

Key dimensions of business-to-consumer web sites

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Abstract

The rapid growth in the electronic commerce over the Internet has fuelled predictions and speculations about what makes a business-to-consumer (B2C) web site effective. Yet, there are very few empirical studies that examine this issue. We examined the key characteristics of a B2C web site as perceived by online consumers. Based on a questionnaire survey of 214 online shoppers, we empirically derived four key dimensions of B2C web sites: *information content, design, security, and privacy*. Though all these dimensions seem to have an impact on the online purchase intent of consumers, security and privacy were found to have greater effect on the purchase intent of consumers. The implications of the findings for online merchants are discussed. © 2002 Elsevier Science B.V. All rights reserved.

Keywords: Business-to-consumer web sites; Online shopping; Web design; Security; Privacy

1. Introduction

There has been a phenomenal growth in business-to-consumer (B2C) electronic commerce since the commercialization of the Internet in early 1990s. The global nature of the Internet, its vast reach and different interactive capabilities have made it an important marketing and trading medium for many firms. There is a drastic increase in the number of organizations that are using the web for marketing, promoting, and transacting products and services with consumers. In 1999, organizations exchanged US\$ 20 billion worth products and services through B2C web sites. This number is predicted to be as high as US\$ 184 billion in the year 2004 [19].

Apart from organizations, there seems to be rapid adoption of the Internet by consumers for various purposes, including information search and online shopping. A study by the Georgia Institute of Technology [33] reported that about 40% of the respondents indicated shopping as their primary use of web. Another study by Ernst & Young found that over 39 million individuals shopped online in 1998, with more than 50% of them spending US\$ 500 or more on their online purchases [20]. The rise in online shopping is affecting the traditional retail sales in that the growth in offline sales over the next decade is expected to slow down from 5 to 3% a year. The increase in B2C commerce has made several firms look for new ways to understand online shopping behavior in order to attract and retain consumers.

While there seems to be an understanding that online shopping behavior is fundamentally different from that in a conventional retail environment [46], empirical research in this area is sparse. There is little

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documentation on consumer perception of what makes an effective B2C web site. A number of frameworks and guidelines have been proposed by industry experts and consultants for building and designing B2C shopping sites, but there is no unified view on its key characteristics. Our research is intended to help addressing these gaps.

In this paper, we identify the key dimensions of B2C sites as perceived by online consumers. We operationally define a B2C web site as a site on the world wide web through which a consumer can purchase a product or service. By our definition, they include online shopping sites set up by *infomediaries*, brick-and-mortar merchants, and virtual malls. Based on a survey of 214 shoppers, we empirically develop four key dimensions of these web sites. Our study examined the main characteristics that consumers look for, identified the underlying dimensions, and assessed their relative importance. By this, our study identified factors that were critical to the success of a B2C site.

2. Background

2.1. Literature review

Business articles, popular press, white papers and reports by various vendors and consultants dominate the literature in this area. Many articles are based on experiences of one or a few organizations, and give a descriptive account of organizational experiences in deploying B2C web sites [11,17,54,55]. Articles have also focused on reporting existing status of B2C e-commerce [15,25,56], forecasting future trends, and providing general guidelines for designing and managing B2C web sites [7,21,42]. While various characteristics have been touted as being effective, there is no unified view of the critical dimensions that an effective B2C web site should possess.

A number of researchers have examined the use of the Internet for commercial purposes. Liu et al. [37] examined the web sites of Fortune 500 companies to identify how they were using the web for interacting with their customers. They found that 95% use web sites to provide information on their products and services, and about 26% do some kind of electronic transactions. Ho examined 1800 web sites from varied

industries across multiple nations. Hoffman et al. [26] provided six categories for classifying commercial web sites, namely: online storefront, Internet presence, content, mall, incentive site, and search agent. Spiller and Lohse [53] focused on online shopping stores and classified them into five categories: superstores, promotional stores, sales stores, one-page stores, and product listings. Jones and Biasiotto [32] examined the web sites of 160 retailers and described how store-based retailers use the Internet. Most of these studies have been descriptive in nature, trying to describe the existing state of affairs and industry practices.

Another group of researchers attempted to develop frameworks and models for B2C e-commerce. Angerhn and Meyer [3] examined the banking industry to offer some guidelines for developing Internet strategies. Nour and Fadlalla [44] provided a framework for formulating web-based marketing strategies. Johnson, Hyde and Ambrose [31] developed a socio-technical framework for assessing the benefits of electronic retailing. Lohse and Spiller [38] reviewed user interface features in electronic shopping and made several recommendations for developing a B2C web site. Liu and Arnett [36] proposed a framework for designing quality B2C web sites. Hoffman and Novak [27] analyzed a few case studies to recommend several measures for improving B2C web sites. Patrick and Joe [45] extended the conventional model of consumer buying behavior to online purchases, and made recommendations for improving online commerce. These studies have been prescriptive in nature, offering several useful guidelines for conducting B2C e-commerce. But, they have been largely theoretical, based on a few cases, and they have not been empirically tested for their validity.

Most studies have either adopted a technical or organizational approach to studying B2C e-commerce. Those adopting the first focus on technology related issues, adopting a point of view of technical executives [49]. Those following an organizational approach focus on top management concerns about aligning e-commerce strategy with business strategy [22,57]. In contrast, we seek to study B2C e-commerce from a consumerist perspective as recommended by Ho. In spite of a sound technical architecture, and a formal e-commerce strategy derived from business strategy, a B2C web site will not be effective if it

fails to meet customer expectations [43]. Moreover, it is very important to understand consumer perceptions of an effective B2C web site, as online consumers tend to have a very different profile compared to traditional retail shoppers [16]. Hence, we look at the B2C e-commerce from a consumer oriented approach, trying to suggest value additions as perceived by consumers [29]. It is imperative to understand what customers view as being effective if we are to make any useful suggestions for improving them.

Here, we seek to test the efficacy of common recommendations for designing effective B2C web sites. Our goal is to derive the key dimensions of business-to-consumer web sites from a consumerist point of view. To this end, we constructed an instrument measuring the various web site characteristics, collected data from 214 electronic shoppers, analyzed them and empirically derived the broader dimensions of B2C web sites.

2.2. *Characteristics of B2C web site*

Web sites are essentially store houses of information, which is provided in such a way that it helps the visitors and thus, affects their view of its effectiveness. The key characteristics of a B2C web site could be categorized along the lines of its content and design [28]. Content refers to the information, features or services offered in the web site, while design is the way by which the contents are presented to consumers.

The contents of a B2C web site play an important role in influencing the purchase decision process of a consumer. They should allow the consumers to locate and select the merchandise that best satisfies their needs. Thus, the usefulness of a B2C web site not only depends on the information content, but also on the tools provided for navigating through and evaluating the use of the information.

B2C web sites differ in the sheer amount of information provided about their merchandise. Before purchasing a product, consumers look for information on it: brands, variety, price and quality. But, different consumers have different information needs. B2C web sites can offer information through hyperlinks, so that the consumers can drill-down to further detailed product information as needed. For instance, Amazon (www.amazon.com) offers hyperlinks to book reviews

and product testimonials. Many software firms and entertainment companies provide product samples in the form of package demonstrations and movie-clippings. Provision of such content can greatly enhance the consumer experience. The information given in a B2C web site should be just sufficient for the consumers to make a decision, and care should be taken to avoid giving too much, as this is likely to result in information overload [34].

A consumer buying process could be viewed a sequence of several stages, of which, information search and information evaluation are two important preparatory steps [6,18]. Lower costs of information search is a fundamental benefit of electronic marketplace [4]. Therefore, B2C sites which offer navigational tools that would ease the search process are likely to be more effective [1]. Cdnw.com offers a tool by which a consumer can search for compact-discs based on the artist name, album title, song title, or the record label. Navigational tools like search engines help consumers to locate merchandise and related information in a web site [48].

The next stage in the consumer decision process involves evaluation of alternatives before making a final purchase decision. Web retailers differ in the extent to which they facilitate the comparison of alternatives. Internet shopping has the potential to provide superior decision aids for making comparisons compared to traditional retail shopping. Research studies have also shown that decision aids have a favorable effect on the quality of online purchase decisions [23]. Many web sites like Excite and MySimon (www.mysimon.com) offer decision aids for making product–price comparisons. Through Dell's web site (www.dell.com), a consumer can custom-build a computer and make price comparisons for various computer configurations. There are also web sites like Priceline (www.priceline.com) that offer decision aids, like a calendar, that are useful in the decision making process.

A major difference between traditional retailing and online selling lies in the extent of interaction that a customer can have with the merchant. In order to compete effectively with retailers, online merchants have to offer electronic interactivity in the form of email and frequently asked questions (FAQs). Consumers usually have a number of questions on the shipping, service, payment and product return policies.

Many web sites have a section on FAQs that provide answers to common consumer concerns. Studies have shown that online stores with a FAQ section get more consumers visiting them than those without it. Despite this, many B2C web sites do not seem to offer FAQ section or interactive email features.

One of the frequently cited concerns about online shopping is the security of monetary transactions. Despite various technical advancements in Internet security, like cryptography, digital signatures and certificates, and authentication [2], consumers are still concerned. In a recent survey [13], almost 70% of the consumers expressed their fears about Internet security. Though it has been found that perceived web security has a positively influence on the intention to purchase online [50], security still remains one of the major barriers to online shopping [35,39,40,51]. To overcome such fears, many B2C web sites offer alternative payment modes, like telephonic transactions or checks. In order to allay the consumer concerns, many web sites also offer individual accounts with a logon-id and password.

B2C web sites use a number of mechanisms to gather information about their visitors. Explicit modes of gathering, such as registration forms, web surveys, and implicit means, like the use of cookie files, are commonly used. Information about consumers provides crucial inputs to marketing, advertising, and product related decisions made by merchandisers. But, a growing number of Internet users have expressed their concerns over potential misuse of personal information [8,10,24,30,47]. As many as 58% of the respondents to a recent survey cited privacy concerns as a major barrier to online shopping [14]. To address this issue, a number of web sites have developed and displayed consumer privacy policies [41]. A number of independent companies (e.g. www.truste.com) have also emerged to verify, audit, and certify the privacy policies of various web sites.

The design of a B2C web site plays an important role in attracting, sustaining and retaining the interest of a consumer at a site. The design of the web site is as important as its contents. Literature discussing the design principles of a B2C web site highlights three important issues: ease of navigation of the web site, time taken for navigation and page download, and use of multimedia to improve its visual appeal.

One of the important characteristics of a B2C web site that makes a customer comfortable is the ease with which it could be navigated [12]. Difficulties in navigating a B2C web site have been cited as a barrier for online purchasing. Poorly designed navigation also has a negative impact on online sales [5]. Hence, consistent navigation links to each page of the web site, useful navigation buttons, and an index to the web site have been suggested as important issues when designing a B2C web site.

Convenience and time savings are often cited by consumers as important reasons for shopping online [9]. B2C sites must be designed in such a way that consumers spend less time in finding information they are looking for. Delays in searching or in loading a web page might turn the consumers away to other sites that have faster download and display times. The download time is dependant on the size of the page, the extent of multimedia content in it, presence of applets or other programs, and technical parameters like the networking infrastructure, bandwidth connection between nodes, and infrastructure, etc. It is essential to strike a balance between these parameters in order to keep the download and display times at an acceptable level. Waiting times of 30 s or more are considered unacceptable [52].

B2C web sites often use animation, video, music, and other multimedia effects to capture customer attention. Multimedia combines static and dynamic images, sounds, and text and capture the consumer's attention more decisively than any of these elements alone, reaching audiences on multiple cognitive levels and resulting in higher retention. Though graphic images have become an essential part of most B2C web sites, a recent study by Poynter Institute (<http://www.poynter.org>) revealed that text material attracts the attention of web page visitors before graphics. Though multimedia increases the aesthetic element of a web page and increases the visual appeal, a fine balance must be made between multimedia elements and download times.

In order to avoid delays, several web sites offer multiple versions: the option to choose text-only versions, low-bandwidth, and high-speed connection driven pages. A study of well known retail web sites found that only 2 in 50 offer a low-bandwidth version. Some companies, like 3M, have adopted a dual strategy of providing text-only as well as

graphics-versions. An effective B2C web site should be able to accommodate different connecting capacities, depending on the choice of user, in order to reduce delays and waiting times.

To summarize, effective B2C web sites should serve as a major source of information; provide complete information on the products and services; allow for quick access to information through tools like search engines; and provide decision aids to help in evaluating the alternatives. Apart from product–price data, consumers also look for information on the organization that they are dealing with and some contact information. Therefore, it is essential that B2C web sites offer electronic means of interactivity to consumers. Further, B2C web sites should incorporate appropriate security measures and adopt privacy practices in order to develop consumer trust. In addition, B2C web sites should be easy to navigate, consume less time in searching, and have an aesthetic appeal.

3. Data collection

3.1. Survey instrument

The attributes were summarized into various items and a survey instrument was created. This instrument asked the respondents to identify the extent to which they agreed/disagreed with these items in relation to their experience in shopping from B2C web sites. Respondents rated each item on a scale of 1–7 where 1 represented “strongly disagree,” and 7, “strongly agree.”

In addition to this, we collected some demographic data from the respondents. This included information about their experience in using the Internet, extent of its usage for various purposes, frequency of Internet usage, number of online purchases made in last 6 months, and amount they spent on such online purchases.

Further, the respondents also answered four questions about their online purchase intent. The first three questions asked the subjects about the likelihood, their willingness to buy, and expected frequency of online purchases in the next 6 months, based on a seven-point Likert scale, ranging from very low to very high. The fourth question asked them to rate their probability of

making an online purchase in the next 6 months using a probabilistic scale ranging from “No chance” to “Certain.”

The survey instrument was pilot tested using three doctoral students and 12 others who had prior experience in online shopping. The items were revised based on this feedback. Following the revision, the survey was administered to a convenience sample of 409 individuals in Illinois. Because we wanted to gather data on consumer perception about important characteristics of online shopping sites, it was important that we asked only those subjects with some prior web shopping experience. Of the 409 individuals contacted, only 214 answers by people who had completed at least one online purchase in the last 6 months were considered qualified for analysis.

3.2. Sample

The characteristics of respondents is presented in Table 1. We had a diverse sample of respondents, with about 60% in age ranging between 20 and 30. More than 80% had used and surfed the Internet for more than 2 years. Moreover, all had made purchases online, with 70% having made at least two or more online transactions over the past 6 months, spending varying amounts. The profile indicates that they were heterogeneous with considerable online shopping experience.

4. Findings

4.1. Data analysis

An exploratory factor analysis was applied to assess the underlying dimensions of B2C web sites. This was chosen because little was known about the number of underlying dimensions. The exploratory factor analysis (as shown in Table 2) yielded four dimensions that were labeled: information content, design, security, and privacy.

To ensure that the items for each of the factors were internally related, we assessed the reliabilities of all four dimensions using Cronbach’s coefficient alpha. Those for each of the factors (as shown in Table 3) was much higher than the threshold level

Table 1
Profile of respondents ($N = 214$)

Gender	
Male	122 (57%)
Female	92 (43%)
Age	
15–20	16 (7.5%)
21–30	127 (59.3%)
31–40	30 (14%)
41–50	20 (9.3%)
>50	16 (7.5%)
Undisclosed	5 (2.3%)
Experience in Internet surfing	
<3 months	5 (2.3%)
Between 3 and 6 months	8 (3.7%)
Between 6 and 12 months	11 (5.1%)
Between 1 and 2 years	15 (7%)
Between 2 and 3 years	46 (21.5%)
Between 3 and 5 years	85 (39.7%)
>5 years	44 (20.6%)
No of online purchases in last 6 months	
1 transaction	61 (28.5%)
2–3 transactions	78 (36.4%)
4–5 transactions	30 (14%)
6–10 transactions	23 (10.7%)
11–20 transactions	17 (7.9%)
>20 transactions	5 (2.3%)
Amount spent in online shopping in last 6 months	
<US\$ 10	13 (6.1%)
Between US\$ 10 and 25	17 (7.9%)
Between US\$ 25 and 50	33 (15.4%)
Between US\$ 50 and 100	29 (13.6%)
Between US\$ 100 and 250	53 (24.8%)
Between US\$ 250 and 500	31 (14.5%)
Between US\$ 500 and 1000	22 (10.3%)
>US\$ 1000	13 (6.1%)

of 0.60 considered appropriate for exploratory research.

To assess the relative importance of these dimensions and their ability to predict online purchase intent, we used multiple discriminant analysis. The online shoppers were divided into two groups, based on the median score of their purchase intents. Discriminant analysis differentiated the responses into *greater than* and *less than* the median score of the purchase intent measure.

The results of the discriminant analysis are presented in Table 4. The Wilk's lambda and Chi-square values indicate that the discriminant function was

significant. The canonical correlation was found to be 0.468, indicating that the four dimensions explain 21.9%¹ of the variance in purchase intent.

The canonical discriminant function coefficients and the discriminant function loadings show that security and privacy are most important for discriminating the low and high purchase intent shoppers, followed by design and information content of B2C sites. Though the canonical discriminant coefficient of content is higher than that of design, the loadings of content are lesser than those of design. Since loadings are more valid than coefficients in prediction, the relative order of importance of the web site dimensions was found to be: security, privacy, design, and information content, from high to low.

4.2. Discussion of results

Exploratory factor analysis of various characteristics of online shopping web sites revealed four underlying dimensions; information content, design, security and privacy. Of these, security emerged as the best predictor of online purchase intent. The item under security that had the maximum factor loading was the provision of an alternate, non-online mode of transmitting financial information. Providing non-online modes, along with provision of individual accounts with logon-id and password for consumers (the second highest factor loading for security) seems to be the important way in which online merchants can attract more consumers to their web sites.

Privacy had the second highest discriminant analysis coefficient and loading. Consumers are unwilling to reveal personal information over the web, despite assurances given by online merchants. This has important implications for various online merchants. A survey conducted by the Federal Trade Commission in 1998 found that 85% of web sites collect personal information from their visitors. Of these, only 14% provide any explanation why. Also, only 2% of the web sites surveyed displayed a comprehensive privacy policy. Since privacy emerged as a key factor discriminating between high and low purchase intents of online shoppers, B2C web sites will have to take adequate steps to guard consumer privacy.

¹ Square of canonical correlation.

Table 2
Final factors, items and loadings

F1: information content	
Availability of information to compare across alternatives	0.82
Availability of decision making aids	0.82
Completeness of information provided about firm, product and services	0.84
Availability of options to communicate and interact with the organization	0.83
F2: design	
Ease of navigation for information search	0.88
Time taken for navigation	0.90
Presence of visual presentation aids (graphics, audio, video)	0.86
F3: security	
Availability of secure modes for transmitting information	0.79
Provision for alternate, non-online modes for financial transactions	0.83
Opportunity to create individual account with logon-id and password	0.82
Overall concern about security of transactions over the Internet	0.70
F4: privacy	
Gathering of personal information	0.81
Attitude towards sites that demand personal information	0.78
Hesitation in sharing personal information over web	0.86
Presence of statement on how personal information collected will be used	0.76

Table 3
Reliability analysis

Factor	No. of items	Alpha
Information content	4	0.89
Design	3	0.89
Security	4	0.87
Privacy	4	0.88

Design dimension emerged as the third best predictor of online purchase intent. Our results indicate that consumers pay attention to delays and ease of navigation. Information content represents another predictor of online purchase intent. It is a basic necessity of any web site and a key factor that differentiates competing ones.

Table 4
Results of discriminant analysis

Factors	Standard canonical coefficient	Discriminant loading
F1: information content	−0.53	−0.48
F2: design	−0.42	−0.32
F3: security	0.62	0.65
F4: privacy	0.58	0.58
Wilk's lambda	0.78	
Chi-square	51.71 (d.f. = 4)	
Signature	0.1%	
Percent correctly classified		
Total ($N = 213^a$)	70%	
Low Purchase Intent ($N = 106$)	81%	
High purchase intent ($N = 107$)	66%	

^a One response dropped due to missing values for purchase intent.

5. Conclusions

A recent study on online merchants revealed that they invest an average of about US\$ 24 to acquire a new customer. If online merchants have to attract and retain consumers while realizing a good return on their investment, they must focus on the consumer's expectations. The results reported in this paper are based on what online consumers perceive as important and effective in B2C web sites. Online merchants can assess their web sites based on our set of variables and identify areas that need improvement. As limitations of our study, we emphasize both the regional and convenient nature of our sample. Our study could be extended using a web-based survey with more Internet users and a globally representative sample.

The importance of business-to-commerce to the future global economy is well known. Determining how to create business-to-consumer web sites that can effectively attract and retain consumers so that key objectives, such as online purchases, web visitor satisfaction, repeat visits, and online customer loyalty are attained is an important step in developing an overall e-business strategy of an organization.

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