



AN EXPLORATION OF ANTECEDENTS OF WEBSITE OPERATIONAL EFFECTIVENESS

Yuan-shuh Lii, Assistant Professor
Department of International Trade,
College of Business
Feng Chia University
100 Wenhwa Rd, Seatwen, Taichung, Taiwan
Telephone: (886) 4-2451-7250 ext. 4273
yslii@fcu.edu.tw

Abstract

This paper presents the results of empirical research that studied the impact of several factors on website operational effectiveness. Eighteen operational variables were identified and tested for their relations with four indicators of website effectiveness: the number of visitors, repeat visits, average time spent on the site, and visitor-to-purchaser ratio. The relative importance of these variables was then examined to uncover factors crucial for a website's operational effectiveness. The results indicate that the websites that were more secure, more frequently updated, down less, prompt in responding to online inquiries and offered more relevant information and different types of information are more likely to attract the greatest number of new and repeat visitors. These visitors stay longer and are more likely to complete a purchase. Multivariate analyses indicate that website content, entertainment, design awards, and third-party certification are important determinants of each indicator of website effectiveness.

An Exploration of Antecedents of Website Operational Effectiveness

Introduction

The growth of the Internet and the World Wide Web are phenomenal; still, only a small fraction of the power of the Internet has been harnessed. In order to maximize its true potential, companies must devise a sound Internet strategy and incorporate it into their long-range plan (Basch, 2000; Hoffman, Novak, & Chatterjee, 1995).

Despite the enormous business potential presented by the Web, companies connected through the Internet have realized only limited success (Preston, 1999). Many experts attribute this shortcoming to the inability of firms to understand the medium and their resulting inability to use it to their greatest advantage (Preston, 1999; Stuck, 1996; Fortune, 1996). The Web has transformed the buyer-seller relationship by tipping the scale in favor of consumers. Interactive

technology gives marketers a cost-effective way of attracting consumers into one-to-one relationships fueled by two-way communication. The interactive feature of the technology puts the consumer in control (Korgaonkar & Wolin, 1999). In order to take full advantage of an e-commerce medium such as the Web, firms must first see this market as an interactive, multimedia environment, where “many-to-many” communication occurs, something that is dramatically different from the traditional “one-to-many” communication model. Practitioners and researchers must pay more careful attention to the needs of Web users in order to explore the potential of this new and different channel (Korgaonkar & Wolin, 1999).

Although the field of e-commerce is not a new one, there is a lack of statistical data or empirical research by academicians and business researchers (Huizingh, 2002; Nagendra, 2000; Bloch, Pigneur, & Segev, 1996). The objective of this study is to perform empirical research on the effect of several Web operational variables on website effectiveness, first by evaluating the relevance of antecedents for website effectiveness and then by investigating the relative importance of the many possible antecedents in order to identify the variables that are crucial for the website’s operational effectiveness.

Literature Review

The Web has introduced a set of tools that has the power to revolutionize marketing (Deighton, 1996). With the introduction of the Web and the emergence of e-commerce, the marketing community is experiencing enormous innovation. The driving force of changes in marketing practice in this e-commerce era is the shift from broadcast marketing to interactive marketing. The old paradigms of mass-marketing strategy should be reconsidered and modified in the new interactive environment.

As information technology continually improves cost performance, firms are increasingly motivated to coordinate their activities electronically (Basch, 2000; Wilder, Caldwell, & Dalton, 1997). By using cheap, coordinative transactions, interconnected networks and easily accessible databases, firms will realize significant cost savings (Gantz, 1998; Wigand & Benjamin, 1997). The use of an e-commerce channel such as the Web makes possible a faster response to the needs of the marketplace (Horowitz, 1996). The result of this speedier response to customer demand, along with lower costs of supply chain inventory, has meant a tremendous increase in profitability for industry (Shaw, 1998). The advantages of online commerce over traditional commerce can be seen in greater speed and efficiency, lower processing costs, lower distribution costs and the ability to deal directly with customers. The cost savings in the travel and insurance industries are well documented in industry publications (Keegan, 1998; Mott, 1997).

With respect to the operational aspects on the Web, website design and implementation issues are key determinants of a company’s online effectiveness (Huizingh, 2002; Morris-Lee, 2000). Design factors such as the website’s content, attractiveness, ease of use, interactivity and site maintenance have direct influence on the process that consumers go through in an information search. Site customization and online communities enhance companies’ online communication efforts. Online security has a direct bearing on consumers’ perception about a site’s safety; this perception determines the utility factor. The dependent variable (website operational effectiveness) will be discussed first, then, hypotheses will be formulated for each of the antecedents based on the literature.

Antecedents of Website Operational Effectiveness

While there is still no industry standard for measuring the effectiveness of content on the Web, Dreze and Zufryden (1997) sought methods of evaluating the effectiveness of promotional content on the Web. They found that the number of pages accessed, the number of hits and the time spent were very useful and relevant measures of effectiveness. The amount of Web traffic should influence not only online sales (if a firm accepts online orders) but also the overall revenue of firms that still accepting orders in person, by mail or over the phone.

Higher hit-rates on the Web give companies a chance to capture greater amounts of customer information; with the appropriate treatment of this information, they can increase sales potential. The websites that have the most repeat visitors have higher probabilities of visitors purchasing through the website. The companies that have the most repeat visitors have the greatest chances of maintaining on-going relationships with those customers; this likewise translates into higher probability of purchases. Based on the previous research, we use the number of visitors, repeat visits, the average time spent, and visitor-to-purchaser ratio as surrogates for measuring website effectiveness.

Web Site Operational Factors

Since companies are investing heavily in website design and implementation, they should understand which Web operational factors have the largest impact on the success of their website. Previous researchers have cited several antecedents of Web operational effectiveness: content, attractiveness, ease of use, customization, interactivity, online community involvement, security, and maintenance level.

Website content

In the early stages of Web development, company websites served as repositories for stale, static corporate publications and little else; now, the Internet offers a vital channel for customer service and communication (Talley, Fletcher-McDonald, Mitchell, & Dugan, 1999). For many companies, Internet usage is limited to the corporate website, a very uninteresting and largely unread entity. This type of website adds little value to the enterprise. The enterprises that use the Web as a transaction generator and an interactive communication medium make the best use of the Web. In order to produce the best result, industries need to tailor their content on the Web (Kirsner, 1999; Waite & Harrison, 2002). For example, banks should offer account information and online bill payment; airlines might incorporate functions that handle frequent flier inquiries and mileage statements; manufacturers could provide order and shipping status.

The computer manufacturer Dell uses its corporate website to let customers track orders and retrieve 45,000 pages of service information. Business customers have access to password-controlled areas inside Dell's site, where they can display their uniquely configured products, review recent purchases, or electronically page Dell sales representatives (Thurm, 1998). Corporate websites can be used for a variety of tasks, ranging from providing company information, promotional materials, to processing online sales (Klein, 1998).

H1: The type of website content has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor-to-purchaser ratio.

H2: The relevance of content information has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor-to-purchaser ratio.

Website attractiveness

Kim, Shaw, and Schneider (2003) state that an appealing website design is a critical factor in the success of corporations with an e-commerce strategy. Quality websites show industry-specific context and information presentation which understand customers, products, and service delivery in their Web design (Gurley, 1998). Entertainment can also generate traffic (Eighmey & McCord, 1998). The users of Internet bulletin boards have rated recreation and entertainment as their primary motivations for using the Web.

Palmer and Griffith (1998) maintain that the multimedia, interactive format must be superior to the text and graphics of printed sales brochures and catalogs. Attractive website design, multimedia experience, and entertainment features all attract visitors to a website (Raney, Arpan, Pashupati, & Brill, 2003). Menon and Kahn (2002) found that if consumers are exposed to pleasing websites, they are then more likely to have higher purchase intentions. In addition, a website with playful appeal is more likely to strengthen visitors' shopping preferences and the likelihood of future patronage (Mathwick, Malhotra, & Rigdon, 2001).

H3: Page layout has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor-to-purchaser ratio.

H4: Multimedia experience has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor-to-purchaser ratio.

H5: Entertainment experience has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor-to-purchaser ratio.

H6: Design award has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor-to-purchaser ratio.

Ease of Use

When visitors find a website difficult to navigate and to search for information, they tend to abandon it for others (Huizingh & Hoekstra, 2003). Companies must ensure that the navigation throughout their websites is intuitive and straightforward. In their study, Huizingh and Hoekstra

(2003) found that ease of use is one of the most important predictors of consumers' attitudinal changes. Unfortunately there is often no one on staff at many companies who focuses on ease of use or makes the user experience a priority (Kalin, 1999).

More e-commerce sites are making ease of use a differentiator. The investment firm Schwab set up its usability lab in 1995 to test the ease of use of its desktop software products for the Web. Schwab invests heavily each year to improve the usability of its website. According to NetSmart Research, 83 percent of Web surfers are frustrated with navigation, and Forrester Research estimated that two-thirds of all e-shoppers abandon their shopping carts before checkout (Lidsky, 1999). Childers, Carr, Peck and Carson (2001) found that navigation is one of the most important predictors of online shopping attitudes.

H7: Site navigation has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor-to-purchaser ratio.

H8: Key word search has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor-to-purchaser ratio.

H9: Search directory has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor-to-purchaser ratio.

Customization

One of the most powerful properties of the Web is the ability to customize sites to suit individual users (Koprowski, 1998). Successful online businesses have implemented technologies that allow them to tailor the shopping experience of individual customers (Hodges, 1997). These innovators simplify product searches, or profile an individual's buying preferences in order to offer precise user-specific information. These sites should eventually draw larger audiences.

Information that is customized to each consumer's taste will attract more visitors to the website (Bucklin & Sismeiro, 2003; Ansari & Mela, 2003; Srinivasan, Anderson, & Ponnnavolu, 2002; McGaughey & Mason, 1998). Large firms have broader customer bases, with diverse requirements; through website customization, customers can access the specific information they require (Quelch & Klein, 1996). The customization capability of websites will serve as an important differentiating factor.

H10: Site personalization has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor-to-purchaser ratio.

Interactivity

The interactive medium enables greater on-going dialogue, which in turn increases the benefits of loyalty for the customer and decreases the marketer's costs of retention (Raney et al., 2003; Klein, 1998; Earley, 1997). A study by Ghose and Dou (1998) showed that higher interactivity on the website results in more repeat visits. They also found that the greater the degree of interactivity, the more likely it is for the website to be considered "a top site."

Not only it should be possible for the visitor to easily navigate the site and to buy at any stage or on any page, a quick response time to online inquiry would help to maximize the chances that prospects who do not order on one visit will order in a future visit (Saunders & Brown, 2001). Successful websites acknowledge that the Web's interactive nature and quick response brings together people with similar interests within virtual communities where they can interact whenever they wish (Hodges, 1997). The most popular websites walk a customer through the selection of a product, in what is known as "considered purchases." Dell has a system configurator; automotive sites offer decision guides. A few clothing stores let a customer virtually try on clothes. These are excellent examples of the cutting edge interactive features on the Web.

H11: Level of interactivity on information has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor- to- purchaser ratio.

H12: Response time to online inquiries has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor -to-purchaser ratio.

Community

Business websites gain an advantage by fostering a sense of community among their visitors (Hodges, 1997). Establishing this sense of community keeps visitors coming back to the site (Hardy, 1998). Given the Internet's ability to foster real-time, bilateral and multilateral communication and interaction, the "chat rooms" have all of the right ingredients to become exceedingly popular (Peterson, Balasubramanian, & Bronnenberg, 1997). These "chat rooms" stimulate debate and gather, at a rapid pace, people with shared interests. According to Sivadas, Grewall, and Kellaris (1998), advancements in information technology have enabled marketers to target and satisfy narrower market segments. Marketers now have an easier time building relationships with these narrow segments of customers on the Web by grouping them into interest groups. Also, people who discover people themselves in these cyberspaces are much more likely to return to the site that sponsors the meeting space.

H13: A company's involvement in community has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor- to- purchaser ratio.

Security.

Several factors have prevented e-commerce from fully blossoming on the Web; the most apparent is the lack of trust and the insecurity of making or receiving payment over the Internet (CommerceNet Research Report, 1998; Bush, Bush & Harris, 1998; Cockburn & Wilson, 1998). For consumers, the threat to the security of their financial information as it is transmitted over the Internet is the greatest concern (Phelan, 1996). The questions of credit card security and consumer privacy must be answered before the potential of the Web can be maximized (Margherio, Henry, Cooke, & Montes, 1998; Furger, 1998). In addition to security issues, the protection of personal information concerns online consumers (Yang, Ahmed, Ghingold, Boon, Mei, & Hwa, 2003; Hoy & Phelps, 2003). A San Francisco-based, non-profit group known as TRUSTe has been gaining acceptance as a third-party auditing service that periodically checks participating sites for compliance with their own privacy policies (Wingfield, 1998). BBBOnline and Verisign are other third-party organizations that test the trustworthiness of websites.

H14: Type of security measure has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor –to- purchaser ratio.

H15: Third-party certification has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor- to- purchaser ratio.

Web Maintenance.

The refresh frequency of a site is one of the most important influences upon a website's traffic. Customers will return to a site more often if they know they will find something new on each visit (Chain Store Age, 1997). The interactive community is very time-sensitive; content must be updated constantly for customers to return to the site (Rowsom, 1998; Lee & Dea, 1997). Changing a website often is directly linked to customer retention and ultimately increasing customer lifetime value. An outdated website can actually damage a firm's image (Andrews & Trites, 1997). Balancing timeless information with regular updates could be a powerful means of disseminating information and maintaining interest. Dell's website updates its key suppliers on sales and inventory as often as every hour (Thurm, 1998).

H16: Site design update has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor- to- purchaser ratio.

H17: Content update has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor- to- purchaser ratio.

H18: Server downtime has a positive effect on the operational effectiveness of a website which includes (a) number of visitors, (b) repeat visits, (c) average time spent per visit, and (d) visitor- to- purchaser ratio.

Method

A self-administered structured questionnaire was developed to collect quantitative data pertaining to the different aspects of Web operation and website effectiveness. The sample group consisted of 178 U.S. manufacturers of physical products. Internet companies such as service or content providers, mall operators, or search agents were excluded from this study. The targets of this research were the heads of marketing at selected manufacturing companies with websites. Each manufacturing company was one sampling unit. Some companies chosen were subsidiaries of large conglomerates. Manufacturers of both consumer and industrial products were included.

An online survey questionnaire and follow-up phone calls were used to collect the data. The questionnaire that was sent to company marketing heads was pre-tested to increase the reliability by minimizing potential variation caused by errors in interpretation. The survey questionnaires were distributed online, because the Web is regarded as one of the most effective research media (Shaughnessy & Zechmeister, 1997). The advantages of using an online survey are free contact, fast access and easy follow-up if there is no response on the first attempt. The drawbacks of this method are a high non-response rate and some incomplete survey returns. In order to increase the response rate, the results of this research were offered to marketing professionals who responded to the survey. Before sending out this questionnaire to the full target group, a smaller set of organizations was selected to pre-test the survey form.

In the second phase of data collection, the website evaluation survey questionnaires were distributed to the panel, who then rated the designated websites. A panel of twenty students was chosen to evaluate the designated websites. Each panelist had to have at least two years of college education and/or three years of Web search experience. Online product interest and online purchase experience were each considered a plus. Once selected to participate in the panel, each panel member attended a short instruction session. During this session, the same examples of good and bad websites were shared. The design, search functions, ease of use, personalization and interactivity characteristics of websites were demonstrated. More specifically, the panel members were asked to consider use of white space, use of color, font style and size, and balance of text and graphics in evaluating page layout. Regarding the evaluation of navigation around the website, panel members were asked to count the number of clicks or pages it took to find desired information. This measure was taken to ensure that the panel members based their evaluation on the same criteria, which helped reduce the variability in evaluations of the websites.

The list of website addresses and the survey form were provided to panelists for data collection. The questions that were not covered by company survey or the panel, such as those regarding industry, company size, and average response time to inquiries, were collected by gathering publicly available data on the Internet and from other sources. All variables used in this study and their measurement are described in the Appendix. Multi-item scales on the basis of interviews with professionals and a review of literature were generated to measure variables.

Analysis and Results

Descriptive Statistics

Among the companies surveyed, 83 companies were international and 95 were national or local companies. In terms of industry, 140 were consumer-type companies and 38 were industrial-type companies. The consumer product companies represented manufacturers of toys, games, athletic goods, shoes, bicycles and consumer electronics. The industrial companies manufactured computers, software, electronic equipment and semiconductors.

Bivariate Analysis

The bivariate analysis was employed to examine whether the importance of various website operational variables could be confirmed. Table 1 includes indicators of website effectiveness and the Pearson correlation coefficient with each of the 18 variables.

Number of Visitors

Most correlation coefficients were significant for the number of Web visitors (with $p < 0.05$). The strongest correlation was found with design award, type of security, sever downtimes, relevance of information, type of content, and response time. Other significant correlations involved content update, personalization, site design update, page layout, third-party certification, entertainment, multimedia, keyword search, and level of interactivity. The insignificant correlations included two categories: ease of use (site navigation and search directory) and community (company involvement).

Table 1

	Number of visitors	Repeat visit	Average time spent	Visitor to purchaser ratio
Content				
Type of content	.506**	.280**	.488**	.200**
Relevance of info.	.514**	.294**	.393**	.147*
Attractiveness				
Page layout	.269**	.127*	.218**	.059
Multimedia	.203**	.014	.204**	.001
Entertainment	.222**	.029	.193**	-.021
Design award	.726**	.117	.366**	.213**
Ease of use				
Site navigation	.071	.118	.137*	.084
Keyword search	.166*	.110	.205**	-.07
Search directory	.116	.036	.113	.152*
Customization				
Personalization	.339**	.073	.122	.085
Interactivity				
Level of interactivity	.139*	.104	.156*	.064
Response time	-.502**	-.225**	-.413**	-.148*
Community				
Company Involvement	-.037	-.024	-.037	.111
Security				
Type of security	.534**	.257**	.456**	.170*
Third-party certification	.267**	.027	.049	.123
Maintenance				
Site design update	-.276**	-.026	-.252**	-.104
Content update	-.442**	-.221**	-.411**	-.211**
Server downtimes	-.515**	-.273**	-.479**	-.161*

Notes: *One-tailed significance: $p < .05$; ** $p < .01$

Repeat Visit

For the repeat visit, seven correlation coefficients were significant (with $p < 0.05$). The significant correlations include content (type of content, relevance of information), maintenance (server downtimes, content update), security (type of security), interactivity (response time), and attractiveness (page layout). The strongest correlations were found with relevance of information, type of content, server downtimes, and type of security. The insignificant correlations included groups of ease of use, customization, and community. Other insignificant correlations of variables were multimedia, entertainment, design award, level of interactivity, third-party certification, and site design update.

Average Time Spent

Table 1 reveals that most website operational variables were significant (with $p < 0.05$). The strongest correlations were found to be type of content, server downtimes, type of security, response time, content update, relevance of information, and design award. Variables that were found to be insignificant included search directory, personalization, company involvement, and third-party certification.

Visitor-to-Purchaser Ratio

For the visitor-to-purchaser ratio, eight correlations were significant (with $p < 0.05$). The significant correlations included type of content, relevance of information, design award, search directory, response time, type of security, content update, and server downtimes. Two groups of antecedents that were found to be insignificant included customization and community.

Multivariate Analysis

The goal of multivariate analysis is to determine the relative importance of the website operational variables and to uncover the most important determinants of website operational effectiveness. Ordinary least squares were used to estimate the four regression equations. Table 2 contains the results of the multivariate analysis for the four indicators of website operational effectiveness.

Number of Visitors

The adjusted R^2 is .69, and the corresponding F-value indicates that it is highly significant. Three variables are significant in the regression equation of the number of visitors. The most important variable is design award. This variable has a strong positive influence on the number of visitors. The more design awards the site has won, the more visitors it attracts. The other significant variables are third-party certification and entertainment experience. They all have a positive impact on the number of visitors.

Table 2

	Number of visitors			Repeat visit		Average time spent			Visitor-to-purchaser ratio			
	Beta	Tol.		Beta	Tol.	Beta	Tol.		Beta	Tol.		
Content												
Type of content	-.058	.575	.185	.094	.589	.185	.369	.014*	.185	.252	.138	.185
Relevance of info.	.050	.594	.227	.118	.450	.227	.271	.045*	.227	-.08	.601	.227
Attractiveness												
Page layout	.072	.299	.412	-.021	.854	.412	-.09	.366	.412	-.081	.478	.412
Multimedia	-.079	.205	.505	-.064	.540	.505	.05	.579	.505	-.076	.456	.505
Entertainment	.158	.008**	.555	.010	.919	.555	.124	.15	.555	-.075	.441	.555
Design award	.586	.000**	.706	.008	.931	.706	.205	.008**	.706	.202	.021*	.706
Ease of use												
Site navigation	-.077	.202	.542	.055	.589	.542	.011	.897	.542	.055	.582	.542
Keyword search	-.003	.951	.780	-.045	.595	.780	.049	.505	.780	.205	.015*	.780
Search directory	.077	.125	.765	-.047	.578	.765	-.001	.992	.765	.140	.092	.765
Customization												
Personalization	.081	.095	.839	.006	.937	.839	-.06	.395	.839	-.012	.884	.839
Interactivity												
Level of interactivity	-.061	.352	.462	.044	.69	.462	.013	.891	.462	.062	.566	.462
Response time	-.095	.128	.501	-.024	.822	.501	-.089	.324	.501	.021	.835	.501
Community												
Company Involvement	-.074	.119	.873	-.029	.712	.873	-.063	.361	.873	.11	.16	.873
Security												
Type of security	.155	.099	.225	.025	.873	.225	.109	.420	.225	-.064	.676	.225
Third-party certification	.155	.002**	.837	-.048	.557	.837	-.087	.212	.837	.105	.188	.837
Maintenance												
Site design update	.09	.112	.385	.154	.107	.385	.072	.376	.385	.054	.561	.385
Content update	-.107	.134	.616	-.102	.107	.616	-.118	.255	.616	-.144	.221	.616
Server downtimes	-.02	.836	.203	-.105	.527	.203	-.138	.332	.203	.000	.999	.203
Adjusted R ²	.69			.022			.276			.062		
F and p-value				F = 1.223			F = 4.757			F = 1.894		

Notes: *One-tailed significance: $p < .05$; ** $p < .01$

Repeat Visit and Average Time Spent

The adjusted R² is .022, and the corresponding F-value indicates that it is not significant. None of the variables in the regression equation could explain the variation of the repeat visits. The regression equation for the average time spent contains three significant antecedents. The two most important antecedents are the type of content and the relevance of information. Both of them have a positive influence on the average time visitors spent on the site. The more types of content on the site, the longer the visitors stay, and sites that offer more relevant information also tend to keep visitors longer. The third significant antecedent is the design award. This variable has a positive effect on the average time spent of visitors. The adjusted R² is .276, and the corresponding F-value indicates that it is highly significant.

Visitor-to-Purchaser Ratio

The adjusted R^2 is .163, and the corresponding F-value indicates that it is significant at $p < .05$. Only two variables are significant in the regression equation of the visitor- to- purchaser ratio. The most important variable is the design award. This variable has a strong positive influence on the number of visitors. The more design awards the site has won, the more visitors purchase products or services from the site. The other significant variable is keyword search. The availability of a keyword search function has a positive impact on the visitor-to-purchaser ratio.

Discussion and Conclusion

While there has been a great deal of discussion about e-commerce, there is a dearth of empirical research with quantitative analysis. This empirical research examined the Web operational factors that influence website effectiveness.

Previous research identified a total of 18 antecedents as important factors for website effectiveness. Six of them are indeed related to all four indicators of website effectiveness. These variables are type of content, relevance of information, response time, type of security, content update, and server downtimes. These results show that the websites that are more secure, more frequently updated, down less, faster to respond to online inquiries, and that contain more relevant information, attract more first-time and repeat visitors. These visitors stay longer and are more likely to purchase products.

More visitors come to sites that have enhanced features such as better page layout, multimedia and entertainment capabilities and website design awards. In addition, visitors spend more time on these websites. However, these features are not necessary to encourage repeat visits and to entice visitors to make purchases.

Ease of use does not play a significant role in website effectiveness. An organized search directory, however, does encourage visitors to purchase. In general, visitors do not care about personalization capabilities. This may be because visitors are more concerned with their privacy and security.

The results of the multivariate analysis indicate that entertainment, design awards, and third-party certification are important determinants of the number of visitors. The most important variable is design award, followed by entertainment and third-party certification.

The type of content, relevance of information, and design awards influence the average amount of time that visitors spent on the site. The most important factor is type of content, followed by relevance of information and design award. Design award and keyword search have positive effects on the visitor-to-purchaser ratio. The two most important factors are design award and keyword search. The results showed that the website operational variables considered in this study are not uncorrelated. The relatively low tolerance levels in Table 2 indicate that there is considerable correlation among the website operational variables. Consequently, no general claims can be made with respect to the importance of a particular website operational variable.

The findings of this research have both managerial and research implications. From a managerial perspective, marketing professionals or e-commerce strategists in both consumer and industrial companies can use the results of this study to determine the right Internet strategy for their company. This study gives some strong indicators of how to configure websites. All the findings from this study will allow organizations to make wiser decisions about marketing through the Web and expanding e-commerce. It will also answer some of the questions that academicians have posed about the new Web-based marketing paradigm.

In summary, companies could maximize their marketing productivity on the Internet by concentrating on the following operational activities: (1) making the website more secure, (2) frequently updating the website information, (3) reducing website down time, (4) responding to online inquiries faster, (5) providing more relevant information on the website, and (6) making the experience on the Web enjoyable.

There are some limitations of this research that should be considered when interpreting and applying its findings. This study only explored the direct effects of website operational variables on website effectiveness, further research can focus on possible indirect and interaction effects. For example, it is possible that companies producing industrial products or high involvement products may require different website configurations and hence have different operational variables .

Although this research has examined both industrial and consumer companies, the representation of each industry segment was limited. Therefore the generalization of key findings from this research to broader industry segments is not recommended. In future research, clear distinctions between industry types could be studied following the method used in this research.

Appendix

Measurement of Variables

Website content

- ***Type of content on the Web site/completeness.*** Corporate or company content, product content, promotion content, service content, transactional content (Check all the categories that apply).
- ***Relevance of information.*** The information provided by the Web site with respect to visitor's information needs (4-point itemized rating scale from not relevant to very relevant).

Website attractiveness

- ***Page layout/organization.*** Balance of text, graphics, white space, color and design (5-point itemized rating scale from poor to excellent).
- ***Multimedia experience.*** Does the site use sounds and video effectively (5-point itemized rating scale from poor to excellent).

- **Entertainment experience.** Does the site provide fun games or entertainment (5-point itemized rating scale from poor to excellent).
- **Design awards.** Has your company's Web site won any award(s) for Web site design (Yes or No).

Website ease of use

- **Site navigation.** How easy is the overall navigation around the website (5-point itemized rating scale from very difficult to very easy).
- **Key word search.** Does the site provide key word search function (Yes or No).
- **Search directory.** Does the site provide good directory for site navigation (Yes or No).

Website customization

- **Personalization.** Does the Web site offer site personalization tool (Yes or No).

Website interactivity

- **Level of interactivity on information.** How interactive is the Web site (i.e. is the content static or dynamic) (5-point itemized rating scale from not interactive to very interactive).
- **Response time to online inquiry.** Average response time to online inquiry (5-point itemized rating scale from not interactive to very interactive).

Online community involvement

- **Company's involvement in community.** Which of the following statements best describes your company's involvement with online communities on its your Web site? (4 categories of statements reflecting company involvement).

Website security

- **Type of security measures.** What type of Web security measures does your company/division have in place? (7 categories of different security measures – Check all the categories that apply).
- **Third-party certification.** Is your company's Web site certified by an independent privacy auditing organization such as TRUSTe or BBBonline? (Yes or No).

Website maintenance level

- **Site design update.** On average, how often do you update the look and feel of your company's Web site? (6 categories from daily to once a year or greater).
- **Content update.** On average, how often do you update the content of your company's Web site? (6 categories from daily to once a year or greater).
- **Server downtimes.** What is the average number of server downtimes per year? (6 categories from 0 to >12).

Web operational effectiveness

- **Unique visitors.** How many unique visitors visit your company's Web site per day? (# of Web site unique visitors).
- **Repeat visits.** Approximately what % of your company's Web site visitors during a week are repeat visitors? (% of repeat visitors during a week).
- **Average time spent per visit.** On average, how much time does a visitor spend during a visit to your company's web site? (Average time spent per visit).
- **Visitor to purchaser ratio.** Approximately what % of the visitors to your company's Web site actually purchase products online? (% of visitors who actually purchase).

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