An Empirical Review of Industry Preferences in the Design of E-Commerce Web Sites

Donald R. Moscato
Hagan School of Business, Iona College
dmoscato@iona.edu

Eric D. Moscato
Hagan School of Business, Iona College
emoscato@iona.edu

ABSTRACT

This paper discusses several theoretical factors underlying successful Web-site design based on the research literature. Factors such as navigation strategies, animation, search capability, multilingual capability, and the use of color, graphics and icons are included. After identifying the significance of these Web characteristics, the paper reports on the results of an empirical study on Web-site design characteristics based on over 400 e-commerce Web sites that included six industry classifications. While some companies utilize traditional Web-site design approaches, others relied on different
factors in their design.

INTRODUCTION

Ever since businesses discovered e-commerce on the Web as a viable option to generate revenue, the debate over good design principles of Web-sites has flourished. Treatises have been written on every conceivable aspect of Web-site design. Both academics and practitioners have contributed to this discussion. Consulting companies specialize in Web-site design and university courses are taught at all levels to contribute to the development of future Web designers. The eventual goal of the design of a Web-site should be tied to the purposes of the organization. Also, at some point in the assessment of a Web-site's design, there should be an evaluation of its overall effectiveness in achieving the organization's goals. In this research paper, the authors will review several theoretical aspects of good Web-site design as discussed in the literature. This part of the paper constitutes the normative approach to the topic. The second part of the paper presents a review of actual Web design features as depicted in over 400 e-commerce Web-sites across several different industries. The goal of this paper is to review several different industries, itemize the design characteristics, tabulate the differences and comment on the results.

THEORETICAL ISSUES OF WEB-SITE DESIGN

In this section, we discuss several important Web-page design criteria that have been discussed in the literature and are the focus of this paper. These theoretical criteria will then be compared to the empirical results of our analysis. The list is not exhaustive but there is no dispute on the relative importance of the factors selected for this study.

Navigation Issues

Visitors to a company's Web-site homepage knows that it is usually not possible to complete all the necessary business without viewing additional web pages. The decision that each web designer must make is how to navigate within the architecture of the Web- site. In most cases, the customer utilizes navigation bars or tabs that are strategically placed on the web pages. These navigation bars are usually placed at either the top or bottom of each web page. However, the choice can also be made to locate them at the sides of the page. For example, a very popular course container, Blackboard®, has its navigation bars on the left side of the homepage. In their study of both Chinese and U.S. e-commerce sites, Lo and Gong found "a greater variety of navigation styles and site design approaches among the U.S. sites" (Lo & Gong, 2005). In a research paper, Danielson discussed the behavioral dimensions of having a constantly visible site map on a web page (Danielson, 2002). In an interesting approach, Pakpoom, et al. addressed the concerns of senior citizens and their special concerns regarding web page design (Thanesuan, et al., 2004).

Color in Web-Site Design

The use of color in web page design has been one of the most researched topics relating to the overall concept of web aesthetics. Holzschlag did some of the early research on the use of color in web design to satisfy customer preferences (Holzschlag, 1999). Color has also been the topic of research by Lo and Gong who stipulated that there was a greater use of the color red on Chinese e-commerce sites than on those of U.S. based businesses (Lo & Gong, 2005). Skovira in his research paper stated that "color ought to support the informational display and not detract from it, nor should color negatively impact the audience" (Skovira, 2002). Later in the paper he states "some colors dominate and intimidate; others invite and welcome" (Skovira, 2002).

Since color can be used in both graphics and text it has the potential to dramatically impact the look and feel of a company's e-commerce web-site. Quite often, a company chooses to utilize color as part of its branding strategy. For example, Target Stores might make the color red a central focus of its web-site; whereas, AT&T might make use of the color blue to enhance in the consumer's mind the company logo.

Animation

With the advent of products like Flash®, it has enabled web designers to "spice up" a company's web-site through the use of animation. Animation can take the form of artificially created animated images or it can encompass the use of embedded video files that present a multimedia-based corporate e-commerce web-site. Some critics argue that animation is "too busy" and detracts from the primary focus of the web-site. "Don't make your pages move. It doesn't increase users' attention, it drives them away; most people equate animated content with useless content" (Jakob Nielson's Alertbox, 2008).

Others retort that it focuses the customer's attention while it either entertains or informs the visitor about important facts that are being communicated. In his research paper, Bayles presents cogent arguments for the use of animation for advertisements in web-site design (Bayles, 2002).

Graphics and Icons

In his research paper, Skovira discusses the use of images as follows: "The image is a structure that presents information visually. It is a visual narrative. Color and shape are the building blocks of any image. Images are informational structures that demand a viewer's attention" (Skovira, 2000). In his

work, Stephens states that as images rise in use the use of the word decreases (Stephens, 1998). Kaufer and Butler in their book Rhetoric and the Arts of Design, state that "A web site's rhetoric is the expression of the designer's and client's stories told to affect customer's choices and needs and their purchases" (Kaufer & Butler, 1996). "For example, use photos of people who have an obvious connection to the content as opposed to using models or generic stock photos. People are naturally drawn to pictures; gratuitous graphics can distract users from critical content" (Jakob Nielson's Alertbox, 2008). Zhao and Zhao conducted a research study on the Inc. 500 corporate web-sites. They report "the 206 Inc. 500 corporate Web sites demonstrated the efficient and effective use of Web programming technologies, graphics and multimedia" (Zhao & Zhao, 2004). In their study, Pakpoom, et al. noted that "many English and Chinese web sites that were frequented by older adults tended to violate recommendations related to graphics" (Thanesuan, et al., 2004). Chadwick-Dias, et al. also addressed the special issues of older web users with respect to web-design characteristics (Chadwick-Dias, et al., 2003). A study conducted by the National Institute on Aging and the National Library of Medicine has prepared specific recommendations regarding the use of graphics, color and font size in web design (NIA, 2001). In related papers, Bundrick, et al. and White, et al. focused on the accessibility of web-site design for web users with specific needs (Bundick, et al., 2006; White, et al., 2005).

E-Mail Requests

It is quite understandable that companies would want and need a customer's e-mail information in order to issue an order confirmation or to follow-up with problem resolution regarding order placement. The customer has real concerns regarding identity theft (Forcht, et al., 2007); (Vijayan, 2008) and the possible generation of spam each time his/her e-mail information is given in response to a Web-site request. A recent Wall Street Journal article focuses on the use of technology tools that monitor web-surfing behavior so that more information can be gathered about the customer's habits (Mangalindan, 2008). Companies argue that they can have more meaningful communications with their customers.

Requesting a potential customer's e-mail address even if no order is being placed is a different situation. In this case, the company may want the information for future direct mailings. This act can be view as harassment by the customer who can conceivably be bombarded with a stream of unwanted e-mails that are hard to stop (Kleen & Heinrichs, 2007). If a company's web-site does seek to collect customer e-mails they should at the very least provide an explicit privacy statement or an opt-in checkbox right next to the data entry field for the e-mail address.

Search Capability

It is quite common to have an e-commerce site that contains so many pages and branches in its architecture that both a site map and a search capability are needed to successfully navigate the site. There are many schools of thought regarding the potential design options of the search capability. In most cases it does not just appear on the homepage but on each page of the web-site. McCann and Griffith discussed the importance of the search box in research paper (McCann & Griffith, 200).

According to Jakob Nielson, a web designer, "the search box is an important part of any big website. When users want to search, they typically scan the homepage looking for 'the little box where I can type,' so your search should be a box. Make your search box at least 27 characters wide, so it can accommodate multiple words without obscuring parts of the user's query" (Nielson, 2008). He provides additional advice for an effective search approach. "Search is the user's lifeline when navigation fails. Even though advanced search can sometimes help, simple search works best, and search should be presented as a simple box, since that's what users are looking for" (Nielson, 2008b, http://www.useit.com/alertbox/9605.html).

Multilingual Capability

Many e-commerce sites serve a global community. While it is generally agreed that English is the most widely used language on the Web, the number of Chinese Web users is the largest in the world. It behooves a company that engages in global e-commerce to offer a multilingual capability on its homepage so that potential customers can be served in their native language. All that is needed is an option (usually connoted by country flags) that offers the customer to switch to a different language. As all businesses engage in heightened cultural sensitivity, it makes good business sense to offer this multi-language capability to potential customers.

METHODOLOGY

During Fall 2007 over 400 e-commerce web sites were visited from a representative group of industries. The industries visited and the number of companies in each category included the following:

Autos and Auto Parts	64
Sporting Goods	40
Apparel	80
Electronics	60
Travel	60
Miscellaneous	120.

This study selected a representative set of industries from all those possible so as to obtain a preliminary assessment of Web-site design characteristics from primarily consumer-driven enterprises. A varied set of industries representing hard goods, soft goods and recreation themes were selected. For each of the 424 Web-sites, a questionnaire was completed by one of the authors. The results were tabulated by specific question and are presented in the RESULTS section of the paper.

The Practice of Web-Site Design

What are companies actually doing with respect to the design of their Web-sites? In order to answer this question, a selection of industries was reviewed to ascertain if there were differences among them based on certain specified features. There are many design features that can be identified in any study of Web-site design. In this study, we focused on a select number that have been discussed in the theoretical design section of the paper. In future research, other characteristics can also be added to the mix. Some of the questions raised in this study regarding the Web-sites are as follows:

> Is animation used on the Web-site?
> Is interactivity built into the Web-site?
> Is the site easy to navigate?
> What is the dominant color used on the Web-site?
> What percent of the homepage is left blank?
> What percent of the homepage contains graphics/icons?
> Does the homepage contain a search capability?
> Did the site ask for an e-mail address even if no order was placed?
> Are there navigation bars on the top of the page?
> Are there navigation bars on the bottom of the page?
> Does the Web-site offer a multilingual capability?
> Were specific products featured on the homepage?

These characteristics combine several different categories of design. There are navigation features (top, bottom, ease), attention-retaining (animation, interactivity), communication (e-mail, search), diversity (multilingual) and use of real estate(blank space, graphics/icons, color).

RESULTS AND ANALYSIS

In this section we report on the results of each of the questions posed earlier in the paper. The percentages in the body of each table represent the percentage of companies in that industry that had that attribute. The sum of each row is 100%. From these tabulations, we can infer some preliminary tendencies across the industries selected as they pertain to the design characteristics studied.

Table 1: Graphics/Icons as a Percent of the Homepage.

Industry	<=25%	<=50%	<=75%	<=100%
Auto/Parts	16%	13%	8%	63%
Sporting Goods	28%	40%	18%	15%
Apparel	0	24%	41%	35%
Electronics	35%	48%	15%	2%
Travel	18%	45%	18%	18%
Miscellaneous	43%	32%	16%	9%
Grand Total	**25%**	**43%**	**23%**	**19%**

The data illustrates that across all industries graphics/icons account for between 26% and 50% of the homepage of most e-commerce Web-sites. The range in this category is a low of 13% in the auto/parts industry to a high in the electronics (48%), travel (45%) and the sporting goods (40%) industries. Special attention is drawn to the high (63%) level of the auto/parts industry in almost total coverage of the homepage with graphics/icons.

Table 2: Was Animation Used on the Web-Site?

Industry	Yes	No
Auto/Parts	51%	49%
Sporting Goods	42%	58%
Apparel	46%	54%
Electronics	60%	40%
Travel	40%	60%
Miscellaneous	33%	67%
Grand Total	**44%**	**56%**

The data illustrates that the use of animation across all of the industries visited seems to indicate no overwhelming preference by the respective companies. The range for Yes (animation is used) goes from 33% to 60% and the range for No (animation is not used) goes from 40% to 67%. The industry that uses the most animation on the homepage is the electronics (60%); whereas, the industry with the least animation used on the homepage is the miscellaneous category (67%).

Table 3: Dominant Color Used on the Homepage.

Industry	White	Black	Blue	Red	Green	Yellow	Other
Auto/Parts	19%	10%	25%	13%	0	3%	30%
Sporting Goods	28%	3%	35%	3%	28%	0	3%
Apparel	17%	14%	19%	15%	6%	1%	28%
Electronics	48%	2%	27%	10%	3%	3%	7%
Travel	13%	2%	58%	5%	3%	3%	16%
Grand Total	**31%**	**5%**	**28%**	**9%**	**7%**	**2%**	**18%**

The data suggests that on the whole the most dominant colors on the homepages were White (31%) and Blue (28%). White was the preferred color used by the companies in the electronics industry, Black by the apparel industry companies, Blue by travel companies and Green is most used as a percentage by companies in the sporting goods industry. Another glaring result is that Yellow (2%) is not a favorite color on the homepages of most companies visited.

Table 4: Was the Web-site Easy to Navigate?

Industry	Very Easy	Easy	Difficult	Very Difficult
Auto/Parts	51%	41%	8%	0
Sporting Goods	15%	70%	15%	0
Apparel	45%	46%	9%	0
Electronics	33%	52%	13%	2%
Travel	58%	38%	4%	0
Miscellaneous	26%	66%	8%	0
Grand Total	**38%**	**53%**	**9%**	**0**

The data from Table 4 clearly demonstrates that the overwhelming percentage of companies visited had We-sites that were either Very Easy (38%) or Easy (53%) to navigate. Surprisingly, both sporting goods and electronics had a relatively high number of difficult classifications, 15% and 13% respectively.

Table 5: Does the Homepage Have a Search Option?

Industry	Yes	No
Auto/Parts	65%	35%
Sporting Goods	90%	10%
Apparel	93%	7%
Electronics	87%	13%
Travel	70%	30%
Miscellaneous	75%	25%
Grand Total	**79%**	**21%**

The data from Table 5 illustrates quite emphatically that most of the companies visited across all industries utilize a search capability. The biggest users of the search function came from apparel (93%), sporting goods (90%) and electronics (87%). Auto/Parts (35%) and Travel (30%) used a search capability on their Web-sites the least often.

Table 6: What Percentage of the Homepage is Blank?

Industry	<=25%	<=50%	<=75%	<=100%
Auto/Parts	73%	25%	2%	0
Sporting Goods	83%	15%	2%	0
Apparel	66%	28%	6%	0
Electronics	40%	50%	10%	0
Travel	78%	22%	0	0
Miscellaneous	54%	36%	8%	2%
Grand Total	**63%**	**31%**	**5%**	**1%**

Once again, a very clear pattern emerges from Table 6. Most companies have less than 25% of their homepages blank, preferring to fill it with content. The sporting goods industry (83%) and travel (78%) lead the way in this regard. By aggregating the first two columns we note that 94% of the companies have less than 50% of their homepages blank.

Table 7: Were Specific Products Featured on the Homepage?

Industry	Yes	No
Auto/Parts	79%	21%
Sporting Goods	80%	20%
Apparel	84%	16%
Electronics	87%	13%
Travel	83%	17%
Miscellaneous	88%	12%
Grand Total	**84%**	**16%**

The data from Table 7 strongly suggests that the companies visited believe that in an e-commerce environment, it is prudent to take the opportunity to feature key products on their homepages. It is almost a four to one ratio of companies that feature products on their Web-sites' homepages.

Table 8: Did the Web-site Request an E-mail Address Even if No Order Was Placed?

Industry	Yes	No
Auto/Parts	11%	89%
Sporting Goods	48%	52%
Apparel	38%	62%
Electronics	7%	93%
Travel	15%	85%
Miscellaneous	18%	82%
Grand Total	**21%**	**79%**

Table 8 illustrates that most companies did not request a customer's e-mail address if no order was placed. The two industries which deviated from this pattern were sporting goods (48%) and apparel (38%). In an age where one's privacy is becoming increasingly difficult to protect, it is surprising to find that these two industries insist on collecting this information from its customers.

Table 9: Were There Navigation Bars on the Top of the Homepage?

Industry	Yes	No
Auto/Parts	89%	11%
Sporting Goods	95%	5%
Apparel	86%	14%
Electronics	92%	8%
Travel	45%	55%
Miscellaneous	93%	7%
Grand Total	**91%**	**9%**

Table 9 shows that the companies visited had a clear preference for including navigation bars on the top of their homepages. Only the companies in the travel industry (45% Yes) were on the low side of this percentage.

Table 10: Were There Navigation Bars on the Bottom of the Homepage?

Industry	Yes	No
Auto/Parts	68%	32%
Sporting Goods	43%	57%
Apparel	78%	23%
Electronics	50%	50%
Travel	45%	55%
Miscellaneous	64%	36%
Grand Total	**60%**	**40%**

Unlike the Table 9, Table 10 shows that fewer companies across all industries have a fondness for including navigation bars on the bottom of their homepages. Only apparel with 78% is the noticeable exception to this pattern.

Table 11: Does the Homepage Offer a Multilingual Option?

Industry	Yes	No
Auto/Parts	46%	54%
Sporting Goods	8%	92%
Apparel	23%	77%
Electronics	43%	57%
Travel	50%	50%
Miscellaneous	19%	81%
Grand Total	**30%**	**70%**

The data in Table 11 depict no clear pattern across all industries surveyed. One conclusion to be drawn is that most companies visited do not include a multilingual option for customers on their homepage. Not surprisingly, travel (50%), auto/parts (46%) and electronics (43%) did include the multilingual option on their homepages. One can conclude that these industries are catering to a multilingual customer base and have moved in this direction on their Web-sites.

Table 12: Does the Homepage Include Interactivity in its Design?

Industry	Yes	No
Auto/Parts	78%	22%
Sporting Goods	50%	50%
Apparel	25%	75%
Electronics	33%	67%
Travel	57%	43%
Miscellaneous	36%	64%
Grand Total	**44%**	**56%**

The data in Table 12 show that there is a disparate pattern across the industries visited with respect to including interactivity in the design of homepages. The leading industry is auto/parts (78%) and the least interactive is apparel (75%). The literature is mixed with respect to whether the Web-site should engage the consumer in an active manner. Some customers may view this process as a way to gather more information about them so that they can be harassed with spam at a later time.

SUMMARY, CONCLUSIONS and LIMITATIONS

The authors researched important design criteria of e-commerce Web-sites as found in the academic and professional literature. Once these characteristics were identified, a field study was conducted based on over 400 company Web-sites across six selected industries. The purpose of the investigation was to determine the degree to which actual corporate e-commerce Web-sites were aligned with good, general web design principles and whether or not certain industries were similar or different from one another in the application of these principles. No attempt was made to relate the actual design decisions to the economic effectiveness of the business organizations. That issue is left for a future research design.

What we found was that there was not a universal pattern across all industries and across all design criteria. There were distinct differences in the utilization of graphics/icons, the use of animation, the use of a dominant color, the use of space, the use of e-mail requests, the multilingual option and the use of interactivity in the site design. There were distinct similarities across industries in terms of site ease of use, the use of a search option, the feature of specified products on the site's homepage and the navigation strategies employed by the sites.

Based on the authors' research, it is evident that corporate e-commerce Web-sites are in a constant state of flux and, therefore, any study of this nature simply takes a snapshot in time as the basis of comparison. The primary focus of the paper was to study the Web-design characteristics of the homepage. This was done to limit the scope and scale of the study. If future research explores every nook and cranny of a Web-site, it is conceivable that different results might occur. The characteristics of the homepage often determine whether or not the consumer is motivated to explore the remaining areas of a business's Web-site. Finally, the study was limited to six industries so any conclusions must be conditional on the possibility that other industries might exhibit different behaviors with respect to the use of Web-site design criteria.

From this preliminary exploration, future researchers will be able to explore whether or not the results apply to other industries not included in this study, whether there is a tangible link between overall Web-site design and economic value to the business, whether specific design characteristics add differentiable economic value when compared to other characteristics and other site design parameters. For example, the choice of the appropriate business model employed by an organization (barter, auction, etc.) might be

found to be related to or separate from the Web-site design characteristics. Another factor that might be explored is the effect of download speed of a site on the economic success of the e-commerce site could be investigated. While these are all interesting questions to pursue in future research, this study, by categorizing properties by industry, continues the journey to better understand the gap between actual Web-site design characteristics and those identified as important in the theoretical literature.

As a final observation, it should be noted that although several design criteria were the focus of the research study, each of the Web-sites visited resulted in a unique feel and appearance. Since these all were e-commerce Web-sites, the ultimate goal was to help sell the company's products. The corporate Web-site should add value to the customer's shopping experience.

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