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Abstract

Though there is an astounding increase in the amount of business being conducted online, online merchants face a number of problems in generating online sales. Our study extends the prior research on business-to-consumer e-commerce by specifically examining the impact of eleven variables representing the content and design of web sites. By understanding the nature and impact of content and design of web sites, we hope to address some of the current concerns of online merchants and provide them with specific guidelines on their web site management. Based on an analysis of 94 web sites, we identified four variables as being significantly influencing online sales. While provision of decision-making aids and frequent updates to web site have a positive influence on the sales, complexity of navigation structure and heavy use of multimedia have a negative impact. The implications of the results and scope for future research work are presented.

Keywords: Electronic commerce, web site design, online sales.

Introduction

Business press is filled with reports and predictions about the increase in online revenues of various firms. For instance, the Census Bureau of the Department of Commerce (United States Department of Commerce 2001) reported an increase of over 67% in retail e-commerce sales in the fourth quarter of 2000. An estimate by *Giga Information Group* (2000) predicts online sales to grow from $25 billion in 1999, to $152 billion in 2002 and further to $233 billion in 2004. Another report *by Forrester Research* (http://www.forrester.com) estimates the worldwide net commerce to hit $6.8 trillion by the year 2004. It has also been said that online sales could account for as much as 10 % of total US retail sales by 2003 (Calkins et al. 2000).

In order to take advantage of the enormous business growth opportunities offered by the Internet, many traditional brick-and-mortar firms as well as pure Internet players are evaluating different ways to succeed in their online initiatives. However, despite the gains and the firms' enthusiasm over e-commerce, online sales still represent only a fraction of total retail sales (Greenbern 2000). Surveys have pointed out significant hurdles in luring consumers to make online purchases. For example, a study by *Creative Good Inc* (Verton 2000) found that 43% of online purchase attempts failed because consumers either had trouble finding products in the firm's web site, or the electronic checkout process made the purchase too difficult to complete. Moreover, in another survey conducted by AT Kearney (Calkins et al. 2000), 52% of survey respondents reported that they did not complete an online purchase due to the huge amount of information they were asked to provide. In addition, it was found that four of five consumers abandon attempts to purchase products online due to poor web site design and functionality.

Prior research studies in this area have focused on factors that influence electronic exchange (Swaminathan et al. 1999), the role of the web as an effective marketing and distribution channel (Hoffman et al. 1995), the value created on the web sites from a customer's perspective (Ho 1997), web site quality (Loiacono and Taylor 1997; Strong et al. 1997; Wang and Strong 1996), and reactions of consumers to electronic shopping (Jarvenpaa and Tood 1996). Though the problems in luring consumers to make online purchases is well acknowledged, only limited empirical research has tried to address this issue. There are no empirically grounded prescriptions available for online merchants to guide them in their efforts to improve their online sales. Addressing this

gap, the purpose of this research is (i) to investigate whether the content and design of a web site influence a firm's online business performance, and (ii) to understand and examine the nature and extent of their influence.

Our study extends the prior research on business-to-consumer e-commerce by specifically examining two important constructs that influence the online business performance. By understanding the nature and impact of content and design of web sites, we hope to address some of the current concerns of online merchants and provide them with specific guidelines on their web site management. We first draw on existing literature to define the two basic constructs – content and design of web site, that are the focal points of this study. Then, we operationally define these constructs in larger detail. This is followed by the research model and hypotheses. Next, we present the research design, data collection, analysis and the results of the study. Finally, we discuss the results along with implications for research and practice.

Literature Review

According to a study by Forrester Research (Tedeschi 2000), two-thirds of Web shoppers abandoned their "shopping carts" before they made an online purchase. In order to improve online revenues, there is an imminent need to understand the factors that influence online purchases and find out ways to tackle these factors. Among the various factors, content and design of web site (Huizingh 2000; Ranganathan and Ganapathy 2001; Calkins 2000) have been repeatedly mentioned as being important in impacting the decision process of consumers to make an online purchase.

Huizingh (2000) as well as Ranganathan and Ganapathy (2001), refer to content as the information, features or services offered on a web site. The former considers information, transaction, entertainment, and number of features in the web site as the main features of content. The latter, on the other hand, considers information and availability of decision-making aids as the major variables that define content. The quality of information content on a web site is reflected by the extent of available information about a firm, its products and services and mechanisms through which a surfer can make contacts with a firm representative.

Prior studies on web site management have highlighted the importance of web site content. For example, Chase (1996) stated that "content is king on the Net." He pointed out that content is typically why surfers are out there in the first place. In addition, the content of a website has been said to be a critical success factor for retailers who want to become online retailers (Calkins et al. 2000). In their study, Calkins et al. (2000), argued that content can increase both the rate at which browsers are converted into buyers and their transactions. This increase, in turn, is expected to positively increment firms' online sales as well. However, no previous research has attempted to empirically prove this assertion.

Another important dimension of a web site is the design. Design refers to the way in which the content of the web site is presented to the customers (Huizingh 2000; Ranganathan and Ganapathy 2001). The design of a website has been studied in diverse contexts. For instance, Wan (2000) studied features of website design and place them in a matrix of business functions versus customer values. Huizingh (2000) conducted an empirical research of a sample extracted from Yahoo and Dutch Yellow Pages directories to find out what design characteristics of a web site predominated in a group of 651 websites. He considered six characteristics in web design: navigation structure, search function, protected content, quality of the structure, image, and presentation style. However, he did not find significant differences in design among the web sites studied.

Further, attempts to evaluate the design quality of a website have also been made. Liu and Arnett (1998) established a framework to appraise and evaluate the design quality of an electronic marketplace on the Web. The framework proposed information quality, learning capability, playfulness, system quality, system use, and service quality as factors that are related to well designed web pages. In a more recent study, Liu and Arnett (2000) tested the previous factors on 698 websites extracted from *Fortune 1000* companies. Although the response rate was rather low (18%), they found interesting results. IS success was influenced by the following: quality of information and service, system use, playfulness, and system design quality.

In this study, we examine the nature and extent of impact of various content and design variables pertaining to web sites on the online revenues derived through the web site. Our investigation falls in line with similar inquiries made by Lohse and Spiller (1998, 1999). In their first study (1998), Lohse and Spiller described attributes that influence store traffic and sales using six different categories: merchandise, promotion, service, convenience, checkout, and store navigation. Based on previous research, they came across with appealing web design attributes, such as search functions, site maps, frequently asked questions, and number of products. In their subsequent study (1999) they used regression models to identify web site features that impact store traffic and sales. They defined store traffic as the number of visits to the web site by month. Sales, on the other hand, were defined as the monthly total sales. They found, among others results, that featuring a FAQ section in the store was associated with more traffic; improving product list had a tremendous effect on sales; and providing a feedback section for the customers was associated with lower traffic and higher sales. Even though, this research was well conducted and the findings were

appealing, it had some drawbacks. First, it considered firm's monthly sales as one of the dependent variables. However, these monthly sales included on and off-line revenues, preventing us to know what is the real effect on online sales. Second, the study was limited to only 28 online retail stores which represent a very small sample. As stated by the authors, this sample size limits the overall confidence in the parameter estimates as well as increases the probability of type II error. Finally, the sample was not random nor a systematic sample since it was contingent upon the availability of data from a cybermall. In another related study, Ranganathan and Ganapathy (2001) studied web sites features that impact purchase intent of consumers. They found that web site content, design, security, and privacy were the main characteristics of a B2C web sites as perceived by online consumers. Building on prior research, we focus our study on determining how content and design variables influence a firm's online revenues.

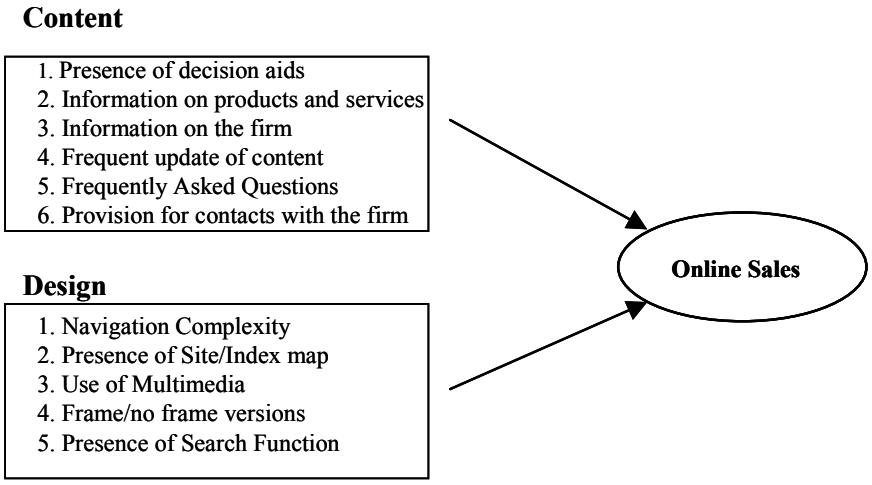

Figure 1. Research Model

Research Model and Hypotheses

The research model for this study is shown in Figure 1. Description of the variables representing the content and design dimensions of the web site, along with relevant references from prior research studies is shown in Table 1 and Table 2.

Based on prior research studies, we propose eleven hypotheses linking the eleven content and design variables to the online sales generated by the web site. We expect the high use of multimedia and navigation complexity to be negatively associated with the online revenues. All the other variables are hypothesized to have positive associations with online revenues. The hypotheses are listed in Table 3.

Table 1. Variables Describing CONTENT of a Web Site

Variable	Description	Source
1. Presence of Decision Aids	Does the firm's web site provide help for decision-making? For example, product comparison or, recommendations from earlier buyers	Ranganathan & Ganapathy, 2001
2. Information on products and services	Does the firm's web site provide information on the products and services?	Lohse, 1999 Liu et al., 1997
3. Information on the firm	Basic information on the company, background etc	Lohse, 1999 Liu et al., 1997
4. Frequent update of content	How often is the web site updated? Is there a "what's new" section or a section introducing new products, catalog features or news that helps in identifying updated content?	Lohse, 1999 Lohse & Spiller, 1998 Liu et al., 1997
5. Frequently Asked Questions	Does the firm's web site provide frequently asked questions section on product related questions or the company?	Lohse, 1999 Lohse & Spiller, 1998
6. Company contact information	Does the firm's web site offer any way to contact it via mail, email, phone or fax?	Lohse, 1999

Table 2. Variables Describing DESIGN Features of a Web Site

Variable	Description	Source
1. Complexity of navigation	What type of navigation structures is deployed in the web site?	Huizingh, 2000
2. Presence of Site index or help section	Does the web site provide an index or help page?	Lohse & Spiller, 1998 Nielsen, 1996
3. Use of multimedia	What type of multimedia does the web site use? Are there heavy graphics, animations, sound and video?	Ranganathan & Ganapathy, 2000 Huizingh, 2000
4. Frame/no frame versions	Does the company provide a *Text Only version* on its home page in order to maximize the site upload time for users?	Wan, 1999
5. Search function	Does the firm's web site have a search function?	Lohse & Spiller, 1998 Huizingh, 2000

Table 3. Research Hypotheses

Hypothesis	Variables	Expected Associations
CONTENT		
H1	Presence of decision aids → online sales	Positive
H2	Presence of detailed information about products and services → online sales	Positive
H3	Information about the firm → online sales	Positive
H4	Frequent update of content → online sales	Positive
H5	Presence of FAQ section → online sales	Positive
H6	Availability of company contact information → online sales	Positive
DESIGN		
H7	Navigation Complexity → online sales	Negative
H8	Presence of Site/Index map → online sales	Positive
H9	Heavy use of Multimedia → online sales	Negative
H10	Availability to choose from Frame/no frame versions → online sales	Positive
H11	Presence of Search functions → online sales	Positive

Data Collection

This study used the secondary data from *Internet 500* provided by ZDNet Interactive week *(http://www.zdnet.com/intweek).* Interactive 500 estimated data on online revenues for over 500 firms for the years 1999 and 2000. In order to define online sales, the firm uses the definition offered by the Department of Commerce: *"E-commerce sales are sales of goods and services over the Internet, an extranet, electronic data interchange or other online system. Payment may or may not be made online*" (McCormick 2000). We considered the top 200 companies identified by the Interactive Week magazine. We visited the web site of each of these companies in 2000 and collected data on all our variables. We used data coding schemes that were available from earlier studies (Lohse and Spiller 1999, Huizingh, 2000). The data-coding scheme is presented in Table 4. We eliminated all those firms whose web sites did not contain enough information required for our analysis. This resulted in a data set of 94 firms that were included in the final analysis.

Table 4. Data Coding Scheme

Variable	Data Coding
1. Presence of Decision Aids	0: no; 1: yes
2. Information on products and services	Average number of lines of information per product/service
3. Information on the firm	Number of lines containing firm information
4. Frequent update of content	Presence of "what's new" tags and sections 0: no; 1: yes
5. Frequently Asked Questions	0: no; 1: yes
6. Company contact information	Contact information – address, email and telephone; 0: no; 1:yes
7. Complexity of navigation (summation)	1: Hierarchical; 1: Tree w/return to home page; 1: Network
8. Presence of Site index or help section	0: no; 1: yes
9. Use of multimedia (summation)	1: picture; 1 animation; 1: sound; 1: video
10. Frame/no frame versions	0: no; 1: yes
11. Search function	0: no; 1: yes

Data Analysis and Results

Multiple regression was used to analyze the associations between the dependant variable and independent variables. We used the logarithm on online sales of the year 2000 as the score for our dependant variable. The scores for all the independent variables capturing the content and design features of web sites were assessed using the coding scheme indicated in Table 4. Ninety-four firms were included in our analysis. The overall R-squared statistic was 0.209 with F-value of 2.905 that was significant at 0.1% level. This implies that our independent variables explain 20% of variance in the online revenues. The results of the regressions are shown in Table 5.

Table 5. Regression Results

Variable	Standardized co-efficient
1. Presence of Decision Aids	0.21*
2. Information on products and services	-0.04
3. Information on the firm	-0.05
4. Frequent update of content	0.33**
5. Frequently Asked Questions	0.07
6. Company contact information	0.11
7. Complexity of navigation	-0.27*
8. Presence of Site index or help section	0.14
9. Heavy use of multimedia	-0.17***
10. Frame/no frame versions	0.04
11. Search function	0.08

*5% level; ** 1% level; *** 10% level

As can be seen from Table 5, we found support for four hypotheses. Of the content variables, the presence of decision aids in the web site to help consumers in their purchase process and the frequency of web site updates emerged as the most significant variables influencing online sales. None of design-related variables seem to positively influence the online sales. Rather, heavy

use of multimedia resulting in slower response times, and complex navigation structures seem to negatively influence the online revenues generated through the web site.

Table 5 also throws some interesting results. We earlier hypothesized that the extent of information provided in the web site with regards to the firm, its products and services would be positively related to the online sales. However, our regression showed an insignificant, but negative impact of information content on online revenues. This implies that online merchants should provide concise and precise information rather than loading their web sites with heaps of unnecessary information content.

Presence of FAQ section, company contact information, providing options for frame/non-frame versions, site index and help sections does not seem to affect the online revenues generated by web sites. It could be argued that these are the fundamental necessities that consumers look for when shopping on a web site. Their presence is more of a necessity; they do not play a major role in enhancing online sales.

Conclusions and Future Work

Though the problems in conducting business-to-consumer e-commerce is well recognized, there are little empirical studies that have attempted to examine the factors that influence the success of online business. We examined eleven variables representing the content and design features, based on the analysis of ninety-four web sites. The results show that firms have to focus on continuously updating their web sites and providing decision aids to facilitate online purchase process. Sites with complex navigation structures and with heavy multimedia content seem to be associated with lower online sales.

We plan to extend our analysis to identify more factors that are likely to affect online sales. Apart from content and design features, other critical factors such as trust, privacy and security etc also might have significant impact on the online purchase behavior. In future, we plan to extend our analysis with larger a data set and with additional variables that potentially impact online revenues.

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