Technology Transfer in the Hardwood Industry

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For the hardwood industry to remain competitive in a global economy, it is imperative that the industry evaluate and adopt technologies or new ways of doing business.

Transferring technology is often difficult to evaluate and its effectiveness not immediately known or measured by the participants. Although technology developers, transfer intermediaries, and technology end-users may have different views and concerns about innovation, strategies to bridge the differences between these groups are essential to the success of any technology transfer effort. For the hardwood industry to remain competitive in a global economy, it is imperative that the industry evaluate and adopt technologies (or new ways of doing business) that will provide them with an advantage. The first step in transferring new ideas or technology to the hardwood industry is to understand the best methods to reach managers who make these decisions and the important concepts that will impact the success of their operations in the future.

To evaluate the tech transfer process in the hardwood industry, Virginia Tech's Department of Wood Science and Forest Products, the U.S. Forest Service in Blacksburg, VA and the National Hardwood Lumber Association sought to understand how "new" knowledge, innovative techniques, improved technology, new products and new marketing information reaches hardwood sawmills.

A questionnaire was developed by faculty and evaluated by the US Forest Service and NHLA for clarity and completeness. The questionnaire was mailed with the August 2005 issue of *Hardwood Matters.* Approximately 80 were returned.

Respondents were located in more than 25 states of the eastern United States, and Canada. More than half of the mills had less than 50 employees, with only 20 percent responding that they had over 100 full-time workers. Nearly three-quarters of the respondents were the owner, president or vice president of the company, while 12 percent said they were the mill manager. The range of production of responding mills was 1.5 million to 60 million board feet with an average production of 12.3 million feet. This represents larger mills responding to the questionnaire because average production was reported by Bowe et al. (Forest Products Journal, 2002) at 7.5 million feet. Total respondents production was 887 million feet, which represents about eight percent of 2004's production of 11 billion feet.

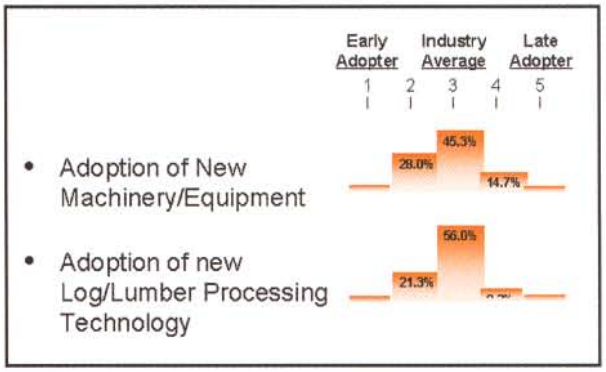

Figure 1. Self Characterization of Firms Adoption of Technology

Figure 1 illustrates that respondents characterized themselves slightly above average or average on the adoption of new technologies for equipment and technology. This is surprisingly similar to Rogers work on the adoption of innovations in which approximately five percent of individuals were classified as innovators and another 15 to 20 percent were early adopters. When asked their current attitudes towards new technology, 48 percent said they will try new technology providing someone they trust has tested it first with success. Thirty-six percent said will only use proven technology that is recognized as effective in the industry. Less than seven percent responded that they consider themselves pioneers with respect to trying new machinery in the hardwood industry.

Participants were asked their current attitude toward information on new markets or product development. More than 80 percent responded that they find updated market/product development helpful in their job duties, while only 10 percent were satisfied with the amount of information available.

Owners and managers were asked to rate the importance of motivating factors in seeking

technical information on new technologies or markets. Table 1 shows that increased profits, increased efficiencies and staying competitive were the highest rated items, while increased productivity and safety concerns were next. The lowest rated reasons for respondents to seek new information were changes in legal requirements and environmental concerns.

Table 1. Importance Ratings of Factors in Seeking New Technical Information

Motivating Factor	Average Rating
Increased profits	4.8
Increased efficiency	4.7
Staying competitive	4.7
Increased productivity	4.4
Safety concerns	4.2
Changes in current product markets	4.0
Seek new markets or clients	3.8
Changes in technology	3.7
Environmental concerns	3.5
Changes in legal requirements	3.4

1 = Completely Unimportant, 5 = Extremely Important

Hardwood owners and managers were asked to rate the importance of different sources of information for making them aware of new technologies, techniques or markets. Table 2 shows that plant tours, conversations with peers and equipment shows remain the top methods to learn about new innovations. When asked to list the major association or trade shows they attend, the top mentioned shows were the Forest Products Expo in Atlanta, the NHLA National Convention, the VPFA Richmond Machinery Expo, the HMA National Conference and their regional meetings.

Respondents indicated trade associations also play a vital role in their learning about new technologies or markets. Traditional educational methods such as seminars, short courses, conferences and training sessions also are important methods to transfer information on new technologies. Scientific journals, universities or government research personnel, government publications and company meetings and extension agents were seen as the least likely source on new information for the industry. This indicates that there exists an innovation gap between the developers on new technology (government and universities) and those who should be adopting it.

Participants were asked how they prefer to learn about new technologies (Figure 2). The highest rated learning style was seeing the technology in use. This was followed by demonstrations and trying it out, or reading and trying it out. The results indicate most respondents wanted to see the technology in use before they would consider it. This also supports the finding that plant tours and equipment shows are the primary ways to promote the new technologies.

The least effective learning style was trial and error.

Table 2. How Valuable are Sources of New Technology, Techniques or Markets?

Source	Mean Rating
Plant tours	4.2
Conversations with peers	3.9
Equipment shows	3.8
Trade magazines	3.5
Trade association newsletters	3.5
Hands-on workshops	3.4
Competitors	3.4
Educational seminars / short courses	3.3
Conferences	3.3
Training sessions	3.2
Sales representatives	3.2
Videos	2.9
Web sites	2.8
Personal visits from consultants	2.7
Scientific journals	2.6
University or other research personnel	2.6
Company meetings	2.5
Company publications	2.4
Other newsletters	2.4
Government publications	2.4
Extension Agents	2.1
Conversations with non-sawmilling people	2.0

1 = Not valuable at all, 5 = Extremely valuable

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Managers and owners were then asked to rank different forms of communication tools in their preferences in receiving information for their businesses. The highest rated form was one-on-one personal meetings or conversations and was followed by one-on-one phone conversations as the second method. These were followed by 3) letters/literature/manuals sent by conventional mail, 4) roundtable group discussions, 5) email, 6) classroom instruction, 7) conference calling and 8) video conferencing was ranked as the last method on how they preferred to receive information. Nearly half of the respondents indicated they had used an outside consultant to help them improve their business practices.

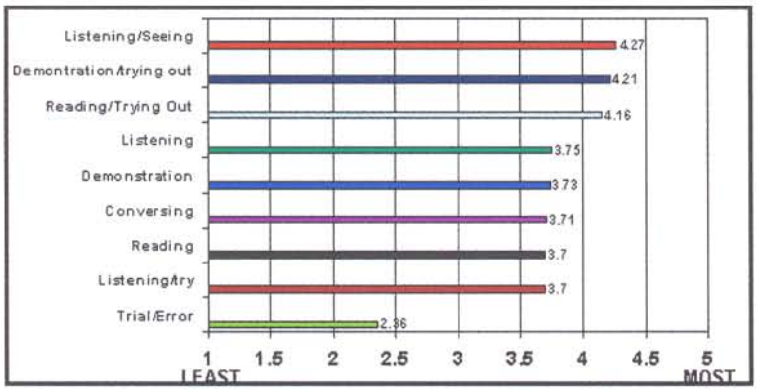

Figure 2: Ratings of Effectiveness of Learning Styles

Participants were asked to indicate their previous, current and future interests from a broad list of topic areas (Figure 3). In the past the top interests were community activism, tooling, management-labor relations, lumber drying and production scheduling. Current interests lie with production flow improvements, mill safety, lumber pricing, new equipment capabilities, market analysis and new market opportunities, and log breakdown and lumber recovery. In the future, they believe the most interest will be in new equipment capabilities, lumber drying, information technology training, tooling, human resource skills, market analysis and management-labor relations (Figure 3). To remain competitive in a global economy, the hardwood lumber industry needs to be aware of the latest available technological and market innovations.

Personal contact is the preferred method of reaching hardwood owners and managers.

The results of this study indicate personal contact is the preferred method of reaching hardwood owners and managers with information on new technologies and markets. Respondents represented, on average, larger mills, with an average production of 12 million feet. Because larger companies are often the first to adopt new innovations, the results should indicate the best methods to reach this group.

Figure 3. Previous, Current and Future Interests in Innovation

Participants reported they follow Roger's adoption of innovation theory with roughly five percent classifying themselves innovators. The bottom line (profits, efficiencies, and staying competitive) was the primary reason respondents pursued information on new technologies or markets. Plant tours, conversations with peers and equipment shows remain the top methods to learn about new innovations. Participants indicated they want to see new technologies in use before adopting them.

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