

MANAGEMENT

INTERNET TECHNOLOGIES IN THE HOMECENTER INDUSTRY

CASEY A. ROADCAP
PAUL M. SMITH*
JUDD H. MICHAEL*

ABSTRACT

As competition intensifies in the \$127 billion homecenter industry (1998 data), homecenter retailers are implementing electronic commerce technologies in order to generate and maintain competitive advantages. Internet technologies give companies an alternate method of expanding their trading communities, thus creating a streamlined supply chain and reducing costs (6). This research was designed to explore how internet technologies are impacting a key retail channel for forest products: the homecenter retail industry. The study sample consisted of the 500 largest homecenter retail companies (by sales) in the United States. This group of large homecenters represented over 75 percent of the total homecenter industry sales in 1998 (10). Study results show that 87 percent of the homecenter respondents had access to the Internet in 1998 and 57 percent of these companies used the Internet for company promotion via home pages. Results also showed that in 1998, 32 percent and 13 percent of respondents had intranets and extranets, respectively. As expected, large homecenter retail respondents are lead adopters for these important Internet technologies.

The homecenter market is driven by the repair and remodel demand sector, which includes expenditures by both do-it-yourself (DIY) customers and professional (PRO) contractors (15). In 1998, homecenter industry sales totaled \$127 billion, with the two largest homecenter chains, Home Depot and Lowe's, combining for 33 percent of total homecenter sales (10). In addition, the top 500 retailers had over 75 percent of the total homecenter industry sales in 1998 (10).

As the homecenter industry continues to grow, homecenter retailers are fiercely competing for market share through the strategic location of stores, aggressive pricing, larger warehouse-style shopping venues, and more sophisticated promotional materials such as displays, point-of-purchase (POP) literature, and

interactive information technologies. Many homecenters recognize that the effective use of electronic technologies will likely improve their logistics efficiency and as a result, will reduce their costs, thus securing a more competitive position in the marketplace. This paper focuses on internet technologies, an emerging form of electronic commerce (EC), including home pages, intranets, and extranets.

THE INTERNET

"The body of interconnected computer networks that today is collectively known as the Internet" is the largest and most powerful computer network on the planet (17). In 1993, there were only 90,000 Americans with Internet access (1). This number increased more than 900 times to 81 million Americans by early 1999 (1).

The World Wide Web, the fastest growing part of the Internet, is "touted increasingly as the great new marketing medium of our time" (13). It allows two-way communication, which makes it a powerful marketing tool. According to a study by Silvia Watkins-Castillo (20), "the most common use of the Internet by companies is ... for information purposes, either to gather information or to disseminate information."

In 1998, there were 829 million Web home pages (1). This number is projected to reach 1.45 billion by 1999 and 7.7 billion by 2002 (1). Ted Blackman (4) has stated that websites mostly contain information about the company and its activities, therefore focusing more on marketing the firm, not its products. For example, WTD Industries' Vice Presi-

The authors are, respectively, Sales Associate, Ferguson Enterprises, Inc., Baltimore, MD (former Research Assistant, Pennsylvania State Univ.); Professor, Wood Products Marketing; and Assistant Professor, Wood Products Marketing and Management, The Pennsylvania State Univ., University Park, PA 16802-4705. This paper was received for publication in September 2000. Reprint No. 9179.

*Forest Products Society Member.

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dent, Bob Riecke said, "our website is useful for news and financial information (which) has been very popular" (4).

The Internet is dramatically altering the way companies do business with each other, even for those already using electronic commerce to improve productivity (6). The Web allows companies to present information on the Internet using attractive graphics, text, sounds, and videos that can be found by very inexperienced computer users (6). Companies are attracted to the Internet because of its user-friendliness, but also because it offers the following: 1) *open connectivity*: the Internet is compatible with nearly every computer from personal computers (PCs) to mainframes; 2) *a global presence*: by creating a website, a company's information can be accessed by any computer in the world; and 3) *economic value*: the Internet can be used to lower marketing and logistics costs and potentially increase sales and revenue by creating new distribution channels (6).

INTRANET

An intranet is a network of computers within an organization that are connected using standard Internet protocols (12). An intranet can be as small as two computers or as many as a thousand computers spread around the world. Companies with intranets usually limit access to a select target of users (12).

Intranets are linked to the outside world through the Internet, where special software called a "firewall" protects the company from unauthorized visits by monitoring the incoming and outgoing information (14). Users of an intranet can access the Internet but Internet users cannot access an intranet without permission (or the password). The danger of unauthorized access is a concern and security is often an issue both inside and outside the company.

The major benefit of an intranet is its ability to efficiently share information such as management and safety policies, newsletters, memos, bulletins, trip reports, schedules, calendar of events, product descriptions, customer information, job training, and job postings (12). Shared intranet information is available to the people who need it, when they need it, and in the form they need it (14). Other benefits of an intranet include "speeding up activities, reducing the need for paper documents, making con-

tinually updated material available, and automating repetitive documentation processes" (14).

EXTRANET

"When a company makes its intranet available to customers outside its security firewall, it creates an extranet" (14). An extranet is often viewed as an extended intranet. A more formal definition is a collaborative network of computers that uses Internet technology to link businesses with their supply chain. A company creating an extranet usually opens or allows members of its supply chain to view parts of its intranet; therefore a solid intranet is required before a company can have a usable extranet (8).

"Businesses today are under incredible pressure to trim time and costs from their supply-chain processes, as well as to increase market share and revenues" (6). Many companies are noticing that extranets are creating business opportunities (9). Benefits of extranet business activities include improving customer service, gaining product and marketing information, reducing costs, reducing paperwork, shortening order cycles, increasing the efficiency of inventory management, and reducing errors (9,14).

Extranets allow for easy sharing of ideas, easy access to product information, pricing, company information and policies, and can therefore be used to train and support value-added resellers and manufacturers' representatives. Companies are also using extranets for electronic data interchange (EDI) because there are no compatibility problems (2). "EDI generally uses expensive, proprietary communications and data-handling technology which companies hesitate to abandon in favor of extranets" (14). However, extranets can incorporate most forms of EDI with software that translates information between systems (14).

ELECTRONIC COMMERCE AND THE HOMECENTER INDUSTRY

To reap the full benefits of Internet technologies and electronic commerce, the entire supply chain should be included. Therefore, homecenters are increasingly making electronic information system linkages a requirement in their vendor selection (16). As a result, wood products suppliers who adopt these technologies can improve their ability to sustain or develop market position with this essential customer base.

Internet technologies allow easy, quick, and cost-effective access to EC, thus allowing companies to achieve the benefits of electronic technologies and the synchronization of supply and demand. Internet EDI is less complex than traditional EDI, therefore making EC less intimidating for first-time users as well as flattening the learning curve (6). As a result, it can improve productivity for both EC veterans and novices (6). The Internet creates business opportunities for anyone who can access the information regardless of the type of computer, database, or web browser (2,6). The \$27.4 billion business-to-business volume that was transacted with Internet EC in 1998 is expected to reach an astonishing \$978.4 billion by 2003 (1). This increase supports the projection that extranets will replace 40 percent of the business-to-business EC applications by 2002 (6).

This research was designed to explore how the Internet is impacting a fundamental channel for U.S. building materials, that is, the U.S. homecenter industry. The specific research objective was to examine "Internet presence" of homecenters by assessing the extent to which companies use various Internet technologies such as home pages, intranets, and extranets for their business activities. Based upon previous work that found "large" homecenters to be lead adopters of EC technologies, the top 500 U.S. homecenter respondents were divided into large and small homecenters according to their 1997 annual sales (18,19).

METHODOLOGY

SAMPLE DESIGN AND SAMPLING

The 500 largest homecenter retail companies (by sales) in the United States, representing over 75 percent of total homecenter industry sales of \$127 billion in 1998 (10), were used as our study sample frame.

DATA COLLECTION AND RESPONSE RATE

The 1998 Home Center Operators & Hardware Chains CD-ROM Directory (5) was used to identify our sample of homecenters, as well as key informants and titles at their corporate headquarters. Pre-testing of the research instrument was conducted with six faculty members with extensive knowledge of this industry and two homecenters in central Pennsylvania. Survey implementation followed a modification of

Dillman's Total Design Method (7). This procedure included an initial survey mailing, a reminder postcard, and a second survey mailing, resulting in the return of 135 usable questionnaires and an adjusted response rate of 27.3 percent.

To ensure that the largest and most influential homecenters were included, pre-survey notification and follow-up phone calls were made to the top 20 homecenter retailers (by sales) to encourage participation and increase their response rates. The top 20 homecenters represented 53 percent (\$57 billion) of total homecenter industry sales in 1997 (5). These additional primary data collection efforts resulted in 16 of the top 20 homecenters responding to our study.

NONRESPONSE BIAS

The Kruskal-Wallis one-way analysis of variance (ANOVA)¹ technique and a two-tailed t-test² were used to test for non-response bias by comparing the first 45 respondents to the last 45 respondents (3). The assumption in this methodology is that late respondents, who respond only after increased follow-up efforts, tend to be similar to non-respondents. No significant differences were found between early and late respondents in terms of firm size or the adoption of Internets, home pages, intranets, or extranets at a 95 percent confidence level. As a result, non-response bias concerns were set aside.

RESULTS

PROFILE OF RESPONDENTS

Sales and locations. — Respondents represented a total of \$57.2 billion in homecenter sales ($n = 135$) in 1997 resulting in a 72 percent weighted response rate (by sales) and representing 53 percent of the total homecenter retail industry sales that year. Average sales for responding homecenters were \$424 million and ranged from \$17 million to \$24 billion. Homecenter respondents had an average of 29 locations and ranged from 1 store to 656 stores.

The top 500 homecenter respondents were divided into two groups: "large" ($n = 20$) homecenters with 1997 sales ranging from \$200 million to \$25 billion

TABLE 1. — Top 500 homecenters with Internet access in 1998.

	All respondents ($n = 135$)	Large ^a ($n = 20$)	Small ^b ($n = 115$)	Chi-square ^c	Significance
	----- (%) -----				
Unweighted					
1998	86.7	100	84.3	3.585	0.058
1999 to 2000	4.4	--	5.2		
Total	91.1	100	89.5		
Weighted by sales					
1998	99.0	100	87.5		
1999 to 2000	0.3	--	3.9		
Total	99.3	100	91.4		

^a Top 500 homecenter respondents with 1997 sales ranging from \$200 million to \$25 billion.

^b Top 500 homecenter respondents with 1997 sales ranging from \$17 million to \$199 million.

^c A Kruskal-Wallis one-way ANOVA technique was used to test the hypothesis of no difference in internet access between large and small homecenter respondents.

TABLE 2. — Top 500 homecenters with a home page in 1998.

	All respondents ($n = 135$)	Large ^a ($n = 20$)	Small ^b ($n = 115$)	Chi-square ^c	Significance
	----- (%) -----				
Unweighted					
1998	49.6	85.0	43.5	11.663	0.001
1999 to 2000	24.4	15.0	26.1		
Total	74.0	100	69.6		
Weighted by sales					
1998	86.7	90.3	43.5		
1999 to 2000	11.0	9.7	26.4		
Total	97.7	100	69.9		

^a Top 500 homecenter respondents with 1997 sales ranging from \$200 million to \$25 billion.

^b Top 500 homecenter respondents with 1997 sales ranging from \$17 million to \$199 million.

^c A Kruskal-Wallis one-way ANOVA technique was used to test the hypothesis of no difference in the use of home pages between large and small homecenter respondents.

TABLE 3. — Top 500 homecenters with an Intranet in 1998.

	All respondents ($n = 135$)	Large ^a ($n = 20$)	Small ^b ($n = 115$)	Chi-square ^c	Significance
	----- (%) -----				
Unweighted					
1998	31.9	65.0	26.1	11.797	0.001
1999 to 2000					
Weighted by sales					
1998	79.1	83.5	27.2		

^a Top 500 homecenter respondents with 1997 sales ranging from \$200 million to \$25 billion.

^b Top 500 homecenter respondents with 1997 sales ranging from \$17 million to \$199 million.

^c A Kruskal-Wallis one-way ANOVA technique was used to test the hypothesis of no difference in intranet implementation between large and small homecenter respondents.

and "small" homecenters ($n = 115$) with 1997 sales ranging from \$17 million to \$199 million. In 1998, there were 35 U.S. homecenters in the study sample of top 500 homecenters that had sales greater than \$200 million (5).

INTERNET

Of the 135 homecenter respondents, 86.7 percent ($n = 117$) had Internet ac-

cess in 1998 and an additional 4.4 percent ($n = 6$) were planning to be on-line by 2000 (Table 1). The 117 companies with Internet access represented 99 percent (\$56.6 billion) of the total respondent revenue while the 6 companies that were planning to implement Internet access by 2000 represent an additional 0.3 percent (\$171 million) of the total respondent revenue.

¹ The Kruskal-Wallis ANOVA was used to test the nonmetric (ordinal) data (11).

² A parametric statistical test (t-test) was used to analyze ratio data comparisons between early and late respondents (11).

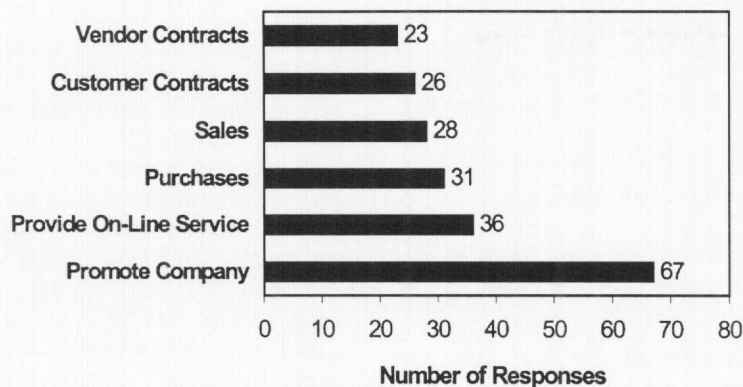


Figure 1. — How homecenter respondents' use the Internet ($n = 117$). Respondents were allowed to select more than one type of usage of the Internet. Therefore, results add to a number exceeding the sample size.

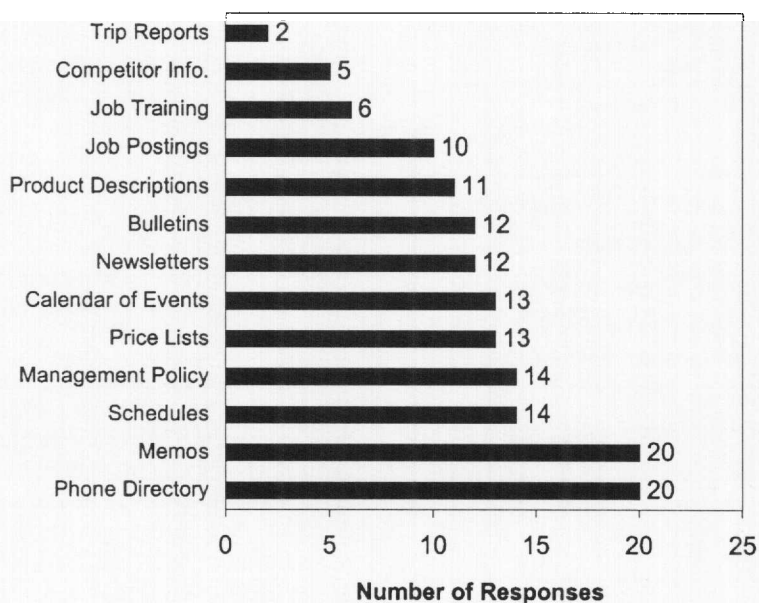


Figure 2. — Information contained on homecenter respondents' intranets ($n = 43$). Respondents were allowed to select more than one type of information. Therefore, results add to a number exceeding the sample size.

One hundred percent ($n = 20$) of the large homecenter respondents had Internet access in 1998 (Table 1). Eighty-four percent ($n = 97$) of the small homecenters had access to the Internet in 1998 with an additional 5.2 percent ($n = 6$) planning to be on-line by 2000.

The large and small homecenter respondents with Internet access were compared using the Kruskal-Wallis one-way ANOVA statistical technique. This non-parametric test for nominal data computes a statistic with a chi-square distribution under the hypothesis that the groups have the same distribution

(11). Using this test, Internet access between our large and small homecenter respondents differed significantly at $\alpha = 0.058$ (Table 1).

Of the 117 homecenters that had Internet access in 1998, over half ($n = 67$) used the Internet to promote their company (Fig. 1). Other key Internet uses by respondents included providing on-line services ($n = 36$), to make purchases ($n = 31$), and for sales ($n = 28$).

As expected, all 67 responding homecenters that used the Internet to promote their company also indicated that they

had home pages (Table 2). These 67 homecenters represented 86.7 percent (\$49.6 billion) of the total respondent revenue. An additional 33 companies (24.4%) were planning to create a company home page by 2000 and represented 11.0 percent (\$6.3 billion) of the respondent revenue.

Of the large homecenter respondents, 85 percent ($n = 17$) representing 90.3 percent (\$47.4 billion) of the large homecenter respondent revenue had home pages in 1998. The other three large homecenter respondents were planning to create a home page by the year 2000. Forty-three percent ($n = 50$) of small ($n = 115$) homecenter respondents had home pages in 1998, with an additional 26.1 percent ($n = 30$) planning to create a home page by 2000. Home page usage by large and small homecenter respondents differed significantly at $\alpha = 0.001$ (Table 2).

INTRANET

Of the 135 homecenter respondents, 31.9 percent ($n = 43$) had implemented an intranet in 1998. These 43 firms represented 79.1 percent (\$45.3 billion) of the total respondent revenue (Table 3). Sixty-five percent ($n = 13$) of the large homecenter respondents and 26.1 percent ($n = 30$) of small ($n = 115$) homecenter respondents were using intranets in 1998. The implementation of intranets by large and small homecenter respondents differed significantly at $\alpha = 0.001$.

Homecenter respondents that had intranets were asked to indicate the types of information contained or provided on their intranet (Fig. 2). Of the 43 homecenter respondents that had intranets, 20 (46.5%) of the intranets included access to phone directories and memos. Homecenter respondents' intranets also frequently have access to schedules, management policies, price lists, and calendars of events.

EXTRANET

Thirteen percent ($n = 18$) of the 135 homecenter respondents had implemented extranets in 1998 and an additional 16.3 percent ($n = 22$) were planning to implement extranets by 2000 (Table 4). The 18 companies that had extranets represented 58.2 percent (\$33.3 billion) of the total respondent revenue while the 22 companies that were planning to implement an extranet by 2000 represented an additional 26.5 percent

TABLE 4. — Top 500 homecenters with an extranet in 1998.

	All respondents (n = 135)	Large ^a (n = 20)	Small ^b (n = 115)	Chi-square ^c	Significance
	----- (%) -----				
Unweighted					
1998	13.3	25.0	11.3	2.745	0.098
1999 to 2000	16.3	30.0	13.9		
Total	29.6	55.0	25.2		
Weighted by sales					
1998	58.2	62.2	10.3		
1999 to 2000	26.5	27.1	19.1		
Total	84.7	89.3	29.4		

^a Top 500 homecenter respondents with 1997 sales ranging from \$200 million to \$25 billion.

^b Top 500 homecenter respondents with 1997 sales ranging from \$17 million to \$199 million.

^c A Kruskal-Wallis one-way ANOVA technique was used to test the hypothesis of no difference in extranet implementation between large and small homecenter respondents.

(\$15 billion) of the total respondent revenue.

Twenty-five percent ($n = 5$) of the large homecenter respondents had extranets in 1998 and 30 percent ($n = 6$) of these large respondents were planning to implement extranets by 2000. Eleven percent ($n = 13$) of the small homecenter respondents had extranets and an additional 13.9 percent ($n = 16$) of these smaller ($n = 115$) respondents were planning to implement extranets by 2000. Use of extranets by our large and small homecenter respondents differed significantly at $\alpha = 0.098$ (Table 4).

Homecenter respondents who had an extranet were asked to indicate all the business applications that were used with their extranet (Fig. 3). Seventy-two percent ($n = 13$) of homecenter respondents who had implemented an extranet used the extranet for product inquiry, EDI, ordering from suppliers, order processing, and price inquiries were also frequently used business applications. As mentioned earlier, extranet EDI is a very attractive option to homecenters interested in an EDI system because it is relatively inexpensive and has no compatibility problems.

Homecenter respondents who had an extranet in 1998 were asked to indicate their relative agreement with the perceived benefits that influenced their decisions to implement an extranet. Table 5 shows the mean responses of these rated attributes using a 5-point scale, where 1 = strongly disagree, 3 = neutral, and 5 = strongly agree. All six of the reasons received a mean agreement rating between 3.11 and 3.56. Keep in mind that all respondents who answered this question regarding extranet implementation were current users of this technology. Table 5 also compares large and small homecenter respondents with unweighted means followed by the ranking in parentheses. Creating a cost savings and improving business relationships had the highest unweighted means ($\mu = 4.2$) for large homecenters, but were the number 4 and 5 reasons according to the small homecenters. Corporate strategy had the highest unweighted mean ($\mu = 3.62$) for small homecenter respondents, but was ranked number 3 by the large homecenters. Large homecenters generally had higher unweighted means as compared with small homecenters. However, large

TABLE 5. — Reasons that homecenters implemented an extranet in 1998.

Extranet technology was implemented to	Unweighted means ^a		
	All respondents (n = 18)	Large ^b (n = 5)	Small ^c (n = 13)
Be part of our company's corporate strategy	3.56	3.40 (3)	3.62 (1)
Create a cost savings	3.50	4.20 (1)	3.23 (4)
Facilitate transactions with vendors	3.50	3.60 (2)	3.46 (2)
Improve business relationships	3.39	4.20 (1)	3.08 (5)
Respond to vendor requests	3.17	2.80 (4)	3.31 (3)
Share information with vendors	3.11	3.60 (2)	2.92 (6)

^a 5-point scale: 1 = strongly disagree; 3 = neutral; 5 = strongly agree.

^b Top 500 homecenter respondents with 1997 sales ranging from \$200 million to \$25 billion.

^c Top 500 homecenter respondents with 1997 sales ranging from \$17 million to \$199 million.

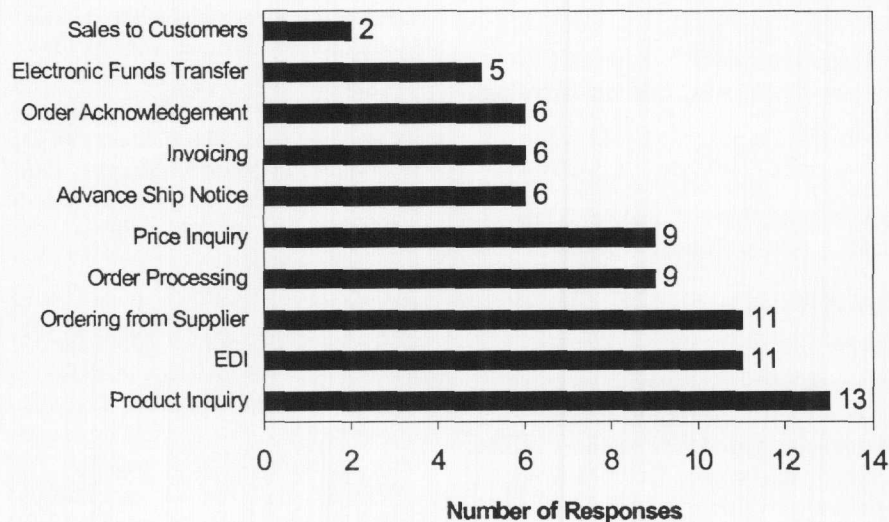


Figure 3. — Extranet business applications by homecenter respondents ($n = 18$). Respondents were allowed to select more than one type of information. Therefore, results add to a number exceeding the sample size.

homecenter respondents rated "be part of our company's corporate strategy" and "respond to vendor requests" lower than the small homecenter respondents (Table 5).

SUMMARY

This study reports the status of Internet EC among the top 500 homecenter retailers in 1998. Study results showed that nearly 87 percent of the 135 responding homecenters had access to the Internet in 1998. Over half of these 135 homecenters had home pages that were used to promote their company. Approximately one-third of U.S. homecenter respondents had intranets in 1998 and only 13 percent of responding U.S. homecenters had implemented an extranet with their suppliers.

Study results show that large homecenters are leading the adoption of Internet-based EC. Also, results show that large and small homecenter respondents implemented their extranets for different reasons. Large homecenter respondents rated cost savings and business relationships as their primary reasons to implement their extranet, while small homecenters rated corporate strategy and vendor transactions as their top two reasons for implementing their extranet.

Although businesses are increasing their use of the Internet, this study suggests that the use of the Internet for business-to-business activities was not yet firmly established among the top 500 homecenter retailers in 1998. However, since 87 percent of our 135 respondents had Internet access, it seems that the foundation has been set for future expansion of Internet-based business activities.

CONCLUSIONS

Internet-based electronic commerce can drastically alter the way companies

do business. Because the Internet is compatible with any computer, language, or web browser, it offers a myriad of business opportunities. Therefore, Internet EDI via extranets can be transacted between current users of EDI and non-EDI users. As a result, business-to-business transactions over the Internet are expected to increase dramatically.

The Internet is a revolutionary tool that allows companies to perform a multitude of business functions. A company can use a home page for cost-effective promotion. For example, Louisiana-Pacific's website is designed primarily to enhance communication and serve their customers' informational needs such as the companies' financial data, growth strategies, company news, and environmental programs (4). In contrast, Crestbrook Forest Industries' website includes product availability information for their customers to access inventory in real time and at their convenience rather than waiting for a weekly fax (4).

The forest products industry and the homecenter industry are rapidly expanding their use of the Internet. Companies that fully utilize the Internet's potential for business activities at the corporate level have opportunities to increase their competitive position within the marketplace.

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