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Exploring Users Intention and Behavior of the Portal Site: Application of Technology Acceptance Model

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Abstract

With the prosperity of the Internet and WWW, lots of web sites have been raised. The *eBusinessWeekly* (2000) reported that “portal site” was with highly proportion (46.1%) among all kind of the websites; this reveals that portal site would be the place where Internet users visit most often. Since the Internet is widely popular, user’s perception to accept such WWW technology was easy to understand.

In this research, we examine how the issue of usability of WWW might affect the application of the Technology Acceptance Model. The data supported all the individual causal paths postulated by TAM. The results suggest that usability principles of WWW had a significant direct positive effect on perceived usefulness as well as perceived ease of use. The usage of the portal sites was influenced by the intention to reuse the portal sites; furthermore, the preference for a portal site had a direct effect on intention to reuse the portal site.

Keywords: Portal site, Usability, Technology acceptance model (TAM), Structural equation modeling (SEM)

1. Introduction

With the prosperity of the Internet, the web sites have proliferated rapidly in the early 1990. According to the International Data Corporation 1999, the number of users will soar from 100 million in 1998 to more than 500 million in 2003 (IDC, 1999). Nowadays, the Internet (especially the WWW) has impacted every facet of our lives, such as communication, entertainment, social activities, shopping, etc. The *eBusinessWeekly* (2000) reported that among the top five hundred favorite web sites, they are classified into several categories: portal site (46.1%), community (9.8%), news/media (7.8%), etc. Every of these categories has different disposition and owns his specific target appealing. Among all, portal site was with highly proportion (46.1%) of all the other investigated sites. This result somehow reveals that portal site would be the place where Internet users visit most often. In fact, the portal site is primarily advertising-supported (Steve, 2000), therefore, the more users visit the site, and the more Internet advertising income the site has. That is, the more and more visiting users provide significant value to web sites, and such value will be the motivation for more

Internet enterprises to construct a portal site. In order to get creative and innovative on attracting their Internet users, company often provides many services (such as free email, personal virtual space, searching, content providing, etc.) and realizes users' tastes, needs, and purchasing habits to grip the attention of the users. Therefore, how to keep people continuing to visit the portal site would be the most important issue in the information age.

Several past studies have examined the relationship among the perceived ease of use, perceived usefulness, attitudes, and the usage of information technologies (Adams et al., 1992; Bagozzi & Davis, 1992; Chau, 1996; Davis, 1989; Davis et al., 1989; Gefen & Straub, 1997; Haynes & Thies, 1991; Hendrickson & Collins, 1996; Igarria et al., 1995; Mathieson, 1991; Straub et al., 1995; Szajna, 1996; Taylor & Todd, 1995; Teo et al., 1999; Thompson, 1998). These studies explored the technology acceptance model (TAM), which posits that perceived ease of use and perceived usefulness can predict attitudes toward technology that then can predict the intention and the usage of that technology. TAM's applications were including primarily e-mail, voice mail, word processing, and spreadsheets. Some of them also applied in the Web using. (Judy & Hsipeng, 2000; Lederer et al., 2000; Shaw et al., 1997). In this paper, the first purpose of this study was to apply TAM in validating with the portal site as the users' application. And the second purpose was to identify antecedents to portal site ease of use and usefulness.

2. Research framework and hypotheses

The Web site is one of the new types of information technology. Therefore, the user's perceptions of a Web site are considered by applying the TAM (Davis, 1989; Davis, Bagozzi & Warshaw, 1989; see Figure. 1).

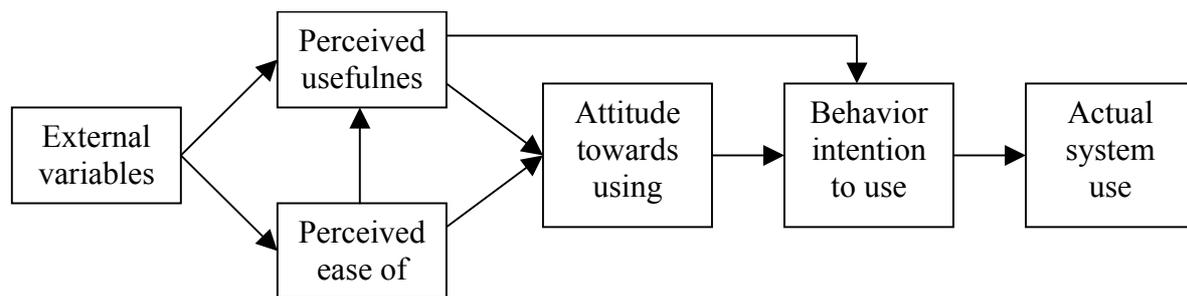


Figure 1. The Technology Acceptance Model (Davis, et al., 1989)

As we know if the Web site is attractive to users, they might highly probably revisit it in the near future. Since the network is widely popular, user's perception to accept such WWW technology was easy to understand. Although there were many antecedents affecting perceived usefulness and perceived ease of use, this study adopts Levi and Conrad (1996), which identified nine usability principles (Heuristics) for WWW, to be the antecedents of the

TAM. Therefore, the framework of our study combines both usability of WWW and TAM (see. Figure. 2).

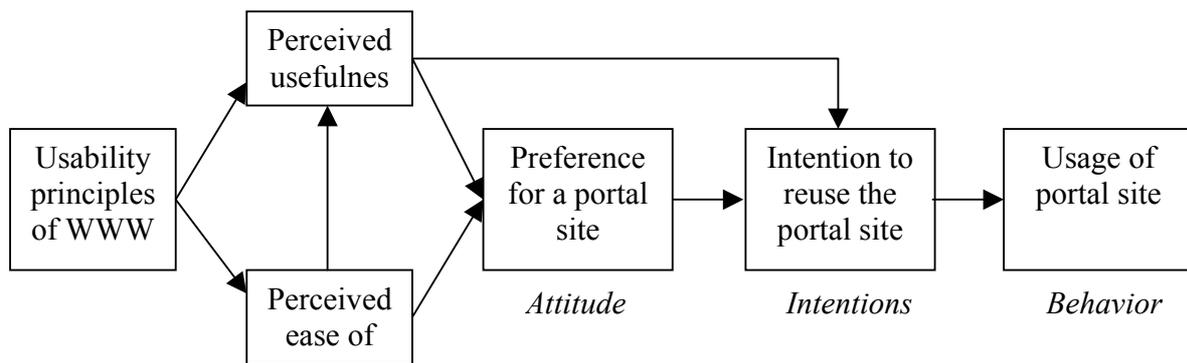


Figure 2. Research framework

2.1 Technology Acceptance Model (TAM)

Davis(1989) has shown that TAM can explain the usage of information technology. He applied the theory of Ajzen & Fishbein (1980) about reasoned action to show that beliefs influence attitudes which lead to intentions, and therefore generate behaviors. Davis thus conceived that TAM's belief-attitude-intention-behavior relationship predicts user acceptance of IT. TAM has been widely used to predict the acceptance of a new technology, such as the acceptance of new software packages. Acceptance and use issues in MIS research are often studied using the TAM (Straub, et al., 1997). TAM describes how people's attitudes toward using information technology are influenced by their perception of the technology's usefulness and ease of use (Davis, et al., 1989).

Specifically, the TAM model posits that the actual use of a technology can be predicted by the user's behavioral intention and his or her attitude toward use, which in turn are influenced by a technology's perceived ease of use and perceived usefulness (see figure 1). Though some researches further modified the TAM recently and extended its application to the Internet or WWW (Agarwal & Prasad, 1997; Atkinson & Kydd, 1997; Lederer et al., 1998; Teo, Lim & Lai, 1999), the related studies of the usage behavior in Internet environment is still primitive. It is not clear as to what external variables would affect the usage behavior and intentions.

According to TAM, user's perception about a Web site is defined by beliefs (subjective probability of the consequence if the Web site is used), attitude (positive and negative feelings about the Web site), and intentions (willingness to use the Web site). As generally assumed, beliefs would influence the user's preferences and, then, both of them would determine the intentions. As figure 2 indicates, the relationships are represented as the following functions:

Function 1: Usage of portal site = f (intention to reuse a portal site)

Function 2: Intention to reuse a portal site = f (preference, perceived usefulness)

Function 3: Preference for a portal site = f (perceived usefulness, perceived ease)

The corresponding hypotheses are:

Hypothesis 1: There will be a positive relationship between the usage and intention to the use of a portal site.

Hypothesis 2a: There will be a positive relationship between the intention and preference to the use of a portal site.

Hypothesis 2b: There will be a positive relationship between the intention and perceived usefulness to the use of a portal site.

Hypothesis 3a: There will be a positive relationship between the preference and perceived usefulness to the use of a portal site.

Hypothesis 3b: There will be a positive relationship between the preference and perceived ease to the use of a portal site.

2.2 Ease of use and usefulness on the Web

Researchers have investigated features potentially predictive of the perceived usefulness and perceived ease of use of the web. Levi & Conrad (1996) identified nine usability principles (Heuristics) for WWW as follow:

1. **Speaking the users' language:** use words, phrases, and concepts familiar to the user. Present information in a natural and logical order.
2. **Be Consistency:** indicate similar concepts through identical terminology and graphics. Adhere to uniform conventions for layout formatting, typefaces, labeling, etc.
3. **Minimization of the user's memory load:** Take advantage of recognition rather than recall. Do not force users to remember key information across documents.
4. **Build flexibility and efficiency systems:** Accommodate a range of user sophistication and diverse goals. Provide instructions where useful. Lay out screens so that frequently accessed information is easily found.
5. **Design aesthetic and minimalist systems:** Create visually pleasing displays. Eliminate information that is irrelevant or distracting.
6. **Use chunking:** write material so that documents are short and contain exactly one topic. Do not force the user to access multiple documents to complete a single thought.
7. **Provide progressive levels of detail:** Organize information hierarchically, with more general information appearing before more specific detail. Encourage the user to delve as deeply as needed, but to stop whenever sufficient information has been received.
8. **Give navigational feedback:** Facilitate jumping between related topics. Allow the user to determine her/his current position in the document structure. Make it easy to return to an

initial state.

9. **Don't lie to the user:** eliminate erroneous or misleading links. Do not refer to missing information.

As figure 2 depicts, the relationships are expressed in the following functions:

Function 4: Perceived usefulness of a portal site = f (evaluation of web prototype, perceived ease of use)

Function 5: Perceived ease of use of a portal site = f (evaluation of web prototype)

The corresponding hypotheses are:

Hypothesis 4a: The Internet user's beliefs of perceived usefulness to a portal site is related to the variable of evaluation of web prototype.

Hypothesis 4b: The Internet user's beliefs of perceived usefulness to a portal site is related to the variable of perceived ease.

Hypothesis 5: The Internet user's beliefs of perceived ease to a portal site is related to the variables in evaluation of web prototype.

3. Research methodology

3.1 Sampling procedure and Instrument development and pretest

To address this study, a field survey was sent to 450 undergraduate students, who came from six different colleges. All of these students have gotten the credit of the basic computer concepts. The purpose of this survey investigated the intention of the subjects to their *primary* portal site usage. The 433 complete surveys constitute a 96% response rate. In selecting the sampling frame, there are three major reasons. First, a survey made by MIC(2000) reported that students hold a 40% proportion of the Internet population; further, 70% of the Internet users education are in the college/university level. Second, students group is in fact the "active users" in the Internet. And third, choosing students as our sampling frame can reduce the variance of the computer knowledge. Meanwhile, for a complete consideration of this questionnaire, six Ph.D. students were first examined and forty-one undergraduate students tested for pilot test, the Cronbach alpha of the six variables were all greater than 0.7 (0.8706, 0.8809, 0.7728, 0.9081, 0.8675, 0.9136).

3.2 Measurement of variables

All variables in the survey were measured by a seven-point Likert scale from completely disagree(1) to completely agree(7). The survey consists of the following major sections.

(1) Usability of WWW: The items used to construct the usability of WWW measure were adapted from Refs (Lederer, et al., 2000;Levi & Conrad, 1996), with appropriate

modifications to make them specifically relevant to portal site. Ten items were identified to measure the extent to which the primary portal site is usable.

(2) Perceived usefulness: The items used to construct the perceived usefulness measure were adapted from Davis (1989) and Davis et al. (1989), with appropriate modifications to make them specifically relevant to portal site. Four items were identified to measure the extent to which the primary portal site meets usefulness characteristics.

(3) Perceived ease of use: This measure was adapted from Davis (1989) and Davis, et al. (1989), with appropriate modifications to make it specifically relevant to portal site. Three items were identified to measure the extent to which the primary portal site meets ease of use characteristics.

(4) Preference (attitude): This measure was adapted from Davis (1989), Davis et al. (1989) and Judy & Hsipeng (2000), with appropriate modifications to make it specifically relevant to portal site. Four items were identified to measure the extent to whose preference for the primary portal site.

(5) Intention: This measure was adapted from Davis (1989), Davis et al. (1989) and Judy & Hsipeng (2000), with appropriate modifications to make it specifically relevant to portal site. Three items were identified to measure the extent to whose intention to reuse the primary portal site.

(6) Usage: This measure was adapted from Lederer et al. (2000), with appropriate modifications to make it specifically relevant to portal site. Three items were identified to measure the extent to which actual use the primary portal site.

We used Confirmatory Factor Analysis (CFA), which implemented within the LISREL framework (Joreskog & Sorbom, 1993) to validate these six constructs. This allowed us to specify a measurement model consisting of a construct defined according to the weighted linear combination of its indicators, and to assess the fit of the specified measurement model to the data. Such a specification subscribes to a causal-indicator model where the observed indicators reflect the unobserved theoretical construct. Typically, a causal-indicator model is specified and analyzed for each theoretical construct individually (Venkatraman, 1989). A CFA was conducted for the construct that included perceived usefulness, perceived ease of use, preference for a portal site, intention to reuse a portal site, usage, and evaluation of web prototype. This model had a reasonable fit (see table 2).

Following the guidelines for scale validation (Anderson & Gerbing, 1988; Bollen, 1989; Chin, 1998), previous analysis was done to assess reliability, convergent validity, and discriminant validity of the six constructs.

3.3 Reliability of the measures

In order to ensure that the variables comprising each proposed research construct were

acceptable. This research uses reliability measures, such as Cronbach's alpha, composite reliability, and variance extracted (Hair, et al., 1998; see table 1). The internal consistency reliability coefficients for the research constructs in this study are all well above the 0.7 level. The composite reliability coefficients for the research constructs in this study are all well above the 0.7 level. The variance extracted coefficients for the research constructs in this study are all well above the 0.6 level. Guidelines suggest that the internal consistency reliability, the composite reliability, and the variance extracted should exceed 0.7, 0.7, and 0.5 for a construct (Hair, et al.,1998; Nunnally, 1978). So constructs of this research were acceptable.

Table 1: Reliability measures

Construct	Cronbach alpha	Composite reliability	Variance extracted
Usability	0.9454	0.9462	0.9182
Perceived usefulness	0.8758	0.8774	0.8220
Perceived ease	0.8157	0.8362	0.7662
Preference for a portal	0.8978	0.8996	0.8609
Intention to reuse the portal	0.7328	0.7882	0.6868
Usage	0.8609	0.8695	0.8211

Note:

$$\text{Composite reliability} = (\sum \text{standardized loading})^2 / (\sum \text{standardized loading})^2 + \sum \varepsilon_j$$

$$\text{Variance extracted} = \sum (\text{standardized loading}^2) / \sum (\text{standardized loading}^2) + \sum \varepsilon_j$$

3.4 Validity of the measure

Convergent validity is demonstrated when different instruments are used to measure the same construct and scores from these different instruments are strongly correlated. If all factor loading for the indicators measuring the same construct are statistically significant (greater than twice their standard errors), this can be viewed as the evidence supporting the convergent validity of those indicators (Anderson & Gerbing, 1988). The fact that all t-test were significant for each construct shows that all indicators are effectively measuring the same construct. See table 2.

Table 2: Regression estimate coefficient and model fit indices

Construct	Measure variable	Estimate	Standard error	t-value
Usability principles of WWW	X1	0.75	0.44	18.05**
	X2	0.79	0.37	19.65**
	X3	0.80	0.35	20.01**
	X4	0.81	0.35	20.10**
	X5	0.81	0.34	20.24**
	X6	0.79	0.37	19.52**
	X7	0.83	0.32	20.82**
	X8	0.80	0.36	19.85**
	X9	0.85	0.28	21.81**
	X10	0.75	0.44	18.11**

Perceived usefulness	Y1	0.74	0.45	17.50**
	Y2	0.80	0.36	19.38**
	Y3	0.88	0.22	22.56**
	Y4	0.78	0.40	18.55**
Perceived ease of use	Y5	0.66	0.57	14.50**
	Y6	0.85	0.27	20.64**
	Y7	0.86	0.26	20.83**
Preference for a portal	Y8	0.85	0.27	21.71**
	Y9	0.87	0.25	22.25**
	Y10	0.80	0.35	19.76**
	Y11	0.80	0.36	19.54**
Intention to reuse the portal	Y12	0.86	0.25	21.44**
	Y13	0.83	0.31	20.21**
	Y14	0.51	0.74	10.87**
Usage	Y15	0.83	0.31	20.01**
	Y16	0.83	0.31	20.04**
	Y17	0.83	0.31	20.04**

Goodness-of-Fit Measures for SEM:

Chi-square = 958.72, *df* = 309, *p-value* = 0.0000, *RMSEA*=0.070, *RMR*=0.049

chi-square/df = 3.10, *GFI* = 0.86, *AGFI*=0.83, *NFI*=0.89, *NNFI*=0.92

CFI=0.93, *IFI*=0.93

** *p-value* <0.01

Discriminant validity should be demonstrated when different scales are used to measure different construct. Discriminant validity was examined by confidence interval tests (Anderson & Gerbing, 1988). If all the intervals (for each construct) do not include 1.0, discriminant validity is demonstrated, as it was the case here. Table 3 presents the first-order correlation coefficients among the variables. The bi-variate relationships indicate that all the variables were significantly correlated with each other.

Table 3: Correlation analysis

	Usefulness	Ease of use	Preference	Intention	Usage	Usability
Usefulness	1					
Ease of use	0.606**	1				
Preference	0.674**	0.576**	1			
Intention	0.615**	0.540**	0.714**	1		
Usage	0.373**	0.440**	0.547**	0.512**	1	
Usability	0.505**	0.458**	0.619**	0.509**	0.402**	1

** Correlation is significant at the 0.01 level (2-tailed)

4. Data Analysis and Results

4.1 Analytical techniques

The research model and hypotheses were tested using path analysis, where a single

indicator measured each variable in the model. In this study, path analysis was undertaken using structural equation modeling (SEM) techniques. SEM-based path analysis assumes that the variance and covariance of the independent variables are also to be estimated, in contrast to traditional path analysis using multiple regression, which assumes they are known numbers. Consequently, SEM-based path analysis provides better estimates of the path coefficients than traditional techniques (David et al., 2000).

The specific SEM-based technique used in this study was LISREL (Linear Structural Relations). LISREL estimates parameters and tests the appropriateness of linear structural equation models using covariance structure analysis. Fit indices reported in LISREL to identify goodness of fit include: (1) the Goodness of Fit Index (GFI); (2) GFI Adjusted for Degree of Freedom (AGFI); (3) Root Mean Square Residual (RMR); (4) the Comparative Fit Index (CFI); (5) the Normed Fit Index (NFI); and (6) a Non-Normed Fit Index (NNFI). Values greater than 0.90 are desirable for each fit index except AGFI (greater than 0.80 is preferred) and RMR (less than 0.10 is preferred). If the model's conformance with the observed data is to be considered acceptable, the probability value for the model's chi-square statistics should exceed a standard cutoff of 0.05 (Bentler, 1989). However, chi-square is a direct function of sample size. In large sample, the chi-square will almost always be significant. With the sensitivity of chi-square to variations of sample size, numerous alternative indices have been proposed and evaluated (for reviews, see Gerbing & Anderson, 1993; Hoyle, 1995). Of these, the value of chi-square divided by the degree of freedom (chi-square/degree of freedom) could provide an indication of the fit of the model per degree of freedom used and therefore was applied to determine the goodness-of-fit. For the statistic, smaller values indicate better fit. Two thresholds have been used for reasonable fit in the literature: 3 or less (Carmines and MacIver, 1981), and 5 or less (Wheaton, et al., 1977). The sample size to parameter ratio for the model was approximately 25:1, which conforms to recommendations of higher than 5:1 (Bentler, 1989).

4.2 Testing the research model

Table 4 summarizes the values observed in the study together with recommended value of common model fit indexes. As shown, even though some of them failed to meet the recommended minimum levels, they were close enough to suggest that the model fit was reasonably adequate to assess the results for the structural model.

Table 4: Analysis of Overall Model Goodness-of-Fit Using Common Fit Indexes

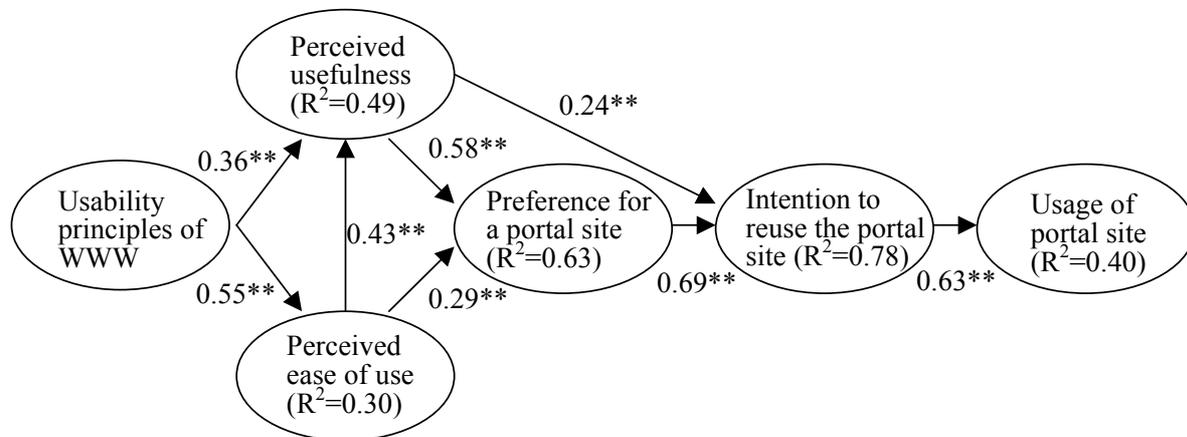
Model goodness-of-fit indexes	Results obtained from the study	Recommended value
<i>Chi-square</i>	1055.94	None
<i>df</i>	316	None

<i>p-value</i>	0.000	Greater than 0.05
<i>Chi-square/df</i>	3.341	Less than 3; less than 5
<i>RMR</i>	0.078	Less than 0.10
<i>GFI</i>	0.85	Greater than 0.90
<i>AGFI</i>	0.82	Greater than 0.80
<i>CFI</i>	0.91	Greater than 0.90
<i>NFI</i>	0.88	Greater than 0.90
<i>NNFI</i>	0.91	Greater than 0.90

The results of the multivariate test of structural model are present in figure 3. The figure shows the path coefficients, which are the standardized regression coefficients. The figure also shows values for R^2 , i.e., the amount of variance explained in perceived ease of use, perceived usefulness, preference the portal, reuse the portal, and usage of portal. Usability principle and perceived ease of use were able to explain 49 percent of the variances observed in perceived usefulness. Usability principle was able to explain 30 percent of the variances observed in perceived ease of use. Perceived usefulness and perceived ease of use were able to explain 63 percent of the variances observed in Internet users' attitudes toward preference for the portal site. Perceived usefulness appeared to have contributed more to the observed explanatory power than perceived ease of use. At the same time, the combination of perceived usefulness of and attitude toward preference for the portal site explained 78 percent of the variances observed in Internet users' intention to reuse the portal site. Preference for the portal site appeared to have contributed more to the observed explanatory power than perceived usefulness. Finally, intention to reuse the portal site was able to explain 40 percent of the variances observed in Internet users' actual use portal site.

Figure 3 illustrates many of the significant structural relationships among the study variables. The data supported all of the individual causal paths postulated by TAM (hypotheses 1, 2a, 2b, 3a, 3b, and 4b). Usability principles of WWW had a significant direct positive effect on perceived usefulness as well as perceived ease of use, with standardized path coefficients being 0.36 and 0.55. Perceived usefulness had a significant direct positive effect on an Internet users' attitude as well as his or her intention to reuse the portal site, with standardized path coefficients being 0.58 and 0.24, respectively. Literally, these coefficients suggested that every unit increment in perceived usefulness would strengthen an individual's (positive) attitude by 0.58 unit and at the same time increase his or her intention to reuse portal site by 0.24 unit. Perceived ease of use had a significant direct positive effect on perceived usefulness as well as an Internet users' preference to the portal site, with standardized path coefficients being 0.43 and 0.29, respectively. Literally, these coefficients suggested that every unit increment in perceived ease of use would strengthen an individual's (positive) attitude by 0.29 unit and at the same time increase perceived usefulness by 0.24 unit. Effects of preference to the portal site on intention to reuse the portal site were significant and showed a 0.69 path coefficient. Finally, intention to reuse the portal site had a

significant positive effect on an Internet users' actual use of the portal site, with standardized path coefficient being 0.63. As was noted previously, the overall result of the model test is supported all hypotheses (from hypothesis 1 to hypothesis 5) at the 0.01 level of significance.



*p<0.05 **p<0.01 ***p<0.01

Figure 3. Model Testing Results

5. Discussion

This study examines the TAM model in the Internet environment by adding usability principles of WWW as external variables. Based on data collected from 433 students, which are all Internet users, the utility of TAM for explaining acceptance of portal site by Internet users was evaluated. The results suggested the general adequacy and applicability of TAM in the portal as indicated by fairly reasonable goodness-of-fit indexes for the model. The study has provided some valuable insight into the Internet user's acceptance of a portal site from the perspectives of usability principles of WWW. We have also tested the descriptive validity of TAM in the domain of WWW environment. Based on the above results presented herein, which seem to provide the following implications.

First, the finding of this study shows that the technology acceptant behavior in the voluntary usage environment (e.g., Internet) can be predicted by using TAM. Second, in agreement with what TAM postulates, perceived usefulness was found to have a significant and in influence on intention to reuse the portal site. This may suggest that users are relatively pragmatic and tend to focus on the usefulness of the portal site. In this connection, providing proper online manual page (including search tips, benefits of the portal site, why use the portal site, FAQ, and special features, etc.) for users is essential for directing and solidifying users' perceptions of the usefulness of the portal site. Since usefulness is still the primary concern for using a portal, the ease of using a portal site, however, has indirect effect on the formation of intentions. That is, the easier a portal site is to use, the more useful it is perceived to be. Therefore, to promote user's intention to reuse a portal site, the company

should promote the portal site's usefulness more than its ease. Increasing the ease of using a portal site alone would not increase the user's intention to revisit the site. Third, the usability principles of WWW are very important factor in leading people to believe in the usefulness and ease of that portal site. According to Fig.3, there are both a direct positive effect of usability principles of WWW on perceived usefulness and on perceived ease of use. The portal site that provides better usability principles of WWW would result in a greater perceived usefulness and perceived ease of use from the user. And finally, preference was found to be significant in influencing intention to reuse the portal site. This suggests the relative importance of preference in users' acceptance of portal site and its respective contribution in predicting behavior intention.

6. Conclusion and limitation

Theory testing has become increasingly important for IS research (Hartwick & Barki, 1994), and therefore examination or validation of existing findings of user technology acceptance is desirable, or even essential, particularly when different technologies, user populations, or organizational contexts are involved. This study examined TAM using Internet users' acceptance to the portal site. Based on data collected from 433 college students with the experience of using portal site in Taiwan, the utility of TAM for explaining acceptance of portal site by Internet users' was evaluated. The results suggested the general adequacy and applicability of TAM in this Internet users' context as indicated by fairly reasonable goodness-of-fit indexes for the model. Several implications can be drawn from the findings of the study.

First, an important contribution to user technology acceptance research is the use of a preeminent intention-based model in a Internet context, which differs considerably in operational independence and individual autonomy from the business organizations ordinarily studied in previous research. On the one hand, we responded to a call for additional theory-testing efforts to validate research results accumulated from prior studies on web site acceptance/adoption (Morris & Dillon, 1997; Thompson, 1998; Teo, et al., 1999; Judy & Hsipeng, 2000; Lederer, et al., 2000).

Second, this study has also contributed by applying TAM to lay the groundwork for understanding antecedent (Usability principles of WWW) to ease of use and usefulness. Such usability principles of WWW might affect portal site usage. An understanding of them could guide both portal site research and development.

Generalizations from this study are limited to the portal site users with the "Kimo(<http://www.kimo.com.tw>)". Among the 433 surveys, 72.5% used "Kimo" as their portal site, and only 27.5% used other site such as "sina(<http://www.sina.com.tw>)", "Pchome(<http://www.pchome.com.tw>)", "Yam(<http://www.yam.com.tw>)", "Yahoo(<http://www.yahoo.com.tw>)".

www.yahoo.com.tw)", etc. Since our study focused on portal site, therefore, such high proportion of the "Kimo" surveys result might failed to generalize to other portal sites. We cannot assume that these relationships will hold true among other portal sites. Given the worldwide nature of the Internet, future researchers may be necessary to examine our findings in a border context.

Furthermore, the sampling frame in this paper consisted of undergraduate students with the credit of basic computer concepts. While this student sample may cause a generalization problem, the study recruited student as our subjects in this study for three reasons. First of all, according to the survey done by Yam (<http://www.yam.com.tw>), about 80% of Internet users in Taiwan are college students (Li, 1999; Judy & Hsipeng, 2000). Secondly, the students will eventually become the most active Internet users and influential consumers in the marketplace in the near future. Understanding the needs and preferences of potential customers are important and desirable to these Internet enterprises. In addition, using of students as the sample in this study can decrease the effect of computer literacy variances. Since the students might have the same characteristics, such as age, hobby, liking, etc. However, these might be a distance between the student group and non-students groups. What's the difference? Further researches need to pay attention to investigate the non-students groups' influence to the portal site and the gap between these two groups.

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