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Impact of Ergonomic and Social Psychological Perspective: A Case Study of Fashion Technology Adoption in Taiwan

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Recently, there have been dramatic and emerging innovations in portable media devices. This is evident, for example, with the Apple iPod, Microsoft Zune, Sony Walkman, and the Samsung and iriver media players. Because of this, how to best understand the users' intentions to adopt these fashionable technologies has become a new issue in the information technology domain. However, in the literature, little is published about what motivates people to adopt these innovative technologies. To address this issue, this research sought to come up with a model by integrating key variables from the role of ergonomic and social psychological facets on estimates of the fashion technology acceptance. A structural equation modeling approach was used to examine 10 hypotheses in the proposed model. The results indicated that usefulness, playfulness, and aesthetics from the ergonomic facet and critical mass from the social psychological perspective positively contributed to the users' intent to adopt the fashion technology. Furthermore, the perceived ease of use indirectly affects adoptive intentions through perceived usefulness and playfulness. Important implications of these findings are discussed from both theoretical and practical aspects.

1. INTRODUCTION

Today, the hedonic-oriented information technologies influence many aspects of our lives, which extend to communication, social activities, entertainment, and more. Over the past two decades, a significant part of the literature has been dedicated to examining and understanding factors that impact users to accept or reject a particular information technology usage (Carayon-Sainfort, 1992; Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; W. Hong, Thing, Wong, & Tam, 2002; Horton, Buck, Waterson, & Clegg, 2001; Igarria, Parasuraman, & Baroudi, 1996; Moon & Kim, 2001). However, few of the studies were done specifically to address the acceptance of hedonic-oriented technologies. Fashionable, or fashion, technology, such as digital audio players and mobile music phones, can be viewed as a special

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type of hedonic-oriented information technology, and they have been invented at a dramatically fast pace. There are usually three major elements—pleasure, art, and innovation—and they are different from the use of software packages and utilitarian technologies, which were the general topics studied in the previous research. Users who adopt these portable media devices hope that such technologies will allow them to obtain and listen to music anytime and anywhere and thus improve the convenience of sharing and carrying music. Users no longer have to take multiple CDs with their CD players, because they can just carry a small and stylish portable digital device containing all of their music. On the other hand, individuals who possess these fashion technologies can also display their individuality and unique personality (Tian, Bearden, & Hunter, 2001). According to a report conducted by Jupiter Research (Cohen, 2006), in the United States, the base for digital music devices will expand from 37 million users in 2006 to 100 million users in 2011. This indicates that the popularity of such technologies will continue to grow in the future. Because of the increasing demand for emerging fashionable technologies in the everyday lives of individuals, these technologies bring many large business opportunities to the consumer electronics industry. An increasing number of companies such as Apple, Microsoft, Sony, and Samsung are making substantial investments in this area. It is worthwhile to elucidate what factors make an individual adopt or ignore a fashion technology and provide some leverage suggestions to those organizations that design hedonic information technologies.

Apple, one of major players in the fashion technology industry, manufactures the iPod, which is now the world's most popular and fashionable portable media device on the market. It was initially launched in October 2001. Different models of iPods are also being invented by Apple. These are popularly known as the iPod Shuffle, Nano, Classic, and Touch. Up until now, the Apple iPod and its variations have proven to be a milestone in fashion technology. As of September 2008, the iPod has an incredible history of selling more than 160 million units across the globe and capturing 73.4% of the market share for portable MP3 players in the United States (Apple, 2008). It also holds a first-place position in Taiwan's MP3 market (J. J. Lee, 2007). Therefore, we can say that the iPod has revolutionized the world of portable media devices. Based on its simplicity and stylish design, the iPod has become a hot device in current society. Individuals can use an iPod to conveniently listen to music, watch movies, view photos, play games, and even store documents. Currently, the name "iPod" is almost synonymous with the term "portable media device" (Weisbein, 2008). Due to the success of the iPod and its dominance in the market, we have some questions. Why do people choose the Apple iPod? Is it attributable to the visual design, fun accessories, or just because everyone has one and people want to fit in? In addition, what are the critical factors that determine the adoption of such fashion technology? How do these factors affect users' intentions? Do the adopters and potential adopters have the same perceptions toward such innovative technology? In the past, user acceptance toward this type of technology was paid little attention. For this reason, there is a need to develop a proper model to solve these curious research questions.

This article differs from previous studies because it is one of the first studies to investigate the reasons behind users' adoption of fashionable technology. The focal technology is the Apple iPod. In view of the preceding research questions, this current study came up with a model by integrating key variables from the

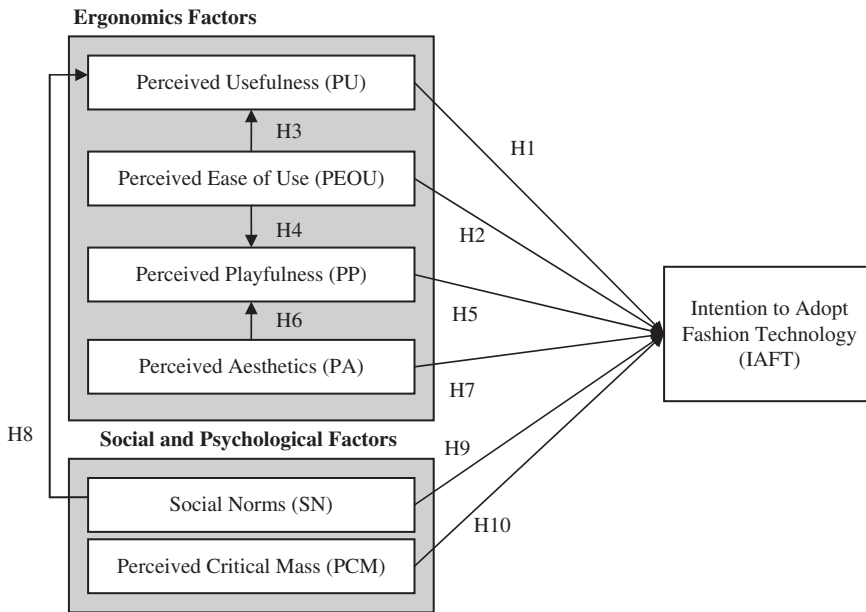


FIGURE 1 Research model.

role of ergonomic and social psychological facets on estimates of the fashion technology acceptance. Accordingly, based on related literature, we have treated the perceived usefulness, ease of use, playfulness, and aesthetics as ergonomic factors. We have also treated social norms and perceived critical mass as social psychological factors. After that, we tested the model empirically using online survey data obtained from a cross-sectional study conducted in Taiwan.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

Figure 1 illustrates the overview of the proposed research model, which asserts that the intention to adopt fashion technology (IAFT) is determined by four ergonomic factors: perceived usefulness (PU), perceived ease of use (PEOU), perceived playfulness (PP), and perceived aesthetics (PA). There are also two social psychological factors: social norms (SN) and perceived critical mass (PCM). The construct relationships and hypotheses are elaborated as follows.

2.1. Perceived Usefulness and Ease of Use

Since its introduction by Davis (1989) and Davis et al. (1989), the technology acceptance model (TAM), adapted from Fishbein and Ajzen’s (1975) theory of reasoned action (TRA), has widespread acceptance as a general and powerful model for understanding information systems/information technology (IS/IT) acceptance. According to TAM, user adoption and usage behavior are determined by the

intention to use IS/IT. There is a direct and positive effect between attitude, intention to use, and actual usage. The TAM also identifies ease of use and usefulness as key predictors that influence the users' acceptance of new technologies. Davis (1989) defined PU as the degree to which a person believes that using the new technology will enhance or improve his or her work performance and defined PEOU as the degree to which a person believes that using the new technology would be free of effort. Both PU and PEOU constructs determine the attitude toward using (AT), and PEOU also has a positive effect on PU. Furthermore, PU and AT are expected to directly influence behavioral intention to use (BI).

Researchers have previously validated the TAM in many different contexts. For example, TAM has been successfully used to explain the acceptance of intranet use (Horton et al., 2001), specific software packages (Chau, 2001), data warehousing software (Wixom & Todd, 2005), the World Wide Web (Moon & Kim, 2001), IT satisfaction (D. Lee, Rhee, & Dunham, 2009), e-services systems (Lin, Shih, & Sher, 2007; López-Nicolás, Molina-Castillo, & Bouwman, 2008), a hedonic information website (Van der Heijden, 2004), and e-learning systems using a sample of employees taken from six international companies in Taiwan (Ong & Lai, 2006). W. Hong et al. (2002) proposed an extended TAM model in the context of digital libraries services and found that PU and PEOU both had significant effects on BI. Also, consistent with TAM, PEOU was a causal antecedent to PU. Another research study conducted by Nisbet (2006) used the TAM model to predict the customer's intention of using gambling technologies and suggested that PEOU and PU are two significant constructs of an intention to use the system. Venkatesh (2000) presented an anchoring and adjustment-based TAM model to learn how that perception forms and changes and revealed that PEOU and PU play a critical role in influencing the BI of the system over time. Based on this literature review, it is expected that usefulness and ease of use from TAM are also applicable to the fashion technology context. When an individual perceives that a fashion technology is useful and easy to use, he or she may have a positive intention to adopt that technology. We defined PEOU as the degree to which a person who uses the fashion technology was free from effort. PU was defined as the degree to which a person believed that using fashion technology would fulfill his or her expectations. In addition, IAFT was the extent to which the user would like to adopt fashion technology in the future. Therefore, the following hypotheses are offered:

- H1: Perceived usefulness will positively influence the users' intentions to adopt fashion technology.
- H2: Perceived ease of use will positively influence the users' intentions to adopt fashion technology.
- H3: Perceived ease of use will positively influence perceived usefulness.

2.2. Perceived Playfulness

Many previous studies have been aimed at finding the effect of additional factors that could interpret behavior toward using a specific technology. Playfulness (similar to "enjoyment" or "fun"), which is mentioned in Lieberman's pioneering

works (Lieberman, 1977) and Barnett's studies (Barnett, 1990), can be considered to be either a state of mind (Moon & Kim, 2001) or an individual trait (Webster & Martocchio, 1992). Moon and Kim (2001) defined playfulness as consisting of three dimensions: concentration, curiosity, and enjoyment. They also found that PP had a significant effect on the intention to use the Internet. In Martocchio and Webster's (1992) study, they posited that individuals considered to be high on the playfulness trait demonstrated higher performance and showed higher responses to micro-computer training. Previous studies have also revealed the importance of the role of playfulness on acceptance of IT (Agarwal & Karahanna, 2000; Dickinger, Arami, & Meyer, 2008; Fang, Chan, Brzezunski, & Xu, 2006; Hsu & Lin, 2008; Igarria et al., 1996; J. J. Lee et al., 2007; Lin, Wu, & Tsai, 2005; Liu & Arnett, 2000; Shin, 2009; Van der Heijden, 2004; Venkatesh, 2000). Atkinson and Kydd (1997) tested the influence of individual characteristics of playfulness and motivation on the use of the World Wide Web. They suggested that playfulness is significantly related to use, especially for entertainment purposes. Van der Heijden (2004) linked PEOU to perceived enjoyment, and he found that perceived enjoyment and PEOU are all strong determinants of the intention to use a hedonic technology. Furthermore, PEOU also had a positive effect on perceived enjoyment. Similarly, Shin (2009) determined the factors influencing the adoption of IP-based technologies and demonstrated that PP is positively related to the intention to use. Based on these findings, there is a need for us to examine the playfulness construct in our research model. We believed that the acceptance of fashion technology comes not only from an extrinsic motivation, such as usefulness and ease of use, but also from hedonic or intrinsic motivation (playfulness). If users are more playful with the fashion technology, they will be more willing to use them. Thus, this study defined PP as the degree to which a person believed that enjoyment could be derived when using the fashion technology. We therefore hypothesize the following:

H4: Perceived ease of use will positively influence perceived playfulness.

H5: Perceived playfulness will positively influence users' intentions to adopt fashion technology.

2.3. Perceived Aesthetics

Unlike simple IS/IT adoption, the acceptance of fashion technology includes not only IT adoption but also the pleasurable consumption behavior. A significant body of prior research on human-computer interaction has begun to consider the role of aesthetics in the context of web page design (Cyr, Bonanni, Bowes, & Ilsever, 2005; Lavie & Tractinsky, 2004; Park, Choi, & Kim, 2004; Schenkman & Jonsson, 2000; Tractinsky, Cokhavi, Kirschenbaum, & Sharfi, 2006), Internet portals (Van der Heijden, 2003), online shopping (Shang, Chen, & Shen, 2005), and mobile services (Cyr, Head, & Ivanov, 2006; Ha, Yoon, & Choi, 2007). Van der Heijden (2003) investigated an extended TAM model adding a new construct called "perceived attractiveness," which was defined as "the degree to which a person believes that a website is aesthetically pleasing to the eye." Results found that visual attractiveness of a website affected the user's enjoyment as well as the

perceptions for ease of use. Other research conducted by Schenkman and Jonsson (2000) suggested that beauty was the primary predictor for preferring a website. In Cyr et al.'s (2006) work, they proposed that an augmented TAM model introducing a hedonic factor named the "design aesthetic" and found that visual design aesthetics did significantly impact usefulness, ease of use, and enjoyment. All of these factors eventually influenced the user's loyalty toward a mobile service. The path from design aesthetics to enjoyment is more significant than the path from aesthetics to usefulness and ease of use. Ha et al. (2007) demonstrated that perceived attractiveness positively affects perceived enjoyment and the attitude toward playing mobile games. Finally, some empirical evidence also found that aesthetics was correlated with user satisfaction with websites (Lindgaard & Dudek, 2003).

In another point, aesthetics was found to play a prominent role in new technology (product) acceptance and marketing strategies. According to Jordan (1998), aesthetics embraced three notions (Karvonen, 2000): "simplicity," "design quality," and "pleasantness." When there is a strong determinant of pleasure during the interaction, this can increase the desirability of the product. Past studies in the field of product management have also found that aesthetically pleasing properties have a significant influence on users' preference of an industrial product (Yamamoto & Lambert, 1994). This is because aesthetic impressions have influence on both users' memories and their decision processes when they consider purchasing products (Kim, 1998). In addition, Hassenzahl (2004) further separated product characteristics into two categories: pragmatic (similar to extrinsic values) and hedonic attributes (similar to intrinsic values). Pragmatic attributes are related to the person's need to achieve behavioral purposes derived from the use experience. Meanwhile, hedonic attributes are associated with the person's self-derived impression from the product's appearance. The Apple iPod is heralded as an "aesthetic revolution" and is different from general utilitarian technology. It can be recognized as pragmatic because it provides effective and efficient ways for the user to fulfill his or her goals. Furthermore, it could also be perceived as hedonic because it provides personal identification by its novel or trendy features. We believe that people often follow some general principles of "styles" or "trends" because they want to be considered fashionable and show their individuality. Based on these discussions, aesthetics is a good predictor of a fashion technology's overall impression. Thus in this study we defined perceived aesthetics as the degree to which a person believed that the fashion technology is attractive and pleasurable to the eye. The hypotheses are as follows:

H6: Perceived aesthetics will positively influence perceived playfulness.

H7: Perceived aesthetics will positively influence the users' intentions to adopt fashion technology.

2.4. Social Norms

SN (also called "subjective norms" or "social influences") are considered in improving the understanding of an individual's adoption behavior. Many classic

theories in psychology such as the TRA (Fishbein & Ajzen, 1975) and the theory of planned behavior (TPB; Ajzen, 1991) provided the theoretical basis for a relationship between SN and an individual's behavior. Fishbein and Ajzen (1975) identified the factors of attitude and subjective norms as two important determinants of behavioral intention and defined subjective norms (SN) as an individual's perception that it is important that others think he or she should or should not perform the behavior. Furthermore, Ajzen (1991) also hypothesized that attitudes, subjective norms, and perceived behavioral control can accurately predict an individual's behavioral intentions. In the TAM2 model, a revision of TAM, Venkatesh and Davis (2000) confirmed that SN have a significant impact on PU and the direct intention to use. A number of empirical studies incorporated this construct into their research models and found some positive support (Bock, Zmud, & Kim, 2005; Herrero Crespo & Rodriguez del Bosque, 2008; S. J. Hong & Tam, 2006; Hsu & Lu, 2007; Jeyaraj, Rottman, & Lacity, 2006; K. C. Lee, Kang, & Kim, 2007; Lucas & Spitler, 1999; Venkatesh & Morris, 2000; Venkatesh, Morris, Davis, & Davis, 2003; Yi, Jackson, Park, & Probst, 2006). Bock et al. (2005) employed the augmented TRA model to understand knowledge-sharing behavior in an organization, and they found that the greater the subjective norms to share knowledge are, the greater the intention to share knowledge will be. Yi et al. (2006) integrated the key findings of the three paradigms including TAM, TPB, and Innovation Diffusion Theory (IDT) and tested their model in the context of personal digital assistant (PDA) acceptance by healthcare professionals. They finally posited that SN had a strong positive effect on PU and BI to use PDAs directly. Otherwise, SN have also been shown to have a positive effect on both PU and the intention to use web-based IS (K. C. Lee et al., 2007). They explained that individuals may use a web-based system because their supervisors or peers think that they should use it. In another vein, SN from the influence of reference groups (e.g., peers, superiors, and relatives) have been verified as a prominent influence on consumer behavior (Bearden & Etzel, 1982; Childers & Rao, 1992). Based on the literature just reviewed, we believe that the effect of SN should not be ignored in the context of fashion technology. When a person perceives that important influencers recommend that a particular technology is useful, this person will incorporate the influencer's suggestion into his or her own mental system for future reference. Then he or she may have a positive perception of the usefulness and intention toward further adopting the technology. Thus, according to the definition by Fishbein and Ajzen (1975), we defined SN as the degree to which a person believes that important others would expect him or her to use fashion technology. The following hypotheses are presented:

H8: Social norms will positively influence perceived usefulness.

H9: Social norms will positively influence users' intentions to adopt fashion technology.

2.5. Perceived Critical Mass

The IDT proposed by Rogers (1983) is a robust and well-known theoretical background used to realize the process by which an innovation (technology) is

introduced to members of a social system over time. IDT defines “diffusion” as a process where an innovation spreads through certain channels over time among the members of a social system (Rogers, 1995). Rogers pointed out that innovation would disseminate through a social system in an S-shaped curve (see Figure 2). In the initial diffusion stage, innovators and early adopters first selected the innovation. They further developed their own perceptions about an innovation and also suggested other impressions that they already use that innovation. Once the diffusion of an innovation reaches the threshold of “critical mass,” the percentage of adoption increased almost exponentially until it reached its saturation point in the last diffusion stage. This is critical, or else innovation is in danger of falling into disuse. Hence, the occurrence of critical mass is important to the sustainability of innovation. Rogers described critical mass as “the certain minimal number of innovation adopters for the further rate of adoption to become self-sustaining” (Rogers, 1995, p. 318). When more and more people adopted the innovation, it was perceived as increasing benefits to both adopters and potential adopters. This is also similar to the concept of positive network externalities (Katz & Shapiro, 1985, 1986). It refers to the case when an adopter will benefit more from an innovation as the total number of adopters for this innovation increases.

There is a rich body of theoretical and empirical literature regarding the role of PCM in the context of diffusion of different innovations (technologies; Mahler & Rogers, 1999; Strader, Ramaswami, & Houle, 2007). Lou, Luo, and Strong (2000) proposed an extended TAM model that incorporates PCM as an independent variable for predicting groupware acceptance. They found that PCM had the largest total effect on an intention to use groupware both directly and on indirect impact. Hsu and Lu (2004) also used TAM that combines social influence (including PCM and SN) and flow experience to demonstrate users’ acceptance of online games. Although they found that the PCM did not have a direct significant impact on intention, it still had an important indirect effect on intention through attitude. In Song and Wloden’s (2007) study, they posited that perceived network externalities are positively associated with the intention to adopt peer-to-peer technologies.

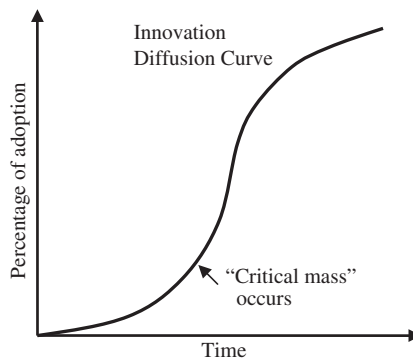


FIGURE 2 Innovation diffusion S-shaped curve.

Note. Based on Rogers (1995).

Furthermore, Van Slyke et al. (2007) used the TRA model and the innovation diffusion theory by developing a research model to test adoption of the communication technology. The results indicate the importance of PCM in understanding BI (both direct and indirect effects) regarding instant message use. Similarly, their findings were also confirmed by recent work; Premkumar, Ramamurthy, and Liu (2008) showed that PCM had the most significant influence on the intention to use instant messaging. Because of the discussions just mentioned, we expect perceptions of critical mass of fashion technology to positively influence the intention to adopt that innovation. When an individual believes that an innovation has a critical mass of users, it is possible that the individual is willing to use the innovation because of its greater quality, abundance of postpurchase services, and complementary gadgets (beneficial to both adopters and potential adopters) related to the innovation (Katz & Shapiro, 1985). Therefore, we state the following hypothesis:

H10: Perceived critical mass will positively influence the users' intentions to adopt fashion technology.

3. RESEARCH METHODOLOGY

3.1. Measurement Development

In this study, the research model contains seven constructs, and each composed three items. All items were adapted from previously published studies and modified to make them suitable to the context of fashion technology. The PU, PEOU, and IAFT constructs were measured using the items extracted from Davis (1989), Davis et al. (1989), and Davis and Venkatesh (1996). PP was measured by adapting the scale of Agarwal and Karahanna (2000) and of Moon and Kim (2001). Scale items for PA were derived from Van der Heijden (2003) and Cyr et al. (2006). Furthermore, to develop a scale for measuring social diffusion factors such as SN and PCM, we used items from Hsu and Lu (2004), Lou et al. (2000), and Lucas and Spitler (1999). The questionnaire also contained some demographic questions. A list of the items and descriptive statistics for all constructs are provided in Appendix A. Each item was measured on a 5-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

To validate the instrument, we first performed a pretest and pilot test before conducting the main survey. The purpose of the pretest was to ensure that the items were adapted appropriately to the current situation. In the pretest process, we asked five respondents who were experts in the field of fashion technology to give us some comments on the length and sequence of items, questionnaire format, and wording of the scales. Finally, a pilot test was undertaken with 49 self-selected respondents in order to reduce possible ambiguity. Cronbach's alpha and exploratory factor analysis were used in this stage. After that, we further modified some unclear instruments from the respondents' feedback and the results of the pilot test. Based on the pretest and the pilot test, we believe that the final items of our survey were reliable and valid.

3.2. Data Collection and Participants

The data used to test the research model were obtained from an online survey conducted in Taiwan. We adopted an online-based survey because it has several advantages over traditional paper-based surveys, including geographically unrestricted samples, lower costs, and faster responses (Pettit, 2002). The analysis unit of this study is the individuals who know the Apple iPod. The survey lasted for 3 weeks. In that period, we placed survey messages on some popular online, iPod-related message boards such as the well-known PTT BBS (telnet://ptt.cc) in Taiwan, the fashion guide website (<http://www.fashionguide.com.tw/>), the EYNY discussion board (<http://www.eyny.com/>), and more. To increase the response rate, we offered an incentive to respondents who filled out the questionnaire completely: an opportunity to participate in a lucky draw for several prizes. Moreover, we checked the IP and e-mail addresses to eliminate repeat responses. The online survey yielded 504 participants for analysis, and 491 of them were complete and valid. There were no cases of missing data in the sample, because respondents could not submit their responses online unless the information was completely filled out.

Table 1 describes the demographic profile of the 491 usable participants. Slightly more male (304 respondents) than female (197 respondents) individuals completed the survey, and the male-to-female ratio was approximately 6:4. Most

Table 1: Demographic Profile

<i>Characteristic</i>	<i>Category</i>	<i>Frequency</i>	<i>%</i>
Gender	Male	304	61.9
	Female	187	38.1
Age	Under 20	76	15.5
	21–30	343	69.9
	31–40	69	14.1
	Over 41	3	0.6
Education	Junior high school or lower	4	0.8
	High school	29	5.9
	Bachelor's degree	296	60.3
Income (NT\$)	Graduate degree	162	33.0
	Less than \$30,000	329	67.0
	\$30,001–\$50,000	126	25.7
Currently own an MP3 player	\$50,001 or more	36	7.3
	Yes	420	85.5
Prior experience adopting an Apple iPod	No	71	14.5
	Yes	272	55.4
Reason for adopting Apple iPod	No	219	44.6
	Attractive brand	192	28.0
	Reasonable price	32	4.7
	Rich in functions	115	16.8
	Stylish appearance	192	28.0
	Simple interface	137	20.0
	Others	17	2.5

Note. $N = 491$.

subjects were between 21 and 30 years of age (69.9%), and more than half of respondents had a bachelor's degree (60.3%), indicating that the subjects of this research were primarily young and educated. This distribution coincided with a recent report conducted by iSURVEY.com, one of the professional consumer market research websites in Taiwan, which found young users (younger than 30 years old) dominate the majority of the consumers in the market of Apple iPod. Also, more than three fourths of participants (85.5%) owned an MP3 player at that time. Around 55.4% of respondents (adopters) had the experience of adopting the Apple iPod, whereas 44.6% of the subjects (nonadopters) had no experience in using it. Attractive brand (28%) and stylish appearance (28%) were the most common reasons for choosing the Apple iPod.

4. RESULTS

The test of our collected data was carried out using the structural equation modeling method, which is a two-stage approach recommended by Anderson and Gerbing (1988). The measurement model is estimated using confirmatory factor analysis to test the reliability and validity of the proposed model. After an acceptable measurement model had been achieved, the structural model was used to perform the direction and significance of causal relationships between various latent variables. In our study, AMOS 7.0 with maximum likelihood estimation was employed to test the measurement and structural model.

4.1. The Measurement Model

The aim of the measurement model was evaluated on the criteria of reliability, convergent validity, discriminant validity, and model-fit analysis. The initial confirmatory factor analysis results indicated that item SN1 from the social norms scale should be dropped for further analysis, as SN1's item reliability (0.274) had a lower than 0.5 cutoff value (Hair, Anderson, Tatham, & Black, 1998; Kline, 2005). As shown in Table 2, after removing SN1 from the instrument, 20 items were retained, and item reliability ranged from 0.519 to 0.880. Reliability of the constructs was estimated by composite reliability. Consistent with the recommendations of Hair et al. (1998) and Fornell and Larcker (1981), the lowest value of composite reliability (SN = 0.722) in our study was above the benchmark of 0.7, indicating the evidence of adequate reliability.

The validity analysis of the measurement model was assessed by convergent and discriminant validity (Hatcher, 1994). Convergent validity is demonstrated when different items are used to measure a single latent variable, and scores from these different items are strongly correlated. Discriminant validity, on the other hand, indicates that a given latent variable is different from other latent variables. We tested convergent validity by using two criteria (Fornell & Larcker, 1981): (a) all item factor loadings should be significant and greater than 0.7, and (b) average variance extracted (AVE) for each latent variable should exceed 0.5. As evident in Table 2, all item factor loadings and AVE values exceeded the threshold, with

Table 2: Results of the Confirmatory Factor Analysis

<i>Item</i>	<i>Factor Loading</i>	<i>Item Reliability</i>	<i>Cronbach's α</i>	<i>Composite Reliability</i>	<i>Average Variance Extracted</i>
PU1	0.788	0.622	0.828	0.8319	0.6233
PU2	0.841	0.707			
PU3	0.736	0.541			
PEOU1	0.852	0.726	0.857	0.8713	0.6948
PEOU2	0.911	0.830			
PEOU3	0.727	0.528			
PP1	0.802	0.643	0.891	0.8981	0.7468
PP2	0.938	0.880			
PP3	0.847	0.717			
PA1	0.919	0.845	0.931	0.932	0.8203
PA2	0.894	0.799			
PA3	0.904	0.818			
SN2	0.782	0.611	0.720	0.7223	0.5657
SN3	0.721	0.519			
PCM1	0.823	0.678	0.823	0.8297	0.6193
PCM2	0.747	0.558			
PCM3	0.789	0.623			
IAFT1	0.930	0.865	0.921	0.9255	0.8056
IAFT2	0.906	0.820			
IAFT3	0.855	0.731			

Note. PU = perceived usefulness; PEOU = perceived ease of use; PP = perceived playfulness; PA = perceived aesthetics; SN = social norms; PCM = perceived critical mass; IAFT = intention to adopt fashion technology.

factor loading ranging from 0.721 to 0.930 and the AVE varying from 0.566 to 0.820. Therefore, our model meets the convergent validity criteria. To further check discriminant validity, we applied the criteria suggested by Fornell and Larcker (1981): The square root of the AVE of each latent variable should be higher than the correlations of the construct with other constructs. As can be seen in Table 3, this criterion is satisfied, as the square roots of the AVE values (on the diagonal) all exceeded the interconstruct correlation. In addition, the correlations between all pairs of constructs are below the recommended value of 0.8 (Kline, 2005). These provide evidence that our research constructs are distinct and have strong discriminant validity.

Finally, model fit analysis was done to determine that the measurement model exhibited a fairly good fit with the collected data. To assess the model fit, we applied the following seven common indices: the chi-square/degrees of freedom (χ^2/df), the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), the normed fit index (NFI), the Tucker-Lewis index (TLI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). In our study, the ratio of chi-square to the degrees of freedom was included instead of the chi-square test, because the chi-square statistic is sensitive to a large sample size. Based on the minimum criteria mentioned in the previous literature (Bentler & Bonett, 1980; Scott, 1995; Tucker & Lewis, 1973), all the model-fit indices of the measurement model succeeded to meet their respective common acceptance levels ($\chi^2/df = 2.774$, GFI = 0.924, AGFI = 0.892, NFI = 0.940, TLI = 0.950, CFI = 0.961, RMSEA = 0.060).

Table 3: Discriminant Validity

	<i>PU</i>	<i>PEOU</i>	<i>PP</i>	<i>PA</i>	<i>SN</i>	<i>PCM</i>	<i>IAFT</i>
PU	<i>0.789</i>						
PEOU	0.753	<i>0.834</i>					
PP	0.664	0.654	<i>0.864</i>				
PA	0.506	0.426	0.635	<i>0.906</i>			
SN	0.385	0.363	0.370	0.409	<i>0.752</i>		
PCM	0.286	0.325	0.213	0.256	0.444	<i>0.787</i>	
IAFT	0.541	0.487	0.607	0.507	0.341	0.325	<i>0.898</i>

Note. Diagonal elements (in italics) are the square root of the average variance extracted. PU = perceived usefulness; PEOU = perceived ease of use; PP = perceived playfulness; PA = perceived aesthetics; SN = social norms; PCM = perceived critical mass; IAFT = intention to adopt fashion technology.

In summary, the result of the model-fit analysis also demonstrated adequate evidence of unidimensionality of the items.

4.2. The Structural Model

The test of the structural model focused on the estimates of path coefficients; R^2 values; and direct, indirect, and total effects on the intention. Before we examine the hypotheses relationships among the latent variables, a similar set of GFI indexes was used to test the structural model. As shown in Appendix B, all fit indices met the desired level, demonstrating that the structural model also had adequate model fit. After confirming the model fit of the structural model, Figure 3 and Table 4 both showed the results of hypothesized path testing of the structural relationships.

As shown, eight hypotheses were supported and two were rejected. Hypothesis 1 posited that PU positively influences IAFT. As predicted, we found that IAFT was positively influenced by PU ($\beta = 0.195, p < .05$), providing support for Hypothesis 1. From Hypotheses 3 and 4, PEOU positively affected PU ($\beta = 0.725, p < .001$) and PP ($\beta = 0.495, p < .001$). Hypotheses 3 and 4 are strongly supported by the data. Likewise, in Hypothesis 5, the relationship of PP to IAFT was also supported with a high level of significance ($\beta = 0.368, p < .001$). Moreover, the paths from PA to PP ($\beta = 0.414, p < .001$) and IAFT ($\beta = 0.150, p < .01$) were positive and significant, thereby supporting H6 and H7. Turning to Hypothesis 8, SN had a significant effect on PU ($\beta = 0.135, p < .01$). Accordingly, Hypothesis 8 was supported. Furthermore, PCM was found to significantly affect IAFT ($\beta = 0.153, p < .01$), supporting Hypothesis 10. Unexpectedly, PEOU and SN had no direct influence on IAFT. Therefore, Hypotheses 2 and 9 were not supported. Finally, the results illustrate that our model approximately explained 62% of the variance in PU, 60% of the variance in PP, and 44% of the variance in IAFT, all of which indicated that our research model has a reasonable explanatory power.

Table 5 also summarized the direct, indirect, and total effects of variables on IAFT. PP had the largest direct effect (0.368) on IAFT as well as total effect.

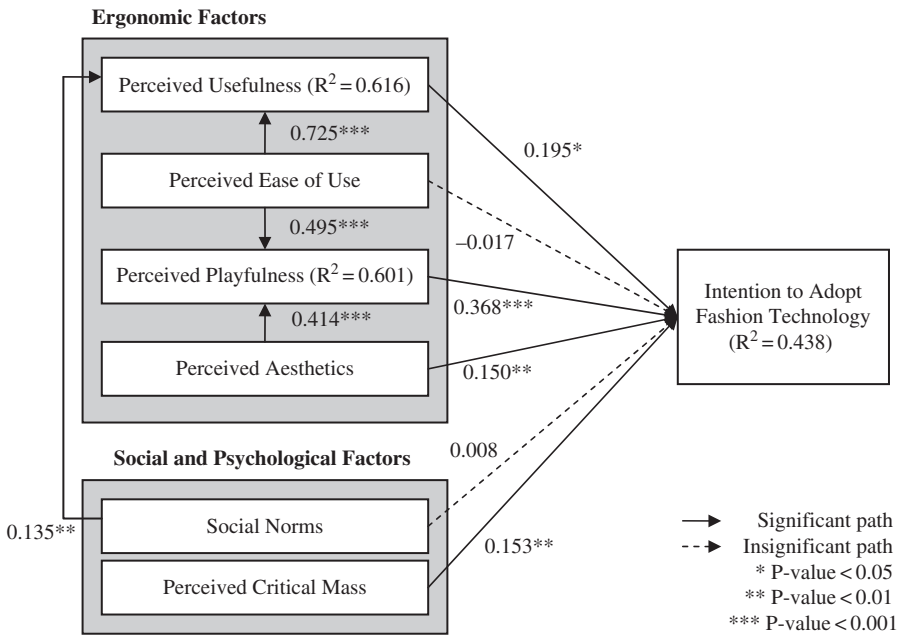


FIGURE 3 Research model.

Table 4: The Results of the Hypotheses Test

	Path	Coefficients	SE	Significance	Results
H1	PU→IAFT	0.195	0.120	.012*	Supported
H2	PEOU→IAFT	-0.017	0.100	.846	Not supported
H3	PEOU→PU	0.725	0.041	.000***	Supported
H4	PEOU→PP	0.495	0.037	.000***	Supported
H5	PP→IAFT	0.368	0.092	.000***	Supported
H6	PA→PP	0.414	0.034	.000***	Supported
H7	PA→IAFT	0.150	0.061	.006**	Supported
H8	SN→PU	0.135	0.045	.004**	Supported
H9	SN→IAFT	0.008	0.085	.891	Not supported
H10	PCM→IAFT	0.153	0.060	.002**	Supported

Note. PU = perceived usefulness; IAFT = intention to adopt fashion technology; PEOU = perceived ease of use; PP = perceived playfulness; PA = perceived aesthetics; SN = social norms; PCM = perceived critical mass.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Meanwhile, PA, with direct and indirect effects through PP, had a total effect of 0.302 on IAFT. PEOU, however, did not have a significant direct effect on IAFT, but it still exhibited secondary large total effect (0.306) through PU (0.141) and PP (0.182) on IAFT. Comparatively, social norms had a very weak total effect on that intention.

Table 5: Effects on the Intention to Adopt Fashion Technology

<i>Construct</i>	<i>Direct Effects</i>	<i>Indirect Effects</i>	<i>Total Effects</i>
Perceived ease of use	-0.017	0.141 0.182	0.306
Perceived usefulness	0.195		0.195
Perceived playfulness	0.368		0.368
Perceived aesthetics	0.150	0.152	0.302
Social norms	0.008	0.026	0.034
Perceived critical mass	0.153		0.153

Table 6: Perception Differences in Experiences Comparison

<i>Construct</i>	<i>Entire Sample</i>		<i>Comparison by Experience (M)</i>		
	<i>M</i>	<i>SD</i>	<i>Group 1^a</i>	<i>Group 2^b</i>	<i>T Test</i>
PU	4.4168	0.5867	4.5368	4.2679	0.000***
PEOU	4.1982	0.7238	4.3799	3.9726	0.000***
PP	4.2172	0.6528	4.3566	4.0441	0.000***
PA	4.4311	0.7011	4.5674	4.2618	0.000***
SN	4.0862	0.5856	4.1397	4.0198	0.023*
PCM	3.7454	0.8238	3.9216	3.5266	0.000***
IAFT	4.1487	0.8629	4.3971	3.8402	0.000***

Note. Group 1: adopters, Group 2: potential adopters. PU = perceived usefulness; PEOU = perceived ease of use; PP = perceived playfulness; PA = perceived aesthetics; SN = social norms; PCM = perceived critical mass; IAFT = intention to adopt fashion technology.

^aN = 272. ^bN = 219.

*p < .05. ***p < .001.

Table 6 displays the descriptive statistics (means and standard deviations) of the constructs. It can be found that, on average, participants respond to the feeling of the Apple iPod in a clearly positive manner (the averages of all constructs were greater than three out of five). Next, to further explore the experience differences in the perceptions of the fashion technology, we divided our sample into two independent groups based on their prior experience of adopting an Apple iPod: adopters (Group 1) and potential adopters (Group 2). All the individuals with no experience adopting the Apple iPod were thus included in Group 2, whereas the rest were put in Group 1. Using the independent-samples *T* test, we analyzed the effects of the experience difference on the PU, PEOU, PP, PA, SN, PCM, and IAFT constructs. Significant experience differences were founded for all variables. The results (means) showed that adopters' ratings were significantly higher than potential adopters'.

5. DISCUSSION AND CONCLUSIONS

Our research sought to explore the impact of ergonomic and social psychological on user intention to adopt and use a fashion technology. To address this issue,

we advanced a research model that included the construct of perceived usefulness, ease of use, playfulness, and aesthetics as the ergonomic factors. We also treated social norms and perceived critical mass as the social and psychological variables. The Apple iPod was chosen for this study because it is a well-known and fashionable information technology that lends its success in the market due to its stylish and high-tech elements. The proposed model was tested by a structural equation modeling approach. The study was strongly confirmed with adequate reliability, validity, and well-predictive power. Broadly speaking, most path coefficients in the model were found to be statistically significant except for the factors of PEOU and SN to intention. From an ergonomic perspective, an interesting finding was that users were willing to adopt fashion technology because of usefulness, playfulness, and aesthetics. Contrary to expectations, the result of the relationship between PEOU and IAFT were insignificant. In the case of the portable media device, it suggests that being easy to use is not a prominent characteristic to attract users to adopt them in these mature stages of markets. However, the usefulness, playfulness, and aesthetic characteristics will allow users to have motivations and increase IAFT. In addition, from a social psychological perspective, the results revealed that only PCM affects the users' intentions toward fashion technology. However, SN did not have a significant direct effect on behavioral intention. Most potential users and adopters were more fairly "pragmatic" and made their own decisions from public tendencies rather than by blindly following responses from friends or relatives. This finding is different from the theories of TRA and TPB. The first explanation is that the usage of fashion technology is not a mandatory behavior, and thus SN may have impact on perceptions rather than intentions for adoption (Venkatesh et al., 2003). The other possible explanation is the need for uniqueness. This is because individuals may try to move away from the norms' opinions to show their personal identity and pursuit of differentiation, especially for fashion technologies (Hassenzahl, Burmester, & Koller, 2003; Snyder, 1992).

5.1. Implications

From a theoretical point of view, the purpose of this study was to propose and verify a model for adoptive intention in a fashion technology domain. The main contributions of the current work are fivefold. First, this study is a pioneering effort in incorporating technology acceptance and social diffusion viewpoints into the newly emerging context of fashion technology. This is a new breakthrough in IT-related literature. We found that not only did usefulness, playfulness, and aesthetics play significant positive influences on behavioral intentions to adopt fashion technology, but PCM from social psychological perspective may also have a positive effect on it. Second, PP is the factor with the greatest significant effect on IAFT. It implied that potential users and adopters were more likely to use a fashion technology when they felt that it was more playful. Therefore, we suggest that PP (enjoyment) should be considered as a crucial factor when investigating the individual adoptive behavior of hedonic systems, especially fashionable technologies. Third, although ease of use is not a direct predictor for fashion technology adoption, it still had a large total effect through usefulness and playfulness on the intention to adopt. Hence, PU and PP could be viewed as the complete mediators

between the PEOU and BI. Fourth, our research also showed that PA had both a direct and indirect effect through PP (partial mediator) on IAFT. These findings support the previous study (Berlyne, 1971) indicating that there is a positive relationship between pleasure and level of interest. It can be interpreted that when potential users perceive the appearance of fashion technology as being beautiful and well designed, they will feel enjoyment while having positive intentions to adopt it in the future. Fifth, our results confirm Rogers's study: The effect of a critical mass was not only an important factor in interactive technologies but also a salient variable in fashion technologies acceptance.

Our article also contributes to practice. First, the results indicate that "perceived playfulness" and "perceived aesthetics" are the top two significant roles in developing the users' intention to adopt fashion technology. These findings shed light on the distinctive features of fashion technologies: Interesting functions and fascinating appearance are the drivers of the fashion technologies. Likewise, these relationships also show that hedonic rather than technical factors are most important in the fashion technology industry, whereas the technical facets are the basic threshold. In Bloch's (1995) study, he suggested that the physical shape or design of a product is an undisputed determinant of its marketplace success. Therefore, today's fashion technology designers should work hard to design technologies that are aesthetic and playful, combining some enjoyable information and stylish form, and then intrigue more potential users to adopt that technology. Second, the effects of usefulness and ease of use from TAM were verified in our study. Even though PEOU is an insignificant factor in the results, it still had the second largest total effect on IAFT. Thus, attention for practitioners must be placed on designing a user-friendly interface, useful functions and detailed operating manual, and so on, because the ergonomic factors are the basic threshold for fashion technology acceptance (Rogers, 1995). Third, our study found that adopters and potential adopters are significantly different in their perceptions of fashion technology. Adopters had the higher perceptions as compared to potential adopters. Therefore, it is important for the decision makers of companies with fashion technology to raise the consumers' overall awareness. They should attend to devoting themselves to building a well-known image and reputation, especially for potential users. Finally, as the results showed, PCM had a direct impact on user intentions. It meant that an individual will more likely have the intention to adopt an Apple iPod when he or she perceives that many people use it. As an individual believes that there are many people who adopt an innovation, he or she will be willing to use it because of its stable quality, rich shared usage experience, and abundant postpurchase services and complementary gadgets (Katz & Shapiro, 1985). Consequently, for marketing managers, to encourage more potential users to adopt the fashion technology, these results suggest that achieving critical mass is an important and essential marketing strategy that will determine the success or failure of a business.

5.2. Limitations

Although our work provides some academic and practical insights, some limitations must be considered. The first limitation concerns the sample used in the

current study. The volunteer respondents were all from Taiwan and self-selected via an online-based convenient sampling. Because of this, one should be cautious of generalization, because cultural and lifestyle differences may influence users' perceptions and intentions. In addition, we also suggested that future research could use a random sampling approach to collect research data. Second, the results were limited to the users' opinions of the Apple iPod. When generalizing the findings and discussions to other fashion technologies, care needs to be taken. Third, our study is a cross-sectional quantitative research; thus conducting a longitudinal approach in the future is a good way to understand the change of users' intentions over time. Last, this study focused only on technology acceptance and social diffusion standpoints. Other additional dimensions (such as perceived brand, monetary value, and personal innovativeness) may affect users' intentions and should be identified in future studies.

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Appendix A

Table A1: List of Model Constructs and Items

Perceived Usefulness ($M = 4.42, SD = 0.59$)
(PU1) I believe that I can listen to music anytime anywhere by using the Apple iPod.
(PU2) I believe that using the Apple iPod enables me to conveniently listen to music.
(PU3) I believe that using the Apple iPod to listen to music can help me kill time.
Perceived Ease of Use ($M = 4.20, SD = 0.72$)
(PEOU1) I believe that it is easy to use the Apple iPod to listen to music.
(PEOU2) I believe that using the Apple iPod to listen to music is effortless.
(PEOU3) It is easy for me to become skillful at using the Apple iPod to do anything I want.
Perceived Playfulness ($M = 4.22, SD = 0.65$)
(PP1) I believe that using the Apple iPod brings me fun.
(PP2) I believe that using the Apple iPod keeps me happy.
(PP3) I believe that using the Apple iPod gives me enjoyment.
Perceived Aesthetics ($M = 4.43, SD = 0.70$)
(PA1) I think the appearance of the Apple iPod is attractive.
(PA2) I think the appearance of the Apple iPod is well designed.
(PA3) I think the appearance of the Apple iPod is interesting.
Social Norms ($M = 4.09, SD = 0.59$)
(SN1-Dropped) My family suggests that I should use Apple iPod.
(SN2) My friends suggest that I should use Apple iPod.
(SN3) My colleagues (classmates) suggest that I should use Apple iPod.
Perceived Critical Mass ($M = 3.75, SD = 0.82$)
(PCM1) I believe many people use the Apple iPod.
(PCM2) I think many people I communicate with frequently use the Apple iPod.
(PCM3) In my opinion, there are a lot of people who use the Apple iPod.
Intention to Adopt Fashion Technology ($M = 4.15, SD = 0.86$)
(IAFT1) I have the intention to use an Apple iPod.
(IAFT2) I am willing to use an Apple iPod in the near future.
(IAFT3) Overall, I have a strong desire to use an Apple iPod.

Appendix B**Table B1: GFI Indices for the Research Model**

<i>Index</i>	<i>Recommended Value</i>	<i>Measurement Model Results</i>	<i>Structural Model Results</i>
χ^2/df	<3	413.262/149 = 2.774	448.801/154 = 2.914
GFI	>0.9	0.924	0.917
AGFI	>0.8	0.892	0.887
NFI	>0.9	0.940	0.935
TLI	>0.9	0.950	0.946
CFI	>0.9	0.961	0.956
RMSEA	≤ 0.06 or ≤ 0.08	0.060	0.063

Note. GFI = goodness of fit index; AGFI = the adjusted GFI; NFI = normed fit index; TLI = Tucker–Lewis index; CFI = comparative fit index; RMSEA = root mean square error of approximation.