

**Extranets:
A Comparison of the U.S. Forest Products Industry and Other U.S.
Industries**

Richard P. Vlosky

Olivian T. Pitis

**Working Paper #38
Louisiana Forest Products Laboratory
Louisiana State University Agricultural Center
Baton Rouge, LA**

October 12, 1999

The authors are Associate Professor and Research Associate Specialist, Louisiana Forest Products Laboratory, School of Forestry, Wildlife, and Fisheries, Louisiana State University Agricultural Center, Baton Rouge, Louisiana.

Abstract

This paper compares the use of extranets between the forest products industry and other U.S. business sectors. Extranets are secure networks that electronically link companies over the Internet. These linkages are proprietary and allow for commerce and other business transactions to take place electronically. Results indicate that the forest products industry uses extranet-based business applications with less frequency than other industrial sectors, receives fewer benefits and has greater concerns from using this business tool.

Introduction

Almost every person in the United States has come in contact at least once with the Internet. This overwhelming technological phenomenon, whose impact on mankind is sometimes compared to that of the printing press or the television, is yet far from reaching its peak. Not only does it grow in size with new corporate and private users joining daily, but also new applications come to light and expand to accommodate for the increasing demands of the net-citizens. The Internet is, therefore, growing both quantitatively and qualitatively.

In the early days of the Internet, much of this growth was brought about by the activity of enthusiasts. However, today's Internet has a more commercial character and a strong orientation towards business. The Internet is firmly entrenched as a vital component of the business landscape, whether it is used as an internal communication tool, a link to business partners and customers, a marketing vehicle or a high-technology sales aid (Kim 1998).

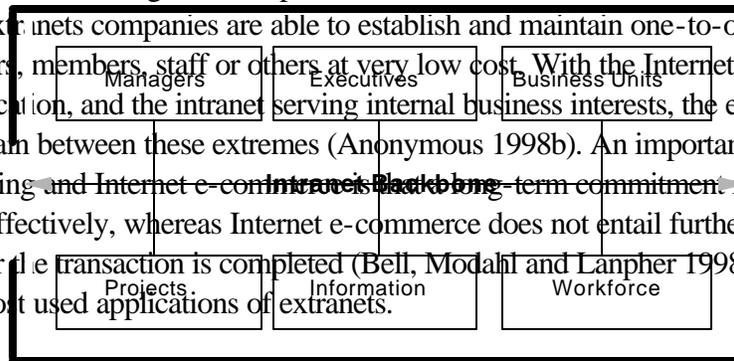
Two applications of the Internet that have emerged in response to business needs are intranets and extranets. Simply put, an intranet is a small-scale version of the Internet inside an organization. Two main features of an intranet are: it is based on the Internet's transmission control protocol/Internet protocol (TCP/IP) and it is proprietary (access from outside is prohibited by a firewall) (Hills 1998). Extranets, on the other hand, go one step further by allowing users or entities outside the organization to access and interact with specific information from the intranet. Therefore, extranets are permeable, yet secure commerce-enabled networks which electronically link organizations or individuals over the Internet in a public, semi-public or private forum. The extranet represents the bridge between the public Internet and the private corporate intranet (Anonymous 1998b, Panches and Vlosky 1998) (**Figure 1**).

Figure 1.

Extranet Applications

Extranets:

Extranet solutions are designed to emphasize and foster the customer relationship. With commerce-enabled extranets companies are able to establish and maintain one-to-one relationships with each of their customers, members, staff or others at very low cost. With the Internet providing public outreach or communication, and the intranet serving internal business interests, the extranet serves the business-critical domain between these extremes (Anonymous 1998b). An important difference between extranet trading and Internet e-commerce is that long-term commitment is required for extranets to operate effectively, whereas Internet e-commerce does not entail further contact between business partners after the transaction is completed (Bell, Modahl and Lanpher 1998). The following is a discussion of the most used applications of extranets.



Sales and customer service. By using extranets, companies can continue to develop and maintain valuable one-to-one relationships with their customers, but doing it more efficiently and at a significantly reduced cost. Extranets can help clear information bottlenecks between customer and company and lessen the learning curve for new sales reps by allowing them to tap into the wealth of information already on the company's network. Extranets also integrate electronic commerce with the process of capturing customer information for future support services (Anonymous 1998b).

Product to market. By allowing for the effective management of multiple vendors, contractors and other entities along the supply chain, extranets can significantly reduce the cost associated with getting products to market. At the same time, extranets can help spot inefficiencies or irregularities that can adversely affect the overall performance of the supply chain, resulting in a more streamlined process (Anonymous 1998b).

Human resources. For most human resources (HR) departments, the cost of creating an extranet by extending the capabilities of the existing intranet is minimal. The benefits thus obtained can far outweigh the initial setup and maintenance costs. Furthermore, the capabilities of the online environment can far exceed those of traditional methods such as paper-based and interactive voice response (IVR) systems. Allowing employees to select health care service providers, providing dependant care and referral services online, offering employees access to government regulations and allowing employees to manage their own retirement accounts are some of the application of extranets in the human resources area (Greengard 1997).

Contractor/distributed partner. Teamwork has come to be the preferred way of doing business. Often times, the team in charge of a project is eclectic in structure, with members separated by geographical distance and lacking personal knowledge between its members. In the face of tight deadlines and complex projects, often times involving interdepartmental cooperation, a Web-based extranet is the natural solution that allows for effectively managing the secure flow of information between all entities (Anonymous 1998b).

Advantages of Extranets

Extranets offer significant benefits to a group of organizations with common goals and objectives. Some of these benefits are:

Ease of set-up, use and maintenance. Compared to proprietary network solutions that can take years to implement, extranets often require months or even just weeks (Anonymous 1998b). A direct result is that more organizations can join at a lower cost, making the whole process more efficient. For example, approximately seventy out of Boeing Co.'s 700 customers used Electronic Data Interchange (EDI) to place orders and control inventories. After Boeing decided to develop its extranet, three hundred customers decided to use the Web-based ordering system, placing \$40 million worth of business through the site (Kim 1998).

Scalability. Because of their inherent structure, extranets can expand to encompass both new users and new technologies (hardware and software). Much like the Internet grows with new users joining from different computer architectures (PC, Apple, Unix, Sun), the extranet, using the TCP/IP protocol, can accommodate for the growing communication needs of the company and its partners (Bayles 1998).

Versatility. Virtually every kind of information that can be stored on a computer can also be transferred and shared over an extranet, from text files and graphics to audio and video files.

Security. Security is still a major issue among all Internet users. Although no system is 100 percent secure, recent technological advances allow for extranets to offer a highly secure framework in which every participant's information is protected from thieves or hackers (Anonymous 1998a), Bayles 1998, David 1998).

Extranets enhance business relationships. By building IT connectivity with business partners, extranets enhance business relationships and increase interdependency between trading partners in specific markets. A direct result is improved competitiveness inside business-to-business markets as a result of reinforced and enhanced relationships (Anonymous 1999).

The extranet is not industry-dependent. Auto-manufacturers like Ford and Hyundai are using extranets to expand their spare parts business (Dalton 1998a, 1998b). Michelin North America, the U.S. unit of the French tire manufacturer, plans to use the extranet to manage the annual flow of 5.5 million order-related documents. AFC Enterprises Inc. (franchising Church's Chicken and Popeye's Chicken &

Biscuits restaurants) uses the extranet to help franchise partners open new restaurants and assist them in operations such as marketing, quality control or inventory (Sinclair 1998). More recently, there are plans for a "Grocery Extranet" that would bring together both sides of the grocery and other similar consumer goods supply chain (producers and retailers). This extranet is expected to evolve even further into an industry-wide Web trading community in about one year (Violino 1999a). Another example is Eastman Kodak Co., which is expanding its use of extranets by adding dealers, contractors, partners and subsidiaries at a rate of two per week (Violino 1999b).

Why are all these companies taking the extranet very seriously? Would they not thrive without going yet one step farther in the never-ending IT race? As Bill Gates, founder and CEO of Microsoft Company, says, "the excellence of a company's nervous system determines that company's competitiveness." (Gates 1997). The extranet is the perfect solution that allows companies to quickly identify and respond to challenging situations by managing a secured flow of information to and from its customers, suppliers, subsidiaries and partners. Not incidentally, 90 percent of Fortune 200 corporations surveyed in September 1996 were deploying intranets, according to a study conducted by Hambrecht & Quist (San Francisco - based marketing research company) (Greengard 1997). Extranets are the natural extension of intranets and, as the current study shows, a high percentage of Fortune 1000 companies surveyed had an extranet in 1998.

This is not to say that companies active in industries that generally lag in technology adoption can not take significant steps to implement extranets. On the contrary, such a move could actually result in a strong competitive advantage, as discovered by Blue Shield, a health insurance company that moved to the Internet in 1998. Traditionally, the insurance business has been slow in adopting the Internet in conducting business, with only 7 percent of insurance selling products online (Hibbard 1998).

The forest products industry has generally been conservative in adopting new technologies before they are "tried and true". The current study shows that with regard to e-business in general and extranets in particular, the industry continues to rely on more traditional methods of conducting business.

The Studies

This paper draws on two studies that were conducted in 1998. The first study examined the use of Internet-based technologies in the forest products industry (Vlosky,). Included in this study was a discussion of extranet implementation by the industry. Results presented in this paper address only those forest products companies that had extranets in 1997. A second study specifically focused on extranets took a broader perspective by studying all U.S. industry sectors (Vlosky et al., in press). The sections common to the two studies are the basis for this paper. Specifically, the objectives of this paper are to compare the forest products industry and general U.S industry with regard to the use of extranets as a vehicle for electronic commerce and other business-to-business supply chain activities.

Research Methodology

Population 1-Forest Products Industry

The questionnaire for this study contained measures developed by the researchers and adapted from other sources. The survey was reviewed and revised by the researcher and industry representatives. An iterative process resulted in the final instrument.

Thirteen hundred questionnaires were mailed to selected companies extracted from electronic company directories (Lockwood-Post Directory of pulp and paper companies and the Miller-Freeman Directory of the Forest Industry). Pre-addressed, postage paid envelopes and a personally signed cover letter were included with the questionnaire. In addition, a copy of an article on the subject of Internet use in the forest products industry was included as a means of encouraging participation. The cover letter also promised summary results of the study for completing and returning the questionnaire, a tactic that has been used successfully by the researcher in many previous studies. Due to time constraints, pre-notification and reminder postcards were not sent to targeted companies. The study results are based on two mailings. All surveys were sent to key informants by name and title.

The questionnaires for both studies consisted of fixed response questions, including fixed alternative and ranked questions for responding firm demographic profiles as well as open-ended questions which allowed respondents to express thoughts and ideas not covered in the fixed format questions. The questionnaire also relied heavily on Likert-type 5-point scaled questions.

Population 2-U.S. Industry

An extensive literature review and web search identified 202 companies that may be involved in an extranet relationship or have networks under construction. Once a company was identified as a possible extranet user, an attempt was made to identify the appropriate contact person. Possible companies were identified in three ways. First, a list of companies identified as using extranets was compiled from the articles reviewed for this project. Second, several confirmed extranet users supplied the names of additional companies and individuals to contact. The last identification method was on the web sites of confirmed extranet users. Several sites provided lists of their business “partners.” The next step was to conduct an Internet search to locate web sites for the identified companies. For the majority of companies, contact information (address and phone information) was available on their web sites. If the contact information was not available, then a search was conducted via Hoover’s Online (www.hoovers.com) and GTE SuperPages (www.superpages.gte.net).

Initial contact was initiated with approximately 50 percent of the companies via e-mail, in an attempt to confirm address information and request an individual contact name. E-mail requests were sent to corporate communications and public relations personnel, sales and marketing departments, information systems and webmasters. Online feedback forms were used if direct e-mail contacts were not listed. Forty-five companies contacted in this manner agreed to participate and furnished a contact name; 18 companies denied the request either due to time constraints, or they were not participating in an extranet relationship at that time.

If the above methods were not successful in garnering the necessary company contact information, a library search was conducted. Company mailing information and individual contact names were found in the Corporate Yellow Book (1998), Hoover’s Guide to Computer Companies (1996) and Corp Tech’s Directory of Technology Companies (1998). The final mailing list included 236 potential contacts at 202 companies.

Results

Response Rates

For the forest products population surveyed (Pulp & Paper and Solid Wood Products), **Table 1** summarizes the number of respondents initially sampled, the adjusted sample size after accounting for

non-deliverable surveys (due to company closures, change of address or deceased) and adjusted response rates. All industry survey respondents were surveyed at the corporate headquarters level. Given that typical response rates for industrial studies range from 15-30 percent, a response rate of 18 percent in this study was considered adequate. Of the 223 that responded to the study, the 37 companies that had extranets in 1997 are included in this paper.

Table 1. Response Rates by Product Group

	Initial Sample Size	Adjusted Sample Size*	Number of Total Respondent Companies	Adjusted Response Rate
Pulp & Paper	300	281	45	16%
Solid Wood	1,000	982	178	18%
Total	1,300	1,263	223	18%
* Undeliverable or Unusable				

For the second study, of the 202 general industry companies surveyed, 17 surveys were returned as not-applicable or undeliverable for an adjusted response rate of 30 percent (56/185 respondents).

Respondents represented a diversity of industrial sectors including:

- | | |
|---------------------------|-----------------------------------|
| ?? Advertising | ?? Government research laboratory |
| ?? Aircraft | ?? Information technology |
| ?? Automobile | ?? Insurance |
| ?? Computer manufacturing | ?? Plastics |
| ?? Consulting services | ?? Retail sales |
| ?? Consumer products | ?? Semi-conductors |
| ?? Electric utility | ?? Software development |
| ?? Entertainment | ?? Telecommunications |
| ?? Financial services | ?? Textiles |

Included were the following companies:

- | | |
|--------------------------------------|----------------------------------|
| ?? Army & Air Force Exchange Service | ?? Digital Equipment Corporation |
| ?? BASF Corporation | ?? DuPont Company |
| ?? Boston Edison Company | ?? Fruit of the Loom, Inc. |
| ?? Chrysler Corporation | ?? GE Aircraft Engines |
| ?? Saatchi & Saatchi | ?? J.P. Morgan & Company |

?? McDonnell Douglas/Boeing
?? Novell

?? Texas Instruments
?? Sun Microsystems

As seen in **Figures 2 and 3**, respondents for both studies are skewed to large companies with greater than \$1 billion in sales and more than 2,500 employees in 1997. Using two-tailed t-tests, no statistical difference was found in sales or employee frequencies between the two respondent groups. P-values for these two tests were 0.91 and 0.51, respectively.

Figure 2.

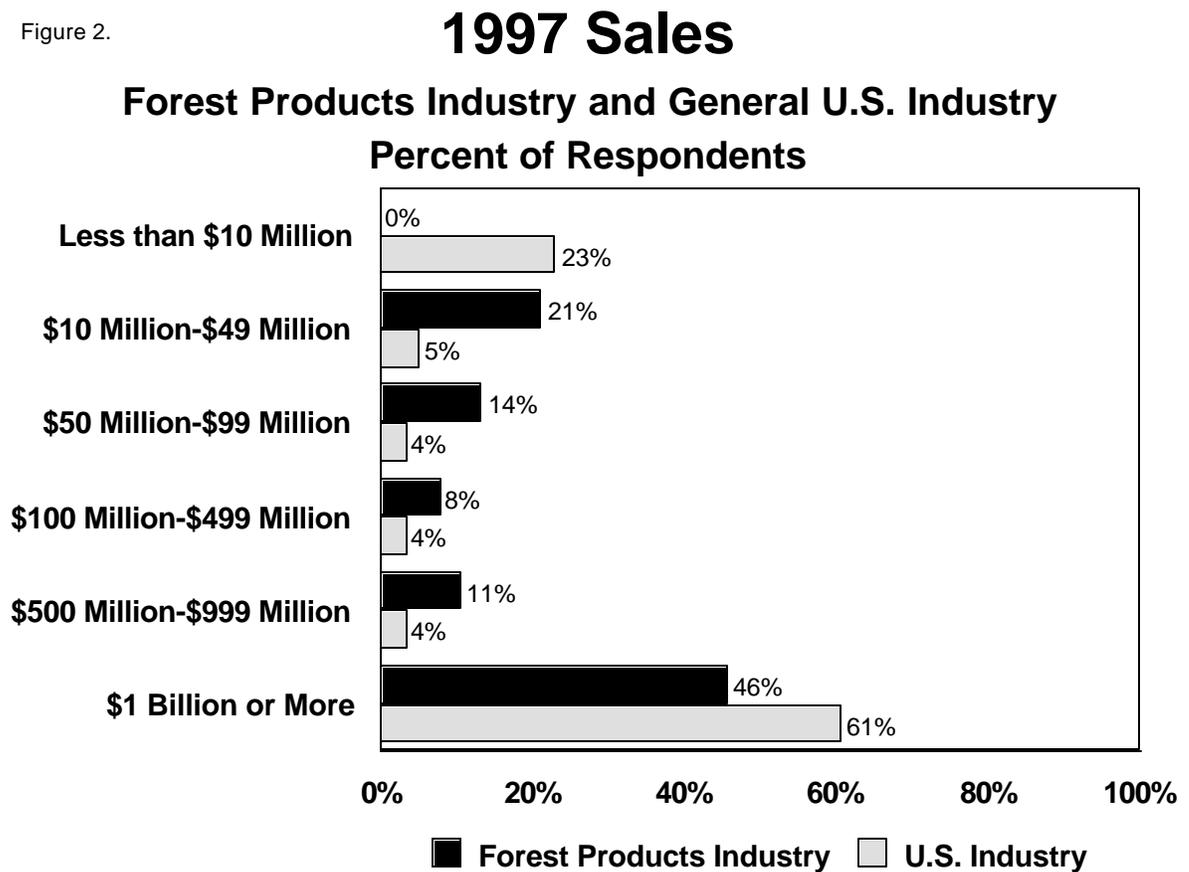
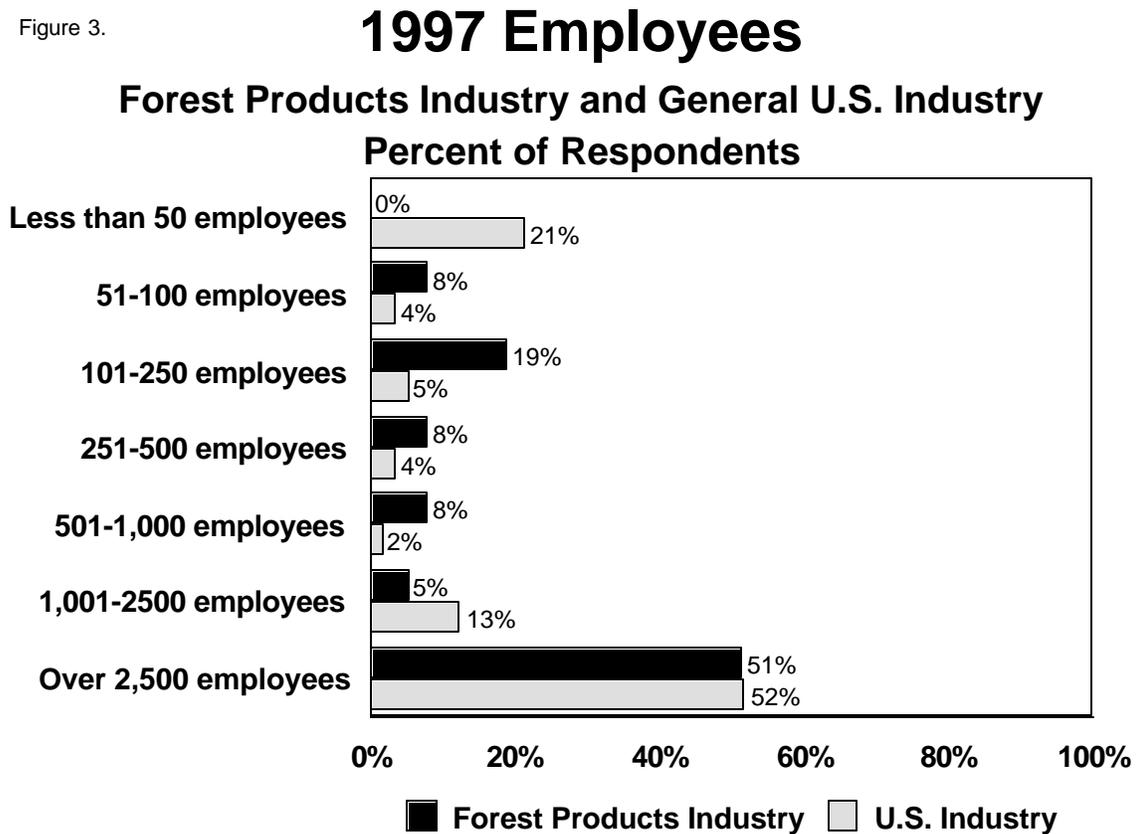


Figure 3.



Use of Extranets

As mentioned earlier, extranets link business partners with the goal of facilitating business exchanges. The range of activities that can take place include developing customer relationships, promoting company products and services and operating procedures and applications. Respondents were asked which applications their company used in 1997. No more than 30 percent of forest products industry respondents used any of the applications listed in **Figure 4**. Usage of all applications fell in a narrow range between 22 percent and 27 percent of respondents. Conversely, general U.S. industry respondents used all applications, except shipping notices, with higher frequencies. For example, the use of extranets for customer contacts was done by 71 percent of respondents, followed by product promotion (70 percent of respondents) and vendor contacts (59 percent).

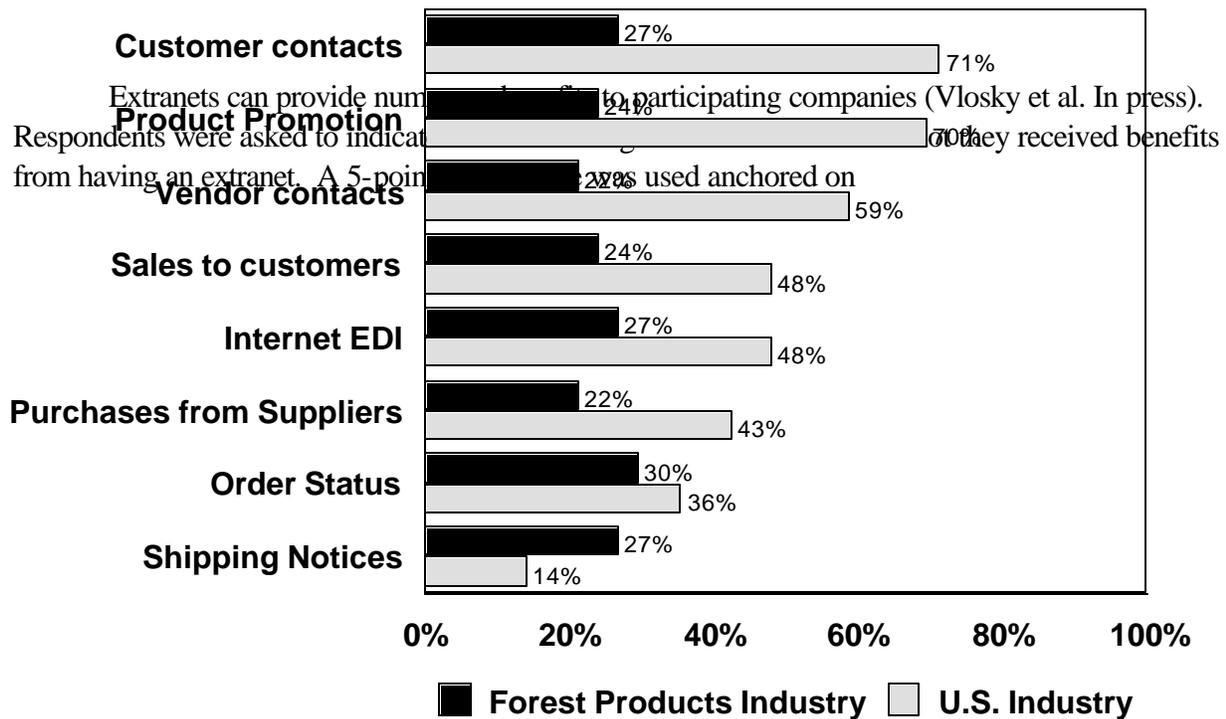
Electronic commerce using extranets is a natural progression of Internet- and World Wide Web-based commerce which are experiencing explosive growth. Many companies are conducting business solely on the Internet while tens of thousands of additional companies are discovering electronic markets as a means for promoting and selling products and services (Vlosky and Gazo 1996). Total Internet-based commerce is projected to be over \$1 trillion by 2002 (Cisco Corp. 1999). Business-to-business commerce, as opposed to consumer sales, by far comprises the bulk of Internet-based commerce with sales of over \$43 billion in 1998, over five times business-to-consumer Internet sales (NUA 1999). While less than a quarter of forest products respondents are using extranets for sales to customers or purchases from vendors, the percentages for the general U.S. respondents were 48 percent and 43 percent, respectively.

Overall, forest products respondents seem tentative in using extranets beyond a testing-the-waters phase. This behavior was supported in a study of U.S. forest products exporters (Pitis, 1999) where 57 percent of respondents believed that the wood products exporting industry lagged U.S. industry in general in Internet-based business application adoption.

Figure 4.

Use of Extranets in 1997

Forest Products Industry and General U.S. Industry Percent of Respondents



Benefits are shown in **Table 2** ranked in descending order by mean scores for forest products industry respondents. Highest ranked for forest industry respondents was increased timeliness of information (4.4/5.0), followed by greater company access by potential customers (4.3/5.0), greater exposure to potential customers (4.1/5.0) and increased access to industry information (4.1/5.0). General industry respondents also ranked timeliness of information first (4.5/5.0), closely followed by increased value to customers (4.4/5.0). Also ranked high were improved image of the company and delivering improved service to customers (both 4.2/5.0). Except for “greater company access by potential customers” and “greater exposure to potential customers”, general industry respondents had higher mean scores for benefits received. Using two-tailed t-tests, significant differences at $\alpha = 0.05$ were found for five of the benefits listed. The widest disparity in responses was with “lower costs of doing business” which was significant at $\alpha = 0.01$.

Table 2.

Benefits Received from Using Extranets

Forest Products Industry (n=35) and
General U.S. Industry (n=56)
(Mean score)

Scale: 1=Strongly Disagree to 5=Strongly Agree

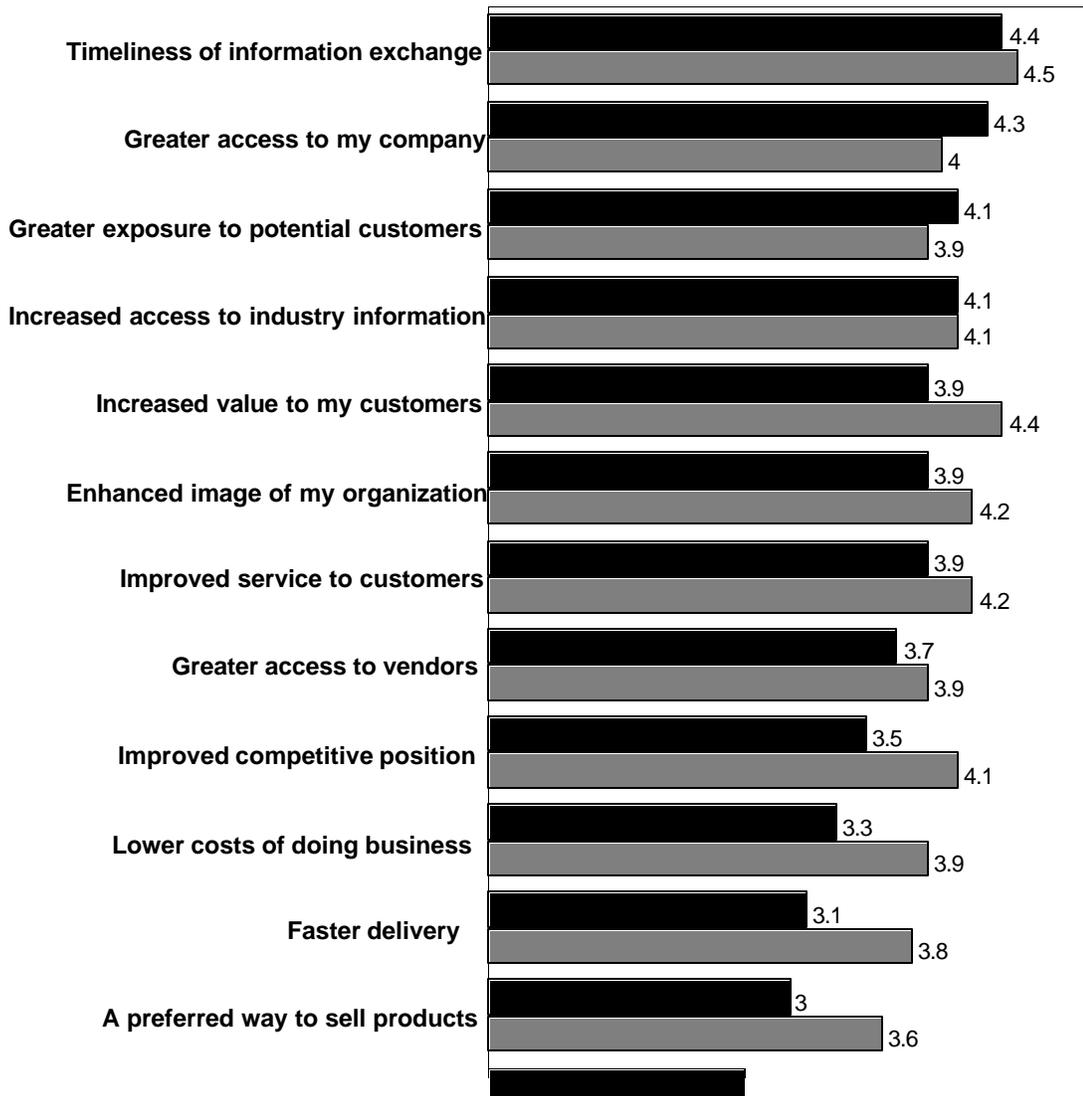
	Forest Products Industry	U.S. Industry	t-value	Significance * 0.05; **0.01
Timeliness of information exchange	4.4	4.5	-.29	ns
Greater access to my company by potential customers	4.3	4.0	1.34	ns
Greater exposure to potential customers	4.1	3.9	.77	ns
Increased access to industry information	4.1	4.1	-.23	ns
Increased value to my customers	3.9	4.4	-2.22	*
Enhanced image of my organization	3.9	4.2	-1.37	ns
Improved service to customers	3.9	4.2	-1.66	ns
Greater access to vendors	3.7	3.9	-.789	ns
Improved competitive position for my company	3.5	4.1	-2.39	*
Lower costs of doing business	3.3	3.9	-2.79	**
Faster delivery	3.1	3.8	-2.59	*
A preferred way to sell products	3.0	3.6	-2.50	*
Lower prices to customers	2.7	3.1	-1.58	ns

Figure 4.

Benefits from Using Extranets

Forest Products Industry (n=35) and
General U.S. Industry (n=56)
(Mean score)

Scale: 1=Strongly Disagree to 5=Strongly Agree



Another objective of both studies was to identify impediments or concerns associated or likely to be associated with implementing Internet technologies. Respondents registered a number of concerns about using extranets. As was found in a 1996 study (Vlosky and Fontenot 1997), concern about security of information ranked highest on the list for the forest products respondents (**Table 3**). Technical issues, availability of technical resources, cost to establish and maintain extranets and the required training of personnel are additional concerns for forest products respondents. Speed of access to the Internet and procedural issues (the need to change established procedures) were also ranked above 3.0, the neutral point on the 5-point Likert scale of concern (1=not a concern to 5=is of great concern).

The general U.S. industry respondents ranked five concerns above neutral, security of information (3.6/5.0), a lack of availability of technical resources (3.4/5.0), speed of access (3.4/5.0), the need to change established procedures (3.3/5.0) and the need to train personnel to support extranets (3.1/5.0). Except for speed of access and the need to change established procedures, the forest products industry respondents had higher levels of concern than the general industry. These higher levels of concern were significantly higher at $\alpha = 0.05$ for “cost” and at $\alpha = 0.01$ for concerns about loss of contact with customers and suppliers, loss of contact from the sales force and extranet profitability.

Table 3.

Concerns of Using Extranets

Forest Products Industry (n=35) and
General U.S. Industry (n=56)
(Mean score)

Scale: 1=Not a Concern to 5=Is a Major Concern

	Forest Products Industry	U.S. Industry	t-value	Significance * 0.05; **0.01
Security of sensitive information	4.0	3.6	1.31	ns
Availability of technical resources	3.5	3.4	.261	ns
Cost (expensive to set up and maintain)	3.4	3.0	2.00	*
Training of personnel	3.4	3.1	1.06	ns
Speed of access	3.3	3.4	-.57	ns
Need to change established procedures	3.2	3.3	-.37	ns

Conclusion

Internet-based technologies offer revolutionary tools for business development and management. As is the case with corporate America in general, the forest products industry is expanding its use of these technologies to conduct business, although at a slower pace. The World Wide Web is the primary vehicle to Internet access, providing forest products firms with a powerful promotional tool. In addition, the potential to use the Internet to facilitate sales and purchases is significant.

Beyond the Internet, extranets work by making information widely available and encouraging people to use it. As such, they tend to distribute decision-making responsibility -- sometimes even to the point of having suppliers, intermediaries and customers make (or at least initiate) decisions that have previously been held close to company headquarters. To be successful, extranets may require a change of business culture. Information that has traditionally been stored away and metered out judiciously becomes far more broadly available. The result is that information controllers find themselves with different jobs (or perhaps no jobs) -- and without the power associated with information control. The hierarchical management system common in businesses today flattens, and a more distributed or team-oriented management system evolves. Those ingrained in the "old" system may be highly resistant to the change required to fully recognize the value of extranets. Thus, adoption of this technology is a company-wide activity that will require full commitment from the company's current decision-makers.

Despite security considerations and potential cultural growing pains, applying Internet technologies to the forest products industry offers considerable opportunity. Many forest products companies already utilize some form of electronic information exchange to facilitate business activities. Internet-based technologies hold promise as a means of simplifying and reducing the cost of these activities. Companies can tailor technologies to their own unique needs within their companies, offering differing but relevant information to sales, marketing, production and other business units.

Extranets can extend key information to business partners throughout the supply and distribution chains, and can facilitate collaborative relationships with business partners widely separated geographically. Given the significant trend toward Internet applications in business in general, forest products companies that develop an Internet-based technology strategy will be better able to compete in the marketplace.

References

- Anonymous. 1998 (a). Leveraging the 'Net for business. *Communication News*. Jul. 1998. 36-37.
- Anonymous. 1998 (b). OneSoft Corporation. The extranet solution. in *Web-Weaving. Intranets, extranets and strategic alliances"*. (Lloyd, P. and Paula Boyle eds.). 55-67
- Anonymous. 1999. Business-to-Business Electronic Commerce: Opening the Market. Ovum Ltd. 13 January 1999, <<http://www.ovum.co.uk/ovum/news/exe3pr.htm>> (5 April 1999).
- Bayles, Deborah. 1998. *Extranets. Building the Business-to-Business Web*. Prentice Hall, Upper Saddle River, New Jersey.
- Bell, Steven, Mary Modahl and Gordon Lanpher. 1998. Maximizing Extranet Return. Forrester Report. <<http://www.forrester.com/ER/Research/Report/0,1338,106,FF.html#section157>>
- Cisco Corporation. 1999.
- Dalton, G. 1998a. Ford Turns To Extranet. *Information Week*. Aug. 1998. 30.
- Dalton, G. 1998b. Hyundai To Sell Auto Parts Over The Web. Jul. 1998. 34.
- David, B. 1998. Tool Will Help Managers Set Intranet, Extranet Access. *Information Week*. Mar. 1998. 26
- Gates, B. 1997. The digital nervous system. Extract from a speech at the Microsoft CEO Summit in Seattle, Washington on 8 May 1997. in *Web-Weaving. Intranets, extranets and strategic alliances"*. (Lloyd, P. and Paula Boyle eds.). 271-281.
- Greengard, S. 1997. Extranets - Linking Employees With Your Vendors. *Workforce*. Nov. 1997 28-33.
- Hibbard, J. 1998. Online Health Insurance. *Information Week*. Aug. 1998. 26.
- Hills, M. 1998. The definition and dynamics of intranets. in *Web-Weaving. Intranets, extranets and strategic alliances"*. (Lloyd, P. and Paula Boyle eds.). 3-16.
- Kim, A. H. 1998. Intra- and extra-netting at the Boeing Company. in *Web-Weaving. Intranets, extranets and strategic alliances"*. (Lloyd, P. and Paula Boyle eds.). 171-182.
- NUA Internet Surveys. 1999. http://www.nua.ie/surveys/analysis/graphs_charts/comparisons/ecommerce_us.html

Pitis, Olivian T. 1999. U.S. Forest Products Exporters and the Information Superhighway. Masters Thesis. Louisiana State University. Baton Rouge.

Punches, John and Richard Vlosky. 1998. "Internet, Intranets and Extranets as Business Tools" Proceedings of the 1998 Wood Technology Show & Clinic. Portland, Oregon. March 26.

Sinclair, P. 1998. Extranet Key To Support System. Information Week. Sep. 1998. 45-46.

Violino, B. 1999a. Grocery Extranet. Information Week. Feb 1999. 20.

Violino, B. 1999b. Kodak's Extranet Push -- Company shares key information with major business partners. Information Week. Mar. 1999.

Vlosky, Richard P. "eBusiness in the Forest Products Industry". In Press. Forest Products Journal.

_____ Renee Fontenot and Lydia Blalock. "Extranets: Impacts on Business Practices and Relationships". Journal of Business and Industrial Marketing. In Press.

_____ and Renee Fontenot. 1997. "The Internet and The Forest Products Industry: Current Status and Projected Trends." Forest Products Journal. 47(11/12):33-40.

_____ and Rado Gazo. 1996. "The Internet and the Forest Products Community: The Role of the Forest Products Society". Forest Products Journal. Vol. 46. No. 5. pp. 19-26. Cover and article.