Determinants of the Service Quality of Technical Support Web Sites: An Empirical Study of IT Companies in Taiwan

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ABSTRACT

This study explores the key factors influencing the service quality of technical support Web sites. Based on the findings of previous literature, six research hypotheses were proposed. An online survey was conducted to investigate service quality evaluations of the technical support Web sites of six well-known IT companies in Taiwan. The data were analyzed by structural equation modeling. The results indicate that "Efficiency," "Information Availability and Content," "Visual Appeal," and "Responsiveness" are the determinants of the service quality of the technical support Web sites. In contrast to previous studies, results of this study suggest that "Privacy" and "System Availability" have no significant impact on service quality. Based on these findings, a number of managerial implications and suggestions for future research are discussed.

Keywords: Technical support Web sites, e-service, Web sites service quality, structural equation modeling, IT companies

1. INTRODUCTION

Since the Internet was invented, Web sites have become an important channel for companies to provide services. Businesses now operate more than 400,000 publicly accessible Web sites around the world. For businesses looking to get the most out of their investments, experts recommend investing 70-75% of the Web site budget in developing online services. In recent years, the applications of information technology have provided a powerful platform for e-service. One noticeable trend of e-service is the increasing use of self-service technologies (SSTs). SSTs enable customers to produce a service independent of direct service employee involvement [Meuter, Ostrom, Roundtree, and Bitner, 2000]. The implementation of SSTs in e-service extends more choices, options, and, ultimately, power to customers in their transactions with businesses [Rust and Kannan, 2003]. One prevailing example of SST-based services is the technical support Web site. Customers seeking information or solution to a problem are now getting used to going to the technical support Web site of a business. Thus, many businesses have established technical support Web sites to reduce human support costs [Parasuraman and Grewal, 2000; Wolf, Alpert, Vergo, Kozakov, and Doganata, 2004] and to provide more personalized, real-time services [Meuter, et al., 2000; Rust and Lemon, 2001]. Thus, ensuring that the technical support Web site provides customers high-quality support and service in order to enhance the relationship with customers is crucial to the viability of organizations.

Taiwan is the world's third largest producer of information technology (IT) products, and IT companies have traditionally been well represented in Taiwan's top 10 international brands. Compared with other types of merchandise, IT products frequently require after-sales technical support. Unlike B2B technical support, however, the sheer numbers of customers make B2C technical support more difficult to deliver. Using a Web site to provide customers with the technical support they need is quite an effective method. Thus, how Taiwanese IT companies can improve their corporate image by providing consumers with better technical support through their Web sites is a challenge that the Taiwanese enterprises, government, and academia must overcome. Before an administrator begins looking for ways to improve the service quality of the technical support Web site, he or she must identify the factors that affect the consumer's perception of the service quality of the technical support Web site.

Prior research on the determinants of e-service quality can be summarized into two main streams. The first concentrated on the quality of the Web site's interface design and hardware performance [Loiacono, 2000]. However, this approach neglected the quality of Web content for customers [Zeithaml, Parasuraman, and Malhotra, 2002], and thus was not capable of fully capturing the service quality of the technical support Web site. The second focused on the service quality during the order fulfillment process of transaction-based Web sites [Barnes and Vidgen, 2002; Yoo and Donthu, 2001]. Nevertheless, the main purposes of the technical support Web sites are information provision and

after-sales service; they therefore do not emphasize online transactions. A review of functions provided by real-world technical support Web sites shows that many do not even support online transactions. Hence, the transaction-based approach may also not adequately measure the service quality of a technical support Web site. To date, few studies have explored factors that determine the service quality perceptions of customers regarding technical support Web sites. This study attempts to fills this research gap by exploring the key factors influencing the service quality of technical support Web sites.

In Section 2, we review the literature and formulate hypotheses, whereafter we illustrate the research method and procedures (Section 3). We then present our results and test the formulated hypotheses (Section 4). In Section 5, we discuss managerial implications and the limitations of this study.

2. LITERATURE REVIEW

This section reviews germane literature relating to the measurement of online service quality and the service quality of technical support Web sites.

2.1. Measurement of Online Service Quality

Service quality aspects vary depending on the context and service type. Recent studies on Web site service quality can generally be divided into two types. The first approaches the topic from the angle of IT systems and tends toward a direct quality assessment of the Web site's interface design and hardware performance [Loiacono, 2000]. This type of research, however, neglects to take into account the consumer's experience of the actual service. The other type tends to focus on transaction-based Web sites and mainly measures the consumer's perception of service quality during the online transaction process [Barnes and Vidgen, 2002; Yoo and Donthu, 2001]. To acquire a full representation of actual online service quality, experts are now blending the two methods. Zeithaml [2000], for example, felt that a customer's assessment of a Web site's service quality should not be just about his or her interaction with the Web site, but should also include the follow-up service interaction level as well. To this end, Zeithaml developed the "e-SERVQUAL" scale for measuring Web site service quality. Parasuraman, et al. [2005] took this a step further and modified e-SERVQUAL by splitting it into two parts: E-S-QUAL (efficiency, reliability, fulfillment, privacy), and E-RecS-QUAL (responsiveness, compensation, contact). This split was mainly intended to cover recovery services when a customer encounters problems on the Web site.

As many Web site service quality scales consist of different aspects and have different names, Zeithaml [2002] collated much of the available Web site service quality research at the time and came up with six aspects that influence a customer's assessment of Web site service quality: information availability and

content, ease of use or usability, privacy/security, graphics style, fulfillment. and others. Dai [2005] also studied the major Web site service quality scales and added two more aspects: system availability and recovery service.

2.2. Measuring Service Quality of Technical Support Web Sites

Past research on Web site service quality has focused mainly on transaction-based Web sites. However, the purpose of the technical support Web sites is to provide technical information and support to customers. Transactions may not be the most important function of technical support Web sites. Whether the weights of determinants of service quality for transaction-based Web sites remain the same for technical support Web sites warrants investigation.

Measuring only the ease of use of the Web site interface probably does not fully reflect the service quality of a technical support Web site. On the other hand, a technical support Web site is usually intended to provide product information and technical support services. It generally does not include a sales function; so, the determinants of service quality for shopping Web sites and their relative importance will be different from that of a technical support Web site as well.

This study explores the key factors influencing the service quality of technical support Web sites. The study proposes to examine the Web sites of six well-known IT companies in Taiwan to explore the determinants of service quality for a technical support Web site. The findings are then compared with those of past studies based on shopping Web sites to determine whether there are any changes in the importance of each quality aspect.

3. METHODS

This section discusses the measurement of variables, presents the authors' hypotheses, and reviews their data collection methods.

3.1. Measurement of Variables

Past research on the common aspects in Web site service quality measurements by Dai [2005] and Zeithaml [2002] was used as the basis for defining our research framework. The two studies show that there were eight aspects common to past research on Web site service quality:

Information availability and content
Efficiency
Fulfillment
System availability
Privacy
Graphics style
Recovery service
Other

Among these, the "Fulfillment" aspect in past studies was based on customer transactions at shopping Web sites and emphasized the online transaction process [Parasuraman, et al., 2005; Wolfinbarger and Gilly, 2003]. Transaction behavior and order fulfillments are therefore prerequisites for measuring a Web site's fulfillment performance. Most technical support Web sites do not provide an online shopping feature, and this study confirms that most technical support Web sites do not include a shopping feature. "Fulfillment" was therefore excluded from the Web site service quality determinants in this study. Also excluded was "Other."

In summary, this study uses the common aspects identified to validate the influence on the service quality of technical support Web sites by the six determinants other than "Fulfillment" and "Other." By reviewing existing Web site service quality literature [e.g., Loiacono, Watson, and Goodhue, 2002; Parasuraman, Zeithaml, and Malhotra, 2005; Yoo and Donthu, 2001; Zeithaml, et al., 2002], this study summarizes six potential factors that may influence the service quality of technical support Web sites; i.e.,

Efficiency
Information availability and content
Visual appeal
System availability
Privacy
Responsiveness

Although "Fulfillment" has been suggested as a construct of Web site quality in the past literatures, this study does not examine its influence on technical support Web site service quality because most technical support Web sites do not support online transactions. In sum, this study aims to examine whether the factors mentioned above influence customers' perceptions of the overall service quality of technical support Web sites.

3.2. Hypotheses

Past studies noted the importance of usability and usefulness in the technology acceptance model (TAM). Browsing and using Web sites can be considered using and adapting to a new technology. In other words, a Web site user's assessment of the site will be influenced by its ease of use and whether it helps the user complete his or her task efficiently. Some studies have already shown that "usability" and "usefulness" can be used to predict customers' acceptance of online financial services. In the E-S-QUAL scale, the two are merged under the "Efficiency" aspect. "Efficiency" is also defined as "the speed and ease with which the Web site can be accessed and used." It is also suggested that a Web site's efficiency affects the user's assessment of the Web site's service quality. Based on these, this study proposed that:

H1: Web site efficiency has a positive effect on a technical support Web site's service quality.

Sachs and Stair [1997] point out that Web site users are willing to revisit a Web site for two reasons: (1) the Web site offers unique functions; and (2) the Web site provides unique content. In the former instance, Web site users can perform certain functions such finding information quickly and easily on the Web site. In the latter instance, the Web site contains some specific, interesting, specialized, or unusual information. These all highlight the importance of information quality on the perception of Web site quality. In a lot of literature, the importance of information quality is also emphasized when it comes to deciding Web site service quality [Liu and Arnett, 2000; Loiacono, 2000; Yang, et al., 2005; Zeithaml, et al., 2002]. Based on these, this study proposed that:

H2: Web site information quality has a positive effect on a technical support Web site's service quality.

Many studies have already examined in detail how a Web site's graphics and appearance influence users' perception of quality when browsing or shopping online [Ariely, 2000; Barnes and Vidgen, 2002; Hoffman and Novak; 1996, Hoque and Lohse, 1999; Lynch and Ariely, 2000; Montoya-Weiss, et al., 2000; Novak, et al., 2000]. A Web site's graphics and visual appeal include its layout, visual design, and number of photos and pictures, as well as multimedia sound and animation. When a user is browsing a Web site, the Web site's visual aesthetics and the ease of use of its user interface affect the user experience most directly. Based on these, this study proposed that:

H3: Web site's visual appearance and appeal has a positive effect on a technical support Web site's service quality.

Because of the Internet's ability to reach long distances and be accessed at any time from any location, online services enjoy the advantage of being "always on," compared with traditional service channels. To realize this advantage, however, companies must invest in and maintain their Web site's software and hardware to ensure problem-free connections between visitors and the Web site, as well as the proper operation of all Web site operations. One of the basic requirements for companies providing online services is to have a stable platform. Empirical research by Parasuraman [2005] even shows that system availability has a major influence on customers' perception of a Web site's value and overall quality ,and even on their loyalty. Based on these, this study proposed that:

H4: Web site system availability has a positive effect on a technical support Web site's service quality.

The protection of privacy is an important service quality aspect for shopping Web sites [Liu and Arnett, 2000; Loiacono, 2000]. During online transactions, shopping Web sites often ask the user for personal details. Whether the customer's privacy is protected and the details are transferred securely are important factors when consumers assess a Web site's service quality [Yang, et al., 2005; Zeithaml, et al., 2002]. Though technical support Web sites do not

usually include a transaction feature, companies may adopt a membership-based log-in method to provide personalized services or to ensure that its resources are reserved for target customers. These may include the providing of private information such as product serial numbers and personal details. Whether the data is properly managed and protected against leaks or misuse is quite important to Web site users and affects their perception of service quality. This study therefore proposed that:

H5: Web site privacy protection has a positive effect on a technical support Web site's service quality.

Apart from its basic function of providing information, technical support Web sites have the more important mission to provide customers with faster service or assistance. For example, these sites often offer live online customer support to answer or solve customers' problems [Li, et al., 2002]. Some Web sites also set up a discussion area where customers can talk with other customers or to the company directly [Yang, et al., 2005]. These all use the nature of the Internet to help customers more quickly and conveniently. Whether a company can use its Web site platform to deal with customer problems or requirements in a timely manner is therefore an important factor when it comes to consumers' assessment of Web site service quality. For the above reasons, this study proposed that:

H6: Web site service and response has a positive effect on a technical support Web site's service quality.

3.3. Data Collection

The information technology (IT) industry is selected for investigation because the need for technical support is often critical to customers of IT products. Three international companies (Apple, HP, and Sony) and three domestic companies (acer, Asus, and BenQ) in Taiwan are selected as the research subjects because they are top-selling brands in Taiwan. The scales used to measure the six possible determinants of technical support Web site service quality in the questionnaire are modified from Loiacono, et al. [2002], Parasuraman, et al. [2005], Wolfinbarger and Gilly [2003], and Yang, et al. [2005].

An online survey was conducted to collect data. The subjects are customers of IT products in Taiwan. Participants first chose as the target one of the six companies' technical support Web sites with which they were most familiar, and then filled out an online questionnaire. The first section of the questionnaire consisted of the 27 items (shown in Appendix A) measuring the Web site's performance on "Efficiency," "Information Availability and Content," "Visual Appeal," "System Availability," "Privacy," and "Responsiveness." The second section contained three items measuring the overall service quality of the technical support Web site (also shown in Appendix A). All items in the current study were rated on a seven-point Likert scale.

4. RESULTS

The survey process yielded a total of 536 completed questionnaires. When the confidence of the six factors and "Web site overall quality" were analyzed, only "Web site system availability" had a Cronbach α value of 0.796. The α values of all other aspects were above 0.8. This showed that the Web site service quality aspects extracted through explorative determinant analysis all had a high level of internal consistency. The internal consistency of all scales used in this study had satisfactory Cronbach's alphas (as shown in Table 1).

The CR value was composed of the confidence for all measurement variables, and Fornell's recommended value was 0.6 and above. In this study, "system availability" had a CR value of 0.78 as a potential aspect. All of the other aspects were above 0.8 and higher than the 0.6 recommended by Fornell. AVE calculates the average explanatory ability of each measurement for each potential aspect. A higher AVE meant that the potential variable had a higher confidence and convergence rate. Fornell considered an AVE value greater than 0.5 to offer excellent convergence. In this study, the AVE values for all potential aspects were above 0.5; so, the aspects in this research model had good validity (as shown in Table 1).

As the structural equation model for this study has ideal confidence and validity, we can use this model to verify whether the main hypotheses proposed in this study are supported by the empirical results. By checking the inspection path's standard parametric estimates for significance, we can verify whether each determinant affects the overall service quality of a technical support Web site. Where the estimate is significant, a higher value means an aspect corresponds more closely to the overall service quality.

Table 1
The Value of CR and AVE on Service Quality of Web Sites

Determinants Item	Cronbach α	CR	AVE
Efficiency	0.903	0.89	0.61
Information Availability & Content	0.836	0.84	0.51
Visual Appeal	0.815	0.86	0.55
System Availability	0.796	0.87	0.57
Privacy	0.835	0.90	0.66
Responsiveness	0.857	0.84	0.50
Overall service quality	0.879	0.92	0.71

The independent variables are scores of six possible determinants of technical support Web sites. The dependent variable is the overall service quality of technical support Web sites. The results show that all goodness-of-fit indices of structure equation modeling (χ^2／df=2.65, GFI=0.88, NFI=0.97, NNFI=0.98, CFI=0.98, RMSEA=0.058) were within a satisfactory range [Hu and Bentler, 1999], which implies that the data fit the proposed model reasonably well. Following the process suggested by Bagozzi and Yi [1988], the composite reliability, convergent validity, and discriminant validity for each factor were computed, and were all well above conventional cutoff values. Figure 1 presents results of the structure equation modeling of the current study. The loadings of "Efficiency," "Information Availability and Content," "Visual Appeal," and "Responsiveness" are significantly positive (p<.05) correlated with overall technical Web site service quality. However, "System Availability" and "Privacy" do not significantly impact overall Web site service quality.

Among the six hypotheses proposed in this study, four (H1, H2, H3, and H6) were subjected to empirical analysis. The parametric estates for their route all met the standard for significance (as shown in Table 2).

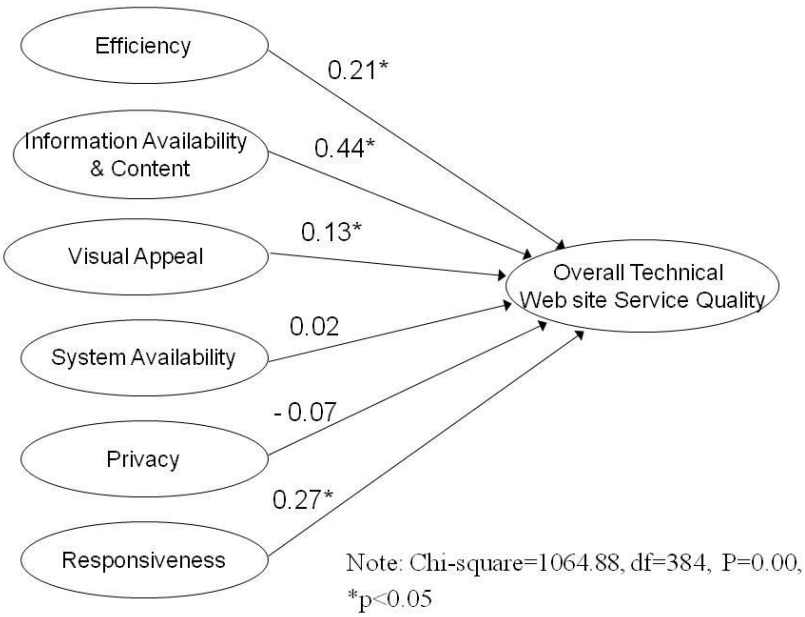

Figure 1. Standardized Coefficients for the Structural Model

Table 2
Summary of Results

Hypotheses	Standardized Coefficients	t value	Result
H1	**0.21**	4.12*	Supported
H2	**0.44**	6.98*	Supported
H3	**0.13**	2.94*	Supported
H4	**0.02**	0.36	Non-supported
H5	**-0.07**	-1.85	Non-supported
H6	**0.27**	5.08*	Supported

***Significant path**

5. CONCLUSION AND DISCUSSION

Structural equation modeling was used in this study for hypothesis validation. The above determinants on Web site service quality were inspected to determine whether they did influence a technical support Web site's overall service quality. Structural equation modeling was used instead of the multiple-regression method as it provided a better reflection of the variances in service quality aspects and a more accurate picture of the relationships among aspects. The results of the structural equation modeling showed that "Web site system availability" and "Web site privacy protection" were not related to "Web site overall quality" in a significant way, whereas the other factors had a significant positive relationship.

This paper is an exploratory study investigating the determinants of service quality on technical support Web sites. The results show that the influencing factors in determining service quality of technical support Web site are not totally identical to transaction-based Web sites. It suggests that the existing e-service quality scale that is based on online shopping may not applicable to technical support Web sites. Whether there are other factors affecting service quality for technical support Web sites warrants further investigation. Future studies may wish to develop more a comprehensive measurement of e-service quality that contains self-service technology.

The purpose of this study was to explore the determinant of service quality on technical support Web sites. The results show that "Efficiency," "Information Availability and Content," "Visual Appeal," and "Responsiveness" significantly influence the service quality of technical support Web sites. The results suggest that the characteristics of technical support Web sites are, to a certain extent, different from transaction-based Web sites. The main objective of a technical support Web site is to provide customers with effort-saving self-service. The

users of technical support Web sites, therefore, expect more on information quality and real-time support. These findings suggest that companies should ensure the accuracy and usability of the information on their technical support Web sites to assist users in finding required information efficiently. In addition, companies may wish to use multimedia technology on a more user-friendly Web design (e.g., using animated demonstrations) to help customers better accomplish their goals. Companies can also implement online service technology on their technical support Web sites (e.g., instant messaging) to enhance customer satisfaction with e-service. If a customer cannot solve the problem alone, he or she can use a real-time channel to contact the company for immediate response.

In contrast to previous studies, this study found that "Privacy" did not significantly influence the service quality of technical support Web sites. Past research on Web site service quality has focused mainly on transaction-based Web sites on which most of the informational transactions involve high-risk personal information (such as credit card number, Social Security number, etc.). In contrast, most information transfers on technical support Web sites do not involve high-risk private information. Thus, information security may be less vital to technical support Web sites. This study also revealed that "System Availability" had no significant impact on the overall service quality of technical support Web sites. A possible explanation is that consumers have already taken system stability as an essential requirement for online service. Therefore, "System Availability" does not affect consumers' perception of the Web site's service quality.

APPENDIX A

Determinants	Content
Efficiency	● This Web site makes it easy to find what you need. ● It makes it easy to get anywhere on the Web site. ● Information at this Web site is well organized. ● This Web site is simple to use. ● This Web site enables you to get on to it quickly. ● This Web site is well organized.
Information Availability & Content	● Information contained on the Web site is current, timely. ● Information contained on the Web site is accurate and relevant. ● Information contained on the Web site is rich in detail. ● The Web site provides sufficient information for potential and existing customers. ● The Web site provides relatively comprehensive information compared to other Web site.
Visual Appeal	● The Web site displays visually pleasing design. ● The Web site avoids cluttered pages. ● Present colors, graphics, and text of the Web site are pleasing to the consumer's eye. ● The Web site is visually appealing.
System Availability	● Pages at this Web site do not freeze. ● The Web site is available all the time. ● The Web site does not crash.
Privacy	● I feel safe in my interactions with this Web site. ● I feel like my privacy is protected at the Web site. ● Security arrangements & privacy are stated on Web site.
Responsiveness	● Automated or humane e-mail responses or serving pages give customers prompt service. ● The achievable service level is stated on Web site. ● Feedback is continuously changed in response to customer. ● The Web site takes care of problems promptly. ● This Web site offers a meaningful guarantee. ● This Web site offers detailer contact information.
Overall Service Quality	● Overall, the services provided by the Web site have excellent quality. ● The service quality provided by this Web site matches my expectations. ● This Web site's service offerings are very competitive.

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