

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 that influence the service quality of technical support Web sites. The authors proposed six research hypotheses, based on the findings of previous literature, and then conducted an online survey of service quality evaluations of the technical support Web sites of six well-known IT companies in Taiwan. They analyzed the data using structural equation modeling. The results indicate that “efficiency,” “information availability and content,” “visual appeal,” and “responsiveness” are the determinants of the service quality of these sites. In contrast to previous studies, the results of this study suggest that “privacy” and “system availability” have no significant impact on service quality of technical support Web sites. The authors discuss the managerial implications of their findings and offer suggestions for future research.

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 around the world now operate more than 400,000 publicly accessible Web sites. 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, more options, and, ultimately, more 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 are now getting used to going to the technical support Web site of a business for information or the solution to a problem. Many businesses, therefore, 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]. It is crucial to the viability of organizations, therefore, to ensure that their technical support Web sites provide customers with high-quality support and service in order to enhance their relationship with customers.

Taiwan is the world's third largest producer of information technology (IT) products; hence, IT companies have traditionally been well represented in the country's top 10 international brands. Unlike many other types of merchandise, IT products frequently require after-sales technical support. In contrast to B2B technical support, however, B2C technical support is more difficult to deliver because of the sheer number of customers involved. Using a Web site to provide customers with the technical support they need is an effective approach for companies. The challenge facing Taiwanese enterprises, government, and academia is to determine how Taiwanese IT companies can improve their corporate image by providing consumers with better technical support through their Web sites. Before administrators begin looking for ways to improve the service quality of their technical support Web site, however, they need to identify which factors affect the consumer's perception of service quality.

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]. This approach, however, neglected the quality of the Web content for customers [Zeithaml, Parasuraman, and Malhotra, 2002], and was thus incapable of fully capturing the service quality of a technical support Web site. The second focused on service quality during the order fulfillment process of transaction-based Web sites [Barnes and Vidgen, 2002; Yoo and Donthu, 2001].

Since the main purpose of technical support Web sites is to provide information and after-sales service, they 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. The transaction-based approach, therefore, may also not adequately measure the service quality of a technical support Web site. To date, few studies have explored factors that determine customers' service quality perceptions of technical support Web sites. The present study, therefore, aims to fill this research gap.

Section 2 presents the literature review. In Section 3, we discuss our methodology and present our hypotheses. Our research results are presented in Section 4. In Section 5, we present our concluding remarks and discuss the managerial implications and limitations of this study.

2. LITERATURE REVIEW

The literature review discusses the measurement of online service quality and the measurement of the service quality of technical support Web sites.

2.1. 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, does not take into account the consumer's experience with 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 [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, thought 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 further step was mainly intended to cover recovery services when a customer encounters problems on the Web site.

Because many Web site service quality scales consisted of different aspects and had different names, Zeithaml [2002] collated much of the available Web site service quality research at the time and came up with six aspects that influenced 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. Service Quality of Technical Support Web Sites

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

Measuring only the ease of use of the Web site's interface probably does not fully reflect the service quality of a technical support Web site. On the other hand, because technical support Web sites are usually intended to provide product information and technical support services, they generally do not include a sales function. The determinants of service quality for shopping Web sites and their relative importance will be different, therefore, from that of a technical support Web site. This study explores the key factors that influence the service quality of technical support Web sites. It examines the Web sites of six well-known IT companies in Taiwan in order to explore the determinants of service quality for a technical support Web site. The findings are then compared with those of past studies on shopping Web sites to determine if there are any changes in the importance of each quality aspect.

3. METHODS

This section discusses the measurement of variables, presents our hypotheses, and describes our data collection effort.

3.1. Measurement of Variables

Our research framework was defined based on past research on the common aspects of Web site service quality measurement by Dai [2005] and Zeithaml [2002]. The two studies identify 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

In past studies, the *fulfillment* aspect 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 fulfillment are prerequisites, therefore, for measuring a Web site's *fulfillment*

performance. Most technical support Web sites, however, do not provide an online shopping feature, and this study confirmed that most of these sites do not include a shopping feature. *Fulfillment* was therefore excluded from the Web site service quality determinants in this study. We also excluded the *other* aspect.

Based on further review of 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], we selected six potential factors that may impact the service quality of technical support Web sites:

- Efficiency
- Information availability and content
- Visual appeal
- System availability
- Privacy
- Responsiveness

In the following section, we present our hypotheses regarding these six factors.

3.2. Hypotheses

Past studies note the importance of usability and usefulness in the technology acceptance model (TAM). Browsing and using Web sites can be considered as 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 has also been suggested that a Web site's *efficiency* affects the user's assessment of the site's service quality. Based on facts, this study proposed:

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 site for two reasons: (1) it offers unique functions; and (2) it provides unique content. In the former instance, Web site users can perform certain functions, such as being able to find information quickly and easily on the Web site; in the latter instance, the Web site contains some specific, interesting, specialized, or unusual information. These findings highlight the importance of *information availability and content* in shaping one's perception of Web site quality. The importance of information quality in deciding Web site service quality is cited in other studies [Liu and Arnett, 2000; Loiacono, 2000; Yang. et al., 2005; Zeithaml, et al., 2002]. Based on these findings, 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, number of photos and pictures, as well as any multi-media sound and animation. When a user is browsing a Web site, the site's visual aesthetics and the ease of use of its user interface affect the user's experience most directly. Based on these, this study proposed that:

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

Because of the Internet's ability to span long distances and to 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] shows that *system availability* even has a major influence on customers' perception of a Web site's value and overall quality and on their loyalty. Based on these findings, 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 private, 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]. Although technical support Web sites do not usually include a transaction feature, companies may adopt a membership-based login 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 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, a technical support Web site has the more important mission of providing customers with faster service or assistance. For example, technical support Web 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 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 an important factor, therefore, when it comes to consumers' assessment of Web site service quality. For these 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

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

We used an online survey to collect data. The subjects were customers of IT products in Taiwan. Participants first chose as a target one of the six companies' technical support Web sites with which they were most familiar, and then filled out the online questionnaire. The first section of the questionnaire contained 27 items (shown in the Appendix) to measure the Web site's performance with regard to the six factors chosen for use in this study; i.e., *efficiency, information availability and content, visual appeal, system availability, privacy, and responsiveness*. The second section contained three items to measure the *overall service quality* of the technical support Web site (also shown in the Appendix). All items in the current study were rated on seven-point Likert scale.

4. RESULTS

The survey process yielded 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 0.7961. The α values of all other aspects were above 0.8. This shows 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 means 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 are above 0.5; so, the aspects in this research model have good validity (as shown in Table 1).

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

Determinant 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

Since 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.

The independent variables are the scores of six possible determinants of technical support Web sites. The dependent variable is the *overall service quality* of the sites. The results show that all goodness-of-fit indices of structure equation modeling ($\chi^2 / df=2.65$, GFI=0.88, NFI=0.97, NNFI=0.98, CFI=0.98, RMSEA=0.058) are 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 ([988], we computed the composite reliability, convergent validity, and discriminant validity for each factor. All were well above conventional cutoff values. Figure 1 presents the results of structure equation modeling for the present 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. *System Availability* and *Privacy*, however, do not have significant impact on overall Web site service quality.

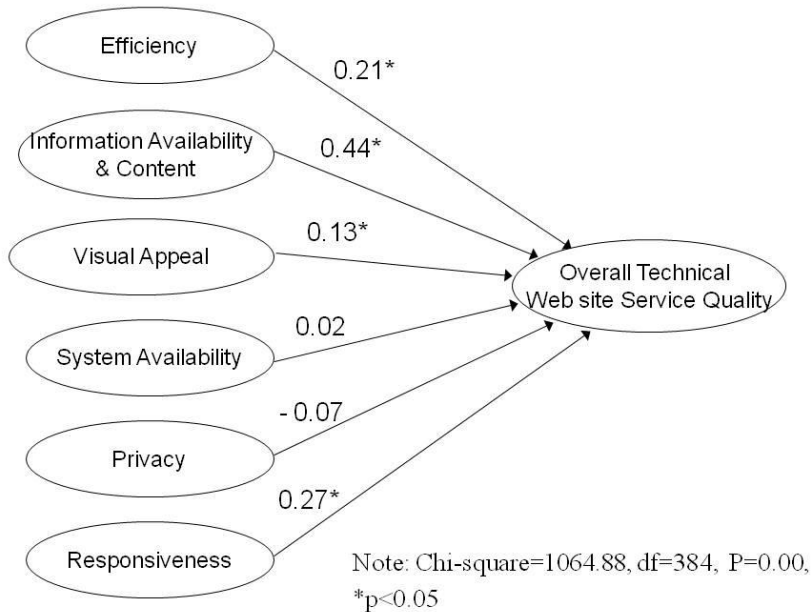


Figure 1. Standardized Coefficients for the Structural Model

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

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 where 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 between the 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.

The results of this exploratory study show that the influencing factors in determining service quality of a technical support Web site are not totally identical to those influencing transaction-based Web sites.

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

The findings suggest that the existing e-service quality scale which is based on online shopping may not be applicable to technical support Web sites. Whether there are other factors that may affect service quality for technical supported Web sites warrants further investigation. Future studies may wish to develop a more comprehensive measurement of e-service quality.

The results of this study show that *Efficiency*, *Information Availability and Content*, *Visual Appeal*, and *Responsiveness* significantly influence the service quality of technical support Web sites. The main objective of technical support Web site is to provide customers with effort-saving self-service. The users of technical support Web sites, therefore, expect more 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 site so as to help users find the required information efficiently. In addition, companies may wish to use multi-media technology (e.g., animated demonstrations) to create a more user-friendly Web design and thus give customers a better user experience. Companies may also wish to implement online service technology (e.g., instant messaging) on their technical support Web site 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 finds that *Privacy* does not significantly influence the service quality of technical support Web sites. Past research on Web site service quality has been focused mainly on transaction-based Web sites on which most of the informational transactions are 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. Information security may therefore be less vital to technical support Web sites. This study also reveals that *System Availability* has 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.

APPENDIX

Determinants	Content
Efficiency	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● Information contained on the Web site is current and 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	<ul style="list-style-type: none"> ● The Web site displays a 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	<ul style="list-style-type: none"> ● Pages at this Web site do not freeze. ● The Web site is available all the time. ● The Web site does not crash.
Privacy	<ul style="list-style-type: none"> ● I feel safe in my interactions with this Web site. ● I feel like my privacy is protected at the Web site. ● Security arrangements and privacy are stated on the Web site.
Responsiveness	<ul style="list-style-type: none"> ● Automated or human e-mail responses or serving pages give customers prompt service. ● The achievable service level is stated on the 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	<ul style="list-style-type: none"> ● 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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