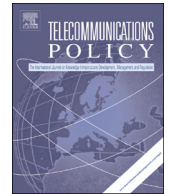


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Lifestyle orientations and the adoption of Internet-related technologies in Taiwan



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ABSTRACT

Using Rogers' diffusion of innovation model as the theoretical framework, this study examined the relationships between lifestyle orientations and the adoption of nine Internet-related technologies in Taiwan including IPTV, digital cable, emails, Internet instant messages, Facebook, scanners, notebooks, printers and personal computers. A telephone survey was conducted to collect data, and 506 valid questionnaires were obtained, representing a response rate of 58.6%. The results showed that lifestyle orientations were a powerful predictor for the adoption of information-oriented and entertainment-oriented technologies, but not for the adoption of interpersonally oriented technologies. Furthermore, this study found that while demographics were the most powerful variable that distinguished the adopters from the non-adopters, mass media use was not.

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1. Introduction

Past studies have shown that people adopted new technologies not only for their practical functions, but also for the social rewards they confer. The possession of certain technologies allows people to communicate social differentiation and identity. Rogers' diffusion of innovation model also identifies social rewards as one motive that drives people to adopt new technologies. Lifestyles measure people's attitudes, interests, and activities to reflect their psychological preferences. The unique feature of lifestyles lies in their visibility because individuals express parts of themselves by developing different types of lifestyles, and thus lifestyles become a key indicator for understanding the psychological world of consumers. Lifestyles have been heavily researched by marketing scholars, because past studies have consistently found a strong link between them and particular brands consumed (Chan & Leung, 2005; Li, 2004a). One of the motives for consuming new technologies is for social identity (Rogers, 2003), and thus lifestyles should be a powerful predictor for technology adoption; however, only a few studies have investigated the relationship between lifestyles and the process of adopting new technologies. These few studies have found that lifestyles are able to predict the adoption of new technologies (Chan & Leung, 2005; Leung, 1998; Li, 2004a; Mazzoni, Castaldia, & Addeob, 2007). According to the latest survey, 47% of the Taiwanese are classified as frequent users of the Internet (FIND, 2011). This study examined the relationship between lifestyles and the adoption of nine Internet-related technologies in Taiwan including IPTV, digital cable, emails, Internet instant messages, Facebook, scanners, notebooks, printer and personal computers. According to the latest studies in Taiwan, in 2011, the penetration rate for Facebook was 45.9%, the rate for PC was 98%, the rate for notebooks was 36%, the rate for digital cable was 6.3%, the rate for emails was 67.4%, the rate for MSN was 35%, and the

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rate for IPTV was 9%. There are no data so far for the penetration rates of printers and scanners in Taiwan (FIND, 2011; NCC, 2011; Nielson, 2011)

This study selected the nine Internet-related technologies for investigation due to the following reasons: (1) past studies showed that people adopted certain technologies because the functions of the technologies fulfilled their needs, and that different types of technologies fulfilled different needs (Dupagne & Driscoll, 2010; Lin, 2006). Based on Atkins' (1995) classification, the nine technologies can be classified into three types: entertainment-oriented technologies such as digital cable and IPTV, interpersonally oriented technologies such as email, MSN, and Facebook, and information-oriented technologies such as PCs, printers, notebooks, and scanners; and (2) the nine Internet-related technologies were relatively popular or were regarded as the technologies of the future in Taiwan.

Rogers' model has been criticized by scholars for its failure to take full account of the psychological dynamics that drive people to adopt technologies (Atkin, Neuendorf, Jeffres, & Skalski, 2003; Rogers, 2003). Recent studies have tried to account for this deficiency by examining adopters' personalities, and innovativeness has been one of the personality variables that were found to be critical in predicting technology adoption (Li, 2004b; Lin, 2004). Therefore, by adopting Rogers' model of diffusion of innovation, this study also examines the effect of people's innovativeness on the adoption of nine Internet-related technologies.

In addition to Rogers' model, Davis' technology acceptance model (TAM) is another theoretical model that is often used to predict technology adoption. The main notion in the TAM is that people's attitudes toward a technology are shaped by their beliefs about the attributes of this technology, which in turn influence people's intentions to adopt this technology. Empirical studies on TAM show that when TAM was used to examine technology adoption under the circumstances that adopters were voluntary, then individual differences such as demographics needed to be included in the model. This study investigated the adoption of nine Internet related technologies when adopters are voluntary, and thus this study considered that Rogers' model is more suitable (Davis, 1989; Lin, 2009; Shin, 2009; Venkatesh & Davis, 2000; Venkatesh & Bala, 2008).

2. Literature review

Rogers (1995, p. 10) defines the diffusion of innovations as "the process by which an innovation is communicated through certain channels over time among the members of a social system." Based on this model, three elements—innovation attributes, mass media use, and demographics—are critical predictors for technology adoption (Rogers, 1995, 2003).

Among the three elements mentioned above, innovation attributes are the most powerful predictor for technology adoption. This variable includes the social rewards of having a relative technological advantage that belong to one of the perceived innovation attributes—relative advantage (Rogers, 1995, 2003). When people's adoption of a given technology is motivated by social rewards, then lifestyles become an important predictor because lifestyles measure people's psychological preferences in terms of their attitudes and values. Consequently, people are able to express their psychological preferences and show their social status by adopting a given technology. Furthermore, it is rare that people adopt a technology merely for its practical functions. More often than not, people are concerned about social rewards when adopting a technology (Mazzoni et al., 2007).

2.1. Lifestyles

Lifestyles are often a way for people to express their conceptions of themselves. Therefore, lifestyles have been regarded as chief markers of identity because people wear or use certain images and symbols connected with specific lifestyles to actively express and communicate their identity. Compared with the traditional marketing methods that only reveal consumers' demographic information, lifestyles provide an understanding of consumers' needs and desires that are associated with their consumption patterns and purchase behaviors. Therefore, lifestyles have been considered by marketing researchers as one of the most effective methods for niche marketing (Lekakos, 2009; Lorenzo-Dus, 2006).

The measurement of lifestyles relies heavily on psychological studies of consumers' values and attitudes, and several different approaches have been developed by scholars to measure consumers' lifestyles. The most widely adopted approach for lifestyles is the A.I.O., which assesses consumers' activities, interests, and opinions to classify consumers into different lifestyles. Activities are the actual behaviors of consumers, interests refer to the degree to which consumers pay attention to certain matters, and opinions are the views and expectations consumers have toward an issue (Chan & Leung, 2005; Hawkins, Best, & Coney, 1998; Lekakos, 2009; Li, 2004a; Schwartz, 1992). Using A.I.O inventories, researchers have identified different behavioral patterns that are the bases of lifestyles. For example, Mazzoni et al. (2007) found that three lifestyles were associated with different motivations for using cell phones in Italy. More specifically, their study discovered that people with a connected lifestyle used cell phones mainly for entertainment, people of a committed lifestyle purchased cell phones for efficient communication and time organization, and people with a traditional lifestyle utilized cell phones just for maintaining relationships. Li's (2004a) study showed that the lifestyle defined by having a preference for foreign products was associated with a proclivity for Internet shopping, while a fashionable lifestyle correlated to cable television shopping. Leung's (1998) study, which examined the adoption of seven technologies in China, found that lifestyles had a significant effect on differentiating adopters from non-adopters. In particular, his study found that four

types of lifestyles—sophisticated and fashionable, life expansionists, preference for foreign products, and mass media skeptics—were associated with the adoption of the seven technologies in China. Chan and Leung's study (2005) also found that lifestyle orientation had a significant effect on the adoption of different online news services. They also concluded that people with the “experienter” lifestyle were more likely to adopt international news, while people with the “survivor” lifestyle were less likely to.

According to the literature review above, technology adoption was often used by consumers to communicate their social differentiation to others. If the adoption of a given technology allows consumers to express their lifestyles, then this technology must at least meet two prerequisites: (1) first of all, this technology must have a certain cost threshold so that not everyone is able to adopt it, and (2) this technology has not been adopted by most people in a society and thus, the adoption allows consumers to show their social differentiation. Based on this reasoning, emails, instant messengers, and Facebook are easily accessible in Taiwan, and they do not have a certain cost threshold in adoption. Furthermore, the penetration rate of personal computers in Taiwan has reached almost 98%, indicating that most people in Taiwan have adopted this technology (FIND, 2011). Therefore, lifestyles should be only related to the adoption of the five technologies—digital cable, IPTV, printers, notebooks, and scanners. Moreover, among the five types of lifestyles, people with the lifestyle of being fashionable prefer to use personal ornaments or dresses to differentiate themselves from others, and thus this lifestyle should not be related to the adoption of the five technologies. People with the lifestyle of life expansionists are eager to take challenges and learning, indicating that they are more achievement oriented, and thus they are more likely to adopt information-oriented technologies. In contrast, people with the lifestyle of enjoying life prefer to have a relaxed and easy life, and hence, they are more likely to adopt entertainment-oriented technologies. People with the lifestyle of a preference for foreign products are more satisfied with foreign products, and this lifestyle should be related to the adoption of the five technologies because these technologies are, in fact, foreign products. People with the lifestyle of not media skeptics consider messages in advertising or news media as reliable, and thus this lifestyle should be negatively related to the adoption of information-oriented technologies because media credibility plays a much less role in interpersonal and entertainment technologies. Based on this reasoning, this study developed the first hypothesis:

Hypothesis 1a. The lifestyle of being fashionable will not be related to the adoption of digital cable, IPTV, printers, notebooks, and scanners.

Hypothesis 1b. The lifestyle of life expansionists will be positively related to the adoption of three information technologies—printers, notebooks, and scanners.

Hypothesis 1c. The lifestyle of enjoying life will be positively related to the adoption of two entertainment technologies—digital cable and IPTV.

Hypothesis 1d. The lifestyle of a preference for foreign products will be positively related to the adoption of digital cable, IPTV, printers, notebooks, and scanners.

Hypothesis 1e. The lifestyle of not media skeptics will be negatively related to the adoption of three information technologies—printers, notebooks, and scanners.

2.2. Mass media use

Rogers' model defines the diffusion of a given technology as a communication process, with mass media playing the role of informing and interpersonal communication the role of persuading. According to Rogers' model, mass media exert a strong effect on the early stages of technology adoption because media exposure facilitates the public awareness of a given technology. Empirical studies have also shown that mass media use was able to differentiate adopters from non-adopters. In particular, when the adoption of a given technology is in its early stages, mass media use plays a significant role in predicting the adoption (Chan-Olmsted & Chang, 2006; Leung & Wei, 1998, 1999; Lin, 2004; Rogers, 1995). For example, Leung and Wei (1998) examined people's intention to adopt interactive television in Hong Kong and found that mass media use exerted a significant effect on the intention to adopt this technology. In Spain, however, Garitaonandia and Garmendia (2009) found that mass media use, with the notable exception of Internet use, did not affect e-commerce. Similarly, Chan-Olmsted and Chang (2006) discovered that peoples' intention to adopt digital television in the U.S. was positively related only to Internet tenure that was the length one had been using the Internet. Rogers' (1995, 2003) model proposes that technology adopters tend to be heavy users of mass media than non-adopters, and thus this study developed the second hypothesis:

Hypothesis 2. Mass media use will be significantly related to the adoption of the nine Internet-related technologies.

2.3. Demographics

Based on how early individuals adopt a given technology in a society, Rogers' model classifies all individuals into five types: innovators, early adopters, early majority, late majority, and laggards. According to Rogers, the five types of adopters differ significantly from one another in their demographics and personalities. Empirical findings show that

demographic variables exert a significant effect in differentiating adopters from non-adopters. In particular, when the diffusion of a given technology is still in its early stages, demographics exert a significant effect on the adoption (Atkin et al., 2003; Wei, 2001, 2006; Kang, 2002; Leung, 1998; Leung & Wei, 1998; Lin, 1998). For example, Zhu and He (2002) found that when China's Internet adoption rate was in its early stages, age, sex and education were able to discriminate adopters from non-adopters. Similarly, Li's (2004a) study showed that with Internet shopping still in its early stages, several demographic variables including age, sex, and education were able to predict the adoption intention. However, LaRose, Gregg, Strover, Straubhaar, and Carpenter (2007) investigated the intention to adopt broadband in American rural areas and found that even though the diffusion of broadband in the U.S. had passed the initial stages, income and age had direct effects on the intentions to adopt broadband.

This study examined the adoption of nine Internet-related technologies, among which only email and personal computers have passed the early stages of diffusion in Taiwan. The remaining seven technologies—printers, scanners, notebooks, digital cable, IPTV, Facebook, and MSN—are still in their early stages of diffusion. Therefore, this study predicted that demographic variables have a significant effect in the adoption of the nine Internet-related technologies. Based on this reasoning, the third hypothesis was developed as follows:

Hypothesis 3a. The adopters of the nine Internet-related technologies are younger than the non-adopters.

Hypothesis 3b. The adopters of the nine Internet-related technologies are better educated than the non-adopters.

Hypothesis 3c. The adopters of the nine Internet-related technologies are more affluent than the non-adopters.

2.4. Innovativeness

Innovativeness refers to the degree to which people are more accepting of new ideas and new things (Garitaonandia & Garmendia, 2009; Rogers, 2003). Empirical findings show that an individual's tendency to take on challenges or learn new things was significantly related to technology adoption. For example, Lin's (2004) study found that people's innovativeness was positively related to their interest in adopting webcasting. Chan-Olmsted and Chang (2006) found that the respondents' innovativeness was a significant predictor of the intention to adopt digital television in the U.S. Li's (2004a) study showed that innovativeness was a powerful predictor because this variable was significantly correlated with the intention to adopt both Internet shopping and cable television shopping. Based on the literature review, the fourth hypothesis was advanced as follows:

Hypothesis 4. The respondents' level of innovativeness will be positively related to the adoption of the nine Internet-related technologies.

3. Research methodology

3.1. Lifestyles

One major variable of this study is lifestyles, which were measured by rating 22 items on a seven-point Likert scale. The 22 items were adapted from Leung's (1998) study and were originally used in the 1995 IMI Consumer Surveys conducted in three Chinese cities: Beijing, Shanghai, and Guangzhou. The surveys combined items from both U.S. and French A.I.O. inventories. These items have been quite applicable to the populations of greater China because five distinct lifestyles were consistently extracted from them in different studies (Leung, 1998; Li, 2004a). Using the SPSS package, the responses to the 22 items were factor analyzed by applying the principal components and varimax rotation methods. Five factors were extracted from the 22 items (see Table 1).

The first factor, being fashionable, had seven items, all of which were related to being fashionable in every aspect of life. The second factor contained five items, all of which dealt with being aggressive and active in one's life. Hence, this factor was referred to as life expansionists. The third factor, enjoying life, comprised five items, all of which emphasized the importance of seeking pleasure and relaxation in one's life. The fourth factor was defined as a preference for foreign products because the two items of this factor stressed the strengths of foreign products. The last factor had three items, and was referred to as not mass media skeptics because the three items gauged skepticism toward the mass media. A reliability analysis was conducted on each factor and three factors had Cronbach's alphas above .75, indicating a high level of internal consistency. Cronbach's alphas for the third and fifth factors were above .65, which was acceptable. Moreover, this study deleted one item from the factor, enjoying life, because the loading of this item was below .50.

3.2. Innovativeness

This study used Lin's (1998) need for innovativeness scale to operationalize innovativeness because she defined the need for innovativeness as an individual's tendency to take on challenges or be acceptable to new ideas, which was consistent with this study's definition. Lin used four items to measure an individual's degree of innovativeness. The responses to the four items were also factor analyzed using the principal components and varimax rotation methods,

Table 1
Factor analysis on lifestyles.

Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1: being fashionable					
Fashionable in the eyes of others	.730	.077	−.017	.005	.050
Enjoy owning new and fashionable things	.780	.106	.088	.189	.065
Attending to trends in fashion	.755	.126	.087	.125	.118
Like a fancy and distinctive lifestyle	.760	.139	.100	.122	.110
Dress up to express my personality	.629	.288	.056	.108	.087
Enjoy a romantic lifestyle	.728	.124	.110	.097	.159
Enjoy stylish dress	.579	.088	−.095	.356	.206
Factor 2: life expansionists					
Taking on challenges and risk in one's life	.345	.612	−.190	.109	.099
Take classes to brighten my future	.114	.796	.169	−.012	−.027
Like to learn new knowledge and technology	.234	.730	.140	−.004	−.065
Don't like to do nothing in my life	.025	.654	.081	.047	.001
Have high expectations about what I can achieve	.127	.686	−.005	−.012	.136
Factor 3: enjoying life					
Like to do nothing but relax during holidays	.129	−.065	.538	.187	.092
Be happy if I can live a leisurely life	.142	.055	.814	−.004	−.002
Prefer stable and secure jobs	−.076	.042	.740	−.011	.045
Like to have my own living space	.053	.282	.732	.024	−.118
Factor 4: preference for foreign products					
Although expensive, I prefer foreign products	.290	.033	.087	.855	.120
Foreign products make me feel more satisfied	.238	.036	.120	.843	.154
Factor 5: not mass media skeptics					
Trust in advertising	.148	.000	−.025	.202	.754
Trust what newspapers say	.154	.050	−.030	.072	.739
Advertised products are more reliable	.133	.038	.094	.015	.744
Eigenvalue	4.002	2.693	2.208	1.752	1.873
% Variance explained	19.059	12.825	10.512	8.343	8.918
Cronbach's alpha	.869	.764	.662	.821	.669

and one factor was extracted from the four items. The result of a reliability analysis on this factor showed that Cronbach's alpha was .75, indicating a high degree of internal consistency.

3.3. Demographics and mass media use

Six demographic variables were measured in this study: age, sex, education, family size, personal income, and family income. We established nine age levels ranging from 16–20 to over 56. For television viewing, newspaper use, and radio listening, the respondents were asked to indicate how many hours in one day they used the media, for magazines and Internet use, the respondents indicated how many hours or times in each week they used the media, and for movie-going, the respondents indicated how many times they used the medium in one month.

3.4. Adoption

This study identified nine Internet-related technologies—digital cable, IPTV, emails, MSN, Facebook, personal computers, printers, notebooks, and scanners—and asked the respondents whether they had adopted each of the nine technologies.

3.5. Telephone survey

A telephone survey using computer-assisted telephone interviews (CATI) was conducted in March, 2010. Using the population percentage of each county or city in Taiwan, this study employed the proportionate stratified random sampling method to obtain a sample that was most representative of Taiwan's population. The most recent telephone number data-base for every city and county in Taiwan was used for random sampling. Moreover, a “1” was added to the number that was selected by the CATI system to avoid any biases existing in the telephone data-base (Chyu, 2000; Wimmer & Dominick, 2010). The week-long telephone survey was administered in a central location and supervised by the researcher. There were 12 trained telephone interviewers conducting the interviews. The telephone survey resulted in 863 telephone calls, from which 506 valid questionnaires were obtained, representing a response rate of 58.6%.

Table 2
Comparison between Taiwan's population and the sample profiles.
Source: Ministry of the Interior (2012).

2010 Taiwan's population profile (%)		Sample profile (%)	
Sex			
Male	50.23	Male	43.4
Female	49.77	Female	53.6
Age			
< 16	17.05	< 16	5.5
16–20	6.98	16–20	11.3
21–25	6.87	21–25	8.3
26–30	8.44	26–30	7.5
31–35	8.57	31–35	10.5
36–40	7.79	36–40	11.1
41–45	8.05	41–45	11.7
46–50	8.20	46–50	10.7
51–55	7.55	51–55	11.5
> 55	20.50	> 55	11.9
Education			
Junior high or below	31.27	Junior high or below	11.9
High school	31.98	High school	30.5
College or above	36.76	College or above	36.7

3.6. The sample profile

This study found that 43.4% of the 506 respondents were male, and that 30.5% of the sample had finished high school, 31% college, 11.9% junior high school education, and only 5.7% a graduate degree. Approximately 34% of the respondents had four family members, 23.6% had five, 14.7% had three, and 10% had more than 7 family members. The respondents were almost equally distributed across the nine age levels (approximately 12% for each level) except for the 21–25 and 26–30 levels, which each had less than a 10% share. Compared with data released by Taiwanese government, the profile of the sample was relatively consistent with the age and education levels of Taiwan's population (Executive Yuan of Taiwan, 2010). Table 2 contains the data that compared 2010 Taiwan's population profile with the sample profile.

4. Research findings

4.1. Predictors for technology adoption

Before conducting a multiple regression analysis, this study performed several tests to diagnose whether there was a problem of multicollinearity among the 18 independent variables. The results from collinearity statistical tests showed that 15 of the 18 variables had their degrees of tolerance higher than .60, and the degrees of tolerance for the remaining three variables were .543, .558, and .580. Furthermore, the 18 variables had their Variance Inflation Factors (VIFs) lower than 2.0. These results show only low degrees of multicollinearity among the 18 variables (Chyu, 2000; Hayes, 2005). This study also performed Pearson Correlation analyses among pairs of the 18 variables. The results showed that the *R* values for all the pairs were lower than .50 except the two pairs—personal income/family income and innovativeness/life expansionists—which had their *R* values of .50 and .53, indicating a moderate degree of correlation (Chyu, 2000). The means, SDs, and a correlation matrix of all the variables are summarized in Table 3.

This study summed up the responses to whether the respondents had adopted each of the nine technologies, then used these results as a dependent variable for a multiple regression analysis with four sets of independent variables—demographics, media use, lifestyles, and innovativeness. The results from the regression analysis are summarized in Table 4.

Table 4 shows that four demographic variables and two types of media use—education ($B=.186^{***}$), family size ($B=.121^{***}$), family income ($B=.160^{***}$), sex ($B=.093^*$), magazine reading ($B=.081^*$) and Internet use ($B=.207^{***}$)—had a positive effect on the adoption of the nine technologies. Furthermore, this study found that people with a “preference for foreign products” lifestyle ($B=.144^{**}$) were positively correlated with the technology adoption, while people with a “not mass media skeptics” lifestyle ($B=-.092^*$) were negatively correlated with the technology adoption. Table 4 also indicates that innovativeness ($B=.096^*$) exerted a positive effect on the adoption of the nine technologies. In general, this study found that the adopters were more educated, had a larger family size, were more affluent, tended to be female, and did more magazine reading. Compared to non-adopters, adopters tended to have the “preference for foreign products” lifestyle and did not trust mass media. Moreover, adopters were more innovative than non-adopters.

This study performed nine binary logistic regression analyses to better understand the relationships among the four sets of variables and the adoption of each of the nine technologies. The functions of binary logistic regression analyses are

Table 3
Means, standard deviations and Pearson correlations among independent variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Age	1.00																	
2. Edu	-.072	1.00																
3. Family size	-.15	-.05	1.00															
4. Personal income	.27	.38	-.06	1.00														
5. Family income	.05	.32	.09	.50	1.00													
6. Sex	.01	.05	-.06	-.14	.09	1.00												
7. Innovativeness	-.13	.24	.01	.24	.20	-.12	1.00											
8. Being fashionable	-.19	.16	-.03	.04	.16	.17	.40	1.00										
9. Life expansionists	-.15	.19	.06	.21	.16	-.03	.53	.41	1.00									
10. Enjoying life	.10	-.08	-.03	.05	-.03	.12	.21	.18	.16	1.00								
11. Preference for foreign products	-.23	.13	-.11	.08	.22	.08	.24	.48	.15	.19	1.00							
12. Not media skeptics	-.10	.02	.04	-.07	.03	.05	.16	.35	.12	.06	.32	1.00						
13. TV	-.13	-.12	.08	-.10	-.08	-.04	.07	.02	-.02	.10	-.03	.06	1.00					
14. Radio	-.01	.09	.10	.07	.11	-.06	.16	.13	.07	.04	.05	.07	-.07	1.00				
15. Newspaper	.17	.09	.06	.17	.10	-.04	.12	.09	.11	-.08	-.03	.07	-.05	.04	1.00			
16. Magazine	.09	.22	-.09	.33	.29	.04	.18	.13	.14	.06	.17	.02	.01	.03	.20	1.00		
17. Movies	-.25	.18	-.02	-.04	.04	-.03	.15	.23	.11	.00	.16	.05	.06	.02	-.02	.09	1.00	
18. Internet use	-.30	.41	-.04	.14	.20	.01	.27	.25	.23	-.01	.20	.10	.04	.04	-.03	.16	.30	1.00
Mean	5.92	4.74	4.33	2.42	3.22	1.57	20.95	27.20	24.86	21.70	7.82	9.88	4.24	2.40	2.52	2.26	1.44	5.27
S.D.	2.80	1.30	1.42	1.63	1.67	.50	4.31	8.85	5.62	4.09	3.09	3.39	1.43	1.91	1.32	1.57	.68	3.15

Note: boldface indicates significant correlations ($p < .05$).

Table 4
Multiple regression analysis of demographics, lifestyles and media use on the adoption of the nine technologies.

Predictors	Standardized beta
Block 1: demographics	
Age	-.043
Education	.186***
Family	.121**
Pincome	.002
Fincome	.160***
Sex	.093***
Adjusted R^2	.247***
Block 2: media use	
TV	-.038
Radio	-.065
Newspaper	-.055
Magazine	.081*
Movies	.015
Internet use	.207***
Change in adjusted R^2	.062***
Block 3: lifestyles	
Being fashionable	.032
Life expansionists	.077
Enjoying life	.018
Preference for foreign products	.144**
Not mass media skeptics	-.092*
Change in R^2	.041***
Block 4: innovativeness	
Innovativeness	.096*
Change in R^2	.005
Total R^2	.340*

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

similar to those of multiple regression analyses except that logistic regression analyses allow for the analysis of dichotomous dependent variables (Chyu, 2000). The results of the logistic regression analyses are summarized in Table 5.

The data in Table 5 show that, except for IPTV, demographic variables exerted a significant effect on the adoption of the nine technologies. In particular, demographic variables were the best predictor for the adoption of email, MSN, Facebook, personal computers, printers, notebooks and scanners. Regarding mass media use, this study found that while most media use did not have a significant effect on the adoption of a given technology, Internet use was a significant predictor for the adoption of five technologies: email, MSN, Facebook, personal computers, and printers. For lifestyles, this study discovered that lifestyles exerted a significant effect on the adoption of five technologies—printers, notebooks, scanners, IPTV, and digital cable. More specifically, this study found that those who adopted printers, notebooks, and scanners were more likely to have a “preference for foreign products” lifestyle or a “mass media skeptics” lifestyle. Those who adopted digital cable tended to have an “enjoying life” lifestyle and a “preference for foreign products” lifestyle. Those who adopted IPTV were more likely to have an “enjoying life” lifestyle. Furthermore, this study found that innovativeness did not have any significant effect on the adoption of any of the technologies except scanners.

5. Discussion

5.1. Lifestyles and technology adoption

This study’s first hypothesis predicted that the five types of lifestyles would be related to the adoption of different technologies. The data analysis showed that respondents with a “preference for foreign products” lifestyle and a “mass media skeptics” lifestyle adopted more of the nine technologies. For entertainment-oriented technologies, this study found that respondents with an “enjoying life” lifestyle were more likely to adopt digital cable and IPTV, and that respondents with a “preference for foreign products” lifestyle were more likely to adopt digital cable. For information-oriented technologies, this study discovered that respondents with a “preference for foreign products” lifestyle were more likely to adopt printers, notebooks, and scanners and that respondents with a “mass media skeptics” lifestyle were more likely to adopt notebooks and scanners. Therefore, Hypothesis 1a was supported by this study’s data, showing that the lifestyle of being fashionable was not related to the adoption of digital cable, IPTV, printers, notebooks, and scanners. Hypothesis 1b was not supported by the data because the lifestyle of life expansionists was not related to the adoption of printers,

Table 5
Predicting use of new technologies by demographics, media use, lifestyles and innovation.

Predictors	DCTV	IPTV	e-mail	Messenger	Facebook	PC	Printer	Notebook	Scanner
Block 1: demographics									
Age	.012	−.006	−.134**	−.197***	−.121*	−.004	.009	.044	.140**
Education	−.051	.003	.147**	.106*	.148**	.055	.156**	.191***	.155**
Family	−.016	.096*	.084*	.042	.058	.099*	.117**	.049	.093*
Pincome	−.009	.015	−.028	−.028	.004	.059	−.013	−.047	.066
Fincome	.145**	.047	.136**	.125*	.009	.095	.121*	.136**	.001
Sex	−.037	.035	.075	.062	.104*	.022	.025	.101*	.070
Adjusted R^2	.021*	.006	.170***	.162***	.130***	.084***	.089***	.113***	.119***
Block 2: media use									
TV	−.052	−.083	.005	−.033	.010	−.002	−.002	−.002	−.023
Radio	−.060	−.039	−.034	.018	−.020	−.004	−.103*	−.050	−.011
Newspaper	−.059	−.025	.004	.023	−.027	−.021	−.017	.005	−.135**
Magazine	.032	.049	.041	.017	.042	.011	−.051	.065	.174***
Movies	.017	.010	−.019	.052	.032	−.025	−.007	−.007	.006
Internet use	−.044	−.039	.225***	.218***	.160***	.250***	.162**	.087	.092
Change in adjusted R^2	.011	.009	.046***	.046***	.033**	.052***	.033**	.015	.055***
Block 3: lifestyles									
Fashionable	.006	.083	−.011	.016	.077	−.009	−.025	−.045	.056
Expansionists	.036	.049	.021	.024	.029	.058	.033	.083	.048
Enjoying life	.096*	.099*	−.044	.015	−.041	.022	.026	−.010	−.071
Foreign products	.164***	−.015	.034	.018	.069	.024	.151**	.113*	.105*
Not media skeptics	−.032	−.027	.061	−.045	−.047	−.027	−.047	−.141**	−.111*
Change in adjusted R^2	.046***	.021	.008	.003	.015	.009	.020	.027**	.033**
Block 4: innovativeness									
Innovativeness	.053	−.005	.053	.016	.047	.065	.031	.053	.155**
Change in adjusted R^2	.002	.000	.002	.000	.001	.002	.001	.002	.014
Final adjusted R^2	.056	.012	.207	.192	.159	.126	.121	.137	.202**

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

notebooks, and scanners. **Hypothesis 1c** was supported by the data, showing that the lifestyle of enjoying life was positively related to the adoption of two entertainment technologies—digital cable and IPTV. **Hypothesis 1d** was supported by the data, showing that the lifestyle of a preference for foreign products was positively related to the adoption of four technologies—digital cable, printers, notebooks, and scanners. **Hypothesis 1e** was partially supported because the lifestyle of not media skeptics was negatively related to the adoption of two information technologies—notebooks and scanners.

This study found that respondents with a “preference for foreign products” lifestyle adopted more of the nine Internet-related technologies, and these respondents were also more likely to adopt printers, notebooks, and scanners. To further understand the “preference for foreign products” lifestyle, this study performed a multiple regression analysis using this lifestyle as a dependent variable, and demographics, mass media use, innovativeness, and the remaining four lifestyles as independent variables. The results showed that respondents with this lifestyle tended to be younger, have fewer family members, be more affluent, and watch less television, but read more magazines. Furthermore, this study found that this lifestyle had a negative relationship with the “life expansionists” lifestyle, indicating that people with the “preference for foreign products” lifestyle did not like to take on challenges and risks. These findings are consistent with those of past studies, which showed that this lifestyle was significantly related to the intention to adopt Internet shopping in Taiwan because Internet shopping made it easier for people to purchase foreign products (Li, 2004a).

The data analysis showed that people with an “enjoying life” lifestyle were more likely to adopt digital cable and IPTV. To better understand the characteristics of this “enjoying life” lifestyle, this study conducted a multiple regression analysis using this lifestyle as a dependent variable and demographics, mass media use, innovativeness, and the remaining four lifestyles as independent variables. The results show that respondents with an “enjoying life” lifestyle tended to be older, have lower family income, and watch more television, but read fewer newspapers than respondents without this lifestyle. Furthermore, people with this lifestyle were more likely to be female, and less educated, but more innovative than those without this lifestyle. These findings were consistent with those of past studies, showing that this “enjoying life” lifestyle was positively related to the adoption of both VCRs and cable television in China (Leung, 1998), and that this lifestyle was negatively related to the intention to adopt cable television shopping in Taiwan (Li, 2004a).

This study also found that people with a “mass media skeptics” lifestyle tended to adopt more of the nine technologies, and that people with this lifestyle were more likely to adopt notebooks and scanners. As developed by past studies, this lifestyle describes people’s beliefs in the credibility of mass media, and is a reflection of people’s attitudes and values

toward mass media (Leung, 1998; Li, 2004a). Again, this study conducted a multiple regression analysis using this lifestyle as a dependent variable and demographics, mass media use, and innovativeness as independent variables. The results showed that this lifestyle was not related to any of the three sets of variables. To sum up, the findings of this study were consistent with some past studies that found that people with a “mass media skeptics” lifestyle were more likely to adopt new media technologies in China. In particular, Leung’s (1998) study found that the adoption of video stores was correlated with this lifestyle.

This study found that the adoption of entertainment-oriented and information-oriented technologies was correlated with different lifestyles. More specifically, the adoption of entertainment-oriented technologies was predicted by an “enjoying life” lifestyle, while the adoption of information-oriented technologies was predicted by a “mass media skeptics” lifestyle. The two lifestyles came from the French Inventory; the enjoying life lifestyle reflects the non-monetary value people put on their lives. People with this lifestyle want to have a relaxed, stable, and secure life, while the mass media skeptics lifestyle reflects a skeptical view toward mass media (Leung, 1998). These findings indicate that lifestyles reveal people’s needs and desires, which further predict the adoption of technologies with different functions. Moreover, this study found that a “preference for foreign products” lifestyle was able to predict the adoption of both entertainment-oriented and information-oriented technologies. According to past studies (Leung, 1998; Li, 2004a), this lifestyle, which reflects people’s interest in foreign products, was not included in the original A.I.O. inventories. Past studies also suggest that this lifestyle was one of the characteristics of the consumption trend in the Chinese population (Leung, 1998; Li, 2004a).

5.2. Demographics, media use, and technology adoption

This study’s second hypothesis predicted that the adopters of the nine technologies tended to be heavy mass media users. The data analysis showed that magazine reading and Internet use were positively related to the adoption of the nine technologies. For each individual technology, this study found that, except for Internet use, most mass media use was not related to technology adoption. Therefore, this study found that mass media use played only a minor role in the adoption of the nine technologies.

This study’s third hypothesis predicted that the adopters of the nine technologies would tend to be younger, better educated and more affluent than non-adopters. The data in Table 4 showed that among the four sets of variables, demographics were the most powerful predictor for the adoption of the nine technologies, accounting for almost 26% of the variance. The data analysis showed that demographic variables played a relatively minor role in the adoption of entertainment-oriented technologies, but that demographics exerted a significant effect on the adoption of both interpersonally oriented and information-oriented technologies. For interpersonally oriented technologies, the adopters were found to be younger, better educated, and more affluent. For information-oriented technologies, the adopters tended to be better educated and more affluent. Therefore, Hypothesis 3a was only partially supported, while Hypotheses 3b and 3c were moderately supported by the research findings.

This study found that mass media use played a relatively minor role in the adoption of the nine technologies, which is not consistent with the prediction of Rogers’ model. A possible explanation for this unexpected finding is that the Internet has replaced many functions of traditional mass media, and thus as respondents spend more time on the Internet, they are less available for traditional mass media use. Therefore, traditional media use could not predict the adoption of the Internet-related technologies. This explanation was confirmed by some recent studies. One showed that, except for Internet use, the adoption of Internet-related technologies was not related to most mass media use (Chan-Olmsted & Chang, 2006; Garitaonandia & Garmendia, 2009). Another found that Internet use tended to replace the use of traditional electronic media such as television and radio (Dimmick, Chen, & Li, 2004; Lin, 1998). In fact, with the Internet becoming popular in society, many studies have identified this phenomenon—media substitution mechanism—that is gradual erosion of traditional mass media use due to an increase Internet use (Lin, 2001, 2004). This study found that most traditional mass media use was not able to predict the adoption of Internet related technologies, while Internet use was the most significant variable for predicting the adoption. These findings imply that the use of traditional mass media might have been displaced by various contents of the online media in Taiwan.

This study found that demographics exerted a significant effect on the adoption of the nine technologies, and that when taking the nine technologies together, the adopters tended to have more family members, be better educated, have a higher family income, and were more likely to be women than non-adopters. These findings are consistent with those of past studies. However, one finding of note is that women were more likely to adopt these Internet-related technologies than men, which is not consistent with past studies that have consistently shown that men were more likely than women to adopt Internet-related technologies (Li, 2004a; Zhu & He, 2002). A possible explanation for this unexpected finding is that this study included several social media technologies, which women tend to adopt more often than men. This explanation is confirmed by the data in Table 5, indicating that women were more likely to adopt Facebook and notebooks than men. Moreover, a recent survey by Taiwan’s Institute for Information Industry (FIND, 2011) showed that the users of social media in Taiwan tended to be predominantly female, and that Facebook was the most popular social media site on the Internet.

This study found that for interpersonally oriented technologies, adopters were younger, better educated, and more affluent than non-adopters. For information-oriented technologies, the adopters were better educated, had more family members, and were more affluent than non-adopters. These findings were consistent with those of Taiwan’s recent

Table 6

Means and standard deviations for all variables including independent and dependent variables.

Variables	N	Mean	S.D.
Independent variables			
Age	505	5.92	2.799
Education	505	4.74	1.303
Family	505	4.33	1.417
Pincome	505	2.42	1.625
Fincome	504	3.22	1.674
Sex	493	1.57	.496
TV	505	4.24	1.431
Radio	505	2.40	1.912
Newspaper	505	2.52	1.318
Magazine	505	2.26	1.568
Movies	505	1.44	.682
Internet use	505	5.27	3.145
Being fashionable	505	27.20	8.848
Life expansionists	505	24.86	5.624
Enjoying life	505	21.70	4.085
Preference for foreign products	505	7.82	3.090
Not mass media skeptics	505	9.88	3.388
Innovativeness	505	20.95	4.314

studies. In particular, a recent survey showed that social media were frequently used by female college students or female graduate students (FIND, 2011).

5.3. Innovativeness and technology adoption

The fourth hypothesis of this study predicted that the respondents' innovativeness would be positively correlated with the adoption. The data analysis showed that when taking the nine technologies together, innovativeness was able to differentiate the adopters from the non-adopters. However, for individual technologies, innovativeness was a significant predictor only for one of the nine technologies—scanners. Therefore, the findings of this study only partially supported the prediction of the fourth hypothesis.

Rogers' model has been criticized for not taking psychological variables into consideration, but this study found that innovativeness was only moderately correlated with the adoption of the nine technologies. This study suggests that there are many psychological variables to be considered, and future studies should take into account other psychological factors such as the personality variable—openness to experience—from the five factor model to better understand the relationships between psychological variables and technology adoption (Hall, 2005; Handerson, 2009; Jeng & Teng, 2008) (Table 6).

6. Conclusions

This study adopted Rogers' diffusion of innovation model to examine the relationships between lifestyles and the adoption of nine Internet-related technologies. Several conclusions can be drawn from the findings of this study: (1) the first conclusion is that lifestyles did play a significant role in predicting the adoption of the nine technologies. In particular, the results showed that lifestyles were a powerful predictor for the adoption of information-oriented and entertainment-oriented technologies. In contrast, this study found that lifestyles did not have any significant effects on the adoption of interpersonally oriented technologies. These findings confirm the reasoning of this study that for those technologies that have a certain cost threshold, lifestyles become an important variable for predicting the adoption behavior. The existing studies seldom examine the effect of social rewards on technology adoption, and thus future studies should focus on this issue to better understand the process of technology adoption. (2) The second conclusion is that the psychological variables that drove people to adopt technologies exerted a significant effect on the adoption of the nine technologies. This study found that innovativeness only played a minor role in the adoption of the nine Internet related technologies, but when taking together the effects of innovativeness and lifestyles, this study found that the two psychological variables played a major role in predicting the adoption. Therefore, future studies should take into consideration multiple psychological variables to fully account for the psychological dynamics that drive people for technology adoption. (3) The third conclusion is that with the exception of the mass media variable, the findings of this study are consistent with the prediction of Rogers' model. Specifically, this study found that demographics were the most powerful variable that differentiated the adopters from the non-adopters. In contrast, mass media use was barely able to differentiate the adopters from the non-adopters. Hence, this study concludes that traditional electronic media use was not able to predict the adoption of Internet-related technologies.

One limitation of this study is its sample size. Due to a limited budget, this study only obtained 506 valid questionnaires, which is slightly inadequate in terms of representativeness. To remedy this limitation, this study adopted the most rigid sampling method, the proportionate stratified random sampling, to obtain a sample that should be better representative of Taiwan's population.

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