



Adoption of three new types of computers in Taiwan: Tablet PCs, netbooks, and smart phones



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ABSTRACT

Tablet PCs, netbooks, and smart phones are similar to one another in that they possess the basic functions of computers, but they differ in what functions they emphasize. Rogers' diffusion of innovation model has been widely recognized as a powerful model for predicting technology adoption. This study adopted Rogers' model to examine the adoption intentions of the three new types of computers. A telephone survey was conducted to collect data. This study made 1757 telephone calls, from which 1100 valid calls were obtained, representing a response rate of 62.61%. The data analysis demonstrates that the findings are generally congruent with the predictions of Rogers' model. However, this study's results also reveal one limitation of Rogers' model, its pro-innovation bias, which explains why the diffusion of netbooks was incongruent with Rogers' model.

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1. Introduction

According to several recent studies, tablet PCs and smart phones were ranked as the two most wanted digital products in Taiwan (FIND, 2012; Ministry of the Interior, 2012; Sung, 2012). Tablet PCs, which have been available since the late 1980s, are not a new invention. However, early tablet PCs' versions suffered from narrow ranges of functions, such as limited computing power and error-prone operating systems. The launches of Apple's iPad1 and iPad2 in 2010 and 2011 stimulated the popularity of tablet PCs in the global market, which lead other major brands such as Samsung, Acer, Asus, and HP to produce their own tablet PCs (Gerpott, Thomas, & Weichert, 2013). With their intuitive "natural user interface" and sophisticated multimedia hardware, Apple's iPads received the largest share of tablet PC sales in Taiwan and the global market. However, Apple's iPads are not a complete substitute for laptops because they lack several features, including USB ports, memory card slots, and easy word processing. Laptops also have several features similar to stationary PCs, including a keyboard physically separated from the screen, storage volume and plug connections. Laptops labeled as netbooks differ from notebook computers. Netbooks contain all the features of notebook computers, but netbooks are smaller and lighter, which allow people to carry them easily (Gerpott et al., 2013; Sung, 2012). A recent study indicates that the penetration rate of smart phones in

Taiwan in the first season of 2013 has reached 45%, with three brands dominating the market: Apple, Samsung, and HTC (FIND, 2013). Smart phones have similar functions to tablet PCs but are smaller, whose strengths lie in their interpersonal connections and ease to carry around (Sung, 2012).

Tablet PCs, netbooks, and smart phones are similar to one another in that they possess the basic functions of computers, such as access to various Internet services, but they differ in what functions they emphasize. Tablet PCs are characterized by their natural user interface and multimedia applications, netbooks are useful for regular office work, and the strength of smart phones lies in their facilitation of interpersonal connections (Gerpott et al., 2013; Sung, 2012). Due to the different functions they emphasize, smart phones are used more often for interpersonal communication, netbooks are regarded more as an information technology, and tablet PCs are used more often for entertainment purposes.

Rogers' diffusion of innovation model has been widely recognized as a powerful model for predicting technology adoption. It identifies three major variables for technology adoption: the nature of an innovation, communication channels, and adopters' characteristics. The objective of this study was to use Rogers' model to investigate how the three elements – the nature of an innovation, communication channels, and adopters' characteristics – affected the adoption intentions of the three new types of computers – tablet PCs, netbooks, and smart phones – in Taiwan.

Rogers' diffusion of innovation model and Davis' technology acceptance model (TAM) are two models that are often used to examine technology adoption. This study used the Rogers' model

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instead of TAM as its theoretical framework because TAM is designed for technology adoption in work environments or in cases where adoption is not voluntary (Lin, Shih, & Sher, 2007). Rogers' model includes a broader range of variables than TAM. Therefore, Rogers' model is more suitable for this study (Davis, 1989; Rogers, 1995, 2003; Venkatesh & Bala, 2008; Venkatesh & Davis, 2000; Zhou, 2008).

2. Literature review

Rogers (2003) defines the diffusion of innovations as “the process in which an innovation is communicated through certain channels over time among the members of a social system.” (p. 5). Among the three variables identified by the model, the nature of an innovation is considered to be the most powerful predictor because it explains 49–87% of the variance in technology adoption. The nature of an innovation has two variables: innovation attributes and technology clustering.

2.1. Innovation attributes

The perceived attributes of an innovation include its relative advantage, complexity, compatibility, observability, and trialability. Several of the five perceived attributes are also considered important predictors in TAM. The two concepts in TAM – perceived usefulness and perceived ease of use – are similar to “relative advantage” and “complexity” in Rogers' model, whereas the concept of result demonstrability in TAM2, an extension of TAM, is similar to “observability” in Rogers' model (Jung, Chan-Olmsted, Park, & Kim, 2012; Venkatesh & Bala, 2008). Empirical studies confirm the perceived attributes of a technology to be an important predictor for its adoption (Chang, Lee, & Kim, 2006; Daupagne & Driscoll, 2010; Jung et al., 2012; Lee, 2013; Rogers, 2003). For example, Daupagne and Driscoll (2010) found that perceived relative advantage, compatibility, trialability, and observability were significant predictors of the adoption of high-definition television in the U.S. Jung, Chan-Olmsted, Park, and Kim (2012) found that three perceived attributes – relative advantage, compatibility, and trialability – were positively correlated with the intention to use e-books in South Korea. Li's study (2013b) demonstrated that perceived ease of use was a significant predictor of a user's intention to adopt terrestrial digital television in Taiwan.

The conceptualization of Rogers' five attributes also received criticisms from scholars. Zhu and He (2002) suggest that the conceptualization be revised by adding one attribute: perceived image of a technology. Two studies found that relative advantage and compatibility were not distinguishable from each other (Moore & Benbasat, 1991; Wei, 2006).

Based on a review of past studies, this study expects that the perceived attributes will significantly affect users' intentions to adopt the three technologies. Therefore, the first hypothesis is as follows:

H1a. The respondents' perceived relative advantage, ease of use, compatibility, observability, and trialability will be positively correlated with their intention to adopt tablet PCs.

H1b. The respondents' perceived relative advantage, ease of use, compatibility, observability, and trialability will be positively correlated with their intention to adopt netbooks.

H1c. The respondents' perceived relative advantage, ease of use, compatibility, observability, and trialability will be positively correlated with their intention to adopt smart phones.

2.2. Technology clustering

Rogers' model describes the phenomenon of technology clustering as the compatibility between a technology's functions and a user's needs. Past studies have found that people adopt technologies because the functions fulfilled their needs. Individual's ownership of different types of technologies allows researchers to predict technology adoption because individuals are likely to adopt functionally similar technologies due to the compatibility of the technologies' functions with the consumers' needs (Daupagne & Driscoll, 2010; Jung et al., 2012; Lin, 2009, 2010; Rogers, 1995, 2003).

Atkin (1995) classified all communication technologies as entertainment, information, or interpersonal technologies. Based on the concept of technology clustering, he predicted that people were more likely to adopt technologies within similar functional categories. His study verified this prediction, demonstrating that the adoption of entertainment-oriented 1–900 telephone services was positively correlated with the use of entertainment technologies rather than information technologies. Lin (2010) examined the adoption of satellite radio in the U.S. and found that the ownership of fluid digital media technologies was positively correlated with the respondents' adoption evaluation, which consequently positively affected their intention to adopt. Jung et al. (2012) found that the degree of digital media ownership was a significant predictor for the adoption of e-books in South Korea. Daupagne and Driscoll's study (2010) found that the owners of HDTV possessed significantly more communication technologies than non-owners. Lin (2009) found that compared to non-adopters, online radio adopters in the U.S. owned a significantly higher number of digital media devices including iPods, cellular phones, and satellite radio technologies.

This review of past studies indicates that people tend to adopt technologies within the same functional categories, and this study therefore predicts that the adoption of tablet PCs will be associated with the adoption of entertainment technologies because the functional emphasis of tablet PCs is on multimedia applications that are more entertainment oriented. Netbooks will be affected by the ownership of information technologies because the strength of netbooks lies in their usefulness for regular office work. As an interpersonal technology, smart phones are expected to be related to the ownership of interpersonal technologies. Based on this reasoning, the following hypotheses were developed:

H2a. The respondents' ownership of entertainment technologies will be positively correlated with their intention to adopt tablet PCs.

H2b. The respondents' ownership of information technologies will be positively correlated with their intention to adopt netbooks.

H2c. The respondents' ownership of interpersonal technologies will be positively correlated with their intention to adopt smart phones.

2.3. Lifestyles

According to Rogers, people do not adopt technologies simply for their practical functions. Instead, social rewards are typically the motives that drive people to adopt technologies. Social rewards are a relative advantage, one of the five perceived innovation attributes in Rogers' model. When the motive for technology adoption is social rewards, lifestyles become an important predictor for adoption because lifestyles are “the manner in which people conduct their lives, including their activities, interests and opinions” (Peter & Olson, 1994, p. 463). Lifestyles reflect people's attitudes,

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