

CINTRAFOR NEWS

THE CENTER FOR INTERNATIONAL TRADE IN FOREST PRODUCTS

Material Substitution in the US Residential Construction Industry: 1995 – 2005

By Indroneil Ganguly, CINTRAFOR graduate student and Dr. Ivan Eastin CINTRAFOR director.

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In 1995 CINTRAFOR initiated a longitudinal study to assess material substitution within the residential construction industry, determine the importance of a range of softwood lumber attributes and determine builder's satisfaction with individual softwood lumber attributes. The CINTRAFOR material substitution studies were carried out in 1995, 1998, 2001 and most recently in 2005. These studies not only provide interesting insights into the pattern of material substitution within the residential construction industry over time, but perhaps more importantly, they document builder's satisfaction with the primary softwood lumber attributes. Often it is builder satisfaction (or more importantly, dissatisfaction) that drives the material substitution process. Unique to the 2005 study, we asked a range of questions to assess builder's awareness and use of certified wood in residential construction.

In the 2005 study, 240 residential builders from across the US were randomly selected within a stratified sample to ensure that the proportion of respondents from each state was similar to the proportion of housing starts from each state. The respondents were segmented into three regions (west coast, central states and east coast) based on the geographic location of their firm. The survey results indicate that 52% of responding firms were located in the western US and 48% were located in the eastern US. The survey responses show that 54% of the builders work primarily in urban/suburban areas, 34% work primarily in small towns while the remainder (12%) work primarily in rural areas. Overall, single family construction represented approximately 78% of the respondent firm's total annual revenue, while remodeling and home improvement comprised 11% of total revenue, commercial construction represented 5% of total revenue and multi-family construction accounted for another 5%.

The preliminary survey results suggest that the use of substitute structural materials among residential builders has moderated since 1995. Virtually all of the survey respondents indicated that they have used at least one substitute for structural softwood lumber. More importantly, the average number of substitute materials used by residential builders has increased from 4 in 1995 to 7 in 2005 (a number that has been relatively stable in the last three surveys). Interestingly, the percentage of builders

who reported using structural insulated panels, panelized wall systems and finger jointed lumber showed substantial increases in 2005 (Figure 1). More importantly, these were the only substitute products that registered consistent gains across all four of the substitution surveys. In contrast, builder's use of wood I-joists, steel framing, Parallam, TimberStrand lumber and glulam beams declined substantially in 2005.

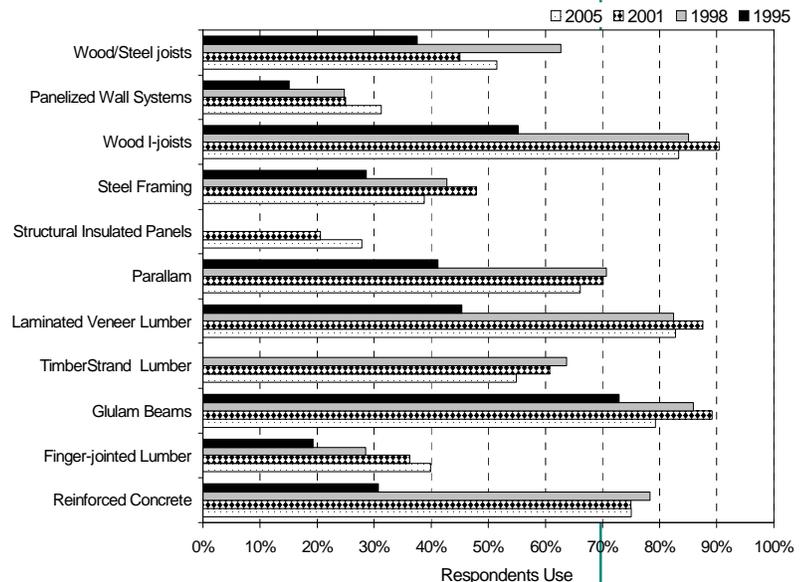


Figure 1. Trend in respondents' use of specific materials in residential framing applications.

In comparing the use of the primary structural materials between 1995 and 2005, it can be observed that the usage of softwood lumber has declined substantially across all three of the main structural end-use applications (Table 1). In flooring applications, softwood lumber use declined from 59% to 39% over the past ten years. The primary gains in this end-use application were for wood-steel open web trusses and wood I-beams. However, a comparison of the 2001 and 2005 survey data shows that builder's use of wood I-joists declined from 43.2% to 37% whereas their use of wood-steel open web trusses remained steady at 12.7% and their use of softwood lumber stayed constant at 38.7%. For load bearing walls, softwood lumber again showed a dramatic decline between 1995 and 2005, dropping from 93% to 77%. In contrast, finger-jointed lumber and steel framing

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Director's Notes:

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The Center for International Trade in Forest Products addresses opportunities and problems related to the international trade of wood and fiber products. Emphasizing forest economics and policy impacts, international marketing, technology developments, and value-added forest products, CINTRAFOR's work results in a variety of publications, professional gatherings, and consultations with public policymakers, industry representatives, and community members.

Located in the Pacific Northwest, CINTRAFOR is administered through the College of Forest Resources at the University of Washington under the guidance of an Executive Board representing both large and small companies, agencies, and academics. It is supported by state, federal, and private grants. The Center's interdisciplinary research is carried out by university faculty and graduate students, internal staff, and through cooperative arrangements with professional groups and individuals.

Why International Market Research is Critical to the US Forest Products Industry

"Monitoring the international markets allows us to track existing markets, assess new export opportunities, and identify emerging competitors. Even though our exports have declined substantially, we continue to follow events in the international markets that could impact our operations or that could provide new export opportunities."

(Anonymous forest products exporter responding to CINTRAFOR survey)

The sustained strength of the US housing market has led many forest products manufacturers to re-evaluate the relevance of international markets to their business strategy. In the past, the US forest products industry often viewed international markets as a safety valve that provided additional demand when domestic markets weakened. This ambivalence towards export markets is reflected in the perception of foreign customers that US forest products manufacturers are "inners and outers" who place little value on establishing and maintaining strategic business relationships with their international customers. What has changed recently is the unusual length and strength of the current residential construction boom, combined with the unexpected strength of the US dollar during much of the boom. The loss of international competitiveness caused by the strong US dollar has led many forest products manufacturers in the US to abandon export markets entirely. Perhaps more significantly, this has resulted in the perception that international market research is less relevant. In my view this is a strategic mistake.

If anything, international market and economic research has become more important for the forest products industry as the market for wood products has become increasingly global in nature. Market and economic research is important in helping industry managers monitor four important aspects of their business environment: identifying business trends in the domestic markets, identifying changes in the business environment in traditional export markets, identifying emerging markets and evaluating potential export opportunities, and identifying emerging competitors. In addition, the information generated from international market and

economic research provides critical support to strategic decision making. Over its history, CINTRAFOR has actively supported a research agenda to provide timely



and relevant research and information in each of the areas mentioned above.

Identifying Business Trends in Domestic Markets

Understanding the dynamics of the domestic market for wood products is key to the long-term competitiveness of the US forest products industry. CINTRAFOR has taken a lead role in understanding use, substitution and end-user perception of structural building materials through a pair of important longitudinal studies of material use in residential construction. This summer we completed data collection for the fourth survey of residential builders regarding their changing use of softwood lumber in structural applications. We also concluded our third survey of material use by home builders and deck builders in exterior decking applications. In addition, CINTRAFOR has provided key support for the CORRIM project which has just begun Phase 2 of their research agenda on life cycle assessment of residential building materials.

Identifying Changes in the Business Environment in Traditional Export Markets

CINTRAFOR has always viewed export markets for US forest products from a long-term perspective. While US exports tend to fluctuate over time, access to timely information on key foreign markets is critical to maintaining our competitiveness over time in these markets. This is particularly true in times when a downturn in the domestic market forces forest products managers in the US to increase their reliance on exports to foreign markets to supplement weak demand in the domestic market. In recognition of the cyclical nature of the economy, CINTRAFOR has also maintained an aggressive research program designed to identify changes in the business environment and track key trends in the forest products sectors in established export markets. In the largest market for wood products, Japan, CINTRAFOR works closely with the Softwood Export Council and the American Forest and Paper Association (and their staff in their Japanese offices) to implement our research program. Recent projects have looked at evaluating the opportunity to expand the demand for Douglas-fir beams within the traditional post-and-beam industry, assessing the newly emerging "powerbuilder" segment within the residential construction industry, and monitoring the increased efforts of the Japanese government to expand the range of subsidies designed to increase the competitiveness of the domestic softwood lumber industry. In particular, we are following the apparent effort to promote domestically grown wood within the draft green building program called CASBEE by including transportation distance as a key assessment criterion.

CINTRAFOR has also been strongly engaged in China by providing administrative support for the US-China Build program. Recent research has focused on describing distribution channels for value-added wood products in China as well as understanding the implications of the recent ban on the sale of unfinished shell housing in Shanghai for US exporters of value added wood products. CINTRAFOR is also a co-sponsor of the upcoming China Boom conference which will be held in Vancouver, British Columbia in January 2006.

Identifying Emerging Markets and Evaluating Potential Export Opportunities

Recognizing that the strong US dollar and increased competition in traditional export markets can erode the competitiveness of US exporters, CINTRAFOR conducts on-going research to identify and describe emerging markets for US wood exports. While this type of research can be time consuming, our strong cadre of international graduate students provides substantial support in this program area. Our latest research projects describe opportunities for US wood products in India and Vietnam with future projects looking at potential market opportunities in Southeast Asia.

Identifying Emerging Competitors

Finally, CINTRAFOR conducts research to identify emerging competitors in both international markets as well as the domestic market. For example, an upcoming CINTRAFOR project will take a closer look at the competitive threat posed by European softwood lumber exporters in the US market. While European softwood lumber exports have generally been limited to non-structural products sold into east coast markets, European companies are now looking to expand their exports to include dimension lumber and west coast markets. Additionally, the recent strength of the Canadian dollar (based on the informal designation of the Canadian dollar as a petro currency) has changed the competitiveness of Canadian wood products in Japan and China.

In summary, CINTRAFOR is committed to maintaining its research agenda to support the US forest products industry in identifying and evaluating international markets and export opportunities for US wood products while providing critical information to support their understanding of how new trends and policies might impact their international competitiveness. ▲



China Conference Deadline Approaching

The deadline for the early bird registration rate for the China Boom conference is quickly approaching. For all of our readers who are interested in attending this conference, I strongly urge you to consider registering as quickly as possible. With the holidays here, it's easy to let the registration date pass unnoticed. The conference organizing committee has put together an extraordinarily strong slate of speakers with extensive experience in China. This conference provides an opportunity to get up-to-date

information on one of the most dynamic markets in the world. In addition to the knowledgeable speakers, the conference also provides an opportunity to informally meet and discuss a broad range of topics with experienced managers from across the forest products industry. For more information on the China Boom conference, please visit the CINTRAFOR website or feel free to give us a call. I look forward to talking with many of our CINTRAFOR supporters at the conference.



Meet CINTRAFOR's Graduate Students

CINTRAFOR relies heavily on its talented pool of graduate students for the myriad of research that we do. Our students come from a variety of professional backgrounds and geographic areas. This year we are pleased to work with the following:

CINTRAFOR graduate students have degrees and/or certificates in the fields of:

- Economics
- Engineering
- Environmental Management
- Forestry
- Furniture Design
- International Development Policy & Mgt.
- International Studies
- Plant Science
- Restoration Ecology
- Wood Science
- Zoology

CINTRAFOR graduate students have professional experience in the fields of

- Carpentry
- Economics
- Forest use Planning
- International Policy
- Marketing
- Teaching

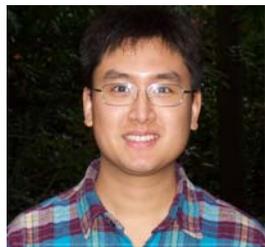


James Barr (USA)

I joined CINTRAFOR in the fall of 2004. Previously I obtained a BS in forestry from the University of New Hampshire where I graduated with honors and also obtained a

minor in environmental and resource economics. After working briefly as a forest technician, I decided to pursue a MS in forest economics to better achieve my career goals of working in the areas of forest land management and forest investment.

Working with CINTRAFOR has given me the unique opportunity to gain valuable work experience while obtaining my masters degree. I have thus far had the pleasure of co-authoring two papers with my advisor Dr. John Perez-Garcia, one pertaining to Washington's sawmilling industry and another examining Washington's export of forest products. Currently we are working on a project with a global outlook that examines carbon accounting methods for wood products. My thesis work focuses on analyzing timber sale data to examine which attributes have been influencing final bid prices on Washington sales dating back to 1989.



Jeff Xiaozhi Cao (China)

I am a second-year PhD student in Forest Products Marketing (FPM), working with Dr. Ivan Eastin. Currently I am involved in several studies with a specific focus on China, includ-

ing distribution channels for value-added wood products, furniture use of wood products, and furniture industry innovation and new product development.

Prior to attending CINTRAFOR, University of Washington, I was awarded an M.S. in Wood Science (major in FPM) from Oregon State University, Corvallis, OR. in 2004; and an M.S. in Wood Science and Technology (major in furniture design and manufacturing) from Nanjing Forestry University (NFU), China, in 2002. I earned my bachelor degree in furniture and interior design from NFU in 1999.



Indroneil Ganguly (India)

I am a Ph.D candidate in marketing with a concentration in international trade and market modeling of forest products. My PhD research involves developing a market forecast model for

forest product diffusion. My research interests range from exploring the potential of international markets to analyzing domestic markets and developing visual tools to aid positioning and market segmentation by forest industries. Recently, I have co-authored a CINTRAFOR working paper titled "Material Use in the US Deck Market: An Assessment of the Market Potential for Alaska Yellow Cedar". My current projects include analysis of material substitution trends in residential construction and decking, and exploring the potential of India as a market for US wood based products.

I have a Certificate in International Development Policy & Management from the Daniel J. Evans School of Public Affairs, University of Washington. I received my undergraduate degree in economics and an MBA with specialization in marketing. I worked for the Government of India as a "Young Professional" from 1998 to 2000, and later, from 2000 to 2002, with a leading NGO as the manager of marketing and research. During this period I worked on economic, social and sustainability aspects of forestry programs in India. The recent awards that I have received include the Lawrence Ottinger Forest Products Endowed Fellowship and the Simpson Centennial Endowed Scholarship in Forest Products Business from the College of Forest Resources (2002 – 2003) and a scholarship for studies abroad from Calcutta University (2002).



Hideaki Kubota (Japan)

I am a first year graduate student at CINTRAFOR in the College of Forest Resources, pursuing Master's degree in Forest Economics. I graduated from Keio University with a Bachelor's degree in

business and commerce. I joined Reforestation volunteer activities held by a non-profit organization in my undergraduate days, which inspired me to go to CINTRAFOR and study economic and ecological problems related to forestry. My graduation thesis for my BA was an analysis of the influence of environmental preservation in the



Pacific Northwest region on Japanese softwood trade.

I am now working as a research assistant with Dr. John Perez-Garcia on a projection study of pulp production and paper and paperboard consumption. As a research assistant, I would like to deepen my knowledge about the pulp and paper industry. My current research interest is in the international trade of forest products involved with environmental problems and in the productivity in the pulp and paper industry.

Toru Nakamura (Japan)

I graduated from Tokyo University in Japan in 1998 with a BA in Forest Environmental Science. Afterwards, I worked as a Japanese government official in the Forestry Agency, gaining experience in planning and manage-



ment of the Japanese national forest. For the last two years, working in the Ministry of Agriculture, Forestry and Fisheries, I have been engaged in negotiations on Free Trade Agreements with Mexico and Asian countries such as South Korea, Thailand, Philippines and Malaysia.

Supported by the Japanese Government Long-Term Fellowship Program, I am starting my master's project under the guidance of Dr. John Perez-Garcia. I plan to focus on the analysis of management costs and improving efficiency for private forest owners from both economic and financial aspects.

Daisuke Sasatani (Japan)

I am a master's student of forest products marketing at CINTRAFOR. I am originally from Osaka, Japan. I received my Master of Environmental Management from the School of Forestry and Environmental Studies at



Yale University. My current focus is on the trends to promote the increased use of domestic timber species in Japan. My recent work also includes niche market opportunity for Alaskan forest products in Japan and the trends of residential housing industry during post-bubble era in Japan.

Elizabeth K. Scott (USA)

My graduate work in forest products marketing is very exciting as I am able to bring together my interests in marketing, design and renewable resource management. The direction of my Ph.D. research effort



is innovation/branding in the U.S. residential hardwood flooring market. It continues to be a privilege to work under the direction of Dr. John Perez-Garcia.

Prior to joining the program at CFR, I earned an MBA from Seattle University and an MA from the UW School of Marine Affairs. My work experience includes my role as the Pacific Division Marketing Manager at Sea-Land working mainly with forest products exports, seven years teaching marketing and international marketing at the college level and five years as an assistant director for Academic Programs at the UW.

Mihyun Seol (Korea)

My dream is to become a professor in environmental sciences. I grew up in Seoul, South Korea, and completed an M.S. in Forest Economics (2001) and a B.S. in Forest Science (1998) at Seoul



National University (SNU). At SNU, my professional activities included teaching assistant, research assistant, and Vice President of college student association. After graduation, I pursued my interest in lecturing and offered sociology classes to high school students. I also started my own business and became the CEO of an online education company.

I came to the University of Washington in 2004, and now am working with Dr. Ivan Eastin toward a Ph.D. degree in Forest Products Marketing. My research interest comes as a combination of marketing, sociology and E-business. I am interested in studying the effectiveness of the Internet as a marketing tool in delivering eco-messages.

Yuan Yuan (China)

I studied in Nanjing Forestry University with a major in Furniture and Interior Design and a minor in Economics for my B.A. and M.S. During graduate study, I received an internship in a foreign trade company in China



dealing with furniture quality control. At the same time, I participated in a research project sponsored by the Forestry Bureau of China focusing on macro control of timber distribution in China.

I have joined CINTRAFOR as a doctoral student working with Dr. Ivan Eastin in forest product marketing. My research goal is not quite settled yet, but I am interested in the environmental marketing and certification of forest products in developing countries, especially in China. ▲

CINTRAFOR graduate student research projects are focusing on:

- Analytical approaches to solve marketing problems
- Community forest management
- Distribution channels for wood products in China
- Identify niche market opportunities in Japan
- PNW log export markets
- Sustainable development
- Trade flow policy for forest products
- Washington's sawmill industry

Table 1. Material use for major structural end-use applications between 1995 and 2005.

		Softwood Lumber	FJ Lumber	Wood Truss	Wood I-Joists	Steel Framing
Floor Joists	1995	59%	0%	16%	23%	0%
	2005	38.7%	1.2%	12.6%	37%	1.1%
Load Bearing Walls	1995	93%	4%	0%	0%	0%
	2005	76.8%	4.2%	6.3%	0.9%	4.0%
Roofs	1995	51%	0%	46%	2%	1%
	2005	39.7%	0.5%	57.3%	1.3%	1.3%

and roof trusses. While the use of trusses increased substantially between 1995 and 2005, the overall use of softwood lumber (which is also used to make roof trusses), held steady at 97%.

In an effort to gauge builder satisfaction with softwood lumber, the survey respondents were first asked to rate the importance of thirteen softwood lumber attributes in the material specification process using a Likert-like scale of 1 to 7 (where a rating of 1 meant that the attribute was not important and a rating of 7 meant that the attribute was very important). Builders were then asked to rate their satisfaction with softwood lumber along each of the previous identified attributes using a Likert-like scale of 1 to 7 (where a rating of 1 meant that they were very dissatisfied and a rating of 7 meant that they were very satisfied). Builder satisfaction with softwood lumber can be assessed by looking at the gap between the average importance ratings and the corresponding satisfaction ratings. Large gaps for important attributes suggest that dissatisfaction with these attributes are driving the material substitution process to some extent. The research results show that builder dissatisfaction is greatest for the attributes that are rated as being most important: lumber straightness, lack of defects in lumber, price stability, lumber strength and overall price. This finding is consistent with the results obtained in the previous material substitution studies. However, the average size of the importance-satisfaction gap declined substantially across all five of the primary attributes during the period 2001 to 2005; dropping from 2.7 to 1.7 for straightness, from 2.4 to 1.5 for lack of defects, from 1.4 to 1.1 for price stability, from 1.5 to 1.0 for lumber strength and 1.2 to 0.9 for overall price. These results suggest that while builders continue to be concerned with the quality and price

of structural softwood lumber, their satisfaction with these attributes has increased substantially since 2001. In 2005, a series of questions related to builder's awareness and usage of environmentally certified wood products was added to the survey. The results show interesting differences in the awareness and usage level among builders operating in different regions of the country (Table 2). The awareness of certified wood products was much higher in the west coast states compared to eastern or the central regions of the country. Approximately 77% of the builders in the west coast states reported that they are aware of environmentally certified wood products, whereas, the awareness declined substantially to 42% and 35% for builders located in the eastern and central regions, respectively. Moreover, among those builders who were aware of certified wood products, the percentage of builders who actually use environmentally certified softwood lumber was also higher for builders located in the west cost states (70%) as compared to the builders located in the central region (38%) and the eastern region (28%). Among those builders who reported using environmentally certified lumber, the average percentage of homes framed with environmentally certified lumber was approximately 50% overall, with 15% of the survey respondents accounting for 100% of the houses built using environmentally certified lumber. Clearly a major factor in the decision to use environmentally certified lumber is the price premium that is often charged for certified lumber. The survey results revealed that only 17% of the respondents in the eastern region and 29% of the respondents in the central region believe that their customers would be willing to pay higher prices for environmentally certified lumber. However, builders operating in the west coast states reported that they thought half of their customers would be willing to pay a premium for a house built using certified lumber. The survey results clearly suggest that the awareness of environmentally certified lumber among builders and home buyers is much higher in the west coast states as compared to the other regions of the country. Moreover there is also a clear indication of a higher proportion of usage of certified lumber in west coast states relative to the other regions of the country. Additional analysis of the survey data could help us better understand the market dynamics that support this higher usage of certified lumber in the west coast states. ▲

Table 2. Builders awareness and use of environmentally certified softwood lumber

	West Coast	Central States	East Coast
Awareness of certified wood	77%	35%	42%
Percentage of home buyers willing to pay a premium for a home built using certified wood	50%	29%	17%
<i>Of those respondents who were aware of certified wood:</i>			
Use of certified wood	70%	38%	28%
<i>Of those who actually use certified wood:</i>			
Average percentage of homes framed with certified wood	56.4%	35.5%	51.4%

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