, Use intention, Use behavior.

### **1. Introduction**

In post-smartphone era, wearable technology was viewed as an important secret weapon in the exploitation of smart phones. Indeed, the wearable technology is one of main expected trends in the 2014 Consumers Electronic Shows. We could see some smartwatches, Google glasses, and other devices with wearable technology appeared in the market and attracted corporations to participate or invest in developing 3C peripheral device with wearable technology. However, the wearable technology is not a brand-new technology strictly speaking. In fact, Microsoft ever launched a smartwatch named SPOT as early as 2004. But the SPOT smartwatch didn't create a new niche marketplace for Microsoft on those days. Now, wearable technology seems becoming attentive again. Fitness or personal e-health devices combined with wearable technology are expected to

be popular in the consumer markets. In order to understand whether this compelling wearable technology will be accepted by consumers to buy the emerging products, the study tries to utilize the Unified Theory of Acceptance and Use of Technology (UTAUT) model to analyze it.

Traditionally, researchers adopt UTAUT model to predict the acceptance of a new technology by applying statistical analytical techniques, and then examining the significance of each relationship in the model. In this study, we adopt ANP methodology under the structure of UTAUT to analyze the model for three main reasons. Firstly, the UTAUT model is viewed as a more robust model for predict a new technology acceptance than the others. Hence, directly cited the model can save time in building the analytical model and avoid the subjective judgment during the structuring process. Secondly, the argue of using the UTAUT model that the statistical significant magnitude of some links presented in the model are weak but significant (Taiwo and Downe, 2013), but it didn't affect the applicability of the ANP owing to the link drawn in the analytical network depended on the relationship is existed or not, therefore, the significant relationship could present the connection between two clusters. Lastly, the statistical analysis often focuses only on the significance between two dimensions, and seems to be less concern on the influences derived from constructs or the side factors in each cluster. By contrast, we can discuss each factors in detail based on the priorities derived from the calculation of ANP methodology.

Accordingly, the objective of the study is to exploit the acceptance of the wearable technology and conclude important determinants of intention to use it.

## **2. Literature Review**

The study adopts an existing UTAUT model without any modification. Hence, in this section we mainly review literatures related to the UTAUT model in order to understand the definitions and relationships of the model clearly. In addition, we also study several papers about the application of ANP methodology united managerial models to realize the adaptability of the study. Lastly, we also searched some industrial reports on the wearable technology development and future assessment to define our research objective more clearly and more conformed to market trends.

### **2.1 The UTAUT Model**

There are some analytical models dealt with technology or system adopting problems based on information systems, psychological, or sociological theories. Owing to these models almost could explain 40% of the variance in individual intention to adopt technology at least, the follow-up studies met an arduous decision to choose appropriate models or even constructs involved in different models without overlooking important functions obtained from other competing models. Venkatesh, Morris, Davis and Davis (2003) integrated eight models from reviewing past related user acceptance literature to formulate a mix model, referred to as "Unified Theory of Acceptance and Use of Technology" (UTAUT). For more detailed contents about eight models and included core constructs please refer to "User Acceptance of Information Technology: Toward a Unified View".

The UTAUT model is composed of four dimensions which direct affect user acceptance and usage behavior significantly, and three to five other dimensions to construct pertained to the above four dimensions. Furthermore, there are additional four key moderators, which are age, gender, voluntariness and experience (e.g., see Venkatesh, et al. 2003). The entire model is presented later in Section4.

There are many papers quoted UTAUT model or adopted partial dimensions and added other dimensions along with their own topics to understand new IT purchase/use intentions. Mäntymäki and Salo (2013) proposed an extended UTAUT model to predict the young people's purchasing intention in social virtual world. Gruzd, Staves and Wilk (2012) directly utilized the UTAUT model to interpret and explore how the social media are used in research practices. Martín and Herrero (2012) added innovativeness into original UTAUT model to find out the user's psychological influential factors on the online purchase intention in rural tourism.

## **2.2 Analytical Network Process**

The AHP developed in 1980 by Professor Thomas L. Saaty is a technique effectively dealt with multi-criteria decision-making problem. Saaty and Takizawa (1986) then further considered the inner and outer dependence with feedback within general analytical networks, i.e. ANP. Decision makers could transform problems in the real world into a hierarchy or a network composed of components and elements and then analyzed them via pairwise comparisons to acquire the priority of each element and alternative for making better decisions.

Now ANP has been applied in many fields, such as telecommunication industry, finance and banking, government, marketing, tourism and so on. Research adopted ANP methodology is needed to structure an analytical model first, which can be obtained through literature related research topics reviews, experts' opinions, and utilized existing models, such as balanced scorecard (BSC)(Bhattacharya, Mohapatra, Kumar, Dey, Brady, Tiwari and Nudurupati, 2013).

## **2.3 Wearable Technology**

IHS Electronics and Media is a business intelligence organization which provides market data and forecasts, performance evaluations, strategic suggestions, and intellectual property in the electronics, medial, transportation, and energy industries. Its whitepaper about market assessment of wearable technology assessed five applications, included healthcare and medical, fitness and wellness, infotainment, industrial and military, and twenty three product categories, such as Bluetooth headsets, smart clothing, smart glasses and smartwatches, and emotional measurement and so on. According to this report, the definition of the product with wearable technology must be "worn on the user's body for an extended period of time, significantly enhancing the user's experience as a result of the product being worn (Wearable). Furthermore, it must contain advanced circuitry, wireless connectivity and at least a minimal level of independent processing capability (Smart)". Above five main applied areas are seen as key market drivers for wearable technology. In "infotainment" area, the smart phone products play a crucial role resulted from the number of users and the diversity of the devices continuously increases, and induce the smart phone to become an excellent data exchange platform for its users (IHS Electronics & Media, 2013).

## **3. Objectives**

Our study is to assist companies developing wearable technology to understand which factor is the most important to bring consumers to intend to use a product with the technology and then actually purchasing it.

Therefore, we apply UTAUT model to be the evaluating model of acceptance of a product with wearable technology. The entire model includes four main clusters: "performance expectancy", "effort expectancy", "social influence", and "facilitating

conditions", and each cluster individually covers three or five factors. Besides, in order to assess whether consumers are willing to use the new product equipped wearable technology and the probability of actual buying behavior, there are two additional clusters in the model: "use intention" and "use behavior". For the detailed analytical model please see Figure 1.

#### **4. Methodology**

We use ANP to deal with the usability of wearable technology under the structure of UTAUT. First, the six dimensions and constructs corresponding to six dimensions in the UTAUT model are considered as six clusters and the components of each cluster, respectively. Afterwards, we further examine the dependences between clusters and elements according to the link shown in the UTAUT model. Moreover, the four moderators in the UTAUT model are the basis of our customer classifications. After confirming the analytical model and analytical targets, the ANP calculation process is followed.

#### **5. Data Analysis**

After collecting the questionnaires from consumers with different characteristics, we calculate consistency indices of each questionnaire to make sure the validity of data. Then we classify the consumers based on their "age", "gender", "voluntariness" and "experience". In order to know the result of "intention to use" and "actual use behavior", we divide the analysis into 2 phases. First, we only compute the data of "use intention" cluster and its influential clusters for understanding the priority of influential factor of "use intention"; Secondly, we count the data of all clusters and then realize the priority of influential factors of "use behavior". Finally, we compare the final results of each group, and identify which factor plays a vital role in attracting consumers to accept and even use a product with wearable technology.

#### **6. Limitations**

Since the wearable technology is still emerging and not mature enough, there are not many actual or potential users can answer the questionnaire of the study, which limits our sample size in the study.

#### **7. Conclusions**

The study obtains the influential factor of using intention and actual using behavior according the UTAUT model among different types of consumers separated from age, gender, experience, and voluntariness. This study utilizes the wearable technology to be an example to test the applicability of the model and provide some suggestions for the companies developing a product with wearable technology. Further, the model presented in the study could be extended to other new emerging technology applications.

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