Exploring the Impact of Online Service Quality on Portal Site Usage

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Abstract

Previous survey showed that the "portal site" would be the place where Internet users visit most often. In this study, we employed the TAM in studying the portal site, and identified antecedents including information content, customization, reliability and response, and security to perceive ease of use and perceived usefulness on portal site usage. In validating our research model, our data supported all the individual causal paths postulated by TAM. The results demonstrated the antecedents contributing to portal site usage and those affecting perceived usefulness and perceived ease of use. The importance of significant antecedents such as information content, customization as well as the reliability and response to portal site usage could provide the companies as a referential point for designing mechanisms and improving users' perceptions of the portal site. Based on the research findings, implications and limitations are discussed.

Keywords: portal site, online service quality, Technology Acceptance Model (TAM)

1. Introduction

With the prosperity of the Internet, the web sites have proliferated rapidly since the World Wide Web (WWW) in the early 1990. According to the International Data Corporation (IDC), the number for users will soar from 100 million in 1998 to more than 500 million in 2003 [18]. Nowadays, the Internet (especially the WWW) has impacted every facet of our lives, such as communication, entertainment, social activities, shopping, etc. The e*BusinessWeekly* survey [10] reported that among the top five hundred web sites, these sites could be classified into several categories, including 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. Further, the more and more visiting users would provide significant value for companies so that they have highly intention in constructing a portal site. [22] In fact, the portal site is primarily advertising-supported [36], therefore, the more users visit the site, the more Internet advertising income the site has. 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 the 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.

Nowadays, the portal site provides variety services but not only the online search services. Traditionally, online search service provides access to limited portions of streaming media content, however, there is a trend that not only the online search services, but also the online service quality would be the simply need of what Internet users want. Recently, some of the researches had applied the TAM and extended its application to the Internet or WWW [2,3, 23,24,34,41]. Several past studies have examined the relationship of the perceived ease of use, perceived usefulness, attitudes, and the usage of information technologies[1,4,5,6,8,12,15,16,19,25,37,38,40,41, 42]. These studies posited that perceived ease of use and perceived usefulness can predict attitudes toward technology and can then predict the intention and the usage of that technology. So far, the applications of TAM include the e-mail, voice mail, word processing,

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and spreadsheets, etc; even, some of them also applied in the Web using[23,24,27,34]. Understanding more about the acceptance of the WWW can lead to significant improvements in the design of both software and hardware to increase its usefulness and ease of use. Applying the TAM to the WWW can also lead to a better theoretical understanding of possible important differences between the WWW and of other types of end user systems. In this paper, we are aimed at exploring users intention and behavior of the portal site. Altogether, the first purpose of this research was to validate TAM 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. Literature Review

2.1. Background: Technology Acceptance Model

Technology Acceptance Model (TAM) was conceived to explain and predict the individual's acceptance of IT [6]. TAM is based on the Fishbein and Ajzen's [11] Theory of Reasoned Action (TRA), which suggest that social behavior is motivated by an individual's attitude toward carrying out that behavior. TAM model posits that the actual use of a technology can be predicted by 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).

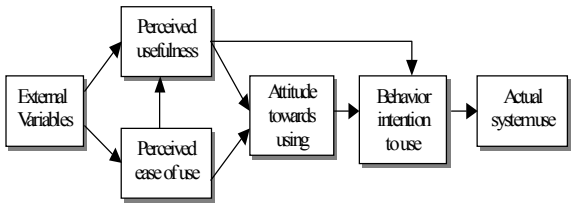

Figure 1. Technology acceptance model

Though some researches further modified the TAM recently and extended its application to the Internet or WWW [2,3,41], 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.

2.2. Online Service Quality

With the prosperity of the Internet, these proliferated web sites have also provided varieties of the online services. However, the online service quality is one of the important factor related to users behavior, therefore, measuring of the online service quality became the critical issue today [35]. The online service quality comprises two parts, including information system quality and service quality. Previous studies have raised concerns about service quality as the gap between customers' expectations and perceptions [30] and about SERVQUAL, which is a two-part instrument for measuring service quality [32], and later refined [31]. According to the PZB [32], the service quality instrument consists of 22 item (expectation/perception statements) distributed approximately equally among the five dimensions of service quality as shown below:

1. **Tangibles:** Physical facilities, equipment, and appearance of personnel;
2. **Reliability:** Ability to perform the promised service dependably and accurately;
3. **Responsiveness:** Willingness to help customers and provide prompt service;
4. **Assurance:** Competence, courtesy, credibility, safety and security are all grouped into this category. It includes knowledge and courtesy of employees and their ability to inspire trust and confidence;
5. **Empathy:** Access, communication and understanding the customers are placed into this category. They depend on the caring and individualized attention that the firm provides to its customers.

In this study, we defined the "Online Service Quality, (OSQ)" as the basis of discrepancies between customer expectation and perception of the service being offered. The OSQ consists of four dimensions, including (1) information content, (2) customization, (3) reliability & response, and (4) security. The measure items of each dimension were inference from DeLone & McLean [9], Hoffman et al. [17] and PZB [30,32]. The necessary modification for these existing measurements had done to fit into our research issue – the use of portal site. Each dimension is described as shown bellow:

1. **Information content:** Ease to understand the text, graphic, article, and proper information;
2. **Customization:** Personalization service, understand the customers' need, provide the information to fit with the users, and ease to use;
3. **Reliability & response:** Problem solving, online service, display/transmission/service correctly, and in time;
4. **Security:** Security of transmission, privacy protection.

"The role of external variables vis-à-vis TAM has not been well explored." Davis [7, p.483] called for

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"future research to consider the role of additional external variables within TAM." In this study, we adopt the four dimensions as our antecedents to explore the relationships between perceived ease of use and perceived usefulness.

3. Methodology

3.1. Research Model

Figure 2 depicts the research model employed in the study. It is an extended TAM model. In this model, portal usage is predicted by one's behavior intention to use this portal. Behavior intention to use portal is predicted by both perceived usefulness and attitude towards using portal; the former also influences attitude towards using portal, and attitude towards using portal is also predicted by perceived ease of use. Perceived ease of use influences both perceived usefulness and attitude towards using portal.

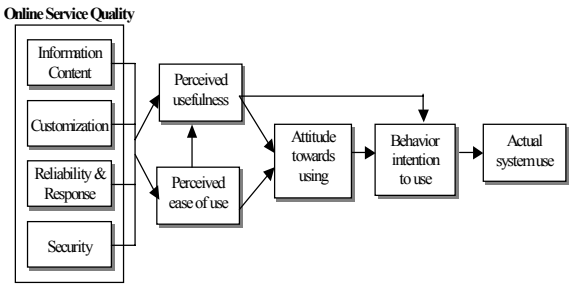

Figure 2: Research model

Finally, the perceived usefulness and perceived ease of use are predicted by the Online Service Quality (OSQ), including information content, customization, reliability and response, and security. In this study, the model hypothesizes that the degree that portal site is easy to use, as perceived by students, affects both their perception of the usefulness of the portal site and their attitude toward using the portal and actual portal use in general. We formulate our hypothesis as shown below:

[H1] There is a positive relationship between online service quality and perceived usefulness of using the portal site.

[H2] There is a positive relationship between online service quality and perceived ease of use of using the portal site.

[H3] There is a positive relationship between perceived ease of use and perceived usefulness of using the portal site.

[H4] There is a positive relationship between perceived ease of use and attitude toward using the portal site.

[H5] There is a positive relationship between perceived usefulness and attitude toward using the portal site.

[H6] There is a positive relationship between perceived usefulness and behavioral intention to use the portal site.

[H7] There is a positive relationship between attitude toward using and behavioral intention to use the portal site.

[H8] There is a positive relationship between behavioral intentions to use and actual use the portal site.

3.2. Research Design

To address this study, a field survey was sent to 450 undergraduate students, who came from six different Management 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.

Table 1. Descriptive statistics of respondents' characteristics

Measure	Items	Frequency	%
Gender	Female	256	40.6
	Male	176	59.1
Degree of WWW (or Internet) experiences	<1 year	65	15
	1~3 years	200	46.2
	3~5 years	121	27.9
	>5 years	47	10.9
Primary use portal site	Kimo(www.kimo.com.tw)	314	72.5
	Sina (www.sina.com.tw)	29	6.7
	Pchome (www.pchome.com.tw)	24	5.5
	Yam (www.yam.com.tw)	28	6.5
	Yahoo of Taiwan (tw.yahoo.com)	17	3.9
	Other	21	4.8
Time of Use primary portal site (everyday)	<1 hour	254	58.7
	1~3 hours	143	33.0
	3~6 hours	26	6.0
	6~9 hours	7	1.6
	>9 hours	3	0.7
Primary Activity	Search data	192	44.3
	Use email	123	28.4
	Read news/magazine	68	15.7
	Other	50	11.6

In selecting the sampling frame, there are three major reasons. First, a survey made by MIC 2000 [26] reported that students hold a 40% proportion of the Internet population; further, 70% of the Internet users education is in the college/university level. Second,

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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. Detailed descriptive statistics relating to the respondents' characteristics are shown in Table 1.

3.3. Validity and Reliability of Questionnaire

The constructs "perceived ease of use", "perceived usefulness", "attitude towards using portal site", "behavior intention to reuse portal site", and "actual portal site use" were referenced from Davis [6] and Davis et al. [8], Lin & Lu [24], Leaderer et al. [23]. As for the construct of online service quality were referenced by DeLone & McLean [9], Hoffman et al. [17], PZB [30,32]. Further, for a complete consideration of the face validity and content validity of this questionnaire, six Ph.D. students were first examined and forty-one undergraduate students were asked to test for pilot test.

The construct validity is categorized into convergence and discriminant validity. Convergence validity means that evidence from different sources gathered in different ways all indicates the same or similar meaning of the construct. Discriminant validity means that one can empirically differentiate the construct from other constructs that may be similar, and that one can point out what is unrelated to the construct. To test discriminant validity, a principal components factor analysis with varimax rotation for the proposed construct of the online service quality yielded four distinct factors: information content, customization, reliable and response, and security. All four items loaded on a distinct factor. Factor loadings for all variables were greater than 0.5 [21]. Together, the three observed factors accounted for 75.93 percent of the total variance. In this study, bartlett's test of sphericity (p-value=0.000) indicates that the statistical probability that the correlation matrix has significant correlation among at least some of the variables, and the Kaiser-Meyer-Olkin measure of sampling adequacy (0.928) show high sampling adequacy [13]. The convergent validity is based on the idea that items are valid measures of the same concept should correlate rather highly with one another or yield similar results even though they are different instruments. Therefore, the correlations provide evidence that the items all converge on the same construct, and the correlation is significant at the 0.01 level [21]. Internal consistency was assessed by computing Cronbach's alpha. In this study, the values range form 0.73 to 0.89 with nine constructs [29].

The intent of our study was to extend TAM by adding an online service quality concept in the portal site context. We hoped to explain user acceptance of the portal site. The research model and hypotheses were tested using path analysis. In this study, path analysis was undertaken using structural equation modeling (SEM) techniques. The SEM technique used in this study was LISREL (Linear Structural Relations). Fit indices reported in LISREL to identify goodness of fit include: (1) the Goodness of Fit Index (GFI)(greater than 0.9); (2) GFI Adjusted for Degree of Freedom (AGFI) (greater than 0.8); (3) Root Mean Square Residual (RMSR)(less than 0.10); (4) the Comparative Fit Index (CFI)(greater than 0.9); (5) the Normed Fit Index (NFI) (greater than 0.9); (6) a Non-Normed Fit Index (NNFI)(greater than 0.9); and (7) chi-square/degree of freedom (less than 5) [20].

Figure 3 shows the results of SEM analysis of the path model developed in this study. This study was close enough to suggest that the model fit was reasonably adequate to assess the results for the structural model. The explanatory power of the model for individual constructs was examined using the resulting R^2 for each dependent construct. Together, information content, customization, reliability & response and perceived ease of use were able to explain 53 percent of the variances observed in perceived usefulness. At the same time, the combination of information content, customization, reliability & response were accounted for 31 percent of the variances observed in perceived ease of use. Perceived usefulness and perceived ease of use were able to explain 29 percent of the variances observed in Internet users' attitude toward using portal site. Meanwhile, the combination of perceived usefulness of and attitude toward using portal site accounted for 55 percent of the variances observed in the Internet users' intention to use the portal site. Finally, the intention to use the portal site of Internet users' was able to explain 26 percent of the variances observed in actual use the portal site.

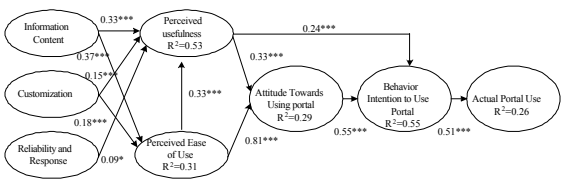

Figure 3. Results of LISREL testing

Hypotheses 1 and 2 examine the links between online service quality (information content, customization, reliability & response, and security) of

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portal site and perceived usefulness and perceived ease of use: information content is significantly positive related with perceived usefulness (β=0.33, t-value=6.38, $p<0.01$) and perceived ease of use (β=0.37, t-value=7.33, $p<0.01$). Customization of portal is significantly positive related with perceived usefulness (β=0.15, t-value=2.90, $p<0.01$) and perceived ease of use (β=0.18, t-value=3.54, $p<0.01$). Reliability & response is significantly positive related with perceived usefulness (β=0.09, t-value=1.73, $p<0.01$) but with non-significant related to perceived ease of use. As for the security of portal is both with non-significant related to the perceived usefulness and perceived ease of use. Therefore, hypotheses 1 and 2 were partial not rejected. Hypotheses 3 to 8 examine the original TAM's causal model. Also, hypothesis 3 was supported (β=0.33, t-value=5.39, $p<0.01$). Hypothesis 4 was supported (β=0.81, t-value=4.83, $p<0.01$). Hypothesis 5 was supported (β=0.31, t-value=9.07, $p<0.01$). Hypothesis 6 was supported (β=0.24, t-value=3.69, $p<0.01$). Hypothesis 7 was supported (β=0.55, t-value=7.82, $p<0.01$). Hypothesis 8 was supported (β=0.51, t-value=8.85, $p<0.01$).

4. Discussion

This study examines the TAM model in the Internet environment by adding online service quality of WWW as external variables. Based on data collected from 433 college students, who 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 online service quality. 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, while perceived usefulness and perceived ease of use were both found to have significant influence on intention to reuse the portal site, the data showed that the standardized path coefficients of perceived usefulness to attitude is 0.33 while perceived ease of use to attitude toward using portal is 0.81, respectively. Inconsistent with what Davis [30] had postulated in his study that perceived usefulness is more important than perceived ease of use, the finding of this study showed that the perceived ease of use (0.81) is more significant twice than perceived usefulness (0.33). Concerning about this contrary finding, we may ascribe the difference as a novel finding, since the portal site have its unique property, such as that it is in fact located in the Internet which belongs to a voluntary usage environment; on the contrast, the pervious studies used TAM in the task-oriented environment, for instance, the word processors, spreadsheets, etc. The different motivation for users to use the technology would make up the differences.

With different traits with the functional information systems, the portal site needs to first pursue the ease of use in order to attract Internet users to visit the portal once again, such as easy target the information they want. This means if a portal site equips with all kinds of services without ease to use, generally speaking, users will not visit this portal again. Thus, for this novel finding that perceived ease of use is more significant important than the perceived usefulness, we then suggest the companies who already have or are planning to construct one, they need to focus on the design of "easy of use". 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 ease of use of the portal site.

Since perceived ease of use is still the primary concern for using a portal, the perceived usefulness of a portal site, however, has indirect effect on the formation of intentions. That is, the easier a portal site is to use, the more usefulness it is perceived to be. Therefore, to promote user's intention to reuse a portal site, the company should promote the portal site's ease more than its usefulness. Increasing the usefulness of a portal site alone might not have increased the user's intention to revisit the site.

Third, the online service quality is very important factor in leading people to believe in the usefulness and ease of use that portal site. According to Fig.3, there is both a direct positive effect of online service quality perceived usefulness and on perceived ease of use. Besides the security in the antecedents to the portal is not effect perceived usefulness and perceived ease of use. The portal site that provides better online service quality would result in a greater perceived usefulness and perceived ease of use from the user. And finally, attitude was found to be significant in influencing intention to reuse the portal site. This suggests the relative importance of attitude

in users' acceptance of portal site and its respective contribution in predicting behavior intention.

5. Conclusion

Theory testing has become increasingly important for IS research [14], 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 of portal site. Based on data collected from 433 students of college with use portal site experience 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 an Internet context; also, the technology acceptant behavior in the voluntary usage environment (e.g., Internet) can be predicted by using TAM. Here, we tested the plausible extension of the applicability of TAM and we contributed the theory-testing efforts to validate research results. Second, this study has also contributed by applying TAM to lay the groundwork for understanding antecedent (information content, customization, reliability & response) to perceived ease of use and perceived usefulness. The understanding of them could guide both portal site research and business practices. In conclusion, the findings of this study reveal that, in order to foster user intentions to use portal site, it is important to encourage and cultivate a positive attitude toward using the portal site. In this connection, positive perception of the portal ease of use is crucial, whereas the portal usefulness may not be equally important for professional users.

6. Limitation and Future Work

Since the collected data in this study showed that among the 433 valid surveys, 72.5% of the subjects indicated that "Kimo" would be their primary portal site, and the other 27.5% are used to visit other sites such as "Sina", "Pchome", "Yam", and "Yahoo", etc. The survey in this study is also consistent with the investigation Kimo itself made; they reported "Kimo is the most-visited, the top Chinese-language portal in Taiwan, recording about 25 million page views each day. The site, which has about 4 million registered members, focuses largely on local content." [33] In addition, Yahoo had reached an agreement on 9th November, 2000 to buy Kimo. Thus, if we also combine the Kimo with Yahoo, they would occupy a fairly high proportion with 82.9%. Given the worldwide nature of the Internet, future researchers may be of necessary to consider our findings in a keep-going and border context.

Furthermore, the sampling frame in this study consisted of undergraduate students with the credit of basic computer concepts. While the student population may cause some opposite issues, the study still recruited student as our sampling frame for several reasons. First of all, use of students as the sample in this study can decrease the effect of computer literacy variances. Second, according to a survey by Yam.com, a popular portal site in Taiwan (http://www.yam.com.tw) reported that about 80% of Internet users in Taiwan are college students [24]. Finally, once the students accumulated the more Internet experience, they will eventually become the more active Internet users and influential consumers in the Internet marketplace after they graduated. Thus, understanding the needs and preferences of potential customers are important and desirable.

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