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U.S. demand for certified tropical hardwood products

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U.S. DEMAND FOR CERTIFIED TROPICAL HARDWOOD PRODUCTS

A Thesis
Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for degree of
Master of Science

in

The School of Renewable Natural Resources

by
Shadia Duery
B.S., Zamorano University, 2001
May 2006

DEDICATION

At this point of my life I would like to say: thanks to life because it has given to me so much. As we say in Spanish "*gracias a la vida, que me ha dado tanto*". One of the things that I cherish most is the friends that life has given to me; they are my treasure and I am what I am because of the contribution of each one of them.

This thesis is dedicated to all my friends that were there with me in many different ways during the process of writing this thesis: my mother Carmen (my best friend), my brother Roberto with his courage in life, Caro the friend that always gives me the best advice, Christian, the friend that understands my eccentricities, and Valeria the friend that is the eternal smile in my life. Thank you, Rich for being my mentor and friend during these two and a half years. Thank you, Sanna and Francisco, my co-workers and great friends, for all your support during this quest.

If I mentioned all my friends, the pages of this thesis would double; this small accomplishment is dedicated to all of them.

ACKNOWLEDGEMENTS

A Master thesis is written by one person but it is the effort of many. In this case, my deepest gratitude is for my major professor Dr. Richard Vlosky. He has been of great help as a mentor and friend during this period. He helped me to develop my coursework, he taught me to prioritize and to be efficient. His understanding in the hard times when I was feeling that I lost direction and his trust and belief that I was able to succeed was the motivation for me to finish my thesis.

TABLE OF CONTENTS

DEDICATION	ii
ACKNOWLEDGEMENTS	iii
LIST OF TABLES	vii
LIST OF FIGURES	vii
ABSTRACT	xi
PROBLEM STATEMENT AND STUDY OBJECTIVES	1
Problem Statement	1
Study Objectives	3
Literature Cited	3
1. RESEARCH OVERVIEW: WORLD TROPICAL HARDWOOD RESOURCES ...	4
Introduction	4
Major Tropical Forest Regions	4
Neotropical Tropical Forest	4
Afrotropical Tropical Forest	5
Indomalayan Tropical Forest	6
Australian Tropical Forest	6
Tropical Hardwoods of the World	6
Tropical Hardwood Trade Flows	7
Supply of Tropical Hardwood Products	8
Demand for Tropical Hardwood Products	8
Tropical Primary Wood Products Trade	13
Tropical Secondary Wood Products Trade	19
Environmental Issues	21
Deforestation	22
Illegal Logging	28
Summary	29
Literature Cited	30
2. RESEARCH OVERVIEW: FOREST PRODUCTS CERTIFICATION	34
Overview	34
Chain of Custody	35
Major Certification Schemes	37
Forest Stewardship Council (FSC)	37
Sustainable Forest Initiative (SFI)	40
Program of Endorsement of Forest Certification (PEFC)	42
Canadian Standard Association (CSA)	43
Comparison of Major Certification Schemes	45
Principles Applied by Major Schemes	45
Certified Forest Distributions among Regions	49
Summary	50

Literature Cited	51
3. RESEARCH OVERVIEW: U.S. MARKETS FOR CERTIFIED AND NON-CERTIFIED TROPICAL HARDWOOD PRODUCTS	54
Overview of the U.S. Tropical Hardwood Products Market	54
U.S. Imports of Tropical Hardwoods (Certified and Non-certified)	55
U.S. Tropical Imports by Country and Product	57
Channels of Distribution	61
Certification Trends in Distribution Channels	67
Summary	68
Literature Cited	69
4. RESEARCH RESULTS: U.S. DEMAND FOR CERTIFIED TROPICAL HARDWOOD PRODUCTS: THE SUPPLY CHAIN MEMBER PERSPECTIVE	72
Introduction	72
Recall of Study Objectives	72
Forest Products Certification from the U.S. Perspective	72
Chain of Custody	73
Overview of the U.S. Supply Chain Members	75
Certification Trends in Distribution Channels	79
Methodology and Materials	81
Sample Characteristics	81
Survey Development	82
Data Analysis	82
Results	83
Survey Response Rate	83
Discussion	95
Implications	98
Limitations and Future Research	99
Literature Cited	99
5. RESEARCH RESULTS: U.S. DEMAND FOR CERTIFIED TROPICAL HARDWOOD PRODUCTS: THE BUILDER AND ARCHITECT PERSPECTIVE...	102
Introduction	102
Recall of Study Objectives	102
Forest Products Certification from the U.S. Perspective	102
Chain of Custody	103
Overview of the U.S. Builders and Architects Sector	106
Certification Trends in Distribution Channels	106
Methodology and Materials	107
Sample Characteristics	107
Survey Development	107
Data Analysis	108
Results	108
Survey Response Rate	108
Discussion	121
Implications	124
Limitations and Future Research	124

Literature Cited	125
GENERAL CONCLUSIONS	127
Implications.....	130
Limitations and Future Research	131
Literature Cited	131
APPENDIX A: SUPPLY CHAIN MEMBERS SURVEY.....	132
APPENDIX B: BUILDERS AND ARCHITECTS SURVEY	140
VITA.....	148

LIST OF TABLES

1. Tropical proportion of total imports by major ITTO importers (2003)	13
2. Average prices of ITTO countries exports of tropical logs (2002-2004)	15
3. Summary of tropical primary wood products world trade (2003)	19
4. Secondary products of tropical species categories and international trade nomenclature classification.....	20
5. Direction of trade of secondary tropical hardwood products for main partners, 2002 (million US\$)	21
6. Import value of primary and secondary processed tropical timber products by the European Union, Japan and United States of America (1995-1999).....	22
7. World deforestation rates by continents and major countries (1999-2000).....	27
8. Certified forest area and Chain of Custody distribution under the Forest Stewardship Council (2005)	38
9. Certified forest area and Chain of Custody distribution under the Program of Endorsement of Forest Certification (2005)	43
10. Major forest certification schemes, area certified and their scope (2005).....	46
11. Selected characteristics of major forest certification schemes	48
12. Basic elements of example certification schemes.....	48
13. Certified forest areas classified by selected regions and certification standards (million of hectares).....	49
14. Tropical timber species imported to the United States	57

LIST OF FIGURES

1. Tropical forests of the world.....	7
2. Import partner countries of primary and secondary tropical timber products that originate on ITTO member countries	10
3. Total housing starts in Japan, the U.S. and the EU: 1991-2004	12
4. Single-family housing starts Japan, the U.S. and the EU: 1991-2004.....	12
5. Major causes for tropical deforestation.....	23
6. FSC and Smartwood logos.....	47
7. Top 3 U.S. import partner countries of tropical hardwood lumber	58
8. Top 5 U.S. import partner countries of tropical hardwood flooring	59
9. Top 6 U.S. import partner countries of tropical hardwood molding	60
10. Top 5 U.S. import partner countries of tropical hardwood plywood.....	60
11. Top 5 U.S. import partner countries of tropical hardwood veneer	61
12. Forest products distribution channels	62
13. Important marketing channel alternatives.....	63
14. U.S. hardwood imports	65
15. U.S. hardwood imports	78
16. Company corporate locations of Supply Chain respondents (n=231)	84
17. Percent of 2003 gross sales of Supply Chain respondents from tropical hardwood species (n=135)	84
18. Products that Supply Chain respondents use, specify or handle (n=106) (multiple response possible)	85
19. Products that Supply Chain respondents use, specify or handle that are manufactured with tropical species (n=106) (multiple response possible).....	86
20. Tropical hardwood products purchase channels by Supply Chain respondents (n=135) (multiple response possible)	86
21. Tropical hardwood products purchase regions by Supply Chain respondents (n=135) (multiple responses possible).....	87

22. Top 15 countries where tropical hardwood products originate for Supply Chain respondents (n=136) (multiple responses possible).....	87
23. Number of years that Supply Chain respondents have been purchasing/specifying tropical hardwood products (n=135).....	88
24. Number of containers of tropical hardwood products Supply Chain respondents purchased in 2003 (n=119)	88
25. Importance of sources of information Supply Chain respondents use to locate tropical hardwood product/wood raw material suppliers (n=108).....	89
26. Barriers that Supply Chain respondents have to purchasing/specifying tropical hardwood products (n=120).....	90
27. Importance of criteria for Supply Chain respondents used in selecting tropical hardwood product/raw material supplier (n=125)	90
28. Ways that Supply Chain respondents work directly with the producers in tropical countries (n=45) (multiple responses possible)	91
29. Ways that Supply Chain respondents would be willing to work with tropical hardwood producers in the future (n=19) (multiple responses possible).....	91
30. Do Supply Chain respondents have a chain of custody certification for the certified tropical hardwood products purchased? (n=64).....	92
31. Current percent of hardwood purchases of Supply Chain respondents that are a) tropical hardwood species and b) certified tropical hardwoods (by value)	93
32. Premium paid for certified tropical hardwood products by Supply Chain respondents (n=59).....	93
33. Change in sales of certified tropical hardwood products for Supply Chain respondents in the past 5 years (n=59).....	94
34. Perception change in sales of certified tropical hardwood products for Supply Chain respondents in the next 5 years (n=61)	94
35. General Supply Chain respondents certification observations (n=64)	95
36. Corporate location of Builders and Architects respondents (n=119)	109
37. Percent of 2003 gross sales from tropical hardwood species for Builders and Architects respondents (n=52)	110
38. Products that Builders and Architects respondents use, specify and handle (n=119) (multiple responses possible).....	111

39. Products that Builders and Architects respondents use, specify or handle that are manufactured with tropical species (n=42) (multiple responses possible)	111
40. Tropical hardwood products purchase channels for Builders and Architects respondents (n=51) (multiple responses possible).....	112
41. Tropical hardwood products purchase regions for Builders and Architects respondents (n=52) (multiple responses possible)	113
42. Top 13 countries where tropical hardwood products originate for Builders and Architects respondents (n=52) (multiple responses possible)	113
43. Number of years that Builders and Architects respondents have been purchasing /specifying tropical hardwood products (n=55).....	114
44. Number of containers of tropical hardwood products Builders and Architects respondents purchased in 2003 (n=36)	114
45. Importance of sources of information Builders and Architects respondents use to locate tropical hardwood products/wood raw material suppliers (n=43).....	115
46. Barriers to purchasing/specifying tropical hardwood products for Builders and Architects respondents (n=42)	116
47. Importance of criteria used in selecting tropical hardwood product/raw material suppliers for Builders and Architects respondents (n=125).....	116
48. Ways that Builders and Architects respondents would be willing to work with tropical hardwood producers in the future (n=19) (multiple responses possible).....	117
49. Do Builders and Architects respondents have a chain of custody certification for the certified tropical hardwood products purchase/specify? (n=30).....	118
50. Current percent of hardwood purchases/specifications from Builders and Architects respondents that are a) tropical hardwood species and b) certified tropical hardwoods (by value)	118
51. Premium paid for certified tropical hardwood products by Builders and Architects respondents (n=14)	119
52. Change in sales of certified tropical hardwood products in the past 5 years for Builders and Architects respondents (n=22).....	120
53. Perception change in sales of certified tropical hardwood products in the next 5 years for Builders and Architects respondents (n=61)	120
54. General Builders and Architects respondents certification observations (n=22).....	121

ABSTRACT

Tropical forests, which contain 50 percent of the planet's biodiversity, are threatened by deforestation and illegal logging. Forest certification was initiated initially as a potential solution to reduce illegal logging practices. There are two types of certification: forest management practices and chain of custody (CoC). The United States is the largest market for secondary, or value-added, tropical hardwood products (STHP) which influences forest management practices in supplier countries. In 2004, this study was conducted to measure the demand for certified products in the U.S. The objectives of the study were to identify characteristics of U.S. demand for secondary (value-added) tropical hardwood products and to understand market perceptions regarding certification of secondary tropical hardwood products. Two sectors were surveyed: importers / brokers / manufacturers / wholesalers / retailers (Supply Chain) and builders and architects (B&A). Response rates were 19 percent for Supply Chain and 12 percent for B&A. For both groups, brokers and wholesalers are the dominant purchase channels for tropical hardwoods. More than 50 percent of TSHP originates from South America with Brazil being the primary export country. The main TSHP imported are doors, flooring, cabinets, and millwork. The most important criteria for respondents when selecting tropical hardwoods are quality, availability, and performance. Consistent supply is the greatest barrier to purchasing TSHP. With regard to certified tropical value-added hardwoods, generally respondents do not pay premiums relative to non-certified alternatives. Certification is not an important product selection attribute relative to price and quality. The B&A respondent group experienced more unexpected costs relative to Supply Chain members while Supply Chain members are more likely to promote certified product to their customers. Overall, in order to target the U.S. market tropical hardwood suppliers, particularly those that are engaged in certification, need to improve consistency of their supply and ensure that product quality standards remain at or above non-certified alternatives.

PROBLEM STATEMENT AND STUDY OBJECTIVES

Problem Statement

Tropical forests (TF) are among humanity's most important resources as they contain 50 percent of the world's biodiversity (SLW 1996). In addition, they regulate greenhouse gases and provide freshwater and timber and non-timber forest resources. With a global deforestation rate of 31 million hectares/year (Rainforest Action Network 2005) the remaining TF resources are quickly vanishing. TF are primarily found in developing countries, where most illegal logging takes place (ITTO 2002). Some suggest that one way of controlling illegal logging would be the creation of a market tool such as certification of forest management practices.

Forest certification came into existence in 1992 as a result of the Earth Summit in Rio de Janeiro, Brazil. Concern about the pressure that population growth puts on natural resources was foremost on the Summit agenda. Sustainability became an integral part of certification as applied to forest management. The foundation for certification is the need for consumers to be assured by neutral third-party organizations that companies involved in the forest products supply chain from their forest to the consumer are employing sound practices that will ensure sustainable forest management (Ozanne and Vlosky 1997). For any market system to function properly there should be a balance between supply and demand. Successful market-driven certification would strike a balance between consumers (demand) and producers (supply).

Ironically, although the early objective of certification was to slow rampant deforestation in the tropics, certification has been most successful in developed countries. Developing countries have encountered problems in creating sustainable forest sectors and defensible markets for certified wood products. For example, Bolivia, the developing

country with the world's largest area of certified tropical forestland, enacted a new forestry law in 1996 to encourage sustainable forest management. The law codified regulations very similar to the requirements that the Forest Stewardship Council (FSC) has in place to certify forests. The similarity of standards facilitated the rapid conversion of forest land in Bolivia from non-certified to certified status. By 2005, Bolivia had 1.5 million hectares of certified forests (Bolfor II 2005), more than any other nation in the world. Although Bolivia is a leader in certification implementation, there remains a lack of information for producers on how to efficiently and profitably export forest products into the U.S. market, which accounts for 50 percent of Bolivia's exports (Camara Forestal de Bolivia 2002).

A strategy being attempted by many developing countries to increase wood product export revenue is to transition from exporting raw materials or semi-processed products towards exporting secondary value-added products (CADEFOR 2004). The focus of this study is to better understand the U.S. market for secondary processed tropical hardwood products. The intent is to provide producers of finished tropical hardwood products information and guidelines about the opportunities, constraints, and characteristics these products face in the U.S. marketplace. In addition to providing an overall perspective of market opportunities, this thesis examines the concept of certification for these products from the demand side in the U.S.

The study was conducted using mail surveys sent to over 2,000 U.S. wood importers, distribution intermediaries, secondary manufacturers, builders, and architects. Results can be used to help secondary wood product manufacturers in tropical countries to better understand the U.S. demand structure for the products they manufacture as well

as U.S. manufacturers to develop strategies to create a sustainable supply of tropical species and products.

Study Objectives

1. Identify characteristics of U.S. demand for secondary (value-added) tropical hardwood products.
2. Understand market perceptions regarding certification of secondary tropical hardwood products.

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1. RESEARCH OVERVIEW: WORLD TROPICAL HARDWOOD RESOURCES

Introduction

“The tropical forest (TF) is earth's most complex biome in terms of both structure and species diversity. It occurs under optimal growing conditions: abundant precipitation and year round warmth. There is no annual rhythm to the forest; rather each species has evolved its own flowering and fruiting seasons. Sunlight is a major limiting factor. A variety of strategies have been successful in the struggle to reach light or to adapt to the low intensity of light beneath the canopy” (SLW 1996).

Tropical and temperate tree species, genera and families differ dramatically. In addition, species diversity is much higher in the TF compared to temperate forests. For example, in temperate forests, typically 5-30 species share dominance versus the 40-100 different tree species one might find in one hectare of TF (Amazon Center for Environmental Education and Research 2005). This difference in diversity creates difficulty in forest management in the TF. In the temperate forest, clear-cut or even-aged management practices are often used to harvest trees. In contrast, TFs have very complex structures and interactions between species. Clear-cut tropical forests do not regenerate due to this structural complexity as well as the fragile soils with thin organic layers inherent in tropical forests. Because clear cutting is the most common harvesting practice, much of the world's TF have been permanently decimated.

Major Tropical Forest Regions

Tropical forests are found between 10° N and 10° S latitude at elevations below 3,000 feet (1000 meters) (**Figure 1**) Within this climatic zone, tropical forests are divided into four major regions as follows:

Neotropical Tropical Forest

Neotropical forests are found in Belize, Bolivia, Brazil, Caribbean islands, Colombia, Costa Rica, Ecuador, El Salvador, French Guiana, Guatemala, Guyana,

Honduras, Mexico, Nicaragua, Panama, Peru, Suriname, and Venezuela (**Figure 1.1**) (Butler 2001).

South America accounts for 23 percent of global forests (Juslin and Hansen 2003). The TF of South America is mostly the Amazon rainforest; it is shared by 8 countries and accounts for 50 percent of global biodiversity. Brazil has the largest share and, not coincidentally, one of the largest deforestation rates in the world. Eighty percent of timber harvested in South American tropical countries comes from illegal logging practices (ITTO 2002). Their forest industry lacks new technology and forest regeneration rates are often less than 50 percent.

Central and South America have similar problems in their forest industries and in their forest management practices. Forest certification presents itself as a possible tool to control and reduce illegal logging.

Afrotropical Tropical Forest

Afrotropical forests are found in the following African countries: Angola, Benin, Burundi, Cameroon, Central African Republic, Comoros, Congo, Djibouti, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Kenya, Liberia, Madagascar, Malawi, Mozambique, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda, Zaire, Zambia, and Zimbabwe (**Figure 1.2**) (Butler 2001). Africa accounts for 17 percent of the world's forests, and most of these forests are tropical. Forest products are mainly used for subsistence purposes (87 percent for fuel wood) while trade in forest products accounts for only 2 percent of wood products manufactured on the continent. Deforestation rates are among the highest in the world (Juslin and Hansen 2003). Ghana

and Côte d'Ivoire are the two major exporting countries of secondary forest products in Africa (FAO 2001).

Indomalayan Tropical Forest

This region includes tropical forests in Bangladesh, Bhutan, Brunei, Cambodia, China, India, Indonesia, Laos, Malaysia, Mauritius, Myanmar (Burma), Nepal, the Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam (**Figure 1.3**) (Butler 2001).

This region contains two of the most populated countries in the world, China and India. Both countries have been experiencing a great economical development in the last decade. China has become one of the largest consumers of lumber in the world, and in order to supply to its own demand China has the largest plan for afforestation in the world. Malaysia and Indonesia are the largest producers of plywood in the world (Juslin and Hansen 2003).

Australian Tropical Forest

Australia, Papua New Guinea, and the Pacific Islands (including Hawaii) comprise this region (**Figure 1.4**) (Butler 2001).

Tropical Hardwoods of the World

Forest products can be divided into timber and non-timber products. The focal point of this section is on timber or wood products. Some examples of non-timber forest products are nuts and rubber (from rubberwood tree sap). Timber species can be divided into softwoods and hardwoods. The difference between hardwoods and softwoods are the way the trees reproduce. Hardwoods are angiosperms meaning that they produce seeds that have a certain type of cover. Softwoods on the other hand gymnosperms meaning that they let the seed fall in the ground. The majority of the world's softwoods are located

in the boreal forests of the northern hemisphere. Douglas-fir (*Pseudotsuga menziesii*), southern yellow pine (*Pinus taeda*), ponderosa pine (*Pinus ponderosa*), western white pine (*Pinus monticola*) sugar pine (*Pinus lambertiana*), western hemlock (*Tsuga heterophylla*), and the true firs (*Abies spp*) are the most important U.S. softwoods cut for lumber.

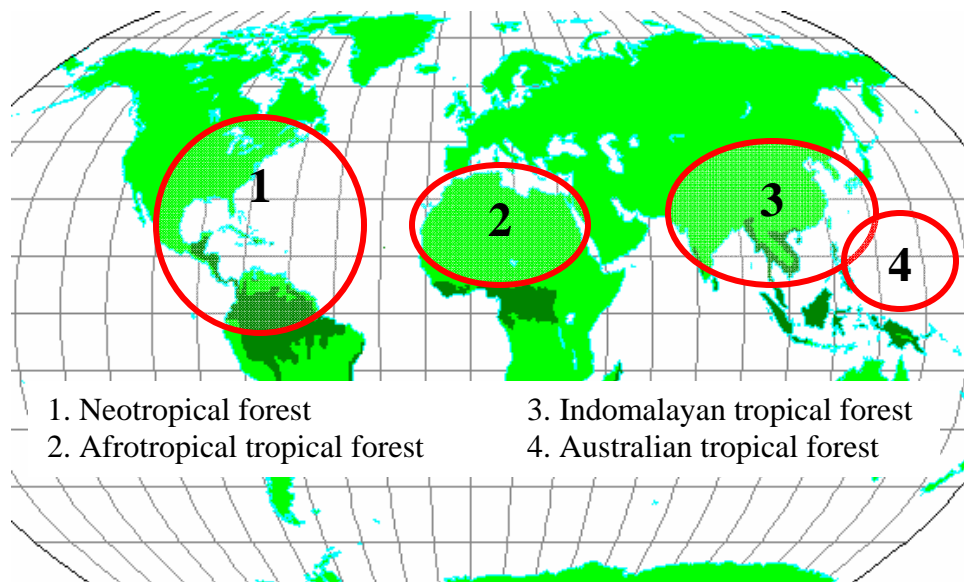


Figure 1. Tropical forests of the world

Source: SLW 1996

The focus of this study is tropical hardwoods. Softwoods will not be discussed further in the paper. Hardwoods grow in non-tropical boreal and temperate forests in the northern and southern hemispheres as well as in tropical regions of the world. Tropical hardwoods are typically high in density and are mainly used for furniture, doors, and flooring.

Tropical Hardwood Trade Flows

Tracking global trade flows for tropical hardwood products is extremely difficult. The most used statistical sources are provided by FAOSTAT, part of the Food and

Agriculture Organization of the United Nations (FAO), the International Tropical Timber Organization (ITTO), Eurostats, and United Nations-Economic Commission for Europe (UNECE). Regardless of reporting entity, major discrepancies exist between data reported by importing and exporting countries. The main causes for the discrepancies are non-standardization in the compilation of trade statistics, errors in data collection, differences in classification and measures, inconsistent conversions, and transshipments that are not accurately recorded. In addition, illegal harvesting and trade activity severely skew the data (Goetzl 2005). The 59 members of the International Tropical Timber Organization account for more than 90 percent of the reported world trade of tropical hardwood products (Hashiramoto et al. 2004). Because of this fact, ITTO data are primarily used in this study.

Supply of Tropical Hardwood Products

Tropical hardwood products originate from developing countries. In 1995, tropical hardwood exports accounted for US\$ 1,107 million, dropping to US\$ 695 million in 1999. Southeast Asia, Latin America, and Central Western Africa are the three main regions from which tropical hardwood products are exported. The trend in past years has been to reduce the export of tropical hardwood logs with a commensurate increase in semi-finished and finished goods. Exporting countries are making this shift in an attempt to increase value-added to their forest resources. Only Africa continues to export tropical logs (ITTO 2004, Forest monitor 1995). The three primary tropical hardwood products exported are sawnwood, veneer, and plywood (ITTO 2004).

Demand for Tropical Hardwood Products

The United Nations Economic Commission for Europe/ Food Agricultural Organization/ Food Agricultural Organization (ECE/FAO) (2000) and International

Trade Center 2001 state that the three primary regions that import tropical hardwood products are the U.S., European Union (EU), and Japan. Concurrent with exporter shifts to finished products exports, importing countries are changing the trend of importing primary products to importing secondary products from tropical countries (**Figure 2**). As EU and U.S. economic growth rates have slowed, prices for secondary tropical hardwoods have not increased in real terms over the past 5 years (International Trade Center 2001). During the Asian economic crisis of 1997-1998, trade of tropical hardwood products experienced a significant reduction but by 2000 had begun a slow recovery. The countries that were more affected by the crisis were Indonesia, South Korea, and Thailand. The Asian crisis was caused by a massive influx of western investment into the Asian economy. This investment created economic growth 2 to 8 percent of GDP. This investment also took place in Latin American economies. When the Mexican peso (currency) fell causing economic losses for the western investors, the uncertainties in these investments caused a snowball effect in the Asian economy as investors withdrew (Wikipedia 2006).

In addition to traditional markets in the U.S. EU, and Japan, other countries/regions are becoming important players in tropical timber trade. For example, China, Taiwan, and Korea import more than 100,000 m³ of one or more tropical hardwood products annually (ITTO 2004). China has become a dominant player in the market for tropical hardwood products and is one of the main importers of tropical logs. UNECE (2002) reports that China has become a significant exporter of tropical plywood to Europe using imported logs as the primary raw material. During 1997-2002, 75 percent of China's total volume of hardwood log imports was tropical logs mainly from

Malaysia, Gabon, Papua New Guinea, Liberia and Myanmar (Hashiramoto et al. 2004).

This figure increased to 80 percent in 2003.

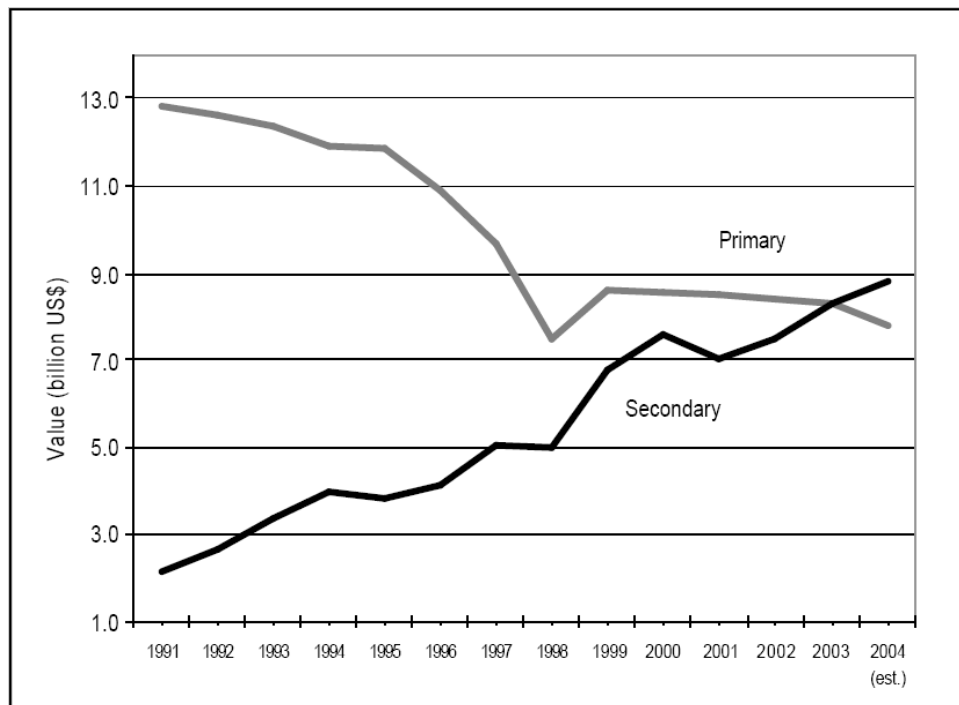


Figure 2. Import partner countries of primary and secondary tropical timber products that originate on ITTO member countries

Source: ITTO 2004

India has also become a major player in the importation of tropical timber. The country's growing economy is creating disposable income for wood product consumer purchases. In addition, infrastructure requirements have also created demand for tropical hardwood. India does not have an adequate domestic supply to meet demand for tropical timber. India's largest import sources are Malaysia, Myanmar, Indonesia, New Zealand, and in the last few years, Latin America and Africa. It is anticipated that India will become a major player in global markets for value-added tropical hardwood products. Its geographical location near the Middle-East, East Asia and Europe gives India a competitive advantage with regard to access to markets (Muthoo 2005).

Consumption of tropical hardwood products is influenced by global economies. One of the variables that influence markets for tropical hardwoods is the economic conditions in consumer countries (ITTO 2004). The major market countries/regions are China, U.S., Japan, the EU, and advanced-economies and new-industrialized-Asian-economies (NIE's). China has maintained steady economic growth over the past four years. Germany accounts for the largest economy of the EU. After the reunification of Germany the German economy contracted somewhat, resulting in an overall softening of the EU economy. The U.S. has had continued growth through 2004 (ITTO 2004).

New home construction is a significant demand sector for wood products. Wood accounts for 17 percent of building components in the U.S. (Trusty 2005). **Figure 3** shows that U.S. housing growth has increased dramatically since 1997 while **Figure 4** shows comparative single-family housing trends in Japan, the U.S. and the EU. The U.S. is by far the leading country in single-family housing starts. Single-family homes are predominantly wooden in these regions and therefore provide a good indicator of overall wood demand (ITTO 2004).

Table 1 shows the proportion of tropical product imports for major ITTO importers in 2004. Taiwan and Portugal obtain more than 50 percent of their logs from tropical suppliers. China and Portugal obtain 50 percent of their sawnwood imports from tropical sources. Taiwan and Hong Kong obtain more than 70 percent of their veneer imports from tropical countries. More than 80 percent of the plywood imported by Taiwan and the Republic of Korea comes from tropical forests. Most of the major producer countries, with the exception of Mexico, depend very much on tropical hardwood product imports for their primary hardwood product needs.

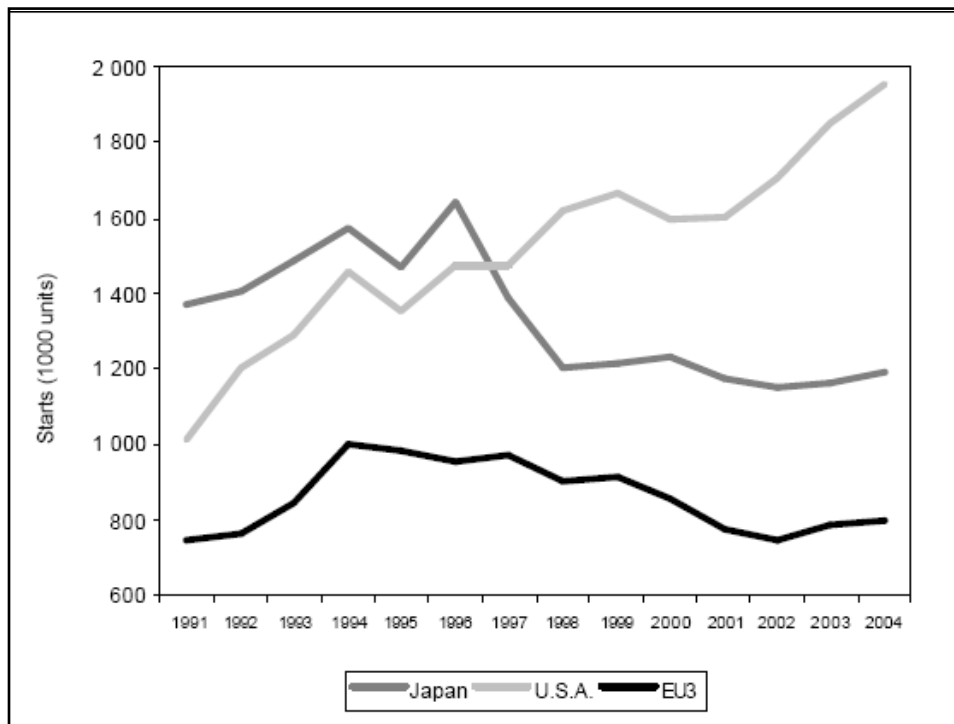


Figure 3. Total housing starts in Japan, the U.S. and the EU: 1991-2004
Source: ITTO 2004

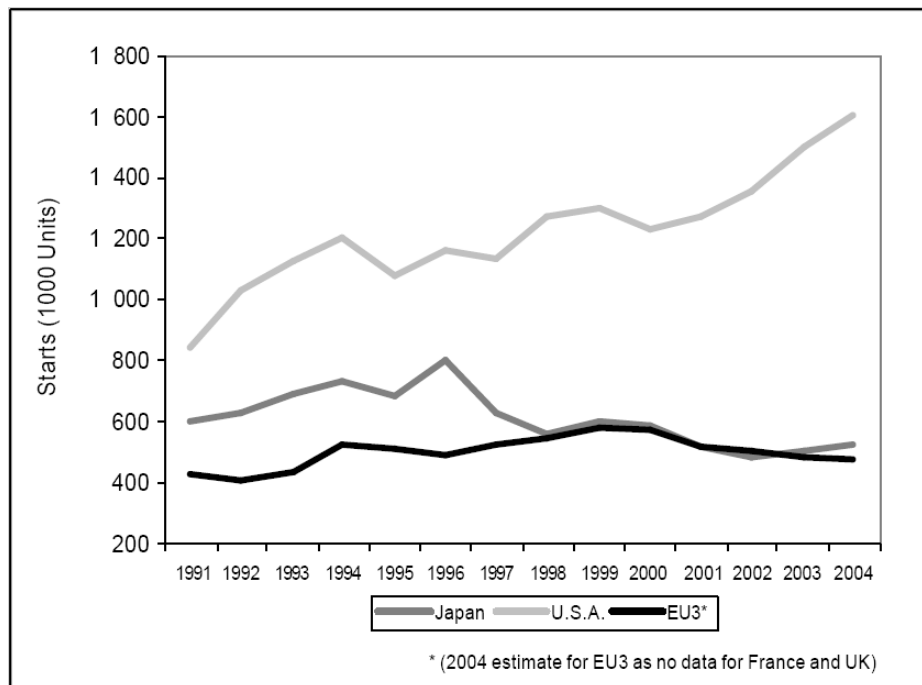


Figure 4. Single-family housing starts Japan, the U.S. and the EU: 1991-2004
Source: ITTO 2004.

Table 1. Tropical proportion of total imports by major ITTO importers (2003)

ITTO	Proportion (%)			
Consumer Members	Logs	Sawnwood	Veneer	Plywood
Taiwan	81.4	38.3	88.4	80.1
Portugal	62.6	52.6	42.5	20.7
Hong Kong	45.4	47.7	75.4	78.9
China	30.0	51.4	54.8	51.2
France	25.7	11.0	56.1	26.5
Japan	14.1	5.5	32.3	78.1
U.K.	11.7	4.2	32.1	27.4
Netherlands	10.5	12.4	40.5	40.4
Republic of Korea	6.4	40.1	68.7	92.2
Italy	4.6	4.1	32.1	18.7
Germany	3.4	2.7	11.8	13.9
Spain	3.0	9.8	29.4	7.6
Denmark	1.2	5.9	46.6	23.5
Belgium	0.9	14.4	29.3	49.1
U.S.	0.1	0.7	6.2	29.5
Producer Members				
India	91.1	38.3	56.3	45.7
Malaysia	57.3	91.3	100	6.8
Mexico	12.2	1.7	18.5	35.4
Philippines	54.1	42.9	76.4	48.1
Thailand	86.3	85.8	74.2	97.2

Source: ITTO 2004.

Tropical Primary Wood Products Trade

Wood products are typically divided into primary and secondary products.

Among the primary tropical hardwood products are logs, sawnwood, plywood, and veneer. Secondary wood products include wooden furniture and parts, doors, flooring, millwork and molding. The primary products discussed in this section are tropical roundwood, sawnwood, veneer, and plywood. The trade of these products is presented by production, consumption, imports, and exports.

Tropical Roundwood

Roundwood is the term given to logs extracted from the forest after debarking but before being squared by sawing or hewing. This stage is considered the first in the wood product manufacturing process.

1. Production

The total world production of tropical roundwood was approximately 136 million m³/ year in 2003. The major producer countries are Brazil and Indonesia, followed by Malaysia and India (ITTO 2004). Indonesia's major trading partner countries are Malaysia and China (Hashiramoto et al. 2004).

2. Consumption

The main producer countries are also the main consumer countries. Indonesia and Brazil are the main consumers followed by Malaysia, India, and China. These five countries account for 73 percent of total consumption (ITTO 2004).

3. Imports

The total world imports of tropical roundwood were 15.8 million m³ in 2003. China is the main importer of tropical roundwood (7.6 million m³) followed by India, Japan, Taiwan, and Portugal. China's growing economy and its zero percent tax on tropical roundwood is driving the imports skyward (ITTO 2004). China imported 7.3m³ in 2003, mainly from Malaysia, Gabon, Papua New Guinea, Liberia and Myanmar (Hashiramoto et al. 2004).

4. Exports

The total world exports of tropical logs were 13 million m³ in 2003. The main roundwood exporter country is Malaysia (5.5 million m³/ year in 2003) followed by Papua New Guinea, Gabon, Myanmar, and Liberia (ITTO 2004).

5. Prices

Table 2 shows a trend of escalating prices for tropical roundwood from 2002-2004. The main reason for the increase is the reduction in supply due to the log export restrictions in some countries to add domestic value reduce illegal logging.

Table 2 Average prices of ITTO countries exports of tropical logs (2002-2004)

Price	2002	2003	2004
	US\$/m ³		
Nominal	167	256	269
Minimum	128	187	197

Source: ITTO 2004

Tropical Sawnwood

The next step in wood processing is the manufacturing of sawnwood. Lumber is the main sawnwood product. Sawnwood production consists of the following stages: debarking logs, sawing boards from logs, squaring the edges, and cutting to length (trimming), drying (typically kiln or air), grading and packing (Juslin and Hansen 2003).

1. Production

Tropical sawnwood accounted for 5 percent of total sawnwood trade in 1999. It is expected to decrease and be replaced by sawn softwood coming from plantations and treated wood (International Trade Center 2001). The total world production of sawnwood from the 59 ITTO countries accounting for 90 percent of the tropical timber trade was 43 million m³/ year in 2003. Brazil is number one with 15.9 million m³ followed by Indonesia, India, Malaysia, and Thailand. Together these countries account for 80 percent of total production (ITTO 2004).

2. Consumption

The main consumer country is Brazil at 14.6 million m³ in 2003, followed by India, Indonesia, China and Malaysia. These five countries accounted for 71 percent of the total consumption (ITTO 2004).

3. Imports

The total world imports of sawnwood in 2003 were 10 million m³. China is the main importer of tropical sawnwood (2.8 million m³) followed by Thailand, Malaysia, Hong Kong, and Japan. These countries account for 40 percent of the total imports (ITTO 2004). Japan has increased its imports of sawnwood coming from Europe. This fact has reduced the market share of Canada, the U.S. and tropical countries. The increase in Thailand's tropical sawnwood imports is related to its growing furniture industry (Hashiramoto et al. 2004).

4. Exports

The total world exports of sawnwood were 7.1 million m³ in 2003. The main sawnwood exporter country at that time was Malaysia (2.5 million m³/ year in 2003) (Hashiramoto et al. 2004, ITTO 2004) followed by Brazil, Thailand, Cameroon, and Cote d'Ivoire (ITTO 2004). The price of tropical sawnwood varies depending on the species.

Tropical Veneer

“Veneer is a thin sheet of wood of uniform thickness—commonly 0.5–1.0 mm (about 0.02–0.04 inch) and sometimes as much as 10 mm (about 0.4 inch). According to the method of production, it is classified as rotary-cut (cut on a lathe by rotating a log against a knife blade in a peeling operation), sliced (cut with a knife blade sheet by sheet from a log section, or flitch), or sawn (produced with a special tapered)” (Encyclopedia Britannica 2005).

1. Production

The total world production of tropical veneer was approximately 2.6 million m³ in 2003. The major producer countries are China, Malaysia, Philippines, Brazil, and Ghana. (ITTO 2004).

2. Consumption

The total annual consumption of tropical veneer was 3.7 million m³ in 2003. The main consumer countries are China, Philippines, Malaysia, India, and Brazil accounting for 55 percent of the total consumption (ITTO 2004).

3. Imports

The total world imports of tropical veneer were 1.3 million m³ in 2003. Korea was overwhelmingly the largest importer of tropical veneer with 228,000 m³ in 2003 followed by Taiwan, Malaysia, China, and the U.S. (ITTO 2004).

4. Exports

The total world exports of tropical veneer were less than 1 million m³ in 2003. The main veneer exporter country is Malaysia (462,000 m³ in 2003) followed by Gabon, Ghana, Cote d'Ivoire, and Brazil (ITTO 2004).

Tropical Plywood

Plywood is a panel product that is composed of odd number of plies or veneers glued together perpendicular to adjacent plies to increase strength. The face layer typically a higher grade than the back because it will be exposed in interior applications. Tropical plywood is used for primarily for decorative purposes.

1. Production

Global plywood production has been declining since 1998 with the introduction of competitively priced composite panels for structural applications (Hashiramoto et al.

2004). The total world production of tropical plywood, used mainly in non-structural applications, was approximately 15.7 million m³ in 2003. The major producer country is Indonesia (6.7 million m³) followed by Malaysia, China, India, and Brazil (ITTO 2004).

2. Consumption

The total annual consumption of tropical plywood was 13.2 million m³ in 2003. The leading consumer countries are Japan, China, India, Indonesia, Rep. of Korea, Indonesia, and Brazil followed by Malaysia, India, and China. These five countries account for 67 percent of the total consumption (ITTO 2004).

3. Imports

The total world imports of tropical plywood were 9 million m³ in 2003. Japan was the main importer of tropical plywood (4.6 million m³) followed by the Rep. of Korea, U.S., Taiwan, and China (ITTO 2004).

4. Exports

The total exports of tropical plywood were 10.2 million m³ in 2003 worldwide. The main tropical plywood exporter country is Indonesia (5.1 million m³/ year in 2003) followed closely by Malaysia, and then Brazil, China, and Belgium (ITTO 2004).

Table 3 gives a summary of the 2003 production, consumption, imports, and exports of the tropical roundwood and tropical primary wood products. **Table 3** shows that 32 percent of the roundwood production goes to produce sawnwood, 2 percent to veneer, and 12 percent to plywood. Around 10-12 percent of the produced tropical roundwood is actually traded (imported or exported); the rest is consumed in the country where it is produced. There is a trend of increasing percentage of product exported from sawnwood to veneer to plywood.

Table 3. Summary of tropical primary wood products world trade (2003)

Product	Production (10⁶ m³)	Consumption (10⁶ m³)	Imports (10⁶ m³)	Exports (10⁶ m³)	% Exported
Roundwood	136.0	--	15.8	13.0	10
Sawnwood	43.0	--	10.0	7.1	17
Veneer	2.6	3.7	1.3	1.0	38
Plywood	15.7	12.3	9.0	10.2	65

Source: ITTO 2004

Tropical Secondary Wood Products Trade

The major consumer countries of tropical secondary wood products are the U.S., Europe, and Japan. There is a trend towards a reduction in imports of primary products and an increase in imports of secondary products. The main producers and exporters of these products are Malaysia, Brazil, Thailand, Mexico, Viet Nam and the Philippines (Hashiramoto et al. 2004). It is difficult to find secondary tropical hardwood product trade data because of the lack of standardization and gaps in data from tropical countries. This has resulted in extremely inaccurate counts and statistics.

Table 4 shows the broad international trade categories of secondary wood products used by ITTO. Wooden furniture categories account for 60 percent of the total trade value. Overall, from producer to consumer countries there is an increase in secondary tropical hardwood products trade and a reduction in primary tropical hardwood products trade.

Major Trade Flows of Secondary Tropical Hardwood Products

The five largest global importers of STWP are the U.S., Germany, the UK, Japan, and France. Most Japanese imports come from China. Chinese STWP imports have decreased because of the increase in Chinese production of STWP. **Table 5** shows the major trade flows among the major players in secondary tropical hardwood products. The main importer countries and regions are the EU, U.S. and Japan, and the main exporter

countries are Indonesia, Malaysia, and Brazil. **Table 5** shows how the three major importers of STWP follow a trend of increasing their imports of secondary tropical hardwood products and reducing their imports of primary tropical hardwood products.

Table 4. Secondary products of tropical species categories and international trade nomenclature classification

Secondary Tropical hardwood Product Category	Description
Wooden furniture and parts	Seats with wooden frames
	Furniture of wood
Builders' woodwork	Builders' joinery and carpentry
Other secondary tropical hardwood products	Packaging, cable drums, pallets, etc.
	Coopers' products and parts
	Wood products for domestic/ decorative use, excluding furniture
	Other manufactured wood products
Moldings	Continuously shaped or profiled wood
	(e.g. moldings, unassembled strips and
	friezes for parquet flooring, beaded wood, dowels, etc.)
Furniture and parts	Furniture of other material like bamboo

Source: ITTO 2004

The United States imports the largest quantity of secondary tropical hardwood products (STWP) in the world (Hashiramoto et al. 2004, ITTO 2004). Imports in 2003 were US\$ 16.5 billion, accounting for 34 percent of global imports. In 2002, 23 percent of U.S. imports came from ITTO producer countries (Mexico, Indonesia, Brazil, Malaysia, and Thailand) that accounted for 90 percent of the tropical hardwood trade. Additional imports came from non-ITTO members such as China, Canada, and the EU (mainly Italy). U.S. imports have quadrupled in the last ten years. Increasing single housing starts is the primary reason for the growing demand for wood products, including STWP (ITTO 2004). The European Union exceeded the imports of the U.S. in 2003, importing US\$ 19.2 billion. The leading importing members of the EU are Germany, the UK, France, the Netherlands and Belgium, accounting for 70 percent of total EU imports. A major portion of the EU imports originate in EU countries (Germany and Italy), with

the remainder coming from China, Brazil, Indonesia, and Malaysia. Germany is the largest importer country, contributing US\$ 4.4 billion in 2002 and consistently importing from Eastern European countries.

Table 5. Direction of trade of secondary tropical hardwood products for main partners, 2002 (million US\$)

Exporter	China	EU	ITTO	Indonesia	Malaysia	Brazil	ITTO
Importer			Consumers				Producers
EU	1,146		11,916	1,010	309	310	2,119
	719		13,985	629	305	279	1,347
U.S.	5,069	2,071	11,497	747	576	656	3,787
	2,935	2,126	9,464	514	522	570	2,805
Japan	1,059	430	1,725	280	171	4	903
	944	424	1,584	321	200	7	917
ITTO Cons.	8,991	14,806		2,264	1,295	1,020	7,493
	5,650	17,371		1,873	1,270	904	6,861

(Source: ITTO 2004)

Table 6 shows the change in import value from 1995 to 1999 of secondary tropical hardwood products in Japan, the U.S., and the EU. The EU is the only one that has increased its import value in primary and secondary tropical hardwood products from 1995 to 1999. The U.S. has reduced its import value of secondary tropical hardwood products and has not changed the import value of primary tropical hardwood products. Japan has radically increased its import value of primary tropical hardwood products and reduced its import value of secondary tropical hardwood products.

Environmental Issues

The clearing of tropical forests has been occurring for many centuries. Deforestation is primarily the result of logging or burning for subsistence agriculture. The National Aeronautics and Space Agency (NASA) (1998) stated that at the current rate of destruction, within 100 years tropical forests will no longer exist. There is no question that deforestation results in unstable and vulnerable watersheds (Revenga et al.

1998). Deforestation also has a huge impact on the carbon cycle. The loss of forests releases carbon dioxide into the atmosphere. Since CO₂ is a greenhouse gas, the result will be an increase in global temperatures (NASA 1998).

Table 6. Import value of primary and secondary processed tropical timber products by the European Union, Japan and United States of America (1995-1999)

European Union	Primary	US\$ million					
		1995	1996	1997	1998	1999	Percent change 1995/1999
Japan	Secondary	3.0	2.5	2.5	2.6	N/A	-12
	Primary	1.3	1.4	1.6	1.6	1.7	+35
United States of America	Secondary	4.5	4.6	4.4	3.8	2.0	-57
	Primary	0.8	0.9	0.8	0.6	0.8	NC
European Union	Secondary	0.8	0.8	0.8	0.8	0.9	+13
	Primary	1.3	1.4	1.5	1.7	2.1	+57

(Source: FAO 2001 citing ITTO)

“Global deforestation has caused mounting environmental concern, and pressures from environmental non-governmental organizations (NGOs) have been actively channeled to affect timber trade and the opinions of individual consumers concerning wood products (particularly in the U.S. and EU)” (International Trade Center 2001).

Deforestation

Deforestation can be seen from many dimensions; (1) forces that influence deforestation, (2) immediate causes of deforestation, (3) contributing factors, and (4) the consequences in terms of habitat destruction. In the end they all convey in the same results. Pearce and Brown (1994) identify two main forces affecting deforestation:

- “Competition between humans and other species for the remaining ecological niches on land and in coastal regions. This factor is substantially demonstrated by the conversion of forest land to other uses such as agriculture, infrastructure, urban development, industry and others” (Pearce and Brown 1994).

- "Failures in the workings of economic systems to reflect the true value of the environment. Basically, many of the functions of tropical forests are not marketed and, as such, are ignored in decision-making. Additionally, decisions to convert tropical forests are themselves encouraged by fiscal and other incentives" (Pearce and Brown 1994).

One of the largest contributors to the deforestation in the tropical rainforest is population growth and the lack of land tenure. The impact of these factors is compounded by (1) poor forest management practices (clearcuts) by commercial and illegal loggers, (2) the increasing demand for both farm and grazing land, and (3) the need for fuel and timber for construction directly correlated with population growth. **Figure 5** shows that the major cause of deforestation of tropical forests is land clearing by subsistence cultivators.

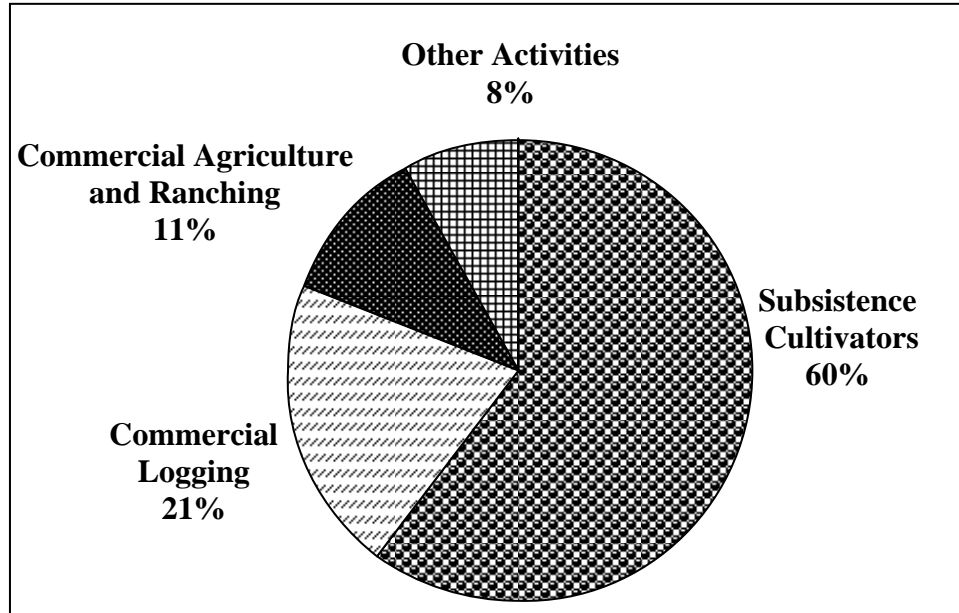


Figure 5. Major causes for tropical deforestation

Source: Butler 2001.

Tropical forests located in developing countries share similar issues. The forests are mainly owned by the state, and the state lacks funding to manage and protect the

forest. As a result the forest is vulnerable to attack. When a resource is unprotected the population at large takes from the resource as much as they can because the resource is a common good. The problem is not the lack of laws and regulations; laws written but not enforced are worthless.

Geist and Lambin (2002) state that tropical deforestation can be better understood by multiple factor analysis than by single factor analysis; the causes are a combination of multiple variables. Their research showed that the results of a multiple factor analysis in one area cannot be applied to another area because of the complexity of the interrelationships of the factors.

Forests, as a general rule, are not only a place for the extraction of wood products; they are also the habitat where more than half of the world's biodiversity is found. At the moment almost half of the world's original forest cover is gone (NASA 1997). Briant et al. (1997) affirm that tropical deforestation can be also seen from the habitat threat perspective and state that deforestation can be analyzed in terms of internal and external causes.

Internal Causes of Tropical Deforestation

1. Logging

Logging accounts for 21 percent of the causes of tropical deforestation, it also opens roads that facilitate the access to hunt and gather materials from the forest.

2. Energy Development, Mining, and New Infrastructure

As an example, discovery of a natural gas reservoir in the middle of the forest results in opening long transects of forest (roads) to access said reservoirs. Another example is mining that requires water and use of highly toxic chemicals such as mercury (a major pollutant of the aquifers).

3. Land Clearing for Agriculture Expansion and Subsistence Agriculture

Many countries have tried to move the poorest segments of the population within cities to the forestland by promising them land for farming (SLW 1996). Forest soils lack proper nutrients for agriculture because the nutrients are in the biomass of the trees, not in the soils. Clearing the forest has become a cyclical deforestation pattern: clear the land, plant some crops for a couple of years, and when the soils do not have more nutrients to support the crops change the land use to grasslands, followed by clearing another piece of forest to start the cycle again (NASA 1998).

4. Excessive Vegetation Removal

Examples in this category include use of the forest as a free source of firewood and building materials. In Africa, the forest has clearly been reduced by over extraction.

External Causes of Tropical Deforestation

1. Growing Economies Consumption

Growing economies have increased trading in forest products (NASA 1998). However, to have a market share countries need to be competitive with respect to costs of production. Tropical countries cannot compete without appropriate technology for timber extraction. By trying to reduce their production costs, poor countries engage in unsustainable practices such as clearcutting, or extraction of only a few valuable sought after timber species.

2. Population Growth and Demand for New Land

Population growth in developing countries creates an increasing demand on their tropical forests. This growing population increases the demand for food, and forests are cleared to accommodate food production systems. At the same time, the growth in population increases the demand for forest products like wood fuel, timber, and paper.

3. Poor Economic Policies

When a cost benefit analysis is done to rationalize replacement of a tropical forest by an alternative use, the value of non-timber tangible and intangible products, such as biodiversity and eco-tourism, are not properly factored into the calculation.

4. Short Sighted Political Decisions

Politicians repeatedly make short-term decisions, i.e. opening certain wildlife refuges for commercial exploitation such as harvesting the natural resources of that site. The pressure to create new jobs overshadows any future consequences of this type of decision.

Tropical Deforestation Measures

Forest covers 30 percent of the world's area, and only 6 percent of that area is tropical forest. Deforestation is measured by the amount of forest that is lost each year. Satellite imaging is the most accurate measurement currently in use. Comparisons of images over time are used to calculate rates of change between images. **Table 7** shows tropical deforestation rates by regions and countries that have the largest tropical forest areas. The distribution of the world's forest area by region is as follows: Africa (7 percent), Asia (9 percent), Oceania (5 percent), and South America (23 percent). In South America, Brazil has the largest forest area, 14 percent of the world's forest area.

Sixty-four percent of Brazil's total area is covered with tropical forest, with an annual rate of change from 1990 to 2000 of -0.4 percent. The region with the largest forest annual rate of change from 1990 to 2000 is Africa with -0.8 percent, followed by South America -0.4 percent, Oceania -0.2 percent, and Asia -0.1 percent. The countries with the largest forest annual rate of change from 1990 to 2000 are Sudan with -1.4 percent and Indonesia with -1.2 percent, followed by Democratic Republic of the Congo

with -0.4 percent and Brazil with -0.4 percent. The majority of the tropical forest is located within these nine countries. Brazil has almost 14 percent of the world forest (Table 7) and also has one of the largest deforestation rates in the world. The Associated Press (2005) stated that “Deforestation in the Amazon rain forest in 2004 was the second worst ever, figures released by the Brazilian government ... Satellite photos and data showed that ranchers, soybean farmers and loggers burned and cut down a near-record area of 10,088 square miles of rain forest in the 12 months”.

Table 7. World deforestation rates by continents and major countries (1999-2000)

		Land area	Forest	Continent	World	Forest	Forest	Forest
		Total	Total	Forest %		% of land area	Change	Annual rate of change
		1999	2000			2000	1990-2000	1990-2000
#	Country/area	(million ha)	(million ha)			% of land	('000 ha)	(%)
	Africa	2,978	650			21.8	-5,262	-0.8
1	Dem. Rep. of the Congo	227	135	21	4	60	-532	-0.4
2	Angola	125	70	11	2	56	-124	-0.2
3	Sudan	238	62	10	2	26	-959	-1.4
				41	8			
	Asia	3,085	548			17.8	-364	-0.1
4	China	933	164	30	4	18	1,806	1.2
5	Indonesia	181	105	19	3	58	-1,312	-1.2
6	India	297	64	12	2	22	38	0.1
				61	9			
	Oceania	849	198			23	-365	-0.2
7	Australia	768	155	78	4	20	-282	-0.2
8	Papua New Guinea	45	31	16	1	68	-113	-0.4
				94	5			
	South America	1,755	886			51	-3,711	-0.4
9	Brazil	846	544	61	14	64	-2,309	-0.4
				51	23			
	World	13,064	3,870		34	30	-9,391	-0.2

Source: Food and Agriculture Organization of the U.N.: The State of the World's Forests 2003

Illegal Logging

“Illegal logging occurs when timber is harvested, transported, processed, bought or sold in violation or circumvention of national or sub-national laws” (Toyne et al. 2002). Illegal logging and illegal trade is a problem that occurs in more than 70 countries of the world including developed and developing countries. The World Bank calculated that illegal logging results in losses of US\$ 5 billion to the governments plus US\$ 10 billion to producing countries per year (2002) (Toyne et al. 2002).

Illegal logging has the capacity to depress world prices from 7 to 16 percent depending on the wood product (American Forest and Paper Association 2004).

A crucial component of the deforestation issue, illegal logging is the end result of inadequate law enforcement in tropical countries. The ITTO found in 2002 that 80 percent of the logging in tropical countries comes from illegal logging practices.

Illegal logging is not only a problem in tropical producer countries but also in consumer countries that do not ensure the legality of the wood product they procure. This results in detrimental repercussions in the short and long term. It propagates corruption, leads to loss of habitat, and leaves forest soils completely unprotected and vulnerable to erosion flooding. Long-term hazards include the release of CO₂ into the atmosphere, with resultant impacts on climate, and ultimately complete loss of the forest resources within that country (Brack 2005).

Developed nations like the G8 (the largest eight economies in the world) have the power to choose what type of products they purchase. There are already some efforts in the EU to ban products that do not come from legitimate activities (Brack 2005). The U.S. has also implemented an initiative to ban the procurement of products coming from illegal logging practices. One of the U.S. proposals is the use of forest management

certification as a tracking tool to ensure the legality of the source. Another is to develop and enhance sustainable building partnerships by asking the U.S. State Department to enforce the laws and help track the source of manufactured products. Another way to help eliminate or reduce illegal logging is to encourage foreign investment in legal logging operations (Metafore 2003).

Illegal logging can be fought only by working in partnership with producer and consumer countries. Illegal logging affects developed countries because it provides wood products at a price that reflects distorted costs and consequently lowers the prices of wood products in developed countries. Metafore 2003 states that to fight illegal logging there are three main points that need to be attacked. The first is to promote legal forestry, the second is to protect areas of focus (natural reserves), and the third is to improve the tracking system along the supply chain.

Summary

The tropical forest is found between 10° N and 10° S latitude at elevations below 3,000 feet or 1000 meters. Tropical forests provide habitat for almost 50 percent of global biodiversity. The main regions encompassing the tropical forests are located in Central West Africa, Central and South America, and Southeast Asia, mostly in developing countries. The primary product extracted from tropical forests is hardwood timber.

The three main regions that consume tropical hardwood products are the EU, U.S., and Japan. The tropical hardwood products that are traded are divided into primary and secondary wood products. Among the primary tropical hardwood products, the most important are logs, sawnwood, plywood, and veneer. Among the secondary tropical hardwood products are wooden furniture and parts, builder's woodwork, and molding. China and India have become major importers of primary tropical hardwood products.

The U.S., the EU, and Japan have decreased their imports of primary tropical hardwood products and increased their imports of secondary tropical hardwood products over the last decade. The main producer countries are Indonesia, Malaysia, and Brazil.

Tropical forests are more than simple producers of timber products. They are the habitat for 50 percent of the world's biodiversity. Tropical forests suffer from major deforestation. The primary activities responsible for deforestation in the tropics include subsistence cultivation (60 percent), commercial logging (21 percent), commercial agriculture and ranching (11 percent), and other activities (8 percent). The two forces that drive deforestation are (1) competition between humans and other species for the remaining land and (2) market failures including lack of land tenure and lack of market value for environmental benefits. The countries with the highest tropical deforestation rates from 1990 to 2000 are Sudan -1.4 percent, Indonesia -1.2 percent, Democratic Republic of the Congo -0.4 percent, and Brazil -0.4 percent.

“Illegal logging occurs when timber is harvested, transported, processed, bought or sold in violation or circumvention of national or sub-national laws” (Toyne et al. 2002). Illegal logging is a problem that hurts the economies of developed and developing countries. The World Bank calculated that in 2002 illegal logging cost US\$ 5 billion to governments plus US\$ 10 billion to producing countries. One way to reduce illegal logging is to promote legal forestry. Another is to protect on areas of focus (conservation areas). The third is to improve the tracking system along the supply chain.

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2. RESEARCH OVERVIEW: FOREST PRODUCTS CERTIFICATION

Overview

To certify means to accredit a product or a practice for some special attribute, characteristic, feature or quality. In a global market it is difficult to have international policies for “well forest management practices”. If the policies cannot be created under command and control practices (laws and regulations) then the alternative option is to create a market value for the goods. In this case the goods are the wood with an extra attribute; this attribute is to have come from a forest with sound management. To be able to track the wood that comes from well-managed forests a tracking tool is needed. This tracking tool is better known as Chain of Custody (CoC). The CoC is an inventory control process in the wood manufacturing industry developed to track certified forest products from the forest through the supply chain to the final consumer.

Certification has been used as a mechanism to attempt to slow tropical deforestation (Cote 1999) and to reduce trading of wood products coming from illegal logging. Regardless of the reasons, environmental certification of forest products and forestry practices continues to proliferate worldwide.

The primary basis for certification is the need for consumers to be assured by neutral third-party organizations that forest product companies are employing sound practices that will ensure sustainable forest management (Ozanne and Vlosky 1997). In addition to reducing negative perceptions by consumers and the general public, it is believed that companies that prove to be environmentally responsible will benefit from certification by differentiating their products in the marketplace and thus acquiring a larger share of the market (Ozanne and Vlosky 1997).

Certification is supported by many non-governmental organizations (NGOs), governments, and companies. The total area of certified forests in the world was 219 million hectares in 2004. The majority of certified forests are in the United States, Europe, and Canada (Ingram 1998). The four main certification schemes in the world are: the Programme for Endorsement of Forest Certification (PEFC), the Forest Stewardship Council (FSC), the Sustainable Forestry Initiative (SFI), and the Canadian Standards Association (CSA). These four schemes certify almost 94 percent of the world's certified forests.

Chain of Custody

Chain of Custody (CoC) is an inventory control process in the wood manufacturing industry developed to verify certified forest products. CoC works as a control system to manage critical components of the flow of materials. In the wood-based products industry, keeping the materials required to maintain the process flowing requires much coordination and planning. Managing non-certified-wood-products (NCWP) and certified wood products (CWP) in the same manufacturing process without mixing them adds even more complexity to inventory process control. Companies move to the CWP to gain market share. It has been shown that only large retail stores that have name recognition (for example Home Depot) are using certified product as one more attribute to differentiate their products (Conservation and Community Investment Forum 2002). "Certified forest product markets are driven at the business-to-business level, but not yet from final consumers" (FAO/UNECE, 2004).

One of the issues in certification is the lack of primary CWPs produced to sustain the supply chain. Wood products can be manufactured using different processes such as:

- Job Shops (custom wood products)

- Batch production (typical products include lumber, dimension, furniture, hardwood plywood, cabinets, and veneer)
- Repetitive production (millwork manufacturers)
- Continuous production (particleboard)

Since each of these processes has different environments, the strategies to manage CoC need to be addressed first with respect to each one of these processes and then to the products manufactured (Rudell and Stevens 1998). As an example of the complexity in the certified wood supply-chain management “it is estimated that over 80 percent of FSC certified lumber is “lost” on the way to the consumer, and ends up being sold as uncertified”(Conservation and Community Investment Forum 2002).

There are four main constraints that impact CWP introduction: market, material, capacity, and logistical constraints. Market uncertainty and demand for CWP make it difficult to introduce CWP's and this uncertainty has generated market-planning strategies to minimize risk. The material constraint is linked to the supply of the primary CWP. There is not enough CWP to satisfy the demand of secondary CWP manufactures.

One solution to the supply problem is to enter into a strategic partnership with private forest owners who also work with CWP. The capacity constraint is reflected in factors that constrain the flow of materials through the manufacturing plant. To avoid this problem CWP inventory needs to be available in excess, although this last practice makes inventory costs rise. Logistical constraints are caused by the complexity in the management of the CWP through the plant. Planning the production, purchasing the material, and planning the inventory add to the cost of the final manufactured CWP.

To overcome all the costs and management problems and to give manufacturers an incentive to work with certified products, premium prices should be applied to the

production of CWP's (Rudell and Stevens 1998). On the other hand "if the forest owners, sawmiller, and manufacturer each get 10 percent premium for their handling of certified products, and the distributor and retailer tack on an additional 5 percent, then the street price of a US\$ 100 table will have inflated to US\$ 160, without having altered the physical appearance or performance one iota" (McIntyre n.d.). For certification to work CWP needs to be associated with a real value like risk reduction, cost reduction, and/or revenue enhancement (Conservation and Community Investment Forum 2002). "Chain-of-custody is a bottleneck in today's certification markets, resulting in products produced from certified forests being sold without a label documenting their source" (UN/ECE 2002).

Major Certification Schemes

Forest Stewardship Council (FSC)

In 1992, during the Earth Summit of Rio de Janeiro, attendees were concerned about the pressure population growth was putting on natural resources. Sustainability became a concept that needed to be applied in the forest management field. As a result, foresters, environmentalists and sociologists came together to form the Forest Stewardship Council (FSC) (Washburn and Miller 2003).

FSC, created in 1993, is a not-for-profit, non-governmental, membership-based organization that sets international certification standards and accredits certifiers. It is comprised of a diverse coalition of local, national, and regional entities that work with FSC member certifiers to establish geospecific standards for forest management. The overall objective of FSC is to guarantee that all certifiers establish appropriate standards and fulfill established requirements in their certification efforts. The FSC has 52 million hectares (**Table 8**) of forests certified under their standards. Fifty-five percent of the

forests certified under the FSC are located in Sweden (20 percent), the United States (14 percent), Poland (12 percent), and Canada (7 percent). Forty-five percent of the members that hold a chain of custody under the FSC are in the United States (11 percent), United Kingdom (11 percent), Germany (9 percent), Poland (8 percent), and Japan (7 percent). The FSC has certified forests in Africa, Asia, Europe, North America, South America, and Oceania.

Table 8. Certified forest area and Chain of Custody distribution under the Forest Stewardship Council (2005)

Country	Certified forest area million (ha)	Percent
Sweden	10.4	20%
United States	7.5	14%
Poland	6.2	12%
Canada	4.8	9%
Russia	3.9	7%
Brazil	3.0	6%
Croatia	2.0	4%
Bolivia	1.9	4%
Latvia	1.7	3%
Rest of the world		22%
Total	52.9	100%
Country	Chain of Custody (#)	Percent
United States of America	435	11%
United Kingdom	401	11%
Germany	328	9%
Poland	311	8%
Japan	251	7%
Netherlands	239	6%
Switzerland	215	6%
Brazil	177	5%
Canada	118	3%
Rest of the world		35%
Total	3,819	100%

Source: FSC 2005.

FSC certifies based on 10 principles that include social and environmental criteria. FSC certified products enter the marketplace with a credential of being a social

and environmentally responsible product. Producers (certified forests) and manufacturers (chain of custody - CoC) both need to go through the certifying process. The process works through a third party certifier. FSC specifies the standards, an accredited certifier applies the standards of the FSC in the field, and the owner of the land receives the accredited certification of FSC in their products. By 2003, forestland in 57 countries was certified and 62 countries had chain of custody with the FSC standards (Washburn and Miller 2003).

Forest products can follow a long process from the forest before they reach the consumer. During the process, the raw materials need to be held to the certification standards. To claim that a solid wood product is certified, the product must contain at least 70 percent of FSC-certified wood (Anderson and Hansen 2003, FSC 2003(a)).

The FSC Principles

“Principle #1: Compliance with laws and FSC Principles

Forest management shall respect all applicable laws of the country in which they occur, and international treaties and agreements to which the country is a signatory, and comply with all FSC Principles and Criteria.

Principle #2: Tenure and use rights and responsibilities

Long-term tenure and use rights to the land and forest resources shall be clearly defined, documented and legally established.

Principle #3: Indigenous peoples' rights

The legal and customary rights of indigenous peoples to own, use and lands, territories, and resources shall be recognized and respected.

Principle #4: Community relations and worker's rights

Forest management operations shall maintain or enhance the long-term social and economic wellbeing of forest workers and local communities.

Principle #5: Benefits from the forest

Forest management operations shall encourage the efficient use of the forest's multiple products and services to ensure economic viability and a wide range of environmental and social benefits.

Principle #6: Environmental impact

Forest management shall conserve biological diversity and its associated values, water resources, soils, and unique and fragile ecosystems and landscapes, and, by so doing, maintain the ecological functions and the integrity of the forest.

Principle #7: Management plan

A management plan – appropriate to the scale and intensity of the operations – shall be written, implemented, and kept up-to-date. The long-term objectives of management, and the means of achieving them, shall be clearly stated.

Principle #8: Monitoring and assessment

Monitoring shall be conducted – appropriate to the scale and intensity of forest management – to assess the condition of the forest, yields of forest products, chain of custody, management activities and their social and environmental impacts.

Principle #9: Maintenance of high conservation value forests

Management activities in high conservation value forests shall maintain or enhance the attributes that define such forests. Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach.

Principle #10: Plantations

Plantations shall be planned and managed in accordance with Principles and Criteria 1 - 9, and Principle 10 and its Criteria. While plantations can provide an array of social and economic benefits, and can contribute to satisfying the world's needs for forest products, they should complement the management of, reduce pressures on, and promote the restoration and conservation of natural forests” (FSC 2004).

Sustainable Forest Initiative (SFI)

Adopted by the American Forest & Paper Association (AF&PA) in October 1994 and officially launched in 1995, The Sustainable Forestry Initiative® (SFI) program is an exacting standard of environmental principles, objectives, and performance measures that integrate the perpetual growing and harvesting of trees with the protection of wildlife, plants, soil and water quality and a wide range of other conservation goals. An independent External Review Panel, comprised of representatives from the environmental, professional, conservation, academic, and public sectors reviews the program and advises AF&PA on its progress. Through the SFISM program, members of the American Forest & Paper Association are revolutionizing the way that private forests are managed in the U.S. Sixteen companies have been expelled from the Association for failure to uphold the standard set by the SFISM program. Currently it is the major certification scheme in the U.S. with 55 million hectares of forests certified under its scheme (SFI 2005, Wallinger 2003, Fletcher et al. 2002).

Sustainable Forestry Board

The Sustainable Forestry Board was chartered as an independent body in July of 2000 to oversee development and continuous improvement of the Sustainable Forestry Initiative® (SFI) Program Standard, associated certification processes and procedures, and program quality control mechanisms.

External Review Panel (ERP)

A distinguished group of 18 independent experts representing conservation, environmental, professional, academic, and public organizations comprise the Independent External Review Panel. The mission of the External Review Panel is to provide a framework to conduct an independent review of the SFISM program and to ensure that the Annual Report fairly states the status of SFISM program implementation. The volunteer Panel provides external oversight with their independent review of the current SFISM program while seeking steady improvements in sustainable forestry practices. While some members of the panel do make field visits to member companies and observe their on-the-ground practices, it is not a charge of the panel to verify practices on the ground, and the panel does not review individual company data (SFI 2004).

The SFI Principles

“Principle #1: Sustainable forestry

To practice sustainable forestry is to meet the needs of the present without compromising the ability of future generations to meet their own needs by practicing a land stewardship ethic that integrates the reforestation, managing, growing, nurturing and harvesting of trees for useful products with the conservation of soil, air and water quality, biological diversity, wildlife and aquatic habitat, recreation and aesthetics.

Principle #2: Responsible practices

To use in forests, and promote among other forest landowners, sustainable forestry practices that are economically, environmentally, and socially responsible.

Principle #3: Forest health and productivity

To protect forests from wildfire, pests, diseases and other damaging agents to maintain and improve long-term forest health and productivity.

Principle #4: Protecting special sites

To manage forest and lands of special significance (e.g., biologically, geologically, culturally or historically significant) in a manner that takes into account their unique qualities.

Principle #5: Legal compliance

To comply with applicable federal, state or local forestry and related environmental laws and regulations.

Principle #6: Continual improvement

To continually improve the practice of forest management and also to monitor, measure, and report performance in achieving the commitment to sustainable forestry” (SFI 2005).

Program of Endorsement of Forest Certification (PEFC)

The Program of Endorsement of Forest Certification was created in 1999 first as Pan European Forest Certification program by the European forest products industry as an alternative for FSC certification. Initially it worked as an umbrella for the forest certification systems in mostly European countries. From 1999 to today the number of member countries has risen to 30 as of March 2005. It became an international umbrella for non-European countries such as Australia, Chile, and Canada, changing its name in 2003 to Program of Endorsement of Forest Certification. The PEFC works under principles of sustainability, credibility, accountability, and adaptability. The PEFC is the largest certification scheme in the world and certifies logging activities on 123 million hectares (**Table 9**) of forests certified under their standards. Seventy-seven percent of the forests certified under the PEFC are located in Canada (52 percent), Finland (18 percent), and Norway (7 percent). Sixty-seven percent of the members that hold a chain of custody under the PEFC are in Finland (31 percent), France (23 percent), and Austria (13 percent). The PEFC has certified forest in Africa, Asia, Europe, North America, South America, and Oceania.

The PEFC Principles

“Principle #1: Sustainability

- Benefits the biodiversity of nature and the environment.
- Promotes the economically viable, environmentally appropriate and socially beneficial management of forests.
- Provides independent certified proof of the sustainable management of forests.
- Provides continuous supplies of wood products from millions of hectares of sustainable managed certified sources.

Principle #2: Credibility

- Develops national forest management certification standards and schemes, using multi-stakeholder processes for the protection of forests, which have been signed by up to 37 nations in Europe, and other inter-governmental processes for sustainable forest management around the world.
- Uses internationally recognized accreditation and certification processes to ensure independence of control, standard setting and delivery of sustainable forest management.
- Is supported by 30 independent certification schemes and their stakeholders, including woodland owners, industry, and environmental and social interests amongst others.

Principle #3: Accountability

- Regulate independent certified controls - from the tree in the forest to the final product.
- To reassure the customer that wood-based product can be traced back to sustainable managed forests.

Principle #4: Adaptability

- Facilitates active involvement of all forests and enterprises regardless of size. This includes family-owned forests, small to medium sized forest enterprises as well as multinational corporations.
- Accommodates and incorporates the global diversity of forest types, cultural heritage, ownership structures and management objectives” (PEFC 2005 (a)).

Table 9. Certified forest area and Chain of Custody distribution under the Program of Endorsement of Forest Certification (2005)

Country	Certified forest area million (ha)	Percent
Canada	63.8	52%
Finland	22.4	18%
Norway	9.2	7%
Germany	7.0	6%
Sweden	6.6	5%
Austria	3.9	3%
France	3.7	3%
Czech Republic	1.9	2%
Austria	1.9	2%
Rest of the world		2%
	123.3	100%
Country	Chain of Custody (#)	Percent
Finland	719	31%
France	520	23%
Austria	290	13%
Chile	203	9%
Switzerland	156	7%
UK	88	4%
Denmark	85	4%
Sweden	64	3%
Canada	50	2%
Rest of the world		5%
	2,285	100%

Source: PEFC 2005.

Canadian Standard Association (CSA)

The Canadian Standard Association (CSA), Sustainable Forest Management Program (CAN/CSA Z809) is a not-for-profit organization engaged in the development

of independent standards. CSA developed a Sustainable Forest Management (SFM) standard modeled on the ISO environmental management systems standard ISO 14000 (Forest World Group, n.d., Canadian forestry Certification Commission n.d.). In 1996 CSA, along with the Canadian government, launched Canada's National Standard for Sustainable Forest Management (CAN/CSA Z809). This standard was developed through the collaboration of various stakeholders including government, environmental groups, forest industry, and academic interests. The fact that the forest industry was taken into account in the development of the CSA shows the great relationship that the Canadian industry has with the government (Cashore et al. 2003). "It is based on an internationally approved set of criteria and indicators for sustainable forest management and modified by the Canadian Council of Forest Ministers, representing each Canadian province" (Weyerhaeuser 2002). In 2003 a revised version of the Z809 standard was published along with requirements for the implementation of a chain of custody for forest products originating from areas certified under standard Z809 (CSA 2002). By 2004 the CSA had 47.5 million hectares of forests certified.

The CSA Principles

"Principle #1: Conservation of biological diversity

Conserve biological diversity by maintaining integrity, function, and diversity of living organisms and the complexes of which they are a part.

Principle #2: Maintenance and enhancement of forest ecosystem condition and productivity

Conserve forest ecosystem condition and productivity by maintaining the health, vitality, and rates of biological production.

Principle #3: Conservation of soil and water resources

The parties who are affected or interested participate voluntarily.

Principle #4: Forest ecosystem contributions to global ecological cycles

Maintain forest conditions and management activities that contribute to the health of global ecological cycles.

Principle #5: Multiple benefits to society

Sustain flows of forest benefits for current and future generations by providing multiple goods and services.

Principle #6: Accepting society's responsibility for sustainable development

Society's responsibility for sustainable forest management requires that fair, equitable, and effective forest management decisions are made" (CSA 2002).

Comparison of Major Certification Schemes

The major schemes in the world were developed and implemented in the same decade as a result of a global concern to address sustainability in the forest sector. The Sustainable Forest Initiative (SFI) has certified forest areas in the U.S. and Canada. The FSC gave incentives to the Canadian industry for the development of the Canadian Standard Association (CSA) so that Canada could stay only with its national certification system (Cashore et al. 2003). The SFI development was very similar to the CSA; both were developed by members of the forest products industry. The Forest Stewardship Council (FSC) and the Program for Endorsement of Forest Certification (PEFC) have a global scope and are broadly used around the world. FSC and PEFC have certified forests in five regions: Africa, Asia, Europe, North America, South America, and Oceania. In May of 2005 the CSA was recognized under the PEFC umbrella (PEFC 2005), turning the PEFC into the largest certification scheme by area around the world. The FSC is typically applied in tropical countries, and FSC principles have been used as a guideline to improve developing countries' forest management laws. The FSC is also broadly used in the U.S. and Canada. **Table 10** shows that the most widely adopted programs are PEFC and SFI. "Despite cooperation between some certification schemes, lack of mutual recognition may confuse consumers" because they cannot recognize the difference among schemes (FAO/UNECE 2004).

Principles Applied by Major Schemes

For the certification system to work there are many steps that need to go hand in hand. First, the certification scheme sets the criteria that define sustainable forest management practices. Once the guidelines are written and a forest landowner/company wants to become certified under a certain scheme, a third party goes to the field and

conducts an audit to see if the criteria are met. If not, the third part recommends the necessary improvements to become certified. When the landowner/company has improved its practices and has passed the third party audit, the forest land becomes certified for a specified period of time (for example: 5 years for FSC). After the initial certification time has passed, if the landowner/company wants to keep the certification the third party needs to verify that the standards have been maintained and recertify the forest management practices. These additional steps add cost of production throughout the supply chain.

Table 10. Major forest certification schemes, area certified and their scope (2005)

Scheme	Area Certified [Millions of hectares]	Scope
PEFC	55.0	International. Umbrella for national schemes. Primarily focuses on forests in the European Union. Currently expanding to Australia, Brazil, Canada, Chile, Malaysia and the U.S.
SFI	55.0	Primarily focused on industrial forests in the United States and Canada.
FSC	52.0	International. Umbrella for national schemes. Used by all types of forest ownership around the world.
CSA	47.4	Canadian Standards Association; primary focused on industrial forests in Canada.
TOTAL	209.4	

Sources: Area figures for FSC, PEFC, SFI, and CSA come from their web pages (Accessed on 2005).

The foundations and main principles of all the certification schemes are to address sustainable forest management practices within a specific scope; meaning there are minimum criteria that need to be achieved to meet a principle. One of the differences between the FSC and other schemes is that the FSC has one principle that deals with indigenous people. The SFI principles address growing trees in a way that ensures protection of the forest environment (soils, wildlife, air, water quality, and plants)

(Ingram 1998). The FSC principles apply to tropical, boreal and temperate forests. However, the FSC encourages taking into account the economical, social and environmental reality of a place to design a more proper management plan (GTZ 1998). The PEFC criteria encourage other less known certification schemes to meet their standards so that they can become part of the PEFC umbrella. To become certified under the FSC and PEFC is voluntary. The CSA and the SFI demand that their members be certified under their scheme. For the CoC of the FSC and PEFC there is a requirement that at least 70 percent of a product must come from certified wood in order to use the label (**Table 11**).

Eco-labeling is applied to products that meet specific environmental standards with the purpose of informing the consumer (Greenbiz.com/ Ecolabeling 2004). In the forest products category the logo that the third party certifier (e.g. Smartwood) stamps when the producer meets the standards of the first party certifier (e.g. FSC) is the eco-label (**Figure 6**). The FSC and the PEFC have an eco-label, but the SFI and CSA do not have one. The CSA, PEFC, and FSC use a third party to gain certification under their standards (**Table 12**).



Figure 6. FSC and Smartwood logos

Table 11. Selected characteristics of major forest certification schemes

	FSC	SFI	CSA	PEFC
Basis for Company Participation	Voluntary	Required for AF&PA membership. Voluntary for third-party certification and non-member licensees.	Required for CSA members.	Voluntary
Public reporting	Public disclosure of certification report and management plan is required for forest management companies. Standards and other program information freely available.	If the participant desires to publicly state it has an SFI certification, then it is required to disclose a summary certification report. Collective performance trends are reported annually by AF&PA. Standards and other program information freely available.		Public disclosure of certification report is required. Standards and other program information available from national programs.
On-product label and chain of custody guidelines	Yes. Minimum threshold varies with product. 70 percent for solid wood.	Yes, for third-party certifications only. Minimum threshold is 66 percent.		Yes. Minimum threshold is 70 percent.
Number of participants	3,311 certified companies (holding 3866 certificates) in 73 countries. 630 are Forest Management certificates and 3,233 are Chain of Custody certificates.	130 AF&PA members. 80 additional organizations outside of AF&PA are licensed under program.		PEFC has in its membership 30 independent national forest certification schemes.

Source: Forest Certification Resource Center (n.d.) and PEFC (2004).

Table 12. Basic elements of example certification schemes

Scheme	Led by	Level	Application	Eco-label
SFI	American Forest & Paper Association	2 nd party	United States	No
CSA	Canadian Standards Association	3 rd party audited, systems-based	Canada	No
FSC	Primarily environmental, non-governmental organizations	3 rd party, performance s-based	International	Yes
PEFC	Primarily environmental, non-governmental organizations	3 rd party, performance s-based	International	Yes

Source: Forest Products Annual Market Review 1997 -1998

Certified Forest Distributions among Regions

Forest certification has been extensively applied in the developed regions of North America and the EU. The majority of certified forests are in the United States, Europe, and Canada (Ingram 1998). In the U.S. the Forest and Paper Association decided that all its members should be certified under SFI management practices. “The US-based SFI and the Canadian CSA scheme are largely applied by the larger industrial land owners or concession holders” (Eba’a Atyi 2002). The forest industry in developed regions is better organized and has a larger budget allocated for responsible management practices. The EU and similar regions have been using their forest resources for a longer time than other developed countries. They have learned through time and experience that establishing sustainable practices is necessary to maintain their forest resources. Developed regions have more critical consumers who have the power to ask for products produced under social and environmentally responsible practices. **Table 13** shows that the two regions where the majority of the forests under the major certification schemes are located are Europe and North America. These two areas account for 96 percent of the total certified forests in the world.

Table 13. Certified forest areas classified by selected regions and certification standards (million of hectares)

Forest Certification Standard (million hectares)						
Regions	PEFC	FSC	SFI	CSA	Total	%
Europe	54.8	26.8			81.6	37%
North America		12.3	55.0	63.8	131.1	59%
South America		4.9			4.9	2%
Africa		1.6			1.6	1%
Oceania	1.9				1.9	1%
Total					221.1	100%

Sources: Canadian Sustainable Forestry Certification Coalition (n.d.), FSC (2005), Forest Certification Resource Center (2004), and PEFC (2005).

Summary

Forest certification appeared on the scene in the mid 1990's to address sustainability in the forest sector, to reduce tropical deforestation, and to curb illegal logging. There are four main forest certifications in the world: the Sustainable Forest Initiative (SFI), the Forest Stewardship Council (FSC), the Programme for Endorsement of Forest Certification (PEFC), and the Canadian Standard Association (CSA). The four schemes hold 96 percent of the world's certified forest area. Ninety-eight percent of that area is located in developed regions (U.S., Europe, and Canada).

The overall goal of all the certification schemes is to address sustainable forest management practices. Each scheme sets the criteria that define sustainable forest management practices. Usually an independent third party audits for verification that the respective criteria are being applied by the landowners/companies who want to become certified. There are two ways to become certified; one is through forest management practices and the other is through Chain of Custody (CoC). CoC is an inventory control process in the wood manufacturing industry developed to control certified forest products through the supply chain to the final customer. CoC is by no means unique to the forest products industry. It is a widely used practice to track the transfer of things from one place to another.

. To manage non-certified wood products with certified wood products in the same manufacturing plant is not an easy process. As an example of the complexity in the certified wood supply chain management "it is estimated that over 80 percent of FSC certified lumber is "lost" on the way to the consumer, and ends up being sold as uncertified"(Conservation and Community Investment Forum 2002).

Currently “certified forest products markets are driven at the business-to-business level, but not yet from final consumers” (FAO/UNECE, 2004). Large retailers such as Lowe's and Home Depot are using certification as one more attribute to differentiate their products. Consumers may find certification difficult to understand because of the various certification schemes. They are more concerned in identifying a unique logo on the products purchased rather than the background of the certification.

“One of forest certification’s most relevant contributions to positive policy developments has been the induction of a new culture of multi-stakeholder processes that is characterized by an increased awareness of Sustainable Forest Management” (Segura 2002).

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3. RESEARCH OVERVIEW: U.S. MARKETS FOR CERTIFIED AND NON-CERTIFIED TROPICAL HARDWOOD PRODUCTS

Overview of the U.S. Tropical Hardwood Products Market

In the 1980s the U.S. was the second largest consumer of tropical hardwood after Japan. At that time, demand was increasing at a higher rate than the country's GDP. This rise was caused by the increasing cost of high quality U.S. hardwoods followed by general interest in preservation of U.S. hardwoods for recreational and aesthetic values. Another important reason was that tropical hardwood plywood paneling could be obtained at low prices from Southeast and East Asia (Myers 1980).

In 1978, U.S. demand for tropical sawnwood was US\$ 537 million and was predicted to increase 75 percent by the year 2000. This prediction was based in the fact that tropical forests have a longer growing period, hence encouraging the paper industry to use tropical hardwood pulp for paper production (U.S. and International Institutions 1983). In 2000, the United States' total imports of tropical sawnwood were US\$ 493 million, eight percent less than in 1978 (IWPA 2004). During this period there was a notable reduction of imports of primary tropical products and an increase in imports of secondary tropical products (ITTO 2004).

In 1990, 40 percent of all U.S. hardwood lumber imports came from tropical countries, Brazil being the largest supplier (The World Forestry Center 2003). The U.S. is currently the largest importer of secondary tropical hardwood products (STWP) in the world. U.S. imports of tropical hardwood products in 2003 were US\$ 16.5 billion accounting for 34 percent of global imports. Twenty-three percent of U.S. imports came from ITTO producer countries which represent 90 percent of STWP producers. The

majority of the production was from Mexico, Indonesia, Brazil, Malaysia, and Thailand. U.S.

Imports of STWP were generally from China, Canada, and the EU (mainly Italy). U.S. imports of STWP have multiplied four times within the last ten years. The increase in single housing starts has been the primary driver of demand for wood products, including STWP (ITTO 2004). North American wood product demand was at an all time high in 2003 due to the strong housing construction sector which approached 2 million (mainly wooden) houses (FAO/UNECE, 2004).

By 1992, Latin America supplied 70 percent of the tropical hardwood lumber to the U.S. Brazil and Bolivia supplied 91 million m³ and 21 million m³ of hardwood lumber, respectively. Mahogany lumber represented 53 percent of lumber consumption volume and 57 percent of value. Latin America was the second largest supplier of tropical hardwood veneer, contributing 6.1 million m² and 31 percent of the volume of tropical hardwood veneer exported to the United States with Brazil being the number one exporter at 5.8 million m².

U.S. Imports of Tropical Hardwoods (Certified and Non-certified)

The U.S. imports approximately 1.7 million m³ of tropical hardwoods annually. Eighty percent are veneer (1.36 million m³) and sawnwood (0.34 million m³) (Metafore 2003e). The U.S. market for hardwood sawnwood constitutes 20 percent of the total U.S. wood market, of which 20 percent are tropical hardwoods. Tropical hardwoods compete with U.S. hardwoods for the similar niche markets; i.e. furniture parts and flooring (Metafore 2003d). Some disadvantages of tropical hardwoods are the transportation time, higher costs, and variable quality, an inconsistent frequency of supply. Advantages include unique species not available domestically and durability.

For certified wood products, price and the quality are as important as in conventional non-certified products (Metafore 2003a). The main problem with growth of certified wood products markets is material constraints (Ellis 1999). Demand for certified wood products in the U.S. market is low; 83 percent of importers sell anywhere from less than 2 to a maximum of 10 percent of their total sales represented by certified wood products. The fact that importers are two to three steps away from reaching the final consumer may explain why demand for certified products is low. Distributors, retailers, and manufacturers all influence demand for certified wood products (Metafore 2003a).

Relative to primary products, value-added tropical wood products imports to the U.S. are increasing. Tropical hardwood decking represents approximately one percent of the total market of decking in the U.S., an equivalent of \$US 3 million. Another product is non-treated tropical sawnwood representing 14 percent of the U.S. decking market. The U.S. hardwood flooring market is approximately \$US 1,400 million a year of which tropical hardwoods represent an 11 percent share (\$US 150 million). Annual U.S. furniture industry value is about \$US 75,000. In recent years, China has become the largest exporter of furniture to the U.S. and now represents over 60 percent of domestic consumption (Metafore 2003b). Indonesia and Malaysia are China's two largest suppliers of solid wood products (mainly tropical hardwood) which are remanufactured and exported to the U.S. and Europe (USDA 2000).

The U.S. imports 161 different species of tropical hardwoods, 20 percent from Africa, 43 percent from Asia, and 37 percent from Latin America (**Table 14**). Importers are often resistant to market new tropical wood species as it is difficult to introduce new species that compete with species currently accepted in the market.

Table 14. Tropical timber species imported to the United States

Area of Origin	Number of Species by		Percent
	Trade Name	Scientific Name	
Africa	41	44	20%
Asia	46	95	43%
Latin America	74	81	37%
Total	161	220	100%

Source: International Wood Products Association 2003.

U.S. Tropical Imports by Country and Product

Tropical Lumber Imports

The three top import partners of tropical hardwood lumber to the U.S. are Brazil, Peru, and Malaysia. U.S. imports from Brazil have decreased from 2002 to 2003. Imports from Peru increased from 2000 to 2002 and decreased in 2003. Malaysia decreased lumber exports to the U.S. by an approximately US\$ 15 million from 2000 to 2003 (Figure 7).

Tropical Hardwood Flooring Imports

The top five import partners of tropical hardwood flooring to the U.S. are Indonesia, Malaysia, China, Thailand, and Brazil. In 2000 China was ranked fifth, and in 2003 it became the number one import partner country, increasing from US\$ 7,000 million in 2000 to almost US\$ 37,000 million in 2003. Over the same period, Brazil increased exports to the U.S from US\$ 10,000 million to almost US\$ 20,000 million (Figure 8).

Tropical Hardwood Molding Imports

The top six U.S. import partners of tropical hardwood molding are Indonesia, Mexico, Malaysia, China, Brazil, and Chile (Figure 9). In the case of tropical hardwood molding, China has taken the lead increasing from US\$ 15,000 million on 2001 to almost US\$ 45,000 million on 2003. Brazil exports to the U.S. increased from US\$ 15,000

million in 2000 to approximately US\$ 27,000 million in 2003. Chile went from exporting nearly zero hardwood molding in 2000 to exporting US\$ 7,000 million in 2003. In contrast, Indonesia reduced its market from US\$ 30,000 million in 2000 to US\$ 10,000 million in 2003.

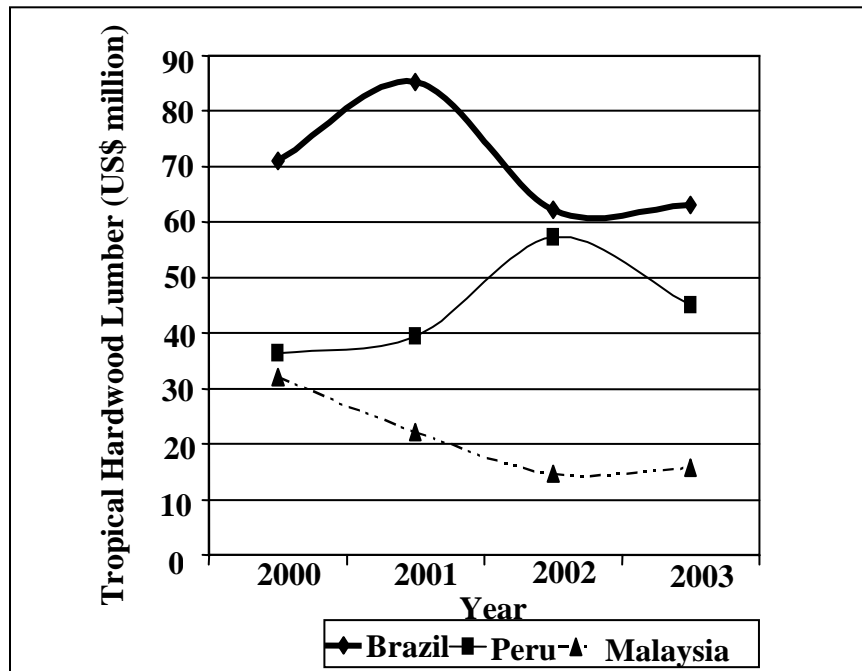


Figure 7. Top 3 U.S. import partner countries of tropical hardwood lumber (2000-2003)

Source: IWPA 2004

Tropical Hardwood Plywood Imports

The tropical hardwood plywood market in the U.S. is dominated by Indonesia, followed by Malaysia and Brazil. China is increasing its market presence rising from approximately US\$ 30,000 million in 2000 to US\$ 130,000 in 2003 (**Figure 10**).

Salamone (2002) states that for many years Indonesia has been the primary supplier of tropical hardwood plywood to the U.S. However, over the last five years plywood exports from Indonesia have declined. The decline can be attributed to some extent to the lack of environmental enforcement in Indonesian forest practices.

Diminishing forest resources account for the fluctuations of Malaysian plywood exports. Malaysia and Indonesia supply three-quarters of the U.S. total tropical hardwood plywood imports. “Plywood makes up 80 percent of U.S. tropical hardwood imports” (Keating 1998).

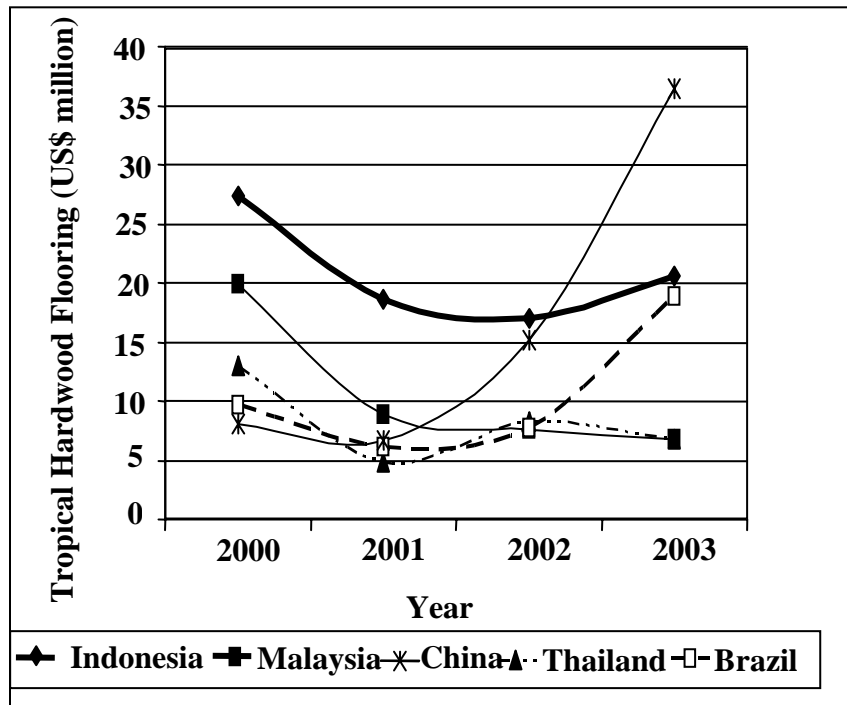


Figure 8. Top 5 U.S. import partner countries of tropical hardwood flooring (2000-2003)

Source: IWPA 2004

Tropical Hardwood Veneer Imports

The top five U.S. import countries of tropical hardwood veneer are Brazil, Ghana, Gabon, Mexico, and China. China has increased exports from US\$ 5,000 million in 2000 to approximately US\$ 12,000 million in 2003 (**Figure 11**).

Overall, China has dramatically increased its share in the U.S. market in tropical hardwood flooring, molding, plywood, and veneer. “China’s advantages as a low-cost producer and exporter of furniture are fueling imports of hardwood, both temperate and tropical species” (USDA 2000).

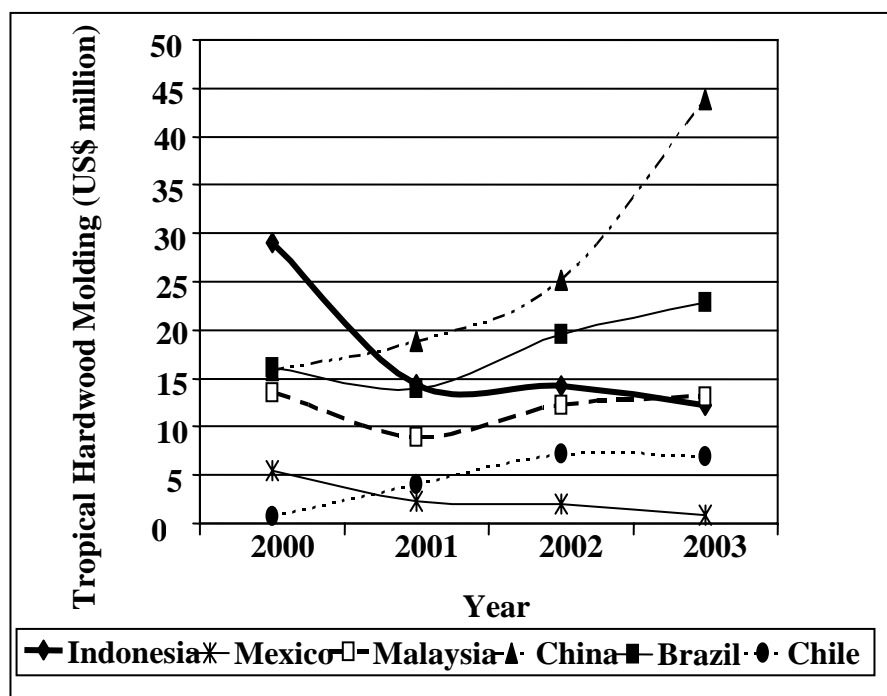


Figure 9. Top 6 U.S. import partner countries of tropical hardwood molding (2000-2003)

Source: IWPA 2004

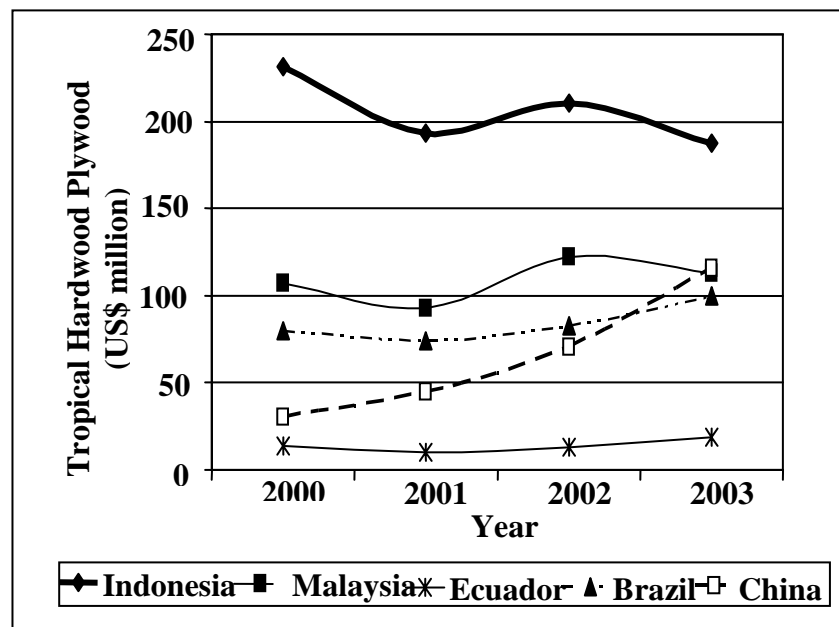


Figure 10. Top 5 U.S. import partner countries of tropical hardwood plywood (2000-2003)

Source: IWPA 2004

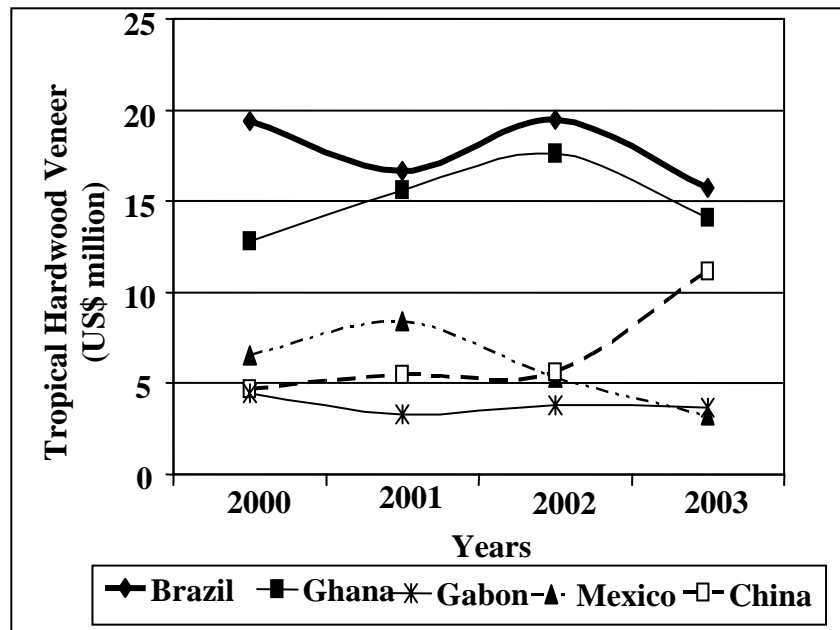


Figure 11. Top 5 U.S. import partner countries of tropical hardwood veneer (2000-2003)

Source: IWPA 2004

Channels of Distribution

Channels of physical distribution allow the products to be transported from producers to consumers. There are many entities involved in the process of physical distribution. The three main participants are intermediaries who buy and sell the product, temporarily taking title of it, agents that do not take title of the product but provide assistance in negotiations between buyers and suppliers, and facilitators that engage in marketing activities. Marketing activities include transportation, warehousing, advertising, financing, and guaranteeing delivery of the product. "The basic components of physical distribution include: order processing, inventory control, material handling, transportation, and warehousing" (Juslin and Hansen 2003).

The main components of channels, in addition to intermediaries, are typically forest landowners, primary manufacturers and secondary manufacturers, retailers and consumers (**Figure 12**). If the product is imported then the distribution channel becomes

more complex and can include buyers agents, sellers agents, customs, foreign agents, exporters, importers (**Figure 13**).

Buyer/seller marketing strategies dictate distribution channel complexity. Each member of a distribution channel provides specific services that need to be performed while managing the products through the supply chain. Shorter channels exist when two or more members of the channel consolidate services (vertically integrate). When this happens there is no elimination of processes as members perform multiple channel requirements. The supply chain involves the management of product and information about the most efficient pathways from upstream to downstream and vice versa, in a manner designed to provide the best value to the customer at the lowest cost.

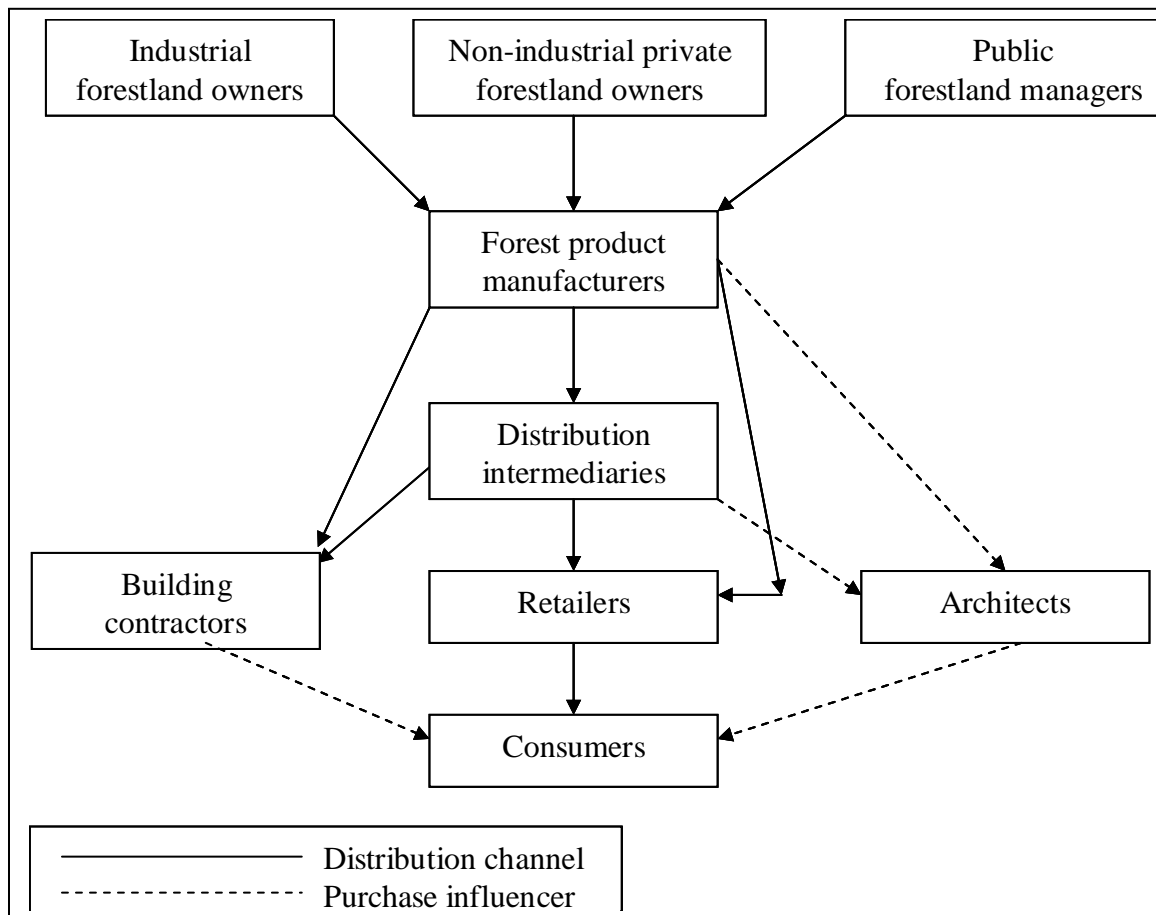


Figure 12. Forest products distribution channels

Source: Vlosky & Ellis 2003

The two most commonly used agents in the U.S. are brokers and manufacturer's representatives. Neither takes title to the goods; they help to connect buyers with suppliers. Many large companies have decreased use of agents and opened their own sales offices in importer countries. Small companies still find it very efficient to use agents to find markets for their products. One positive aspect of working with agents is that they have an understanding of international markets.

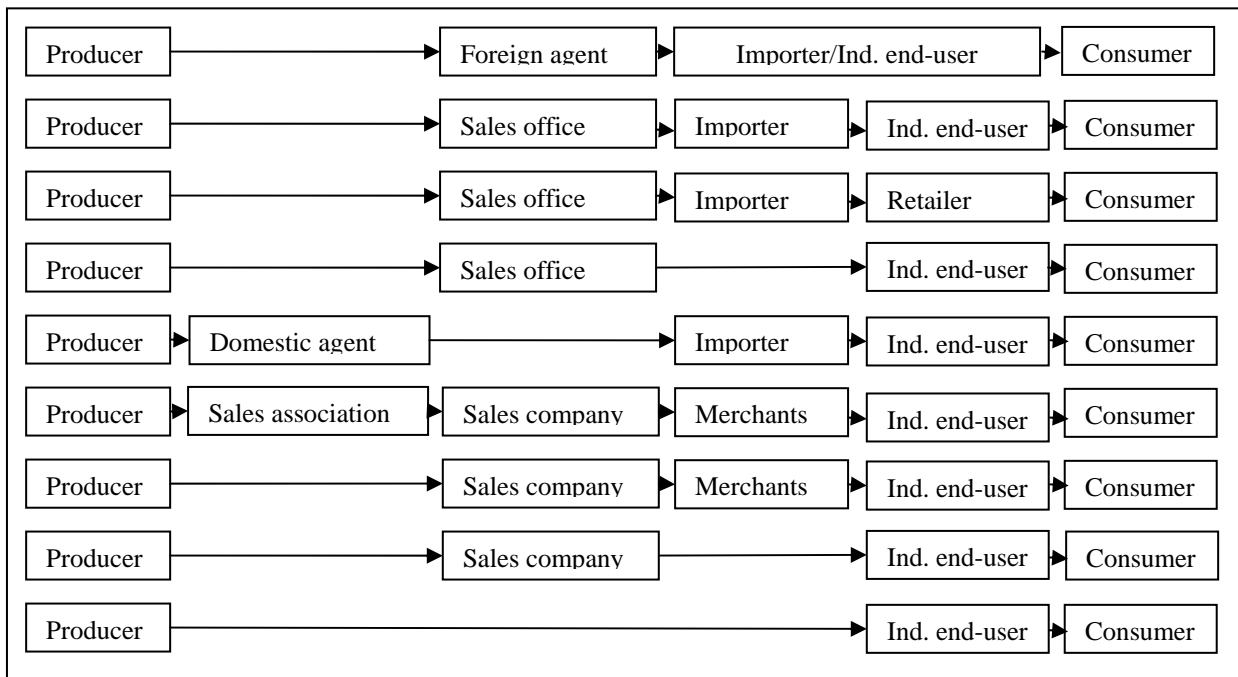


Figure 13. Important marketing channel alternative

Source: Juslin and Hansen 2003

A broker is most frequently used when large volumes of goods are purchased. Brokers also connect buyers with suppliers. Depending on their experience and relationship with the buyer, brokers typically charge a commission fee ranging from 8 to 15 percent of the purchase value (Eid 2006).

Manufacturer representatives are associated with the purchasing production entity. They generally represent non-competing companies and receive commissions

which varies between 1 and 5 percent of the sales value that they facilitate (Juslin and Jansen 2003).

Importers buy directly from the producing countries. They take title to the goods and sometimes add value such as drying, storing, and distributing the product. The size of the importer is dependant on the type of market they serve. For example, large importers often sell to large retailers while small importers sell to specialized niche markets or retailers (Juslin and Hansen 2003). Impoeters may have offices in producer countries where they also manage the export process. According to Metafore (2003c) importing transactions consist of the following steps and documentation:

- Sales conditions (previous agreements between buyers and suppliers)
- Order (the buyer orders the product once terms of agreement with supplier have been settled)
- Shipment (the product is shipped in the agreed time period FOB or SIF)
- Receipt of shipment (the buyer checks the shipment according to the agreement)
- Payment (after at most 30 days the buyer pays the supplier)
- Disputes (if any of the parts has a problem)

In the supply chain manufacturers transform wood into primary and/or secondary wood products. Primary tropical hardwood products include roundwood, sawnwood, veneer, and plywood that are mainly used for decorative purposes in home construction or remodeling.

Examples of secondary tropical hardwood products are furniture, furniture parts, cabinets, flooring, decking, molding, and musical instruments. One of the most important tropical species used in the furniture sector is mahogany. However, in the past few years mahogany has become endangered, leading to a reduction in its use. In 1997, 8 percent of

all the bedrooms and dining rooms in the U.S. were made of mahogany. In 2005 this declined to 5 percent. Another major wood species used in the furniture sector is rubberwood. In 1997 rubberwood held less than 1 percent of raw materials used in the U.S. furniture sector but had increased to 6 percent by 2005 (ITTO 2005a).

Although there is a growing trend of furniture consumption in the U.S. the furniture sector has been shrinking as a result of competition from Asian countries that have lower costs of production. China's entrance in the U.S. furniture market has caused a major decrease in domestic production of bedroom and dining room furniture.

Tropical hardwoods are mainly used in the furniture industry, and despite the apparent reduction in U.S. furniture manufacturing, there is an increasing trend in the use of foreign species (**Figure 14**). This trend is driven by changes in consumer preferences. There are unique cases such as the city of San Francisco where there has been a fifteen-year ban on imports of tropical hardwoods (ITTO 2005b).

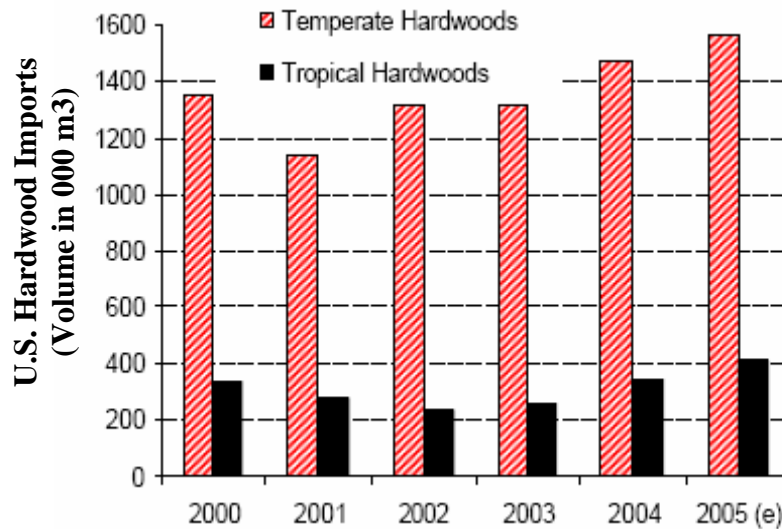


Figure 14. U.S. hardwood imports

Source: ITTO (b) 2005 citing USDA, Aktrin

Wholesalers specialize in matching buyer needs with seller products. They are intermediaries that partition bulk quantities in order to sell smaller quantities to

downstream supply chain members. They can sell to other intermediaries, retailers or to the final consumer. Some services wholesalers can provide are remanufacturing, packaging, grading, arranging transportation, and providing credit. A wholesaler can also be an importer. In the case where wholesalers and importers are separate the only difference among the two of them is that importers buy products from another country and wholesalers buy their products in the importing country. In North America, wholesalers of commodities can gross between 3 to 6 percent of the transaction value (Juslin and Hansen 2003).

Retailers are the part of the supply chain that sells a broad range of products (from lumber to furniture) to the final consumer, remodelers, or to smaller industrial end-users. Retail stores that sell building materials typically sell to do-it-yourself (DIY) consumers or contractors. The U.S. retailer market is dominated by large retail-store chains like Home Depot and Lowe's. These large chain-retail-stores, because of their buying power, can buy at lower prices than small stores. Some retailers have merged many steps of the supply chain by vertically consolidating services and activities. Large retail-stores can also create their own brands. For smaller retailers, competition from major national chains has been fierce. Many have formed buying or marketing cooperatives that allow many small companies to act like a large entity.

Architects do not purchase wood products but they strongly influence the planning, designing, and oversight of building construction and hence, products that are ultimately used. They design and provide advice about the functional, aesthetic, and technical requirements of construction. "In the broadest sense, an architect is a person who interfaces between the end user of a planned structure and the builder. The architect translates the user's needs into the builder's requirements" (Wikipedia 2006). In general

architects buy or specify the required materials from providers in the country.

Commonly, if a project is large, architects specify materials from wholesalers, while for smaller projects, they rely on retailers (Eid 2006).

Architects specify tropical hardwoods their durability and beauty, e.g. colors and patterns for finishing floors, doors, moldings, cabinets, and decking. Architects are more open to specifying lesser-known species if they come with technical specifications.

Certification Trends in Distribution Channels

The U.S. has been experiencing a trend of green building, using energy efficient designs and materials, non-toxic materials, and sustainably produced wood products. This trend makes the use of tropical hardwoods less favorable due to lack of accountability in the sustainability of the forests from which they come (Environmental Building News 2001). Similarly, if architects can document that they buy certified wood products, they receive a credit towards the green building certification (Metafore 2003a).

There are 73 primary manufacturers and 198 secondary manufacturers in the U.S. that provide FSC certified forest products (Forest Certification Resource Center 2004).

Vlosky and Ozanne (1998) studied U.S. manufacturer perceptions of certified wood products and found that larger companies tend to be more committed to environmental principles. In the same study, manufacturers were not predisposed to certification. The main concerns of manufacturers were the costs of managing the chain of custody for certified products and certification costs.

The Collins Company in Oregon is a good example of a manufacturer committed to certification. After becoming involved in certification over a decade ago, certified wood products constitute 20 percent of the company's annual sales. Musical instruments are a more recent market in the certified wood product industry (Miller 2002). Almost 10

years ago, in 1998, a study of potential certified markets was conducted in the Pacific Northwest (Washington, Oregon and California). The results showed that wholesalers in Washington had a high degree of confidence in the growth of certified product markets (Ellis 1999). Generally, it seems that certification is driven by business-to-business market participants, but has not yet reached the final consumer (FAO/UNECE, 2004).

Some retail stores have been promoting green products for almost a decade catering to consumers are look for products that make them feel that they are contributing to environmental health by buying products that come from sustainable sources.

However, there is no clear evidence that the market is willing to pay premium prices for green products. Since the industry does not have common standards on what green is, retailers decide on their own what a green product is (Beck 2006).

Retailers in Oregon and California have envisioned the future of the certified products market as Economically Healthy (Ellis 1999). Home Depot is the largest retailer in the U.S. selling \$5 billion of wood products annually. In 1999, Home Depot adopted a new wood policy of only buying wood products from suppliers committed to environmentally friendly logging and lumber practices (Jacobs, 2003). There are currently 36 retailers sell FSC certified wood products (Forest Certification Resource Center, 2004).

Even though most architects and builders are not familiar with certification, many are open to purchasing certified wood materials only if they are the same price and quality as the non-certified materials (Eid 2006).

Summary

The U.S. market for hardwood sawnwood constitutes 20 percent of the total U.S. wood market, of which 20 percent consists of tropical hardwoods. Tropical hardwood

products compete for the same niche market as temperate hardwoods. The U.S. imports approximately 1.7 million m³ of tropical hardwoods and is the largest importer of secondary tropical hardwood products in the world. In 2002, one quarter of these secondary products came directly from tropical countries; the rest came mainly from China, Canada, and the EU (Italy). The main tropical wood imports are lumber, flooring, molding, plywood, and veneer. By 2003 Brazil was the largest U.S importer partner of tropical lumber and veneer, while China led in tropical hardwood flooring and molding, and Indonesia is the main partner for tropical hardwood plywood.

In order to commercialize wood products there are many players that must work together in the supply chain to bring the product from the forest to the consumer. Marketing channels can have different structural alternatives that consist of producers, foreign agents, sales office staff, importers, industrial end users, retailers, and consumers. Each plays an important role in bring wood products from the source country to the U.S. market.

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4. RESEARCH RESULTS: U.S. DEMAND FOR CERTIFIED TROPICAL HARDWOOD PRODUCTS: THE SUPPLY CHAIN MEMBER PERSPECTIVE

Introduction

The following chapter discusses the supply chain of the supply chain. This sector was chosen to facilitate analysis of the U.S. market for certified tropical hardwood products. The chapter starts with an overview of the sector and the U.S. forest products certification, followed by the methodology used for the study, continuing with the results of the study, and finally the discussion and conclusions of the study.

Recall of Study Objectives

1. Identify characteristics of U.S. demand for secondary (value-added) tropical hardwood products.
2. Understand market perceptions regarding certification of secondary tropical hardwood products.

Forest Products Certification from the U.S. Perspective

To certify means to accredit a product or a practice for some special attribute, characteristic, feature or quality. In a global market it is difficult to have international policies for “well forest management practices”. If the policies cannot be created under command and control practices (laws and regulations) then the alternative option is to create a market value for the goods. In this case the goods are the wood with an extra attribute; this attribute is to have come from a forest with sound management. To be able to track the wood that comes from well-managed forests a tracking tool is needed. This tracking tool is better known as Chain of Custody (CoC). The CoC is an inventory control process in the wood manufacturing industry developed to track certified forest products from the forest through the supply chain to the final consumer.

Certification has been used as a mechanism to attempt to slow tropical deforestation (Cote 1999) and to reduce trading of wood products coming from illegal logging. Regardless of the reasons, environmental certification of forest products and forestry practices continues to proliferate worldwide.

The primary basis for certification is the need for consumers to be assured by neutral third-party organizations that forest product companies are employing sound practices that will ensure sustainable forest management (Ozanne and Vlosky 1997). In addition to reducing negative perceptions by consumers and the general public, it is believed that companies that prove to be environmentally responsible will benefit from certification by differentiating their products in the marketplace and thus acquiring a larger share of the market (Ozanne and Vlosky 1997).

Certification is supported by many non-governmental organizations (NGOs), governments, and companies. The total area of certified forests in the world was 219 million hectares in 2004. The majority of certified forests are in the United States, Europe, and Canada (Ingram 1998). The four main certification schemes in the world are: the Programme for Endorsement of Forest Certification (PEFC), the Forest Stewardship Council (FSC), the Sustainable Forestry Initiative (SFI), and the Canadian Standards Association (CSA). These four schemes certify almost 94 percent of the world's certified forests.

Chain of Custody

Chain of Custody (CoC) is an inventory control process in the wood manufacturing industry developed to verify certified forest products. CoC works as a control system to manage critical components of the flow of materials. In the wood-based products industry, keeping the materials required to maintain the process flowing requires

much coordination and planning. Managing non-certified-wood-products (NCWP) and certified wood products (CWP) in the same manufacturing process without mixing them adds even more complexity to inventory process control. Companies move to the CWP to gain market share. It has been shown that only large retail stores that have name recognition (for example Home Depot) are using certified product as one more attribute to differentiate their products (Conservation and Community Investment Forum 2002). “Certified forest product markets are driven at the business-to-business level, but not yet from final consumers” (FAO/UNECE, 2004).

One of the issues in certification is the lack of primary CWPs produced to sustain the supply chain. Wood products can be manufactured using different processes such as:

- Job Shops (custom wood products)
- Batch production (typical products include lumber, dimension, furniture, hardwood plywood, cabinets, and veneer)
- Repetitive production (millwork manufacturers)
- Continuous production (particleboard)

Since each of these processes has different environments, the strategies to manage CoC need to be addressed first with respect to each one of these processes and then to the products manufactured (Rudell and Stevens 1998). As an example of the complexity in the certified wood supply-chain management “it is estimated that over 80 percent of FSC certified lumber is “lost” on the way to the consumer, and ends up being sold as uncertified”(Conservation and Community Investment Forum 2002).

There are four main constraints that impact CWP introduction: market, material, capacity, and logistical constraints. Market uncertainty and demand for CWP make it difficult to introduce CWP’s and this uncertainty has generated market-planning

strategies to minimize risk. The material constraint is linked to the supply of the primary CWP. There is not enough CWP to satisfy the demand of secondary CWP manufactures.

One solution to the supply problem is to enter into a strategic partnership with private forest owners who also work with CWP. The capacity constraint is reflected in factors that constrain the flow of materials through the manufacturing plant. To avoid this problem CWP inventory needs to be available in excess, although this last practice makes inventory costs rise. Logistical constraints are caused by the complexity in the management of the CWP through the plant. Planning the production, purchasing the material, and planning the inventory add to the cost of the final manufactured CWP.

To overcome all the costs and management problems and to give manufacturers an incentive to work with certified products, premium prices should be applied to the production of CWP's (Rudell and Stevens 1998). On the other hand "if the forest owners, sawmiller, and manufacturer each get 10 percent premium for their handling of certified products, and the distributor and retailer tack on an additional 5 percent, then the street price of a US\$ 100 table will have inflated to US\$ 160, without having altered the physical appearance or performance one iota" (McIntyre n.d.). For certification to work CWP needs to be associated with a real value like risk reduction, cost reduction, and/or revenue enhancement (Conservation and Community Investment Forum 2002). "Chain-of-custody is a bottleneck in today's certification markets, resulting in products produced from certified forests being sold without a label documenting their source" (UN/ECE 2002).

Overview of the U.S. Supply Chain Members

The main components of channels, in addition to intermediaries, are typically forest landowners, primary manufacturers and secondary manufacturers, retailers and

consumers. If the product is imported then the distribution channel becomes more complex and can include buyers agents, sellers agents, customs, foreign agents, exporters, importers.

Buyer/seller marketing strategies dictate distribution channel complexity. Each member of a distribution channel provides specific services that need to be performed while managing the products through the supply chain. Shorter channels exist when two or more members of the channel consolidate services (vertically integrate). When this happens there is no elimination of processes as members perform multiple channel requirements. The supply chain involves the management of product and information about the most efficient pathways from upstream to downstream and vice versa, in a manner designed to provide the best value to the customer at the lowest cost.

The two most commonly used agents in the U.S. are brokers and manufacturer's representatives. Neither takes title to the goods; they help to connect buyers with suppliers. Many large companies have decreased use of agents and opened their own sales offices in importer countries. Small companies still find it very efficient to use agents to find markets for their products. One positive aspect of working with agents is that they have an understanding of international markets.

A broker is most frequently used when large volumes of goods are purchased. Brokers also connect buyers with suppliers. Depending on their experience and relationship with the buyer, brokers typically charge a commission fee ranging from 8 to 15 percent of the purchase value (Eid 2006).

Manufacturer representatives are associated with the purchasing production entity. They generally represent non-competing companies and receive commissions

which varies between 1 and 5 percent of the sales value that they facilitate (Juslin and Jansen 2003).

Importers buy directly from the producing countries. They take title to the goods and sometimes add value such as drying, storing, and distributing the product. The size of the importer is dependant on the type of market they serve. For example, large importers often sell to large retailers while small importers sell to specialized niche markets or retailers (Juslin and Hansen 2003). Impoeters may have offices in producer countries where they also manage the export process. According to Metafore (2003c) importing transactions consist of the following steps and documentation:

- Sales conditions (previous agreements between buyers and suppliers)
- Order (the buyer orders the product once terms of agreement with supplier have been settled)
- Shipment (the product is shipped in the agreed time period FOB or SIF)
- Receipt of shipment (the buyer checks the shipment according to the agreement)
- Payment (after at most 30 days the buyer pays the supplier)
- Disputes (if any of the parts has a problem)

In the supply chain manufacturers transform wood into primary and/or secondary wood products. Primary tropical hardwood products include roundwood, sawnwood, veneer, and plywood that are mainly used for decorative purposes in home construction or remodeling.

Examples of secondary tropical hardwood products are furniture, furniture parts, cabinets, flooring, decking, molding, and musical instruments. One of the most important tropical species used in the furniture sector is mahogany. However, in the past few years mahogany has become endangered, leading to a reduction in its use. In 1997, 8 percent of

all the bedrooms and dining rooms in the U.S. were made of mahogany. In 2005 this declined to 5 percent. Another major wood species used in the furniture sector is rubberwood. In 1997 rubberwood held less than 1 percent of raw materials used in the U.S. furniture sector but had increased to 6 percent by 2005 (ITTO 2005a).

Although there is a growing trend of furniture consumption in the U.S. the furniture sector has been shrinking as a result of competition from Asian countries that have lower costs of production. China's entrance in the U.S. furniture market has caused a major decrease in domestic production of bedroom and dining room furniture.

Tropical hardwoods are mainly used in the furniture industry, and despite the apparent reduction in U.S. furniture manufacturing, there is an increasing trend in the use of foreign species (**Figure 15**). This trend is driven by changes in consumer preferences. There are unique cases such as the city of San Francisco where there has been a fifteen-year ban on imports of tropical hardwoods (ITTO 2005b).

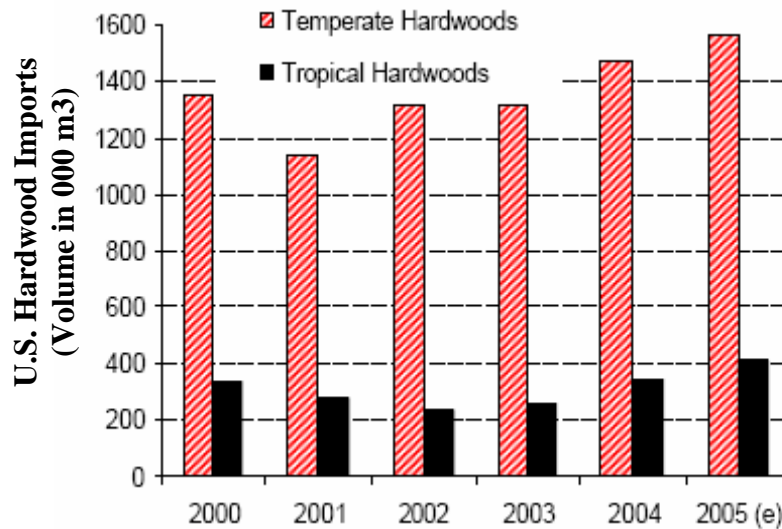


Figure 15. U.S. hardwood imports

Source: ITTO (b) 2005 citing USDA, Aktrin

Wholesalers specialize in matching buyer needs with seller products. They are intermediaries that partition bulk quantities in order to sell smaller quantities to downstream supply chain members. They can sell to other intermediaries, retailers or to the final consumer. Some services wholesalers can provide are remanufacturing, packaging, grading, arranging transportation, and providing credit. A wholesaler can also be an importer. In the case where wholesalers and importers are separate the only difference among the two of them is that importers buy products from another country and wholesalers buy their products in the importing country. In North America, wholesalers of commodities can gross between 3 to 6 percent of the transaction value (Juslin and Hansen 2003).

Retailers are the part of the supply chain that sells a broad range of products (from lumber to furniture) to the final consumer, remodelers, or to smaller industrial end-users. Retail stores that sell building materials typically sell to do-it-yourself (DIY) consumers or contractors. The U.S. retailer market is dominated by large retail-store chains like Home Depot and Lowe's. These large chain-retail-stores, because of their buying power, can buy at lower prices than small stores. Some retailers have merged many steps of the supply chain by vertically consolidating services and activities. Large retail-stores can also create their own brands. For smaller retailers, competition from major national chains has been fierce. Many have formed buying or marketing cooperatives that allow many small companies to act like a large entity.

Certification Trends in Distribution Channels

The U.S. has been experiencing a trend of green building, using energy efficient designs and materials, non-toxic materials, and sustainably produced wood products. This trend makes the use of tropical hardwoods less favorable due to lack of accountability in

the sustainability of the forests from which they come (Environmental Building News 2001). Similarly, if architects can document that they buy certified wood products, they receive a credit towards the green building certification (Metafore 2003a).

There are 73 primary manufacturers and 198 secondary manufacturers in the U.S. that provide FSC certified forest products (Forest Certification Resource Center 2004).

Vlosky and Ozanne (1998) studied U.S. manufacturer perceptions of certified wood products and found that larger companies tend to be more committed to environmental principles. In the same study, manufacturers were not predisposed to certification. The main concerns of manufacturers were the costs of managing the chain of custody for certified products and certification costs.

The Collins Company in Oregon is a good example of a manufacturer committed to certification. After becoming involved in certification over a decade ago, certified wood products constitute 20 percent of the company's annual sales. Musical instruments are a more recent market in the certified wood product industry (Miller 2002). Almost 10 years ago, in 1998, a study of potential certified markets was conducted in the Pacific Northwest (Washington, Oregon and California). The results showed that wholesalers in Washington had a high degree of confidence in the growth of certified product markets (Ellis 1999). Generally, it seems that certification is driven by business-to-business market participants, but has not yet reached the final consumer (FAO/UNECE, 2004).

Some retail stores have been promoting green products for almost a decade catering to consumers who look for products that make them feel that they are contributing to environmental health by buying products that come from sustainable sources.

However, there is no clear evidence that the market is willing to pay premium prices for green products. Since the industry does not have common standards on what green is, retailers decide on their own what a green product is (Beck 2006).

Retailers in Oregon and California have envisioned the future of the certified products market as Economically Healthy (Ellis 1999). Home Depot is the largest retailer in the U.S. selling \$5 billion of wood products annually. In 1999, Home Depot adopted a new wood policy of only buying wood products from suppliers committed to environmentally friendly logging and lumber practices (Jacobs, 2003). There are currently 36 retailers sell FSC certified wood products (Forest Certification Resource Center, 2004).

Methodology and Materials

The study “a demand perspective for certified tropical hardwood product markets in the United States” was conducted using the facilities of the Louisiana State University A & M. and the School of Renewable Natural Resources. The methods used for the research were the following:

1. Literature review of secondary information for background of study
2. Primary data collection from the Supply chain members to better understand its demand perspective for certified tropical hardwood products

Sample Characteristics

The sample of Importers/Brokers/Manufacturers/Retailers/Wholesalers (Supply Chain) was developed gathering company's names from different sources. The sources used to compile the sample were The Big Book 2004, Metafore 2003, Wood Utilization/Forest Inventory Forester, Florida Division of Forestry, companies surveyed before by Dr. Richard Vlosky, and International Wood Product Association (IWP). The

criterion used to select the company sample was based on the products that the companies worked with – Tropical hardwood products- and those that were based or had offices in the United States. The final sample had 1284 companies.

Survey Development

The mail survey was tailored/designed using the Dillman 2000 method. The survey was divided into three sections. The first section was designed to compile general information about the company, the second section asked questions related to tropical hardwoods, and the third section asked questions related to certified tropical hardwoods. The first section had four questions, the second had fourteen, and the third had eight. The questions of the survey were divided into close binomial (yes – no), multiple choice questions, and open questions. The survey had 184 variables to analyze. Before the mail survey was sent out it was pre-tested by sending the survey to 10 companies randomly selected from the list. Those companies sent their feedback to improve understanding of the survey. After the survey was improved it was sent out again. In order to increase the response rate of the survey the following was done:

- A letter sent prior to the survey informed companies that a survey would be arriving a week later
- The main survey was sent with an explanatory cover letter that was hand signed
- A reminder letter sent out a week after the survey was sent to remind the companies that a week ago they had received the survey

Data Analysis

The survey variables were entered into two databases. The first database was used to register the surveys that came back as response, undeliverable, and change of address. The second database was used to enter the survey data in coded language that was to be

analyzed. Both databases were done in Microsoft Excel. The open questions were transcribed to Microsoft Word for future analysis. The statistical analysis of the data was done in SPSS, a program used to analyze social science statistics. To show the graphical representation, output statistical analysis charts and tables were used.

Results

Survey Response Rate

The books were opened for approximately three weeks. The number of companies surveyed was 1,284 and the final adjusted response rate was of 18.3 percent, which is considered a good response rate. Prior to the time the survey was sent out, it was thought that there was a difference among importers, brokers, manufacturers, wholesalers, and retailers. However, the results show that there is no clear difference among them, and that they can be either or both in the supply chain and therefore the results of the study reflect the behavior and perceptions of the all members of the supply chain.

Demographics

The companies that responded were primarily small with annual gross sales under US\$ 5 million (42 percent), from US\$ 6 to 10 million (17 percent), and from US\$ 11 to 25 million (17 percent). Thirty-eight percent of the companies had 1 to 25 employees, 33 percent had 26 to 100 employees, and 29 percent had 100 to more than 500 employees. The respondents were evenly distributed geographically (**Figure 16**).

Annual Gross-sales Attributed to Tropical Hardwood Products

Forty-eight percent of the companies stated that 1 to 9 percent of their company's annual gross sales in 2003 were attributed to TWP, showing that only a small percent of the market share is attributed to TWP. On the other side of the scale 6 percent of the

companies stated that 90 to 100 percent of their annual gross sales in 2003 were attributed to TWP. These companies could be viewed as specialized in purchasing or specifying TWP (**Figure 17**).

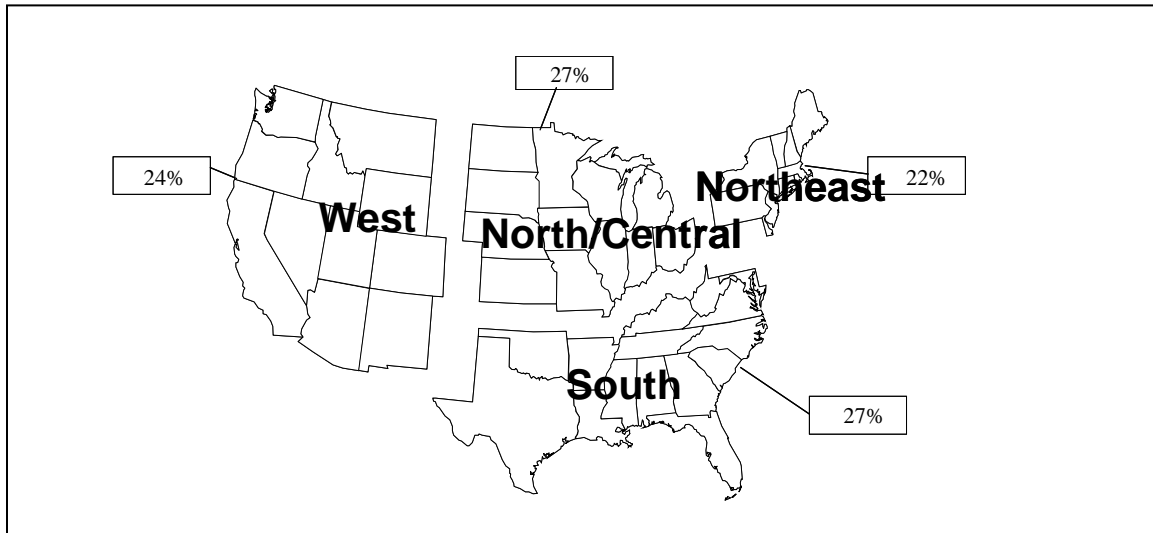


Figure 16. Company corporate locations of Supply Chain respondents (n=231)

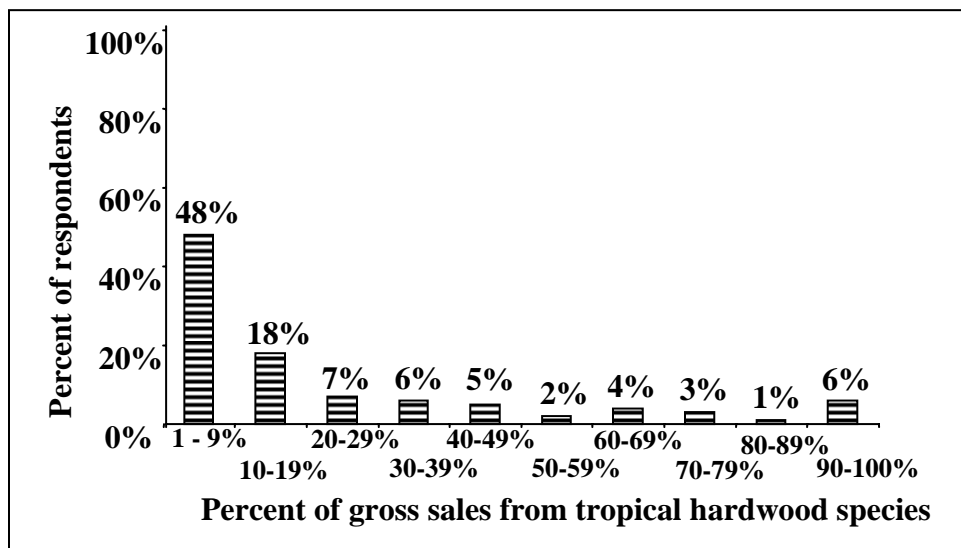


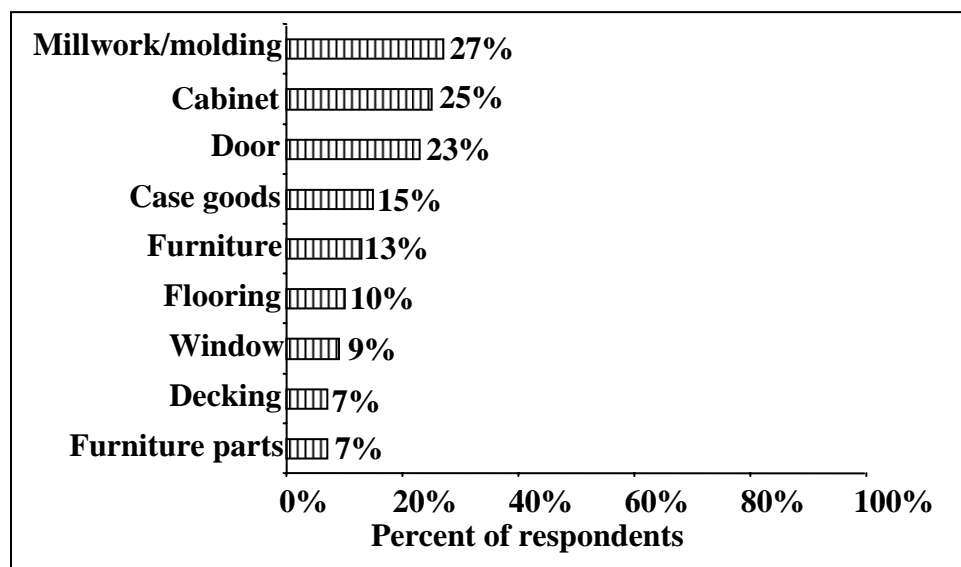
Figure 17. Percent of 2003 gross sales of Supply Chain respondents from tropical hardwood species (n=135)

Products Purchased or Specified

The three main wood products that Supply Chain respondents purchased or specified are doors, millwork/molding and cabinets. These wood products are the three main tropical hardwood products that they purchase or specify (**Figures 18 and 19**). A

possible cause for the high demand of these three specific products can be the rise in housing starts over the last decade in the U.S. (FAO/ UNECE 2004), being those three products are the ones most used in finishing work on houses.

Fifty-nine percent of the respondents do buy tropical hardwood products (TWP), and from the 41 percent that do not buy TWP only 9 percent are planning to buy TWP in the future. Temperate hardwoods compete for the same niche market as tropical hardwoods. As a result the TWP market is small.



**Figure 18. Products that Supply Chain respondents use, specify or handle (n=106)
(multiple response possible)**

Tropical Hardwood Products Purchasing Channels

Forty-three percent of the respondents stated that they purchased their TWP from U.S. broker/wholesalers (**Figure 20**). The majority of the companies surveyed were small companies. Small companies purchase small volumes of product (Juslin and Hansen 2003), and find it convenient to deal with entities based in the U.S..

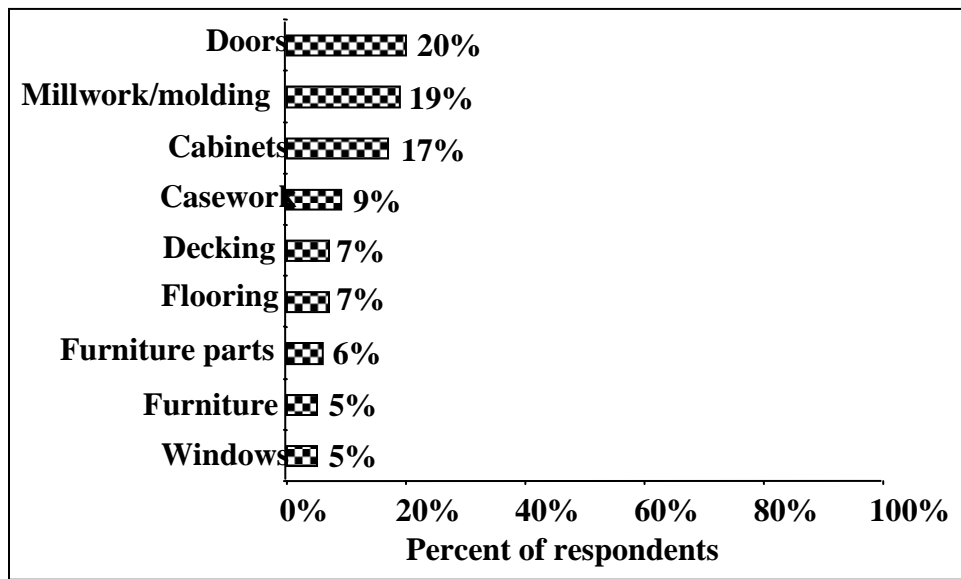


Figure 19. Products that Supply Chain respondents use, specify or handle that are manufactured with tropical species (n=106) (multiple response possible)

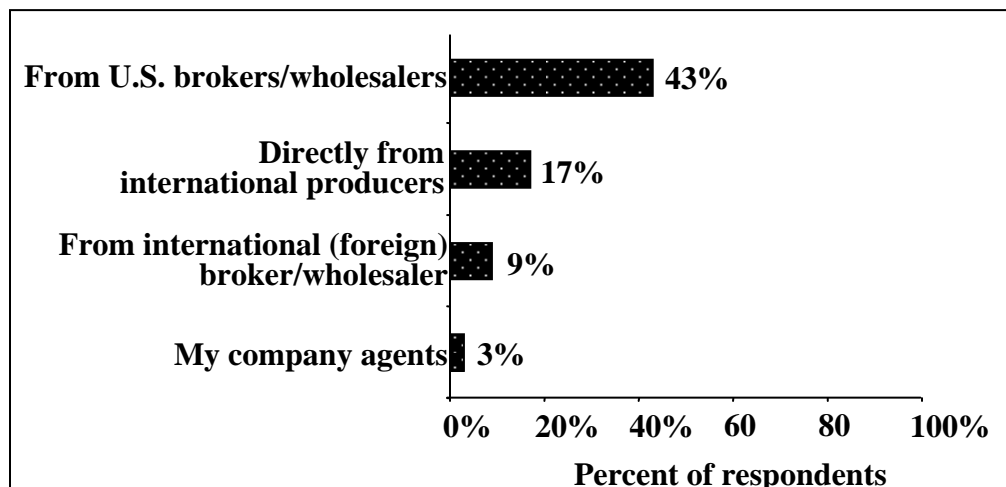


Figure 20. Tropical hardwood products purchase channels by Supply Chain respondents (n=135) (multiple response possible)

Regions and Countries where Tropical Hardwood Products Originate

Forty-eight percent of the Supply Chain respondents affirmed that the TWP they purchase comes from South America (**Figure 21**). The countries where most of the TWP originated were Brazil with 20 percent, Indonesia 9 percent, Malaysia 6 percent, and Honduras 6 percent (**Figure 22**). Other studies have shown that Brazil has been the

largest supplier of tropical hardwood products since 1990 (The World Forestry Center 2003).

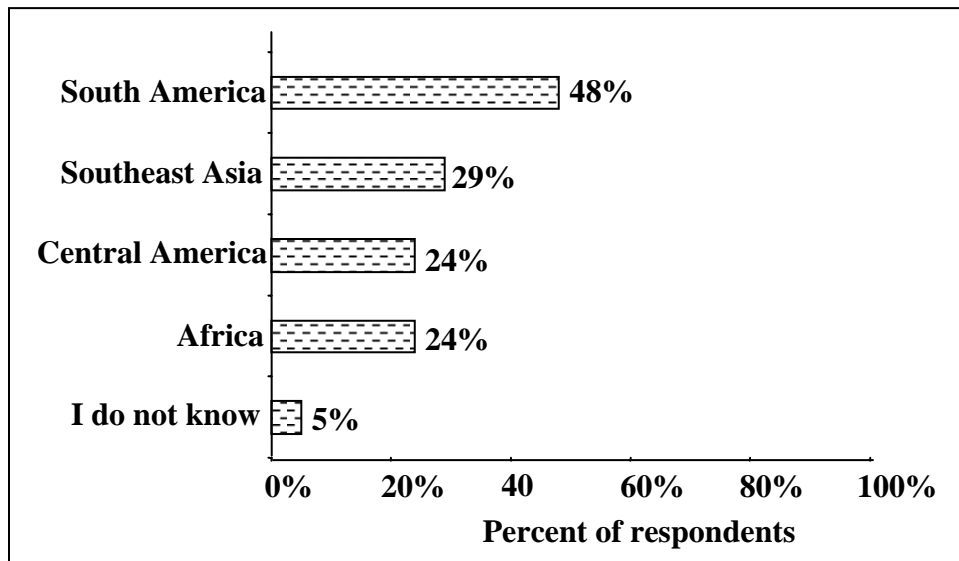


Figure 21. Tropical hardwood products purchase regions by Supply Chain respondents (n=135) (multiple responses possible)

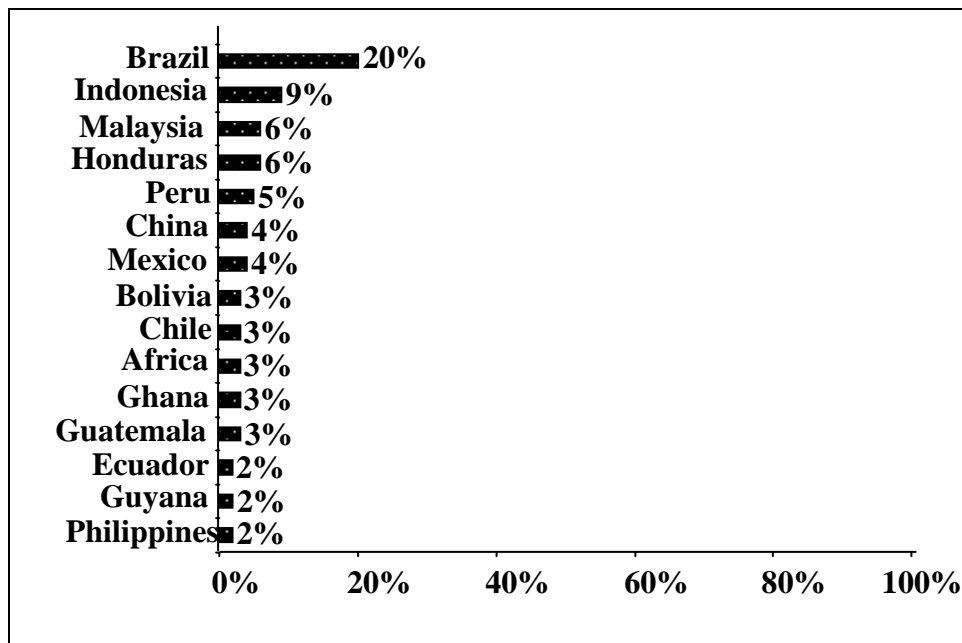


Figure 22. Top 15 countries where tropical hardwood products originate for Supply Chain respondents (n=136) (multiple responses possible)

Years Purchasing Tropical Hardwood Products and Amount of Containers Purchased per Year

More than 50 percent of respondents affirmed that they have been purchasing TWP for 10 or more years (**Figure 23**). This can be interpreted as establishment of long-term business relationships with their suppliers. Seventy percent of respondents bought 1 to 25 containers of TWP's during 2003 (**Figure 24**) demonstrating the small market share TWP has in the U.S. market.

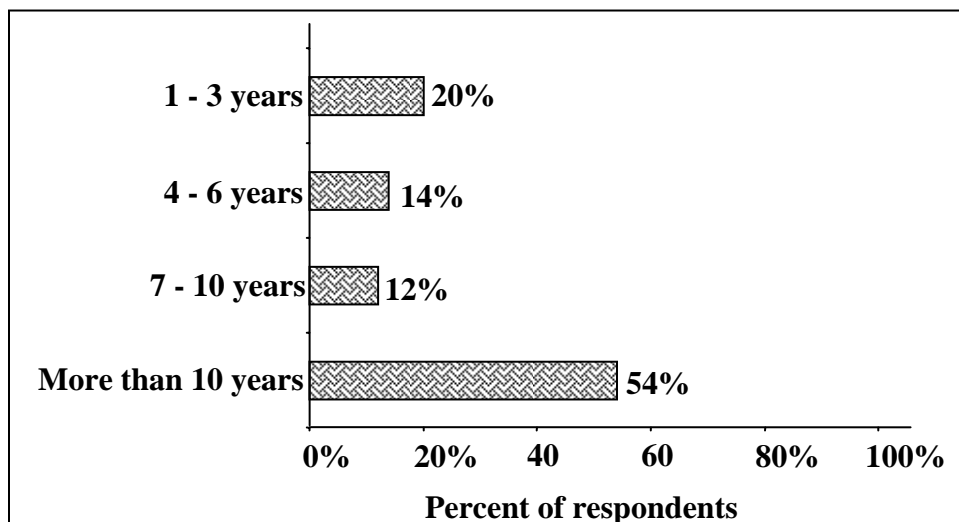


Figure 23. Number of years that Supply Chain respondents have been purchasing/specifying tropical hardwood products (n=135)

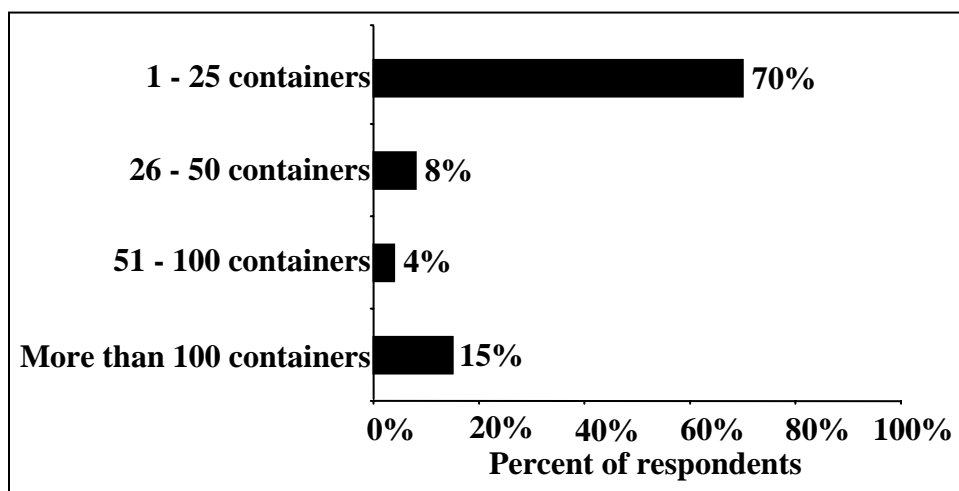


Figure 24. Number of containers of tropical hardwood products Supply Chain respondents purchased in 2003 (n=119)

Sources of Information used to Locate Tropical Hardwood Products

The three most-used sources of information for the Supply Chain respondents to locate tropical hardwood product/wood raw material suppliers were Distributors (52 percent), Company sales representatives (49 percent), and “Word of mouth” (30 percent) (**Figure 26**). The three sources have in common the personal approach. It seems very important to have a person backing up the information in order to create a feeling of trust.

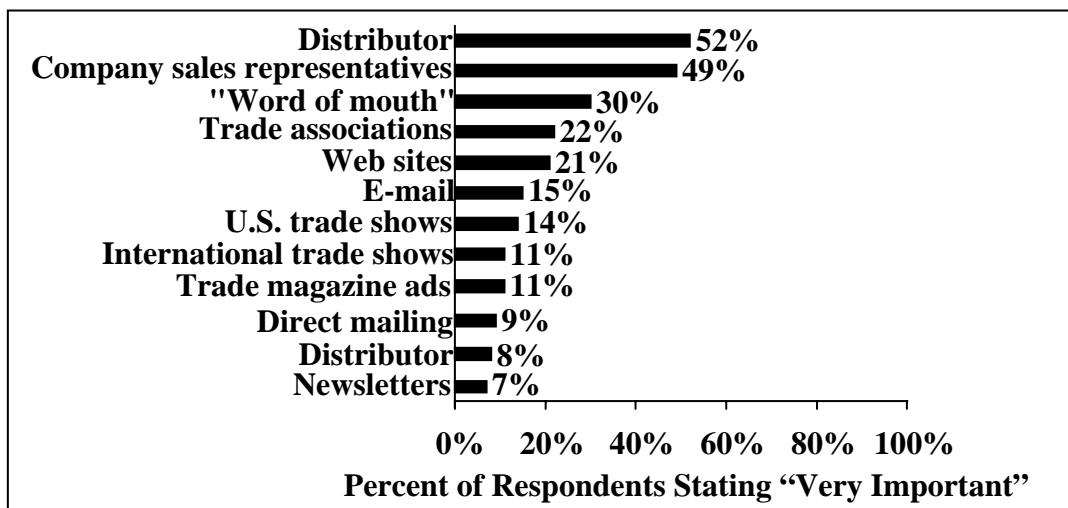


Figure 25. Importance of sources of information Supply Chain respondents use to locate tropical hardwood product/wood raw material suppliers (n=108)

Barriers and Important Criteria when Purchasing Tropical Hardwood Products

Supply Chain respondents state that the three most significant barriers to purchasing or specifying TWP are consistent supply (43 percent), punctual delivery (38 percent), and product quality (32 percent) (**Figure 26**). The four most important criteria Supply Chain look for when selecting tropical hardwood product/raw material suppliers are product quality (90 percent), product availability (84 percent), product performance (74 percent), and consistent delivery (72 percent) (**Figure 27**). The most significant barriers when purchasing TWP match with the most important criteria looked for when purchasing TWP.

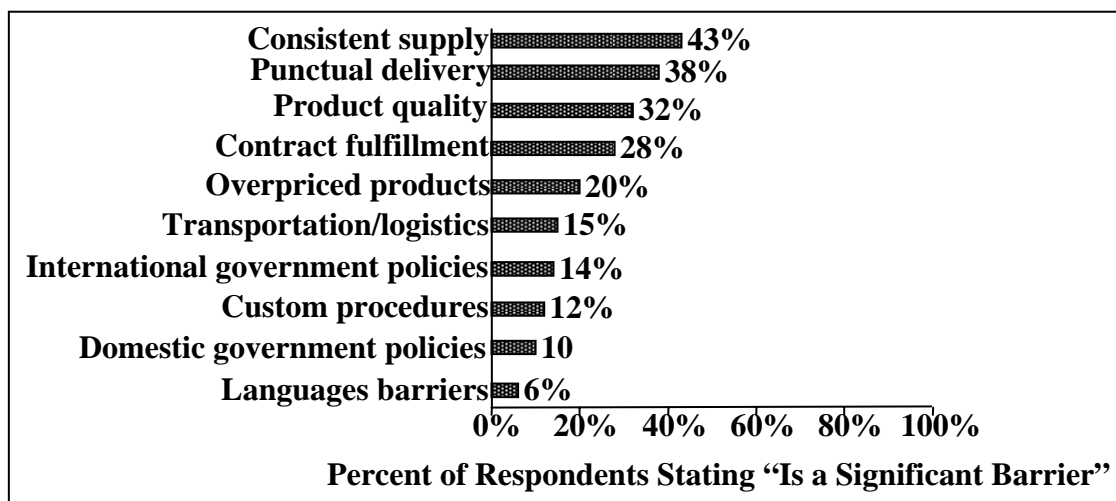


Figure 26. Barriers that Supply Chain respondents have to purchasing/specifying tropical hardwood products (n=120)

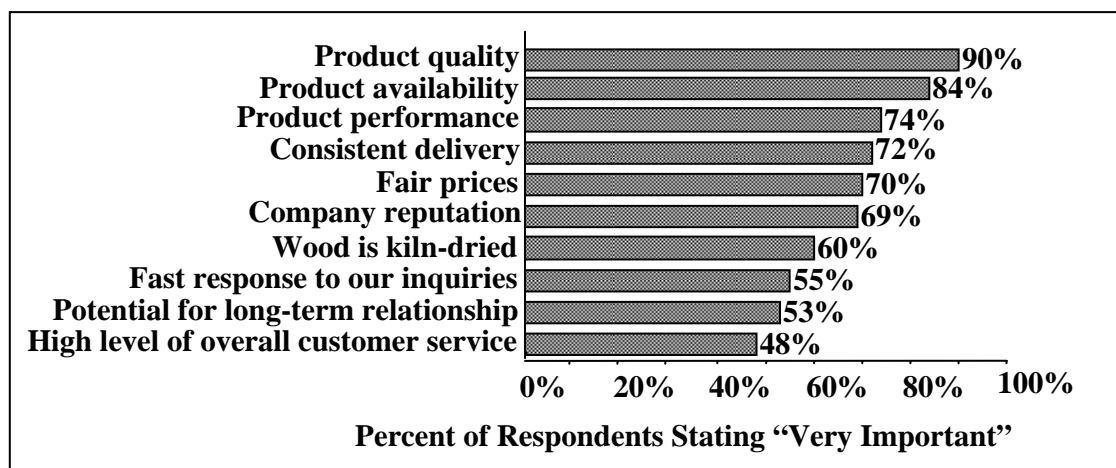


Figure 27. Importance of criteria for Supply Chain respondents used in selecting tropical hardwood product/raw material supplier (n=125)

Ways that Supply Chain Respondents Work or would be Willing to Work with Producers in Tropical Countries

Sixty-seven percent of the Supply Chain respondents affirmed that they did not work directly with producers in tropical countries. The other 33 percent of Supply Chain respondents that worked directly with producers in tropical countries worked with them “using products made of lesser known species” (15 percent) and “advising on quality issues” (14 percent) (**Figure 28**). Twenty-one percent of the 67 percent of Supply Chain respondents that currently do not work with producers in tropical countries would be

interested in working with them “using products made of lesser known species” (9 percent) and on “product development research” (6 percent) (**Figure 29**).

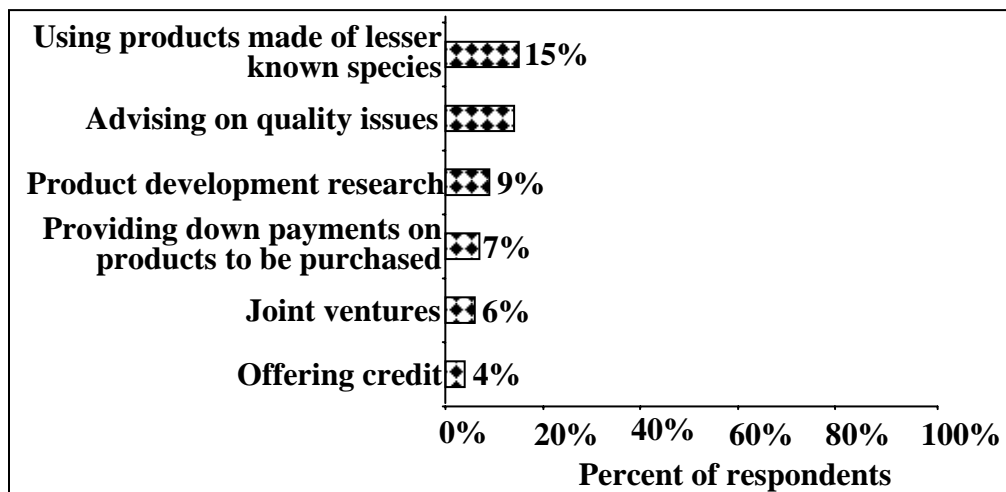


Figure 28. Ways that Supply Chain respondents work directly with the producers in tropical countries (n=45) (multiple responses possible)

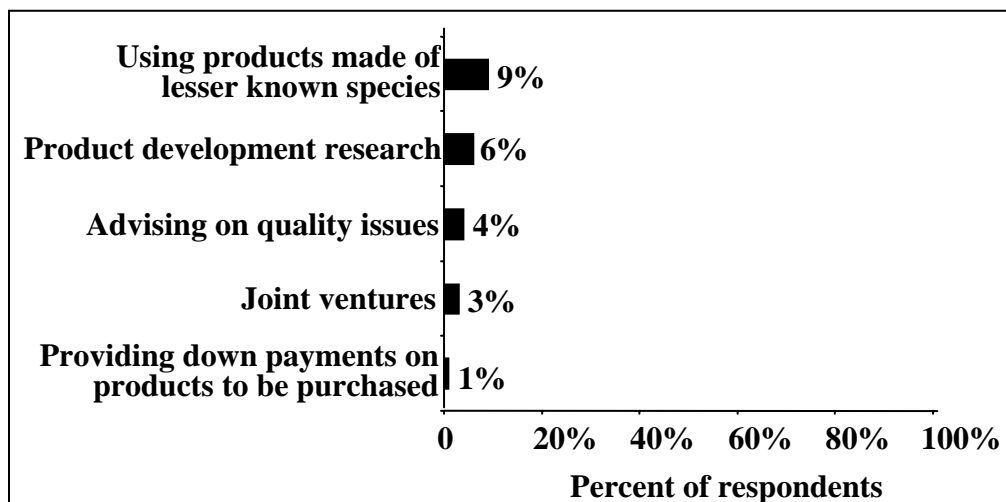


Figure 29. Ways that Supply Chain respondents would be willing to work with tropical hardwood producers in the future (n=19) (multiple responses possible)

Purchase of Certified Tropical Hardwood Products

When it comes to certification, 38 percent of the Supply Chain respondents that buy TWP buy certified tropical hardwood products. One-third of the 62 percent that currently do not buy certified TWP are planning to buy certified TWP in the future. From the 38 percent of Supply Chain that buy certified TWP 31 percent have chain of custody

(CoC), 42 percent do not have CoC, and 27 percent do not know if they have CoC (**Figure 30**). The added value of certified TWP is lost in the supply chain because it is not sold as certified. Approximately one-third of the Supply Chain respondent's annual hardwood purchases are attributed to TWP and approximately one-third of the TWP purchases are attributed to certified TWP (**Figure 31**). Ten percent of the Supply Chain's annual purchases are attributed to certified TWP.

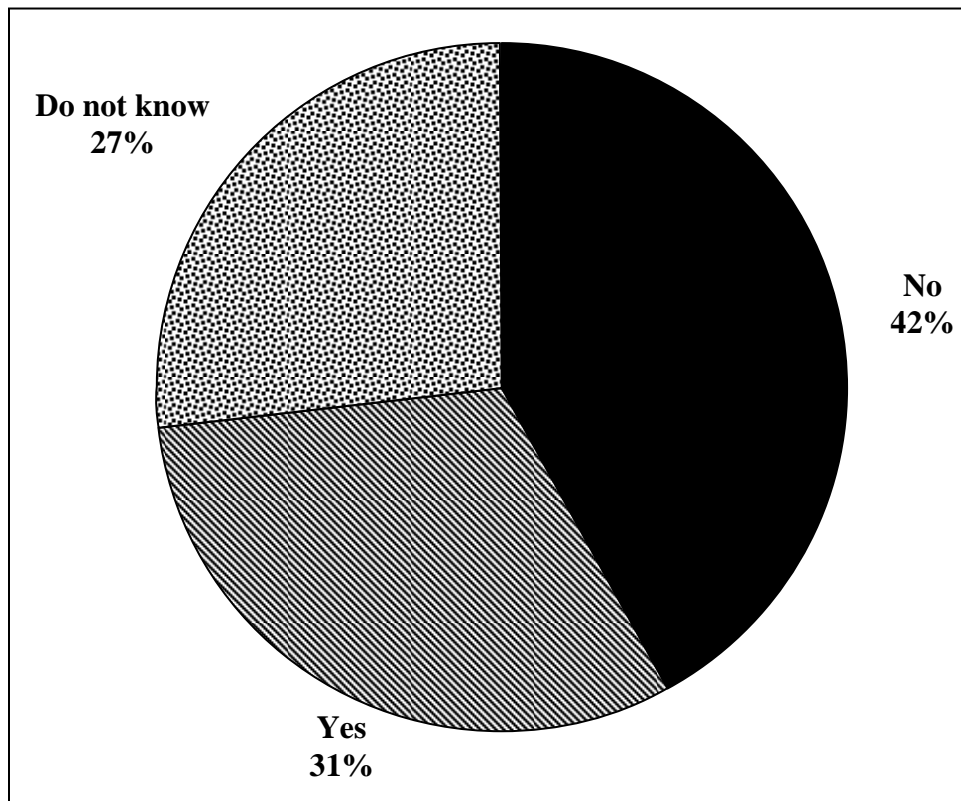


Figure 30. Do Supply Chain respondents have a chain of custody certification for the certified tropical hardwood products purchased? (n=64)

Premium Prices, Requests, and Sales of Certified Tropical Hardwood Products

Forty percent of Supply Chain respondents state that they do not pay premium prices for certified TWP (**Figure 32**). Thirty-two percent of the Supply Chain respondents that work with certified TWP have requested that their suppliers become certified. The approximate value of certified tropical hardwood products sold by the Supply Chain respondents in 2003 was US\$ 2,506,268. Forty-one percent of Supply

Chain respondents affirmed that the percent of sales of tropical hardwood certified products sold in the past 5 years increased somewhat, and 56 percent of the Supply Chain have the perception that it will increase somewhat in the next 5 years (**Figure 33 and 34**).

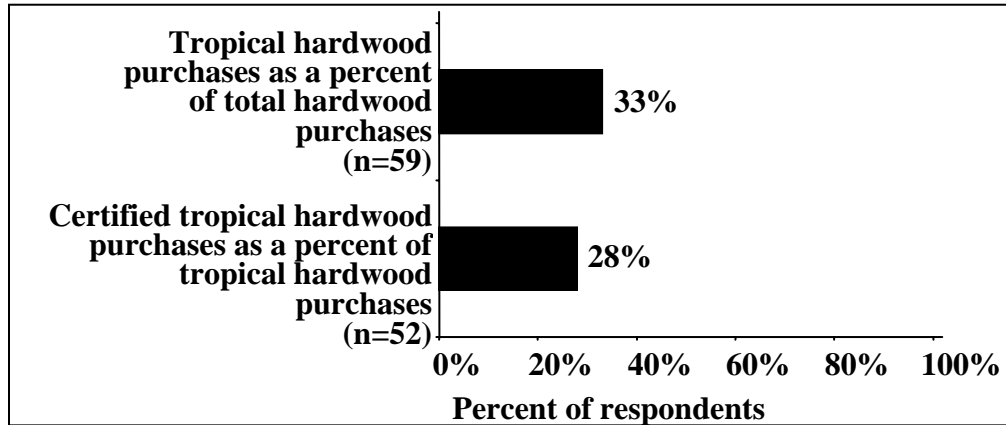


Figure 31. Current percent of hardwood purchases of Supply Chain respondents that are a) tropical hardwood species and b) certified tropical hardwoods (by value)

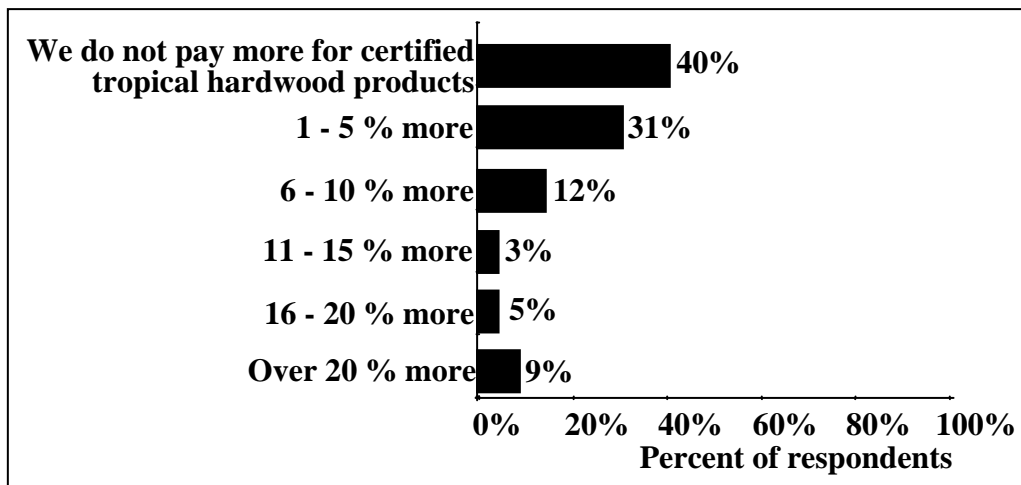


Figure 32. Premium paid for certified tropical hardwood products by Supply Chain respondents (n=59)

General Observations about Certification

Some general observations of the Supply Chain respondents that work with certified TWP are as follows: 33 percent experienced unexpected costs due to participating in certification, 13 percent experienced unexpected benefits due to participating in certification, 33 percent carry products that are “Eco-Labeled”, indicating

that they are certified, and 44 percent actively promote their products as certified to customers. Forty-eight percent of the Supply Chain respondents state that they entered into the certified market because their customers demanded it, 31 percent did it because of business owner's commitment to environmental issues, and 29 percent did it seeking product diversification (**Figure 35**).

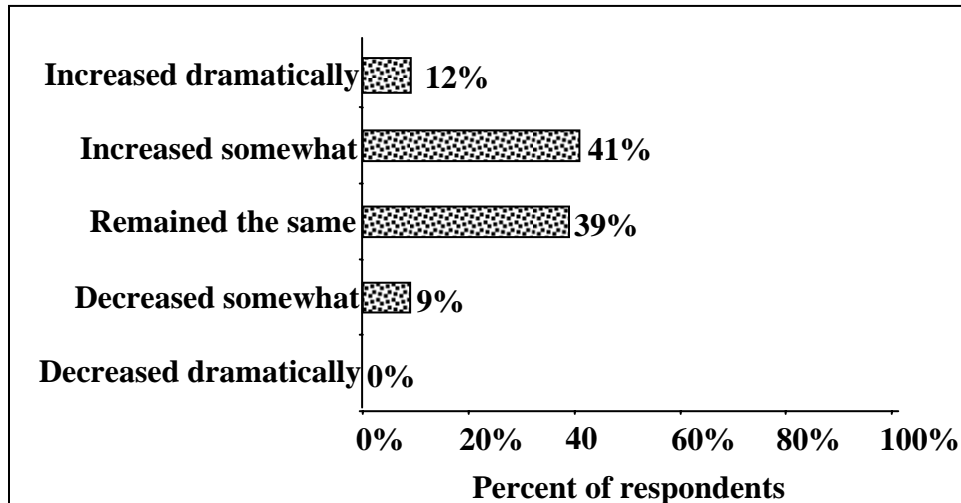


Figure 33. Change in sales of certified tropical hardwood products for Supply Chain respondents in the past 5 years (n=59)

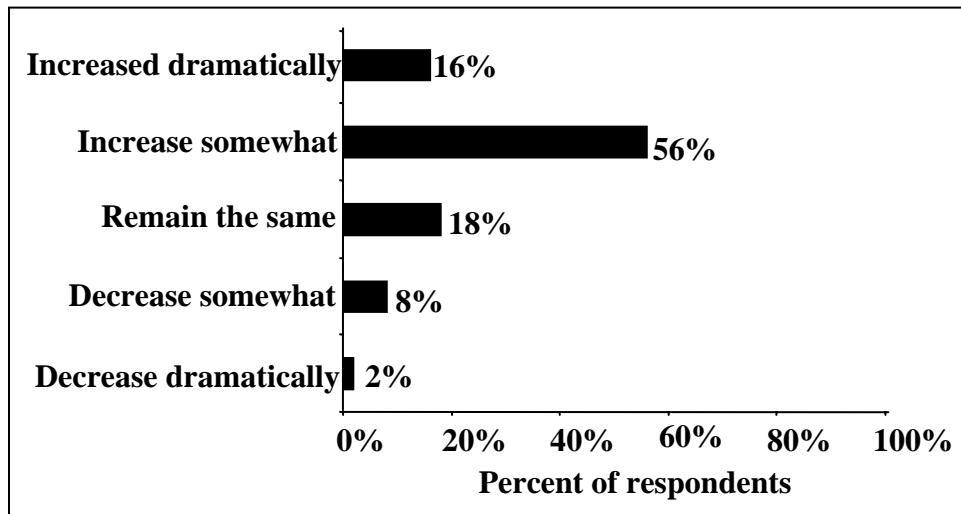


Figure 34. Perception change in sales of certified tropical hardwood products for Supply Chain respondents in the next 5 years (n=61)

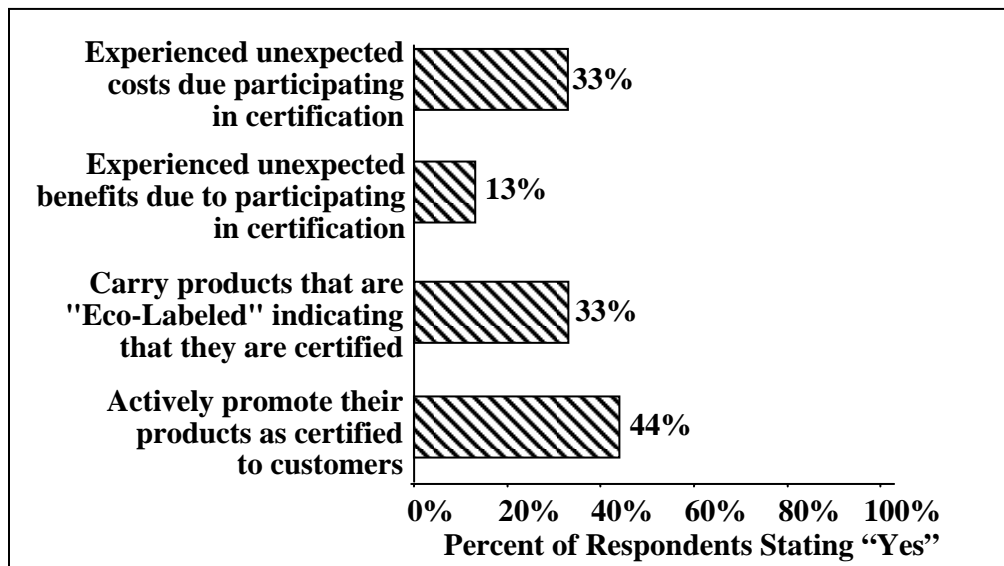


Figure 35. General Supply Chain respondents certification observations (n=64)

Discussion

One of the objectives of the study was to identify opportunities, constraints, and characteristics for secondary tropical hardwood products in the U.S. marketplace. One of the characteristics of the Supply Chain respondents of tropical hardwood products (TWP) is that they work in more than one area of the supply chain. Therefore the results of the members were summarized in one sector (Supply Chain).

The results of the study showed that most of the companies surveyed import tropical hardwood products as a small part of their total imports (1-9 percent), implying that the market share for TWP is relatively small compared to other hardwoods and softwoods. The same conclusion is reached from the number of containers that companies import a year; mostly they import small amounts (1 to 25 containers/ year). Metafore (2003), in a study conducted in 2003, found that tropical hardwood products are mainly used for decorative purposes, and that the amount imported is only 4 percent of the total wood market in the U.S.. Only a small percent (6 percent) of the companies surveyed appear to specialize in importing TWP. Since the U.S. market has been opened

to China, secondary wood product manufacturers in the U.S. have been reduced dramatically, given that the low cost of Chinese production is impossible to compete with. On the one hand China has become one of the largest importers of hardwoods in the world (tropical and temperate), absorbing a large part of the global production (USDA 2000). On the other hand the U.S. is the largest importer of secondary TWP (ITTO 2004).

The study shows that the region where almost 50 percent of the tropical hardwood originates is South America. Brazil took the lead with 20 percent of the total TWP imports. The World Forestry Center confirmed in 2003 that since 1990, Brazil has been the largest supplier of tropical hardwood to the U.S. The main hardwood products that the U.S. imports are molding, cabinets, and doors. The statistics of the International Wood Products Association (2004) showed that from 2000 to 2003 China has increased its exports of tropical molding to the U.S. by 433 percent, becoming the major player in the market (IWPA 2004). In 2003, Metafore also acknowledged that tropical hardwood products and temperate hardwood products competed for the same niche market. Furthermore, U.S. housing starts in the past decade have been growing at the same rate as the GDP of the country (FAO/UNECE 2004), and the foremost wood products used in the construction of houses are molding, cabinets, and doors.

Forty-three percent of the companies surveyed avowed that they purchased tropical hardwood products from U.S. brokers/wholesalers, and 67 percent stated that they did not work directly with producers in tropical countries. Almost fifty percent of the companies are categorized as small companies with annual gross sales under US\$ 5 million. Small companies do not have the buying power to import from producer countries. They rather prefer to buy the amount of product needed from U.S. brokers/wholesaler (Juslin and Hansen 2003). In any case, the study also shows that

purchasing tropical hardwood products is based on long-term relationships. More than half of the companies surveyed that buy TWP have been buying them for more than 10 years. Furthermore, the three criteria that are most important when selecting TWP (quality, availability, and performance) and the three barriers found when purchasing TWP are the same. It can be speculated that when Supply Chain member finds a supplier that can meet these three criteria, they continue to do business with them and form a long-term buying relationship.

The three most important sources of information that Supply Chain respondents use to locate TWP are distributors, company sales representatives, and "word of mouth". People trust people's appreciation and experience more than information from impersonal sources. Suppliers should target these sources to distribute information or promote their products. The 33 percent of companies that work directly with producer countries would be willing to work with them to use products made of lesser-known species and to provide advice on quality issues. That scenario would be a win-win situation for both parties.

Thirty-eight percent of the companies surveyed are currently buying certified TWP, and 20 percent of the ones that are not currently buying those products are planning to buy them in the future. It seems that the trend for Supply Chain members is to buy certified TWP. The perception of the majority of Supply Chain respondents is that the percent of sales of certified TWP has increased in the past 5 years, and it will keep increasing in the following 5 years. Maybe this perception is caused by the trend to purchase more sustainable produced products (Beck 2006).

One-third of the companies that buy certified TWP hold a Chain of Custody (CoC). Consequently most of the certified TWP are commercialized as non-certified. The

commercialized certified wood products lose the certification added value because they are not managed and sold as certified. This shows that the Chain-of-Custody may be the weakness in the chain of commercialization of certified wood products.

Another finding from this study shows that the U.S. market for tropical hardwood products does not have a preference of certified over non-certified forest products, and generally the market does not pay premium prices for certified TWS. Certification is only one more attribute of the product but not the most important one. Price and quality remain as the most important factors when choosing a product. One of the possible reasons why certification is not an important attribute is lack of knowledge of certification among Supply Chain.

Implications

The implications of the results of the study suggest that if the producer countries are expecting to be paid premium rates for certified TWP they should target another market like the European market. For the specific case of the U.S. market certified TWP should target niche markets in places where people have a greater environmental awareness. Places like the Northwest (California, Oregon, and Washington), Wisconsin, and the Northeast (New York and Vermont). In order to target the U.S. market suppliers need to provide high quality products at reasonable prices. If the producing countries are trying to sell to larger retailers like Home Depot and Lowe's, then they need to be able to compete with low prices and high volumes (scale economy).

The Chain of Custody is a bottleneck in the supply chain of certified wood products. If this step in the commercialization process is not corrected, all the efforts to bring certified wood products to the market will fail. There is no point in certifying forest management practices if the wood products are going to be sold to the final consumer as

non-certified. If the final consumer were informed about the difference between a certified and non-certified product and the benefits of certification, then the consumers would be empowered to demand this type of product. A campaign to inform the public about certified products would be a way to do that.

Limitations and Future Research

The limitations of the study were the small amount of statistical information on secondary tropical hardwood products and even less on certified tropical hardwood products and how they move along the supply chain. Wood certification is a recent concept in the market, thus studies to monitor the perception and the acceptance of these products should be frequently.

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5. RESEARCH RESULTS: U.S. DEMAND FOR CERTIFIED TROPICAL HARDWOOD PRODUCTS: THE BUILDER AND ARCHITECT PERSPECTIVE

Introduction

The following chapter discusses the Builders and Architects sector selected to analyze the U.S. market for certified tropical hardwood products. The chapters' setup starts with an overview of the sector and the U.S. forest products certification, followed by the methodology used for the study, continuing with the results of the study, and finally the discussion and conclusions of the study.

Recall of Study Objectives

1. Identify characteristics of U.S. demand for secondary (value-added) tropical hardwood products.
2. Understand market perceptions regarding certification of secondary tropical hardwood products.

Forest Products Certification from the U.S. Perspective

To certify means to accredit a product or a practice for some special attribute, characteristic, feature or quality. In a global market it is difficult to have international policies for “well forest management practices”. If the policies cannot be created under command and control practices (laws and regulations) then the alternative option is to create a market value for the goods. In this case the goods are the wood with an extra attribute; this attribute is to have come from a forest with sound management. To be able to track the wood that comes from well-managed forests a tracking tool is needed. This tracking tool is better known as Chain of Custody (CoC). The CoC is an inventory

control process in the wood manufacturing industry developed to track certified forest products from the forest through the supply chain to the final consumer.

Certification has been used as a mechanism to attempt to slow tropical deforestation (Cote 1999) and to reduce trading of wood products coming from illegal logging. Regardless of the reasons, environmental certification of forest products and forestry practices continues to proliferate worldwide.

The primary basis for certification is the need for consumers to be assured by neutral third-party organizations that forest product companies are employing sound practices that will ensure sustainable forest management (Ozanne and Vlosky 1997). In addition to reducing negative perceptions by consumers and the general public, it is believed that companies that prove to be environmentally responsible will benefit from certification by differentiating their products in the marketplace and thus acquiring a larger share of the market (Ozanne and Vlosky 1997).

Certification is supported by many non-governmental organizations (NGOs), governments, and companies. The total area of certified forests in the world was 219 million hectares in 2004. The majority of certified forests are in the United States, Europe, and Canada (Ingram 1998). The four main certification schemes in the world are: the Programme for Endorsement of Forest Certification (PEFC), the Forest Stewardship Council (FSC), the Sustainable Forestry Initiative (SFI), and the Canadian Standards Association (CSA). These four schemes certify almost 94 percent of the world's certified forests.

Chain of Custody

Chain of Custody (CoC) is an inventory control process in the wood manufacturing industry developed to verify certified forest products. CoC works as a

control system to manage critical components of the flow of materials. In the wood-based products industry, keeping the materials required to maintain the process flowing requires much coordination and planning. Managing non-certified-wood-products (NCWP) and certified wood products (CWP) in the same manufacturing process without mixing them adds even more complexity to inventory process control. Companies move to the CWP to gain market share. It has been shown that only large retail stores that have name recognition (for example Home Depot) are using certified product as one more attribute to differentiate their products (Conservation and Community Investment Forum 2002). “Certified forest product markets are driven at the business-to-business level, but not yet from final consumers” (FAO/UNECE, 2004).

One of the issues in certification is the lack of primary CWPs produced to sustain the supply chain. Wood products can be manufactured using different processes such as:

- Job Shops (custom wood products)
- Batch production (typical products include lumber, dimension, furniture, hardwood plywood, cabinets, and veneer)
- Repetitive production (millwork manufacturers)
- Continuous production (particleboard)

Since each of these processes has different environments, the strategies to manage CoC need to be addressed first with respect to each one of these processes and then to the products manufactured (Rudell and Stevens 1998). As an example of the complexity in the certified wood supply-chain management “it is estimated that over 80 percent of FSC certified lumber is “lost” on the way to the consumer, and ends up being sold as uncertified”(Conservation and Community Investment Forum 2002).

There are four main constraints that impact CWP introduction: market, material, capacity, and logistical constraints. Market uncertainty and demand for CWP make it difficult to introduce CWP's and this uncertainty has generated market-planning strategies to minimize risk. The material constraint is linked to the supply of the primary CWP. There is not enough CWP to satisfy the demand of secondary CWP manufactures.

One solution to the supply problem is to enter into a strategic partnership with private forest owners who also work with CWP. The capacity constraint is reflected in factors that constrain the flow of materials through the manufacturing plant. To avoid this problem CWP inventory needs to be available in excess, although this last practice makes inventory costs rise. Logistical constraints are caused by the complexity in the management of the CWP through the plant. Planning the production, purchasing the material, and planning the inventory add to the cost of the final manufactured CWP.

To overcome all the costs and management problems and to give manufacturers an incentive to work with certified products, premium prices should be applied to the production of CWP's (Rudell and Stevens 1998). On the other hand "if the forest owners, sawmiller, and manufacturer each get 10 percent premium for their handling of certified products, and the distributor and retailer tack on an additional 5 percent, then the street price of a US\$ 100 table will have inflated to US\$ 160, without having altered the physical appearance or performance one iota" (McIntyre n.d.). For certification to work CWP needs to be associated with a real value like risk reduction, cost reduction, and/or revenue enhancement (Conservation and Community Investment Forum 2002). "Chain-of-custody is a bottleneck in today's certification markets, resulting in products produced from certified forests being sold without a label documenting their source" (UN/ECE 2002).

Overview of the U.S. Builders and Architects Sector

Architects do not purchase wood products but they strongly influence the planning, designing, and oversight of building construction and hence, products that are ultimately used. They design and provide advice about the functional, aesthetic, and technical requirements of construction. “In the broadest sense, an architect is a person who interfaces between the end user of a planned structure and the builder. The architect translates the user's needs into the builder's requirements” (Wikipedia 2006). In general architects buy or specify the required materials from providers in the country. Commonly, if a project is large, architects specify materials from wholesalers, while for smaller projects, they rely on retailers (Eid 2006).

Architects specify tropical hardwoods their durability and beauty, e.g. colors and patterns for finishing floors, doors, moldings, cabinets, and decking. Architects are more open to specifying lesser-known species if they come with technical specifications.

Certification Trends in Distribution Channels

The U.S. has been experiencing a trend of green building, using energy efficient designs and materials, non-toxic materials, and sustainably produced wood products. This trend makes the use of tropical hardwoods less favorable due to lack of accountability in the sustainability of the forests from which they come (Environmental Building News 2001). Similarly, if architects can document that they buy certified wood products, they receive a credit towards the green building certification (Metafore 2003a).

Even though most architects and builders are not familiar with certification, many are open to purchasing certified wood materials only if they are the same price and quality as the non-certified materials (Eid 2006).

Methodology and Materials

The study “a demand perspective for certified tropical hardwood product markets in the United States” was conducted using the facilities of the School of Renewable Natural Resources at the Louisiana State University in Baton Rouge. The methods used for the research as the following:

1. Literature review of secondary information to give a background to the study
2. Primary data collection from the Builders and Architects sector to better understand its demand perspective for certified tropical hardwood products

Sample Characteristics

The sample of Builders and Architect was purchased. The two parameters to select the companies' list were the size and sales of the companies in the country.

- Largest Architectural Firms nationally, by sales
- Largest Home building Contractors nationally, by sales
- Companies that Dr. Vlosky had previously surveyed

The final sample had 1061 companies.

Survey Development

The mail survey was designed using the tailor design method (Dillman 2000). The survey was divided in three sections. The first section was designed to compile general information of the company, the second section asked questions related to tropical hardwoods, and the third section asked questions related to certified tropical hardwoods. The first section had four questions, the second section had fourteen and the third section had eight. The questions of the survey were divided into close binomial (yes – no), multiple choice questions, and opened questions. The survey had 153 variables to analyze. Before the mail survey was sent out it was pre-tested by sending the survey to 10

companies randomly selected from the list. Those companies sent their feedback to improve the understanding of the survey. After the survey was improved it was sent to be out.

In order to increase the response of survey rate the following was done:

- An informing letter was sent on before the survey was sent to inform the companies that in one week they were going to be receiving the survey
- The main survey was sent with an explanatory cover letter that was hand signed
- A reminder letter was sent one week after the survey was sent to remind the companies that a week ago they received the survey

Data Analysis

The survey variables were entered in two data bases. The first data base was used to register the surveys that came back as response, undeliverable, and change of address. The second data base was used to enter the survey data in coded language to subsequently be analyzed. Both data bases were done in Microsoft Excel. The open questions were transcript to Microsoft Word for future analysis. The statistical analysis of the data was done in SPSS that is a program used to analyze social science statistics. The statistics run were descriptive and chi-squares. To do the graphical representation the output statistical analysis charts and tables were used.

Results

Survey Response Rate

The respondents are builders and architects (B&A) companies. The books where opened for approximately three weeks. The number of companies surveyed was 1061 and the final adjusted response rate was of 11.6 percent that is considered a not great response rate.

Demographics

The companies that respond were mostly small with annual gross sales under US\$ 5 million 21 percent, from US\$ 6 to 10 million 24 percent, and from US\$ 11 to 25 million 23 percent. Thirty-seven percent of the companies had 1 to 25 employees, 42 percent had 26 to 100 employees, and 22 percent had 100 to more than 500 employees. A majority of the respondents were distributed in the north central part of the country 35 percent (Figure 36).

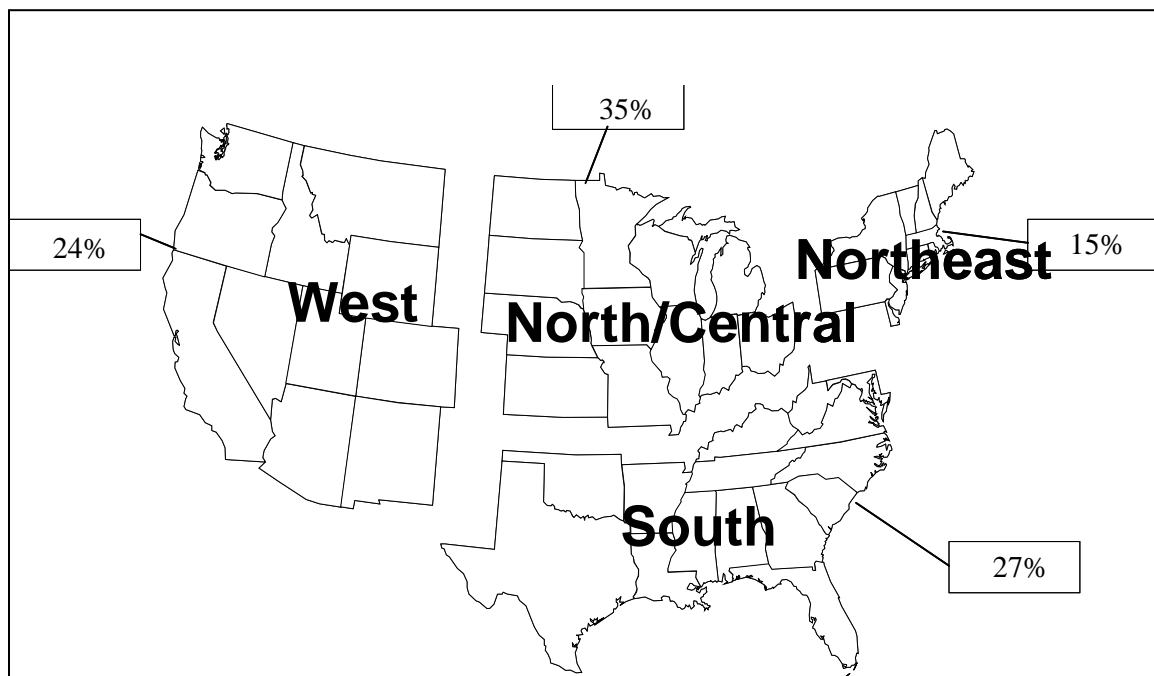


Figure 36. Corporate location of Builders and Architects respondents (n=119)

Annual Gross-sales Attributed to Tropical Hardwood Products

Eighty-three of the companies state that 1 to 9 percent of their company's annual gross sales in 2003 were attributed to TWP (Figure 37). B&A are in the building industry and most of the wood products used in construction are softwood products, thus only a small percent of B&A annual gross sales come from TWP.

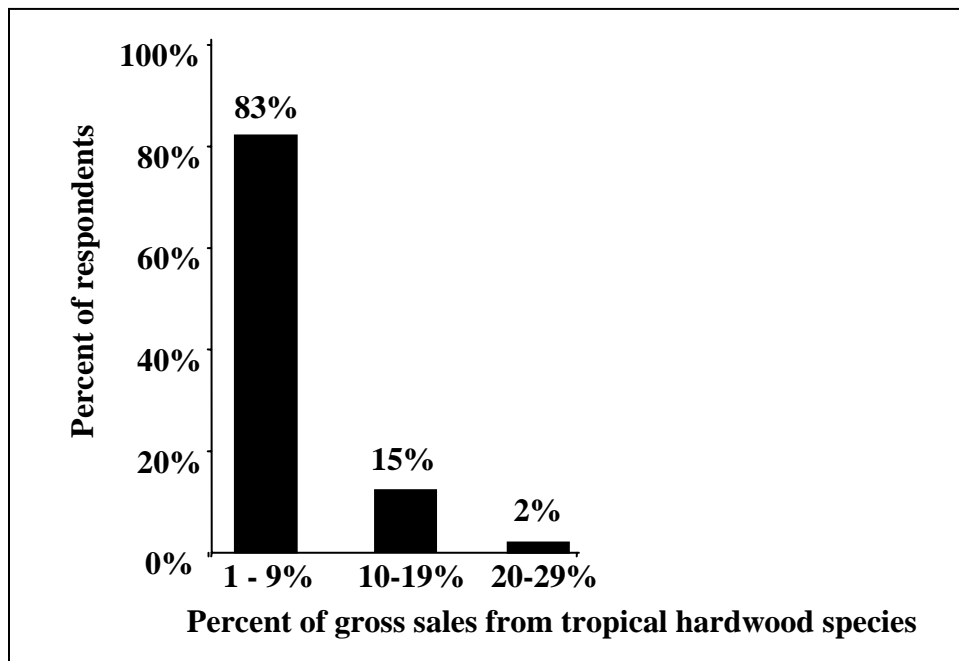


Figure 37. Percent of 2003 gross sales from tropical hardwood species for Builders and Architects respondents (n=52)

Products Purchased or Specified

The main five wood products that B&A purchased or specify are windows 93 percent, flooring 92 percent, doors 92 percent, cabinets 92 percent, and decking 87 percent (**Figure 38**). These products are the ones mainly used when building a house. Thirty-five percent of the respondents state that the main tropical hardwood products that they purchase or specify are flooring 100 percent, millwork/molding 86 percent, and doors 79 percent (**Figures 39**). TWP are mainly used for decorative purposes. Forty-nine percent of the respondents do buy tropical hardwood products (TWP), and from the 51 percent that do not buy TWP 21 percent is planning to buy TWP in the future. This upward trend of buying TWP can be attributed to change in preference of the market favoring TWP (ITTO (b) 2005).

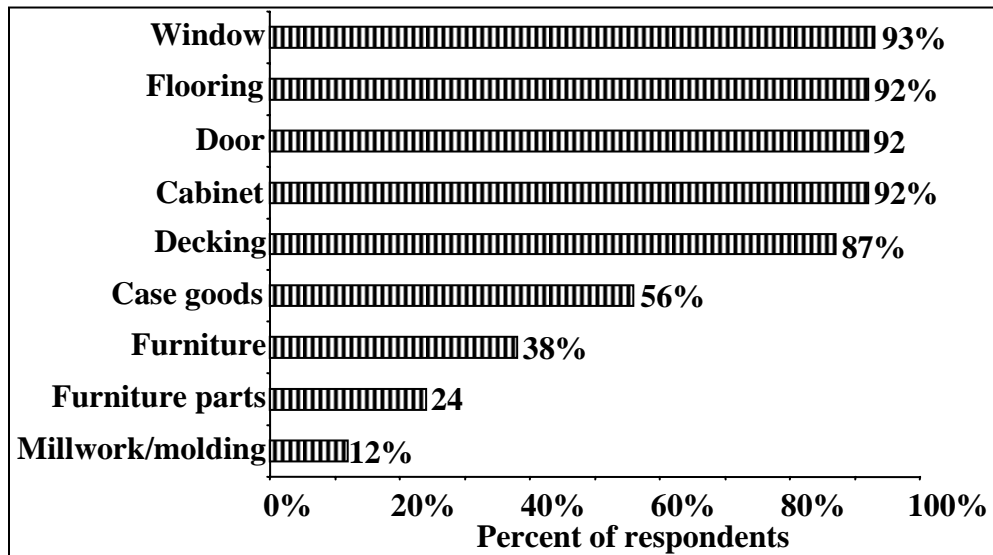


Figure 38. Products that Builders and Architects respondents use, specify and handle (n=119) (multiple responses possible)

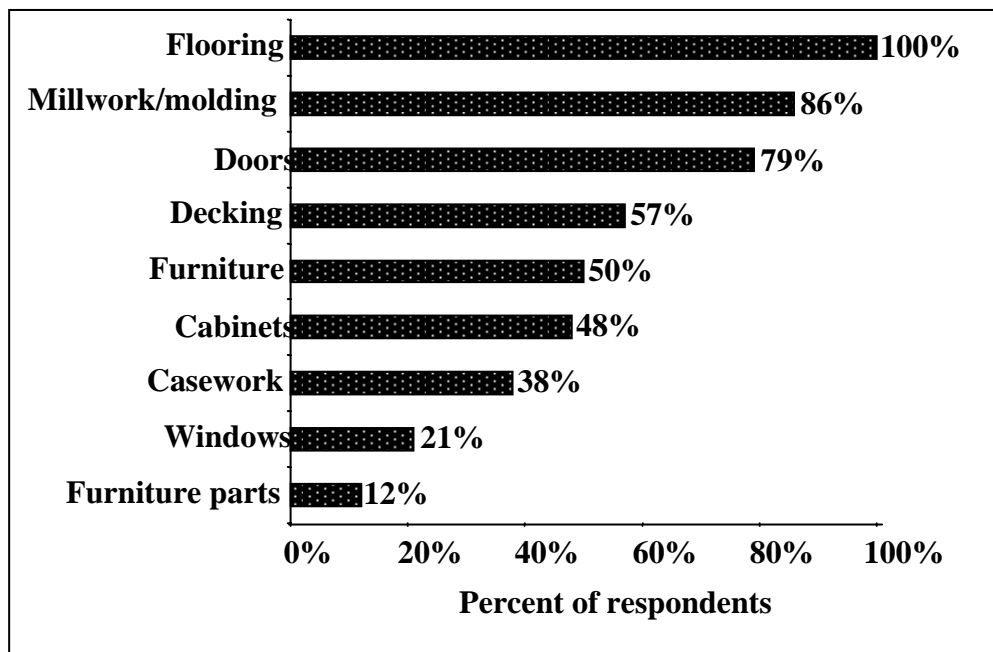


Figure 39. Products that Builders and Architects respondents use, specify or handle that are manufactured with tropical species (n=42) (multiple responses possible)

Tropical Hardwood Products Purchasing Channels

Sixty-five percent of the respondents state that they purchased their TWP from U.S. broker/wholesalers (**Figure 40**). In general, B&A do not have the buying power to

buy from producer countries; they purchase from retailers or wholesalers depending on the size of the construction they are working on (Juslin and Hansen 2003).

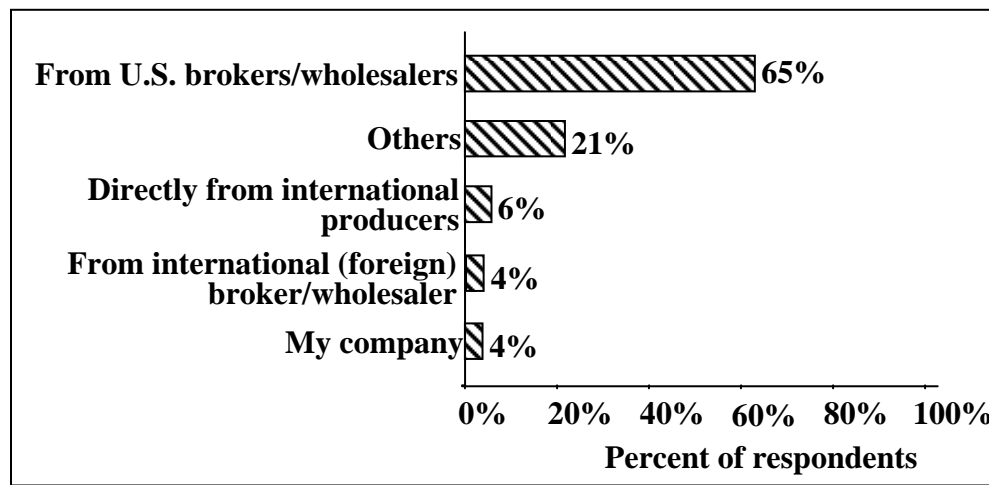


Figure 40. Tropical hardwood products purchase channels for Builders and Architects respondents (n=51) (multiple responses possible)

Regions and Countries where Tropical Hardwood Products Originate

Sixty-five percent of the B&A state that the TWP their purchase come from South America (**Figure 41**). The countries where most of the TWP originate are Brazil with 41 percent, and Honduras 22 percent (**Figure 42**). The World Forestry Center confirmed in 2003 that since 1990, Brazil has being the largest supplier of tropical hardwood to the U.S.. The World Forestry Center confirmed in 2003 that since 1990, Brazil has being the largest supplier of tropical hardwood to the U.S..

Year Purchasing Tropical Hardwood Products and Amount of Containers Purchased a Year

More than 50 percent of respondents affirmed that they have been purchasing TWP for 10 or more years (**Figure 43**); this can be interpreted as establishments of long term business relationships with their suppliers. Ninety-four percent of respondents bought 1 to 25 containers of TWP's during 2003 (**Figure 44**). B&A do not buy great

volumes of wood products, even less of TWP because they represent a smaller amount compared to the total quantity of products required in building.

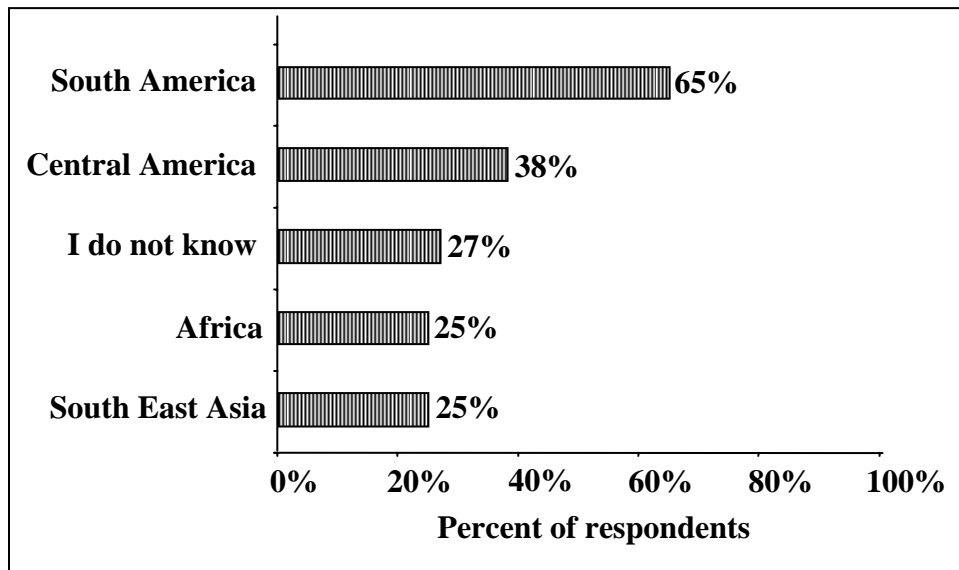


Figure 41. Tropical hardwood products purchase regions for Builders and Architects respondents (n=52) (multiple responses possible)

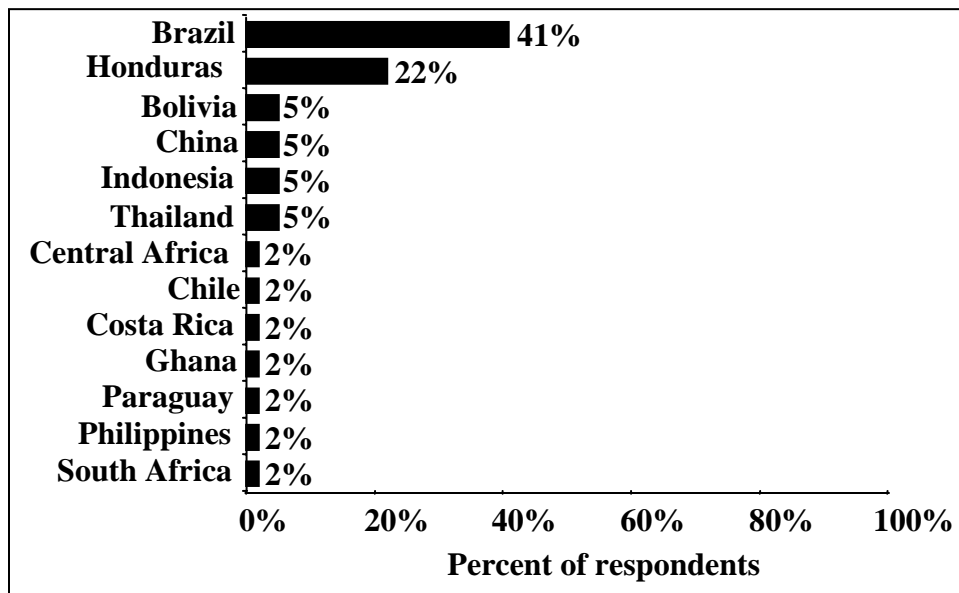


Figure 42. Top 13 countries where tropical hardwood products originate for Builders and Architects respondents (n=52) (multiple responses possible)

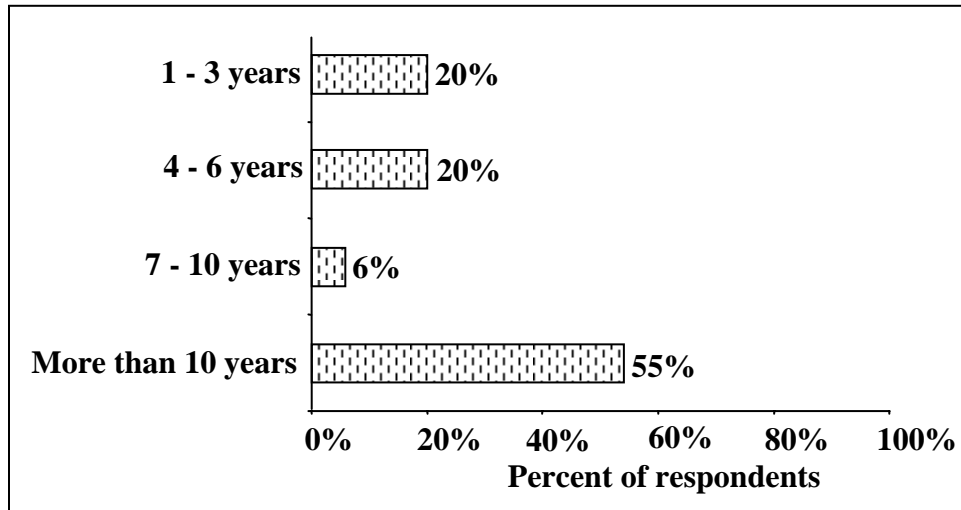


Figure 43. Number of years that Builders and Architects respondents have been purchasing /specifying tropical hardwood products (n=55)

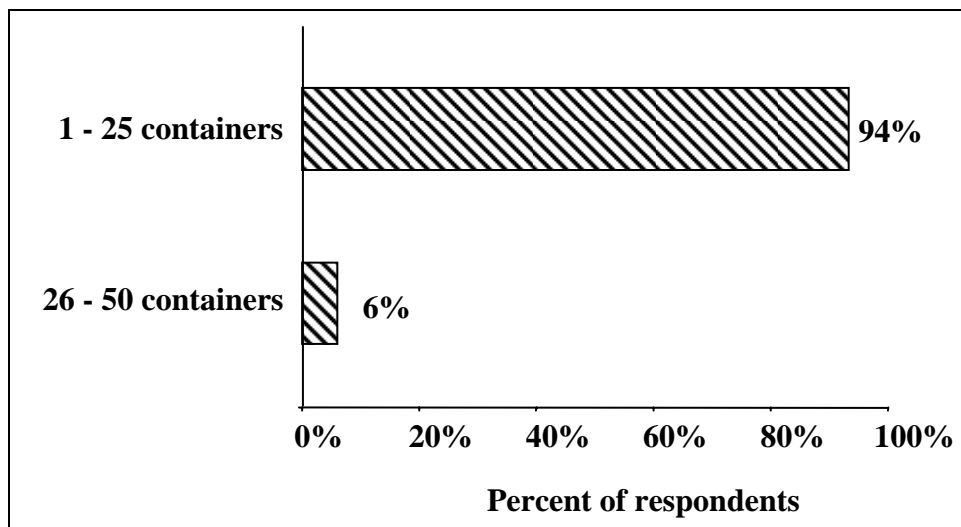


Figure 44. Number of containers of tropical hardwood products Builders and Architects respondents purchased in 2003 (n=36)

Sources of Information Used to Locate Tropical Hardwood Products

The three mostly used sources of information for the B&A to locate tropical hardwood product/wood raw material suppliers are Distributors 53 percent, Company sales representatives 52 percent, Catalogs 35 percent, and Web sites 31 percent (**Figure 45**). B&A work in general with retailers and wholesalers and they go for the

recommendations of the representatives of these stores. B&A are more concerned in the technical specifications of the wood (Eid 2006).

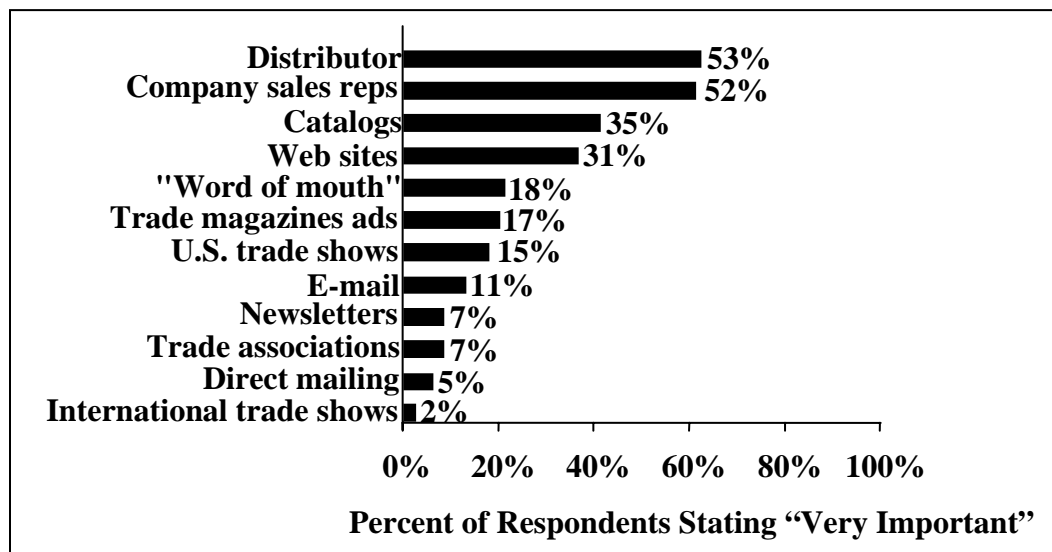


Figure 45. Importance of sources of information Builders and Architects respondents use to locate tropical hardwood products/wood raw material suppliers (n=43)

Year Purchasing Tropical Hardwood Products and Amount of Containers Purchased a Year

More than 50 percent of respondents affirmed that they have been purchasing TWP for 10 or more years (**Figure 43**); this can be interpreted as establishments of long term business relationships with their suppliers. Ninety-four percent of respondents bought 1 to 25 containers of TWP's during 2003 (**Figure 44**). B&A do not buy great volumes of wood products, even less of TWP because they represent a smaller amount compared to the total quantity of products required in building.

Barriers and Important Criteria When Purchasing Tropical Hardwood Products

B&A consider that the three most significant barriers to purchase or specify TWP are overpriced products 40 percent, consistent supply 33 percent, punctual delivery 31 percent, and product quality 25 percent (**Figure 46**). B&A generally work on a budget, even more if they are working in large scale project; overpriced products can impact

negatively their budgets. The three most important criteria for B&A when selecting tropical hard wood product/raw material suppliers are “product quality” 90 percent, “product availability” 80 percent, and “product performance” 74 percent (**Figure 47**).

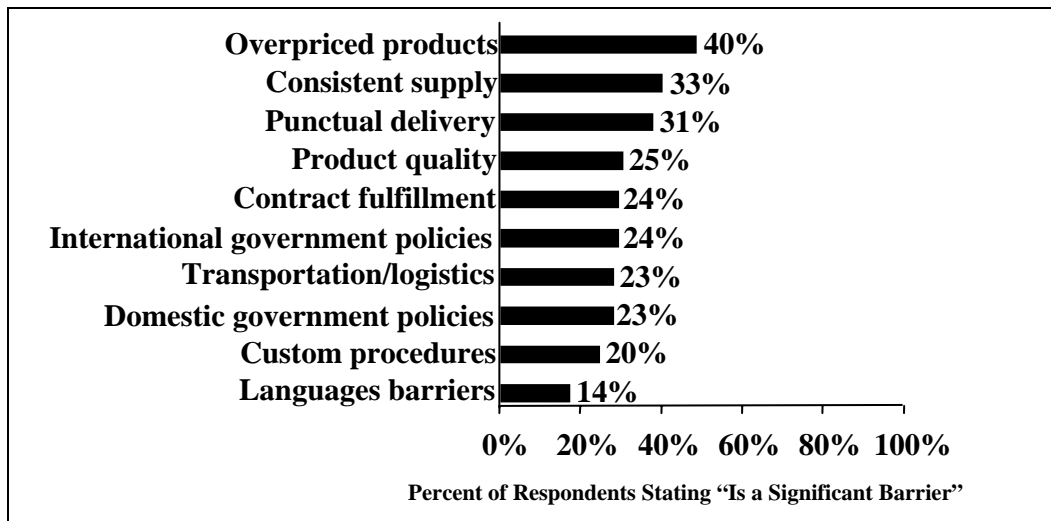


Figure 46. Barriers to purchasing/specifying tropical hardwood products for Builders and Architects respondents (n=42)

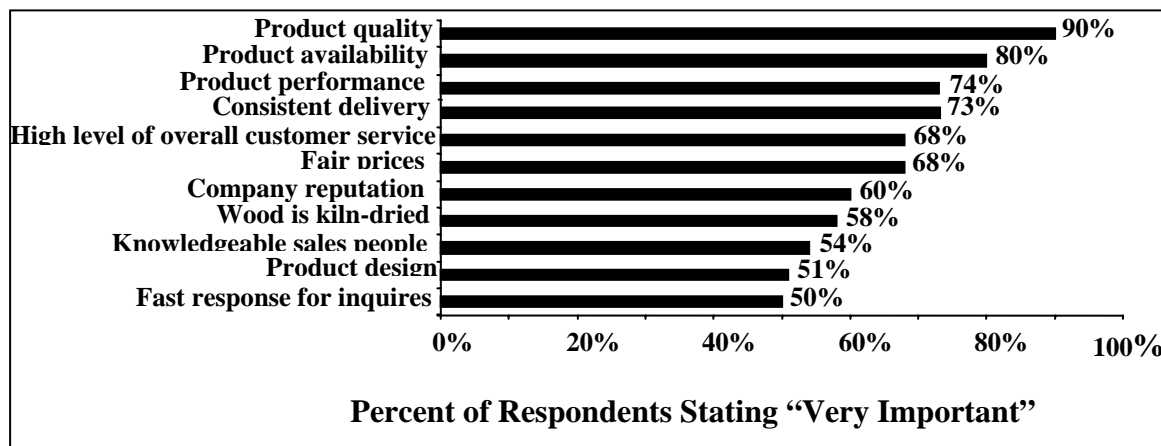


Figure 47. Importance of criteria used in selecting tropical hardwood product/raw material suppliers for Builders and Architects respondents (n=125)

Ways that B&A Work or Would be Willing to Work with Producers in Tropical Countries

Ninety-eight percent of the B&A affirmed that they do not work directly with producers in tropical countries, probably caused by their small buying capacity. The B&A that currently do not work with producer in tropical countries will be interested to

work in working with them “using products made of lesser known species” 25 percent and “product development research” 18 percent (**Figure 48**).

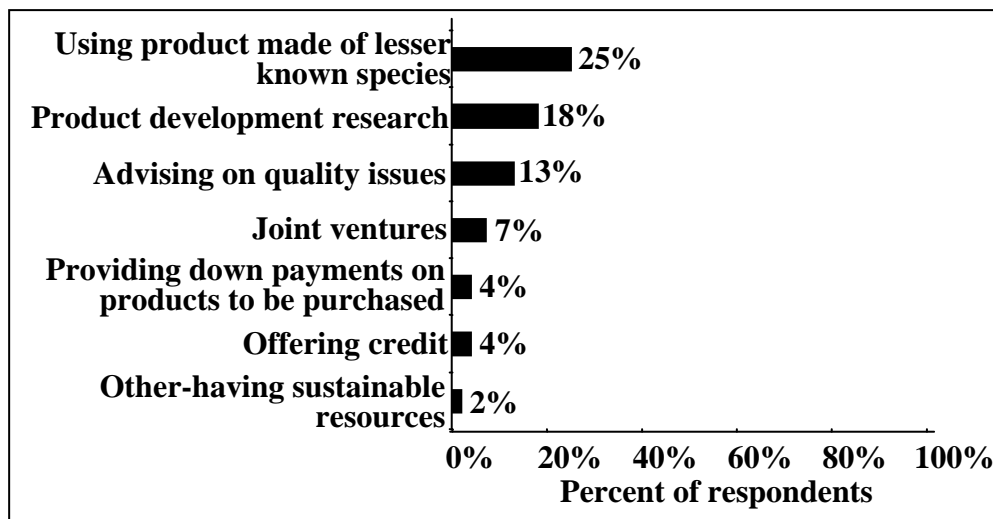


Figure 48. Ways that Builders and Architects respondents would be willing to work with tropical hardwood producers in the future (n=19) (multiple responses possible)

Purchase of Certified Tropical Hardwood Products

When it comes to certification; 43 percent of the B&A that buy TWP buy or specify certified tropical hardwood products. Twenty-six percent of the 57 percent that currently do not buy certified TWP are planning to buy in the future certified TWP. From the 43 percent of B&A that buy or specify certified TWP 7 percent have chain of custody (CoC), 57 percent do not have CoC, and 37 percent do not know if they have CoC (**Figure 49**). If B&A do not have a Chain of Custody and still buy or specify certified TWP might do it for different reasons than just certification (same price than other TWP available). Fourteen percent of the B&A purchases of annual hardwood purchases/specification are attributed to TWP and forty percent of the TWP purchases/specifications are attributed to certified TWP (6 percent of total hardwood products) (**Figure 50**). Even though Architects do not have much knowledge about wood certification they are sensitive to purchasing certified wood materials only if they are the same price of the non-certified materials (Eid 2006).

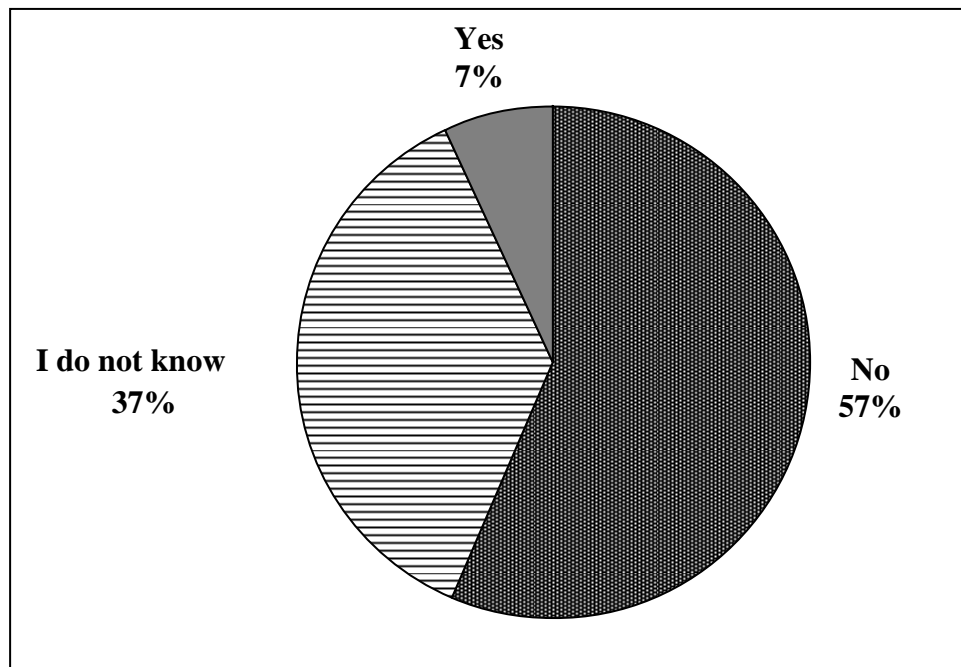


Figure 49. Do Builders and Architects respondents have a chain of custody certification for the certified tropical hardwood products purchase/specify? (n=30)

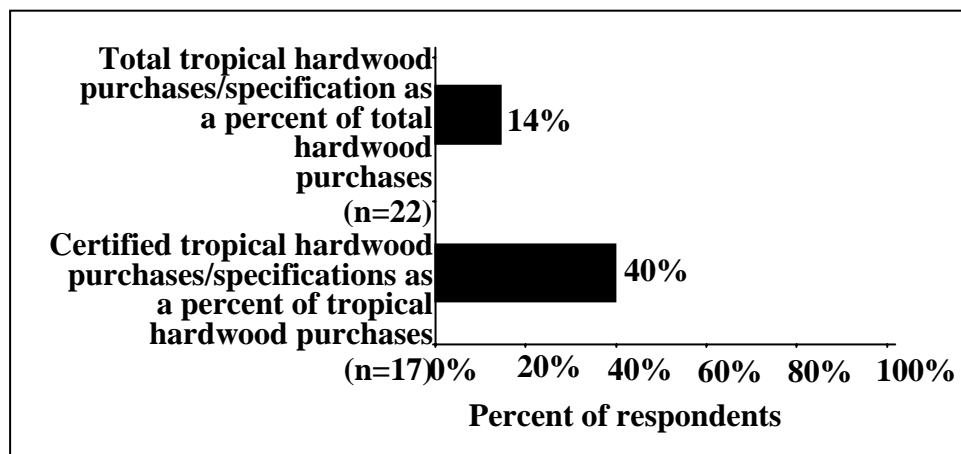


Figure 50. Current percent of hardwood purchases/specifications from Builders and Architects respondents that are a) tropical hardwood species and b) certified tropical hardwoods (by value)

Premium Prices, Requests, and Sells of Certified Tropical Hardwood Products

Sixty-four percent of B&A state that they do not pay premium prices for certified TWP (**Figure 51**). They are very price sensitive sector (Eid 2006). Eleven percent of the B&A that work with certified TWP have requested to their suppliers to become certified. The approximate value of certified tropical hardwood products sold by B&A in 2003 was

US\$ 3,448,000. Half of B&A affirmed that the percent of sales/specifications of tropical hardwood certified products sold by in the past 5 years increased somewhat, and 50 percent of the B&A have the perception that it will increase somewhat in the next 5 years (Figure 52 and 53).

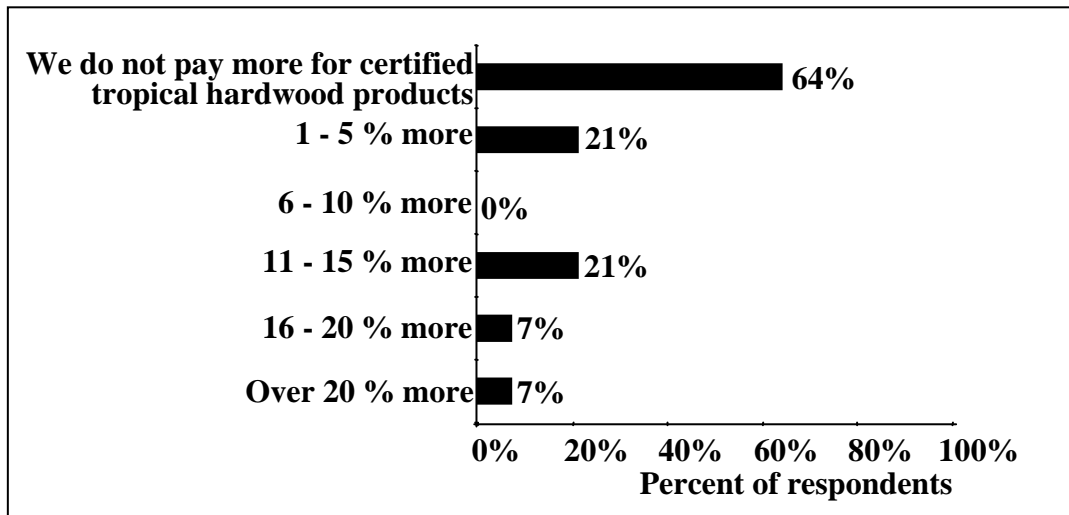


Figure 51. Premium paid for certified tropical hardwood products by Builders and Architects respondents (n=14)

General Observations about Certification

Some general observations of the B&A that work with certified TWP: 18 percent experienced unexpected costs due to participating in certification, 4 percent experienced unexpected benefits due to participating in certification, 33 percent carry products that are “Eco-Labeled” indicating that they are certified, and 20 percent actively promote their products as certified to customers. Fifty-nine percent of the B&A state that they entered into the certified market because their customers demanded it, 36 percent did it because of business owner’s commitment to environmental issues, and 29 percent did it improving company image (Figure 54).

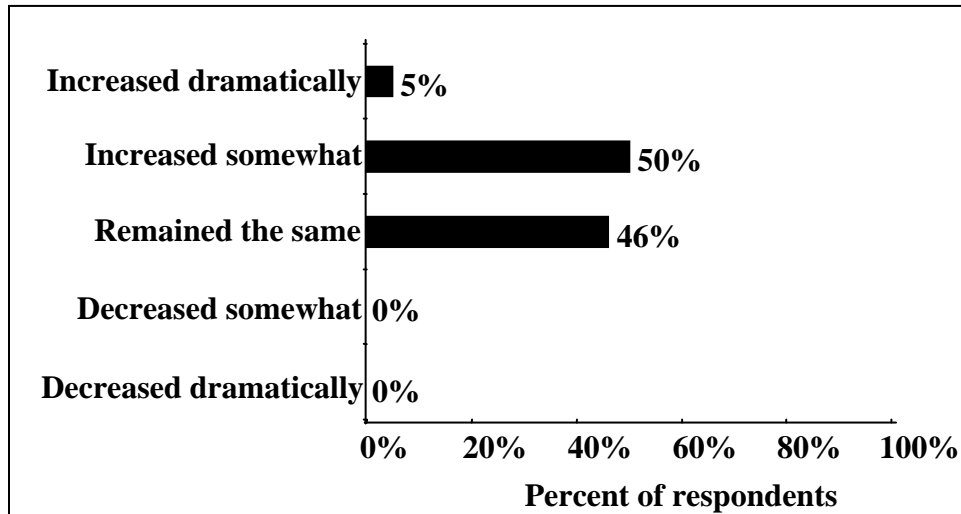


Figure 52. Change in sales of certified tropical hardwood products in the past 5 years for Builders and Architects respondents (n=22)

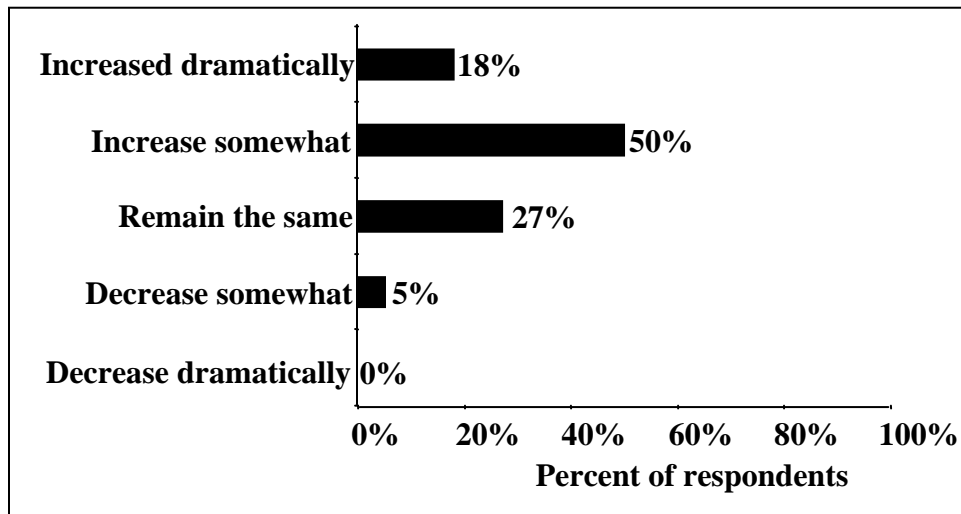


Figure 53. Perception change in sales of certified tropical hardwood products in the next 5 years for Builders and Architects respondents (n=61)

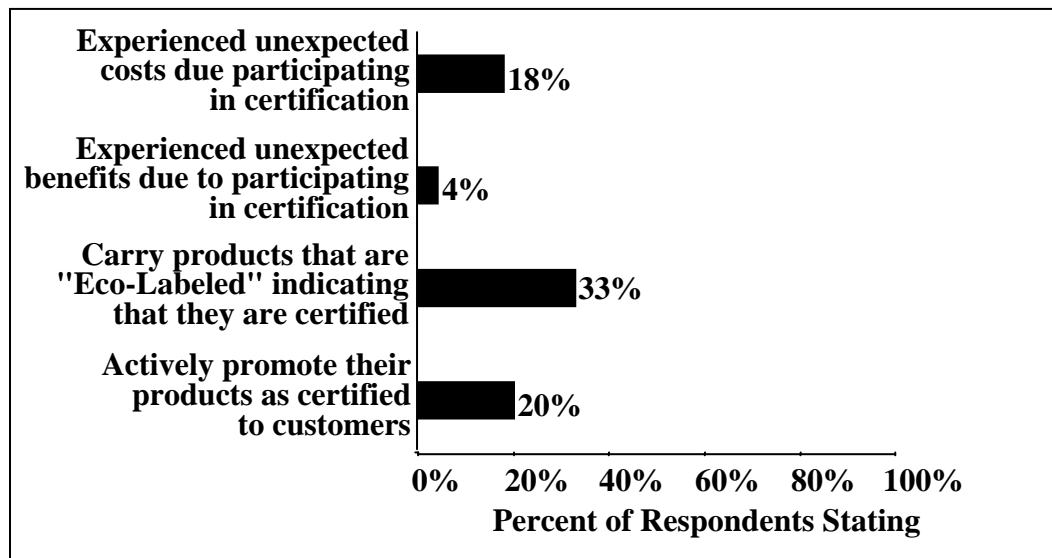


Figure 54. General Builders and Architects respondents certification observations (n=22)

Discussion

One of the objectives of the study was to identify opportunities, constraints, and characteristics for secondary tropical hardwood products in the U.S. market place. One of the characteristics of the builders and architects (B&A) that buy or specify of tropical hardwood products (TWP) is that both work in construction. Therefore the results of the two members were summarized in one sector (B&A).

The results of the study showed that for most of the companies surveyed their tropical hardwood products purchases or specifications represent a small part of their total purchases (1-9 percent). B&A are in the building industry and most of the wood products used in construction are softwood products, thus only a small percent of B&A annual gross sales come from TWP. The same can be reflected in the amount of containers that companies purchased or specified a year; almost all of them purchase small amounts (1 to 25 containers/ year). B&A do not buy great volumes of wood products, even less of TWP because they represent a smaller amount compared to the total quantity of products required in building. Metafore (2003) in a study conducted in

2003 found that tropical hardwood products are mainly used for decorative purposes, and that the amount imported is only 4 percent of the total wood market in the U.S..

The study shows that the region where 65 percent of the tropical hardwood originates is South America, Brazil took the lead with 41 percent of the total TWP purchases. The World Forestry Center confirmed in 2003 that since 1990, Brazil has being the largest supplier of tropical hardwood to the U.S.. The main wood products B&A purchase or specification are flooring, doors, cabinets, and decking that are the main wood products used in the construction of a house. The main TWP purchased or specified are flooring, molding, and doors. The statistics of the International Wood Products Association (2004) showed that from 2000 to 2003 China has increased its imports of tropical molding to the U.S. by 433 percent becoming the major player in the market (IWPA 2004). In 2003, Metafore also acknowledged that tropical hardwood products and temperate hardwood products compete for the same niche market. Furthermore, the U.S. housing starts in the past decade has been growing at the same rate as the GDP of the country (FAO/UNECE 2004), and the foremost wood products used in the construction of houses are flooring, molding, and doors.

Sixty-seven percent of the companies surveyed avowed that they purchased tropical hardwood products from U.S. brokers/wholesalers. Almost fifty percent of the companies are categorized as small and medium companies with an annual gross sale between US\$ 5 and 10 million. Small and medium B&A companies do not have the buying power to import from producer countries, they rather prefer to buy the amount of product needed from U.S. brokers/wholesaler (Juslin and Hansen 2003). In any case, the study also shows that purchasing tropical hardwood products is based on long term relationships. More than half of the companies surveyed that buy TWP have been buying

them for more than 10 years. Furthermore, the three criteria that are most important when selecting TWP (quality, availability, and performance) and the three barriers found when purchasing TWP are overpricing, availability, and punctuality of delivery. B&A generally work on a budget, even more if they are working in large scale project; overpriced products can impact negatively their budgets. It can be speculated that when a B&A finds a supplier that can meet these three criteria then they stay doing business with them and form a long term buying relationship.

The three more important sources of information that Supply Chain use to locate TWP are distributors, company sales representatives, and catalogs. People trust people's appreciation and experience more than information from impersonal sources. Suppliers should target these sources to distribute information or promote their products. Ninety-eight percent of the B&A affirmed that they do not work directly with producers in tropical countries, probably caused by their small buying capacity.

Forty-three percent of the companies surveyed are currently buying certified TWP and only 7 percent of them have a Chain of Custody. If B&A do not have a Chain of Custody and still buy or specify certified TWP might do it for different reasons than just certification (same price than other TWP available). The perception of the majority of B&A is that the percent of sales of certified TWP has increased in the past 5 years, and it will keep increasing in the following 5 years. Maybe this perception is caused by the trend to purchase more sustainable produced products (Beck 2006).

Another finding from this study show that the U.S. market for tropical hardwood products does not have a preference of certified over non-certified forest products and generally the market does not pay any premium prices for certified TWS. Certification is only one more attribute of the product but not the most important one. Price and quality

remain as the most important factors when choosing a product. One of the possible reasons why certification is not an important attribute is because the lack of knowledge of certification among B&A.

Implications

The implications of the results of the study suggest that if the producer countries are expecting to be paid premium for certified TWP they should target another market like the European market. For the specific case of the U.S. market certified TWP should target niche markets in places of the country where people have a greater environmental awareness. Places like the Northwest (California, Oregon, and Washington), Wisconsin, and the Northeast (New York and Vermont). In order to target the U.S. market suppliers need to bring high quality at reasonable prices type of products to the table; to keep in mind that certification is only one more attribute to the wood product but not the most important one.

The Chain of Custody is a bottle neck in the supply chain of certified wood products. If this step on the commercialization process is not corrected all the efforts for bringing certified wood products to the market will fail. There is no point in certifying forest management practices if the wood products are going to be sold to the final consumer as non-certified. If the final consumer would be informed about the difference between a certified and non-certified product, and its benefits, then the consumers would be empowered to demand this type of product. A campaign to inform the public about certified products would be a way to do it.

Limitations and Future Research

The limitations of the study were the little statistical information of secondary tropical hardwood products and even less of certified tropical hardwood products and

how they move along the supply chain. Wood certification is a recent concept in the market, thus studies to monitor the perception and the acceptance of these type products should be done every other year.

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GENERAL CONCLUSIONS

One of the objectives of the study was to identify opportunities, constraints, and characteristics for secondary tropical hardwood products in the U.S. market place. A characteristics of the builders and architects (B&A) that buy or specify of tropical hardwood products (TWP) is that both work in construction. Supply Chain respondents work in more than one area of the supply chain. Therefore the results of B& A and Supply Chain respondents were summarized in two sectors.

The results of the study showed that for most of the companies surveyed in the two sectors their tropical hardwood products purchases or specifications represent a small part of their total purchases (1-9 percent), implying that the market share for TWP is relatively small compared to other hardwoods and softwoods. B&A are in the building industry and most of the wood products used in construction are softwood products, thus only a small percent of B&A annual gross sales come from TWP. The same can be reflected in the amount of containers that companies purchased or specified a year; almost all of them purchase small amounts for both sectors (1 to 25 containers/ year). B&A do not buy great volumes of wood products, even less of TWP because they represent a smaller amount compared to the total quantity of products required in building. Metafore (2003) in a study conducted in 2003 found that tropical hardwood products are mainly used for decorative purposes, and that the amount imported is only 4 percent of the total wood market in the U.S..

Since the U.S. market has been opened to China, secondary wood product manufacturers in the U.S. have been reduced dramatically, given that the low cost of Chinese production is impossible to compete with. On the one hand China has become one of the largest importers of hardwoods in the world (tropical and temperate),

absorbing a large part of the global production (USDA 2000). On the other hand the U.S. is the largest importer of secondary TWP (ITTO 2004).

The study shows that the region where most of the tropical hardwood originates is South America, Brazil took the lead. TWP purchases. The World Forestry Center confirmed in 2003 that since 1990, Brazil has being the largest supplier of tropical hardwood to the U.S.. The main TWP purchased or specified for both sectors are flooring, molding, doors, and cabinets. The statistics of the International Wood Products Association (2004) showed that from 2000 to 2003 China has increased its imports of tropical molding to the U.S. by 433 percent becoming the major player in the market (IWPA 2004). In 2003, Metafore also acknowledged that tropical hardwood products and temperate hardwood products compete for the same niche market. Furthermore, the U.S. housing starts in the past decade has been growing at the same rate as the GDP of the country (FAO/UNECE 2004), and the foremost wood products used in the construction of houses are flooring, molding, and doors.

Forty-three percent of Supply Chain respondents and sixty-seven percent of B&A surveyed avowed that they purchased tropical hardwood products from U.S. brokers/wholesalers. Almost fifty percent of the companies are categorized as small and medium companies with an annual gross sale between U\$5 and 10 million. Small and medium B&A companies do not have the buying power to import from producer countries, they rather prefer to buy the amount of product needed from U.S. brokers/wholesaler (Juslin and Hansen 2003). In any case, the study also shows that purchasing tropical hardwood products is based on long term relationships. More than half of the companies surveyed that buy TWP have been buying them for more than 10 years. Furthermore, the three criteria that are most important when selecting TWP

(quality, availability, and performance) and the three main barriers for Supply Chain respondents are the same and for B&A are overpricing, availability, and punctuality of delivery. B&A generally work on a budget, even more if they are working in large scale project; overpriced products can impact negatively their budgets. It can be speculated that when a company finds a supplier that can meet these three criteria then they stay doing business with them and form a long term buying relationship.

The three more important sources of information that both sectors use to locate TWP are distributors, and company sales representatives. People trust people's appreciation and experience more than information from impersonal sources. Suppliers should target these sources to distribute information or promote their products. On one hand 98 percent of the B&A affirmed that they do not work directly with producers in tropical countries, probably caused by their small buying capacity. On the other hand 33 percent of Supply Chain respondents that work directly with producer countries would be willing to work with them to use products made of lesser-known species and to provide advice on quality issues. That scenario would be a win-win situation for both parties.

When it comes to certification, 38 percent of the Supply Chain respondents that buy TWP buy certified tropical hardwood products, and 31 percent have a Chain of Custody. Forty-three percent of the B&A are currently buying certified TWP and only 7 percent of them have a Chain of Custody. If B&A do not have a Chain of Custody and still buy or specify certified TWP might do it for different reasons than just certification (same price than other TWP available). The perception of the majority of B&A and Supply Chain respondents is that the percent of sales of certified TWP has increased in the past 5 years and remained the same, and it will keep increasing or remain the same in

the following 5 years. Maybe this perception is caused by the trend to purchase more sustainable produced products (Beck 2006).

Another finding from this study show that the U.S. market for tropical hardwood products does not have a preference of certified over non-certified forest products and generally the market does not pay any premium prices for certified TWS. Certification is only one more attribute of the product but not the most important one. Price and quality remain as the most important factors when choosing a product. One of the possible reasons why certification is not an important attribute is because the lack of knowledge of certification among B&A and Supply Chain respondents.

Implications

The implications of the results of the study suggest that if the producer countries are expecting to be paid premium for certified TWP they should target another market like the European market. For the specific case of the U.S. market certified TWP should target niche markets in places of the country where people have a greater environmental awareness. Places like the Northwest (California, Oregon, and Washington), Wisconsin, and the Northeast (New York and Vermont). In order to target the U.S. market suppliers need to bring high quality at reasonable prices type of products to the table; to keep in mind that certification is only one more attribute to the wood product but not the most important one.

The Chain of Custody is a bottle neck in the supply chain of certified wood products. If this step on the commercialization process is not corrected all the efforts for bringing certified wood products to the market will fail. There is no point in certifying forest management practices if the wood products are going to be sold to the final consumer as non-certified. If the final consumer would be informed about the difference

between a certified and non-certified product, and its benefits, then the consumers would be empowered to demand this type of product. A campaign to inform the public about certified products would be a way to do it.

Limitations and Future Research

The limitations of the study were the little statistical information of secondary tropical hardwood products and even less of certified tropical hardwood products and how they move along the supply chain. Wood certification is a recent concept in the market, thus studies to monitor the perception and the acceptance of these type products should be done every other year.

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APPENDIX A: SUPPLY CHAIN MEMBERS SURVEY



Tropical Hardwood Products Questionnaire

This survey is part of a Masters Thesis for one of my students. It is designed to collect information about the use of environmentally certified tropical hardwood products in the United States. Currently, little information is known about use and attitudes for these types of products. To adequately characterize these issues, we need your thoughtful responses. By completing this survey, you will help us to better understand these issues (and help my student to graduate).

The survey is **completely confidential** and only summary information will be reported in study results. The number at the top of this survey is an **identifier only** that allows us to track when we receive your completed survey, ensuring that you do not receive subsequent surveys or phone calls.

A **complimentary copy of the survey results** will be sent to you as a token of our appreciation for completing the survey.

If you have any questions about the research study, please call me at (225) 578-4527 or email me at vlosky@lsu.edu. When you have completed the survey, please place it in the enclosed **postage paid** envelope. We thank you most sincerely for your help on this study.

Richard P. Vlosky

Professor and Director
Louisiana Forest Products Development Center

Remember, as a token of our appreciation for completing this survey, you will receive a **free copy** of the study results.

**→→ Responses need not be exact figures. Estimates or approximations are adequate.
All responses are strictly confidential.**

Section I. General Company Information

1. Please estimate total gross sales for your company in 2003. (Please circle the appropriate response).
 1. \$0 - \$5 million
 2. \$6- \$10 million
 3. \$11 million - \$25 million
 4. \$26 million-\$50 million
 5. \$51 million-\$100 million
 6. \$101 million-\$250 million
 7. \$251 million-\$500 million
 8. \$501 million-\$1 Billion
 9. More than \$1 Billion
2. Please estimate the total number of people that are currently employed by your company in **ALL** company locations. (Please circle the appropriate response).
 1. 1-10 EMPLOYEES
 2. 11-25 EMPLOYEES
 3. 26-50 EMPLOYEES
 4. 51-100 EMPLOYEES
 5. 101-500 EMPLOYEES
 6. MORE THAN 500 EMPLOYEES
3. In what state is your company headquarters located? _____

4. From the lists below, please indicate the business(es) your company is involved in. (Please circle **ALL** that apply.)

<p>A. Type of business(es) that best characterizes your company (please circle all that apply)</p>	<ol style="list-style-type: none"> 1. Importer 2. Broker 3. Agent 4. Limited production/Custom mfg 5. Primary Manufacturer (lumber, plywood, timbers, etc.) 6. Secondary Manufacturer 7. Retailer 8. Wholesaler 9. Distributor 10. Other (specify):_____
<p>B. If your company is a <u>secondary wood product manufacturer</u>, what are the products that the company manufactures? (please circle all that apply). Then please continue to “C” below.</p> <p>_____ We are not a secondary manufacturer (Skip to D)</p>	<ol style="list-style-type: none"> 1. Millwork and molding 2. Doors 3. Windows 4. Furniture 5. Furniture parts 6. Flooring 7. Decking 8. Cabinets 9. Case goods <p>Other (specify):_____</p>
<p>C. If your company is a <u>secondary wood product manufacturer</u>, please indicate the products that your company carries that are <u>manufactured with tropical species</u> (please circle all that apply).</p>	<ol style="list-style-type: none"> 1. Millwork and molding 2. Doors 3. Windows 4. Furniture 5. Furniture parts 6. Flooring 7. Decking 8. Cabinets 9. Casework <p>Other (specify):_____</p>
<p>D. If your company is a secondary product <u>importer or broker</u>, what are the products that the company imports. (please circle all that apply). Then, please continue to “E” below.</p> <p>_____ We are not an importer or broker of secondary wood products (Skip to Section II on Page 2)</p>	<ol style="list-style-type: none"> 1. Millwork and molding 2. Doors 3. Windows 4. Furniture 5. Furniture parts 6. Flooring 7. Decking 8. Cabinets 9. Casework <p>Other (specify):_____</p>
<p>E. If your company is a secondary <u>wood product importer or broker</u>, please indicate the products that your company carries that are manufactured <u>from tropical hardwood species</u>. (circle all that apply)</p> <p>_____ We do not use or import or carry tropical hardwoods (Continue to Section II on Page 2)</p>	<ol style="list-style-type: none"> 1. Millwork and molding 2. Doors 3. Windows 4. Furniture 5. Furniture parts 6. Flooring 7. Decking 8. Cabinets 9. Casework <p>Other (specify):_____</p>

Section II. Tropical Hardwoods

1. Does your company buy tropical hardwood products? (Please circle the appropriate response).
 1. YES 2. NO
2. If **NO**, would you be interested in buying tropical hardwood products in the future? (Please circle the appropriate response).
 1. YES 2. NO 3. I DO NOT KNOW
3. Please indicate the tropical hardwood products your company **CURRENTLY BUYS** ("C") or would be interested in purchasing **IN THE FUTURE** ("F").

**** Place a "C" in the space for current purchases or a "F" for products you plan to purchase in the future.****

____ Millwork and Molding	____ Doors	____ Windows	____ Furniture
____ Furniture	____ Parts	____ Flooring	____ Decking
____ Cabinets			
____ Case Goods	(Other (please specify): _____)		

If you answered "NO" to Question 1 in this Section II (your business does not currently buy tropical hardwood products please return this questionnaire in the postage-paid envelope provided.

If you answered "YES" to Question 1 in this Section II (your business does buy tropical hardwood products), please continue with the questionnaire.

4. Please **estimate** the percent of your company's 2003 gross sales that was from tropical hardwood species. (Please circle the appropriate response).
 1. 1%-9%
 2. 10%-19%
 3. 20%-29%
 4. 30%-39%
 5. 40%-49%
 6. 50%-59%
 7. 60%-69%
 8. 70%-79%
 9. 80%-89%
 10. 90%-100%
5. From which region(s) do the tropical hardwood products you use originate? (Please circle all that apply).
 1. SOUTH AMERICA
 2. CENTRAL AMERICA
 3. AFRICA
 4. SOUTHEAST ASIA
 5. OTHER (PLEASE SPECIFY) _____
 6. I DON'T KNOW
6. From what countries do the tropical hardwood products you use originate? (Please list all countries you can recall).

7. For how many years has your company been purchasing tropical hardwood products? (Please circle the appropriate response).

1. 1-3 years
2. 4-6 years
3. 7-10 years
4. More than 10 years

8. How many containers of tropical hardwood products did you purchase in 2003? (Please circle the appropriate response).

1. 1-25 containers
2. 26-50 containers
3. 51-100 containers
4. More than 100 containers

9. What sources of information does your company use to locate tropical hardwood product/wood raw material suppliers? (Please indicate level of importance for each).

	Not important at all	Somewhat important	Very important
Email	1	2	3
“Word of mouth”	1	2	3
Web sites	1	2	3
International trade shows	1	2	3
U.S. trade shows	1	2	3
Catalogs	1	2	3
Direct mailing	1	2	3
Distributors	1	2	3
Company sales reps	1	2	3
Trade associations	1	2	3
Newsletters	1	2	3
Trade magazine ads (TRAM)	1	2	3

Other: (please specify) _____

10. Please indicate the extent that the following are barriers to your company in purchasing wood products made in tropical countries? (Please circle the appropriate response).

1-3

	Not a barrier at all	Somewhat of a barrier	A significant barrier
Product quality	1	2	3
Punctual delivery	1	2	3
Consistent supply	1	2	3
Contract fulfillment	1	2	3
Overpriced products	1	2	3
Transportation/Logistics	1	2	3
Customs procedures	1	2	3
Language barriers	1	2	3
Domestic government policies	1	2	3
International government policies	1	2	3

Other: (please specify) _____

11. Please rate the relative levels of importance for criteria your company uses in selecting tropical hard wood product/raw material suppliers (Please indicate level of importance for each criterion).

	Not important at all	Somewhat important	Very important
Company reputation	1	2	3
Fair prices	1	2	3
Product quality	1	2	3
Product availability	1	2	3
Knowledgeable sales people	1	2	3
Fast response to our inquiries	1	2	3
High level of overall customer service	1	2	3
Consistent delivery	1	2	3
Helps us gain access to markets	1	2	3
Distribution capabilities	1	2	3
Marketing skills	1	2	3
Computer technology capabilities	1	2	3
Potential for long-term relationship	1	2	3
Uses the Internet	1	2	3
Can communicate through email	1	2	3
Product performance	1	2	3
Source of the products that they sell us	1	2	3
Certification/Eco-labeling	1	2	3
Wood is kiln-dried	1	2	3
Uses U.S. grading standards	1	2	3
Representatives speak English	1	2	3
Product design	1	2	3

Other: (please specify) _____

NO- 2 YES

12. Is your company working directly with producers in tropical countries?

1. NO

2. YES-----→ If YES, what are the ways you are working with them? (Place circle all that apply)

1. Product development research
2. Using products made of lesser known species
3. Joint ventures
4. Providing down payments on products to be purchased
5. Offering credit
6. Advising on quality issues
7. Other _____

13. If you answered **NO**, is your company interested in working directly with tropical product producers in the future in any of the following ways? (Place circle all that apply)

1. Product development research
2. Using products made of lesser known species
3. Joint ventures
4. Providing down payments on products to be purchased
5. Offering credit
6. Advising on quality issues
7. Other _____

Section III. Certified Tropical Hardwoods

Generally, certification means that the forests from which wood products come are managed in a sustainable manner and that the trees are harvested in an environmentally sound manner. Such wood is said to be certified. Forest management and harvesting are monitored by an entity that “certifies” the company managing forests or producing wood products. Companies who purchase certified wood, manufacture it into a product, and sell a certified finished product often obtain a chain-of-custody certification. The chain of custody certification helps insure that certified wood was used in the product.

Your Company’s Certified Product Purchases

1. Does your business buy **certified** tropical hardwood products? (Please circle the appropriate response).

1. YES

2. NO → If you answered “NO”, Do you plan to buy certified tropical hardwood products in the future?

1. YES

2. NO

If you answered “NO” (your business does not buy certified tropical hardwood products) please place the survey in the enclosed POSTAGE PAID envelope and mail back to us.

If you answered “YES” (your business does buy certified tropical hardwood products), please continue to the next question 2 on Page 7.

2. Does your company have a chain of custody certification for the certified tropical hardwood products you purchase? (Please circle the appropriate response).

1. YES, WE ARE CERTIFIED BY _____
2. NO
3. I DO NOT KNOW

3. Approximately what percent of your company's total hardwood wood purchases (by value) are tropical species?

_____ %

4. Approximately what percent of your company's tropical hardwood wood purchases (by value) are certified?

_____ %

5. On average, how much more does your company pay for certified tropical hardwood products than for comparable non-certified tropical hardwood products? (Please circle the appropriate response).

1. WE DO NOT PAY MORE FOR CERTIFIED TROPICAL HARDWOOD PRODUCTS
2. 1 - 5 % MORE
3. 6 - 10 % MORE
4. 11- 15 % MORE
5. 16 - 20 % MORE
6. OVER 20 % MORE

6. Has your company ever requested that your non-certified tropical hardwood suppliers become certified? (Please circle the appropriate response).

1. YES
2. NO

Your Company's Certified Product Sales

1. What is the approximate value of **certified tropical hardwood products** sold by your company in 2003?

\$ _____

2. How did the percent of sales of tropical hardwood certified products sold by your company change in the past 5 years? (Please circle the appropriate response).

1. DECREASED DRAMATICALLY
2. DECREASED SOMEWHAT
3. REMAINED THE SAME
4. INCREASED SOMEWHAT
5. INCREASED DRAMATICALLY

3. How do you perceive the percent of sales of tropical hardwood certified products sold by your company to change in the next 5 years? (Please circle the appropriate response).

1. DECREASE DRAMATICALLY
2. DECREASE SOMEWHAT
3. REMAIN THE SAME
4. INCREASE SOMEWHAT
5. INCREASE DRAMATICALLY

4. Does your company actively promote its products as certified to customers?

1. YES 2. NO

5. Does your company's certified products carry an "Eco-Label" indicating that they are certified ?

1. YES 2. NO

6. Why did your company enter into the certified wood product market? (Please circle all reason(s) that apply).

1. WAS THE ONLY PRODUCT AVAILABLE
2. SEEKING TO INCREASE SALES VOLUME
3. SEEKING TO DIVERSIFY PRODUCTS
4. SEEKING TO EXPAND MARKET SHARE
5. SEEKING TO INCREASE PROFIT PER UNIT
6. BUSINESS OWNER'S COMMITMENT TO ENVIRONMENTAL ISSUES
7. IMPROVE COMPANY IMAGE
8. REDUCE BUSINESS RISK FROM NOT CARRYING THE PRODUCT
9. OUR COMPETITION WAS SELLING CERTIFIED PRODUCTS
10. OUR CUSTOMERS DEMANDED IT

7. Has your company experienced any unexpected benefits due to participating in certification?

1. NO
2. YES (PLEASE SPECIFY) _____

8. Has your company experienced any unexpected costs due to certification?

1. NO
2. YES (PLEASE SPECIFY) _____

THANK YOU!!!

Please return this survey in the included *postage paid* envelope.

Your response has insured that this thesis study will be a success. Thank you for your cooperation and time in completing this survey.

If you have **any** questions or comments about this survey please contact: Richard P. Vlosky, Professor, Forest Products Marketing and Director, Louisiana Forest Products Development Center, School of Renewable Natural Resources, Louisiana State University, Baton Rouge, LA 70803; Phone: (225) 578-4527; Fax: (225) 578-4251; e-mail: vlosky@lsu.edu

APPENDIX B: BUILDERS AND ARCHITECTS SURVEY



Tropical Hardwood Products Questionnaire-Builders & Architects

This survey is part of a Masters Thesis for one of my students. It is designed to collect information about the use of environmentally certified tropical hardwood products in the United States. Currently, little information is known about use and attitudes for these types of products. To adequately characterize these issues, we need your thoughtful responses. By completing this survey, you will help us to better understand these issues (and help my student to graduate).

The survey is **completely confidential** and only summary information will be reported in study results. The number at the top of this survey is an **identifier only** that allows us to track when we receive your completed survey, ensuring that you do not receive subsequent surveys or phone calls.

A **complimentary copy of the survey results** will be sent to you as a token of our appreciation for completing the survey.

If you have any questions about the research study, please call me at (225) 578-4527 or email me at vlosky@lsu.edu. When you have completed the survey, please place it in the enclosed **postage paid** envelope. We thank you most sincerely for your help on this study.

Richard P. Vlosky

Professor and Director
Louisiana Forest Products Development Center

Remember, as a token of our appreciation for completing this survey, you will receive a **free copy** of the study results.

**→→ Responses need not be exact figures. Estimates or approximations are adequate.
All responses are strictly confidential.**

Section I. General Company Information

1. Please estimate total gross sales for your company in 2003. (Please circle the appropriate response).
 1. \$0 - \$5 million
 2. \$6- \$10 million
 3. \$11 million - \$25 million
 4. \$26 million-\$50 million
 5. \$51 million-\$100 million
 6. \$101 million-\$250 million
 7. \$251 million-\$500 million
 8. \$501 million-\$1 Billion
 9. More than \$1 Billion
2. Please estimate the total number of people that are currently employed by your company in **ALL** company locations. (Please circle the appropriate response).
 1. 1-10 EMPLOYEES
 2. 11-25 EMPLOYEES
 3. 26-50 EMPLOYEES
 4. 51-100 EMPLOYEES
 5. 101-500 EMPLOYEES
 6. MORE THAN 500 EMPLOYEES

3. In what state is your company headquarters located? _____
4. From the lists below, please indicate the appropriate information about your company.
(Please circle **ALL** that apply.)

<p>A. Which of these products does your company use or specify for customers? (please circle all that apply). Then, please continue to "B" below.</p> <p>_____ We do not use or specify any of these products for customers (Skip to Section II Below)</p>	<p>1. Millwork and molding 2. Doors 3. Windows 4. Furniture 5. Furniture parts 6. Flooring 7. Decking 8. Cabinets 9. Case goods</p> <p>Other (specify): _____</p>
<p>B. Please indicate the products that your company uses or specifies that are manufactured with tropical species (please circle all that apply).</p> <p>_____ We do not use or specify any of these products that are manufactured from tropical species (Skip to Section II Below)</p>	<p>1. Millwork and molding 2. Doors 3. Windows 4. Furniture 5. Furniture parts 6. Flooring 7. Decking 8. Cabinets 9. Casework</p> <p>Other (specify): _____</p>

Section II. Tropical Hardwoods

5. Does your company buy or specify tropical hardwood products? (Please circle the appropriate response).

1 YES

2. NO

6. If **NO**, would you be interested in buying or specifying tropical hardwood products in the future? (Please circle the appropriate response).

1 YES

2. NO

3. I DO NOT KNOW

7. Please indicate the tropical hardwood products your company **CURRENTLY BUYS/SPECIFIES** ("C") or would be interested in purchasing/specifying **IN THE FUTURE** ("F").

** Place a "C" in the space for current purchases/specification or a "F" for products you plan to purchase/specify in the future. **

_____ Millwork and Molding	_____ Doors	_____ Windows	_____ Furniture
_____ Furniture Parts	_____ Flooring	_____ Decking	_____ Cabinets
_____ Case Goods	_____ Other (please specify): _____		

If you answered "NO" to Question 1 in this Section II (your business does not currently buy/specify tropical hardwood products please return this questionnaire in the postage-paid envelope provided.

If you answered “YES” to Question 1 in this Section II (your business does buy/specify tropical hardwood products), please continue with the questionnaire.

8. Please **estimate** the percent of your company’s 2003 gross sales that was from tropical hardwood wood species. (Please circle the appropriate response).

1. 1%-9%
2. 10%-19%
3. 20%-29%
4. 30%-39%
5. 40%-49%
6. 50%-59%
7. 60%-69%
8. 70%-79%
9. 80%-89%
10. 90%-100%

9. Where does your company purchase/specify its tropical hardwood products? (Please circle all that apply).

1. FROM U.S. BROKER/WHOLESALER
2. FROM INTERNATIONAL (FOREIGN) BROKER/WHOLESALER
3. DIRECTLY FROM INTERNATIONAL PRODUCERS
4. MY COMPANY AGENTS
5. OTHER (PLEASE SPECIFY) _____

10. From which region(s) do the tropical hardwood products you use/specify originate? (Please circle all that apply).

1. SOUTH AMERICA
2. CENTRAL AMERICA
3. AFRICA
4. SOUTHEAST ASIA
5. OTHER (PLEASE SPECIFY) _____
6. I DON'T KNOW

11. From what countries do the tropical hardwood products you use/specify originate? (Please list all countries you can recall).

12. For how many years has your company been purchasing/specifying tropical hardwood products? (Please circle the appropriate response).

1. 1-3 years
2. 4-6 years
3. 7-10 years
4. More than 10 years

13. How many containers of tropical hardwood products did you purchase/specify in 2003? (Please circle the appropriate response).

1. 1-25 containers
2. 26-50 containers
3. 51-100 containers
4. More than 100 containers

14. What sources of information does your company use to locate tropical hardwood product/wood raw material suppliers? (Please indicate level of importance for each).

	Not important at all	Somewhat important	Very important
Email	1	2	3
“Word of mouth”	1	2	3
Web sites	1	2	3
International trade shows	1	2	3
U.S. trade shows	1	2	3
Catalogs	1	2	3
Direct mailing	1	2	3
Distributors	1	2	3
Company sales reps	1	2	3
Trade associations	1	2	3
Newsletters	1	2	3
Trade magazine ads	1	2	3

Other: (please specify) _____

15. Please indicate the extent that the following are barriers to your company in purchasing/specifying hardwood products made in tropical countries? (Please circle the appropriate response).

	Not a barrier at all	Somewhat of a barrier	A significant barrier
Product quality	1	2	3
Punctual delivery	1	2	3
Consistent supply	1	2	3
Contract fulfillment	1	2	3
Overpriced products	1	2	3
Transportation/Logistics	1	2	3
Customs procedures	1	2	3
Language barriers	1	2	3
Domestic government policies	1	2	3
International government policies	1	2	3

Other: (please specify)

16. Please rate the relative levels of importance for criteria your company uses in selecting tropical hardwood product/raw material suppliers (Please indicate level of importance for each criterion).

	Not important at all	Somewhat important	Very important
Company reputation	1	2	3
Fair prices	1	2	3
Product quality	1	2	3
Product availability	1	2	3
Knowledgeable sales people	1	2	3
Fast response to our inquiries	1	2	3
High level of overall customer service	1	2	3
Consistent delivery	1	2	3
Helps us gain access to markets	1	2	3
Distribution capabilities	1	2	3
Marketing skills	1	2	3
Computer technology capabilities	1	2	3
Potential for long-term relationship	1	2	3
Uses the Internet	1	2	3
Can communicate through email	1	2	3
Product performance	1	2	3
Source of the products that they sell us	1	2	3
Certification/Eco-labeling	1	2	3
Wood is kiln-dried	1	2	3
Uses U.S. grading standards	1	2	3
Representatives speak English	1	2	3
Product design	1	2	3

Other: (please specify) _____

17. Is your company working directly with hardwood producers in tropical countries?

1. NO

2. YES-----→ If YES, what are the ways you are working with them? (Place circle all that apply)

1. Product development research
2. Using products made of lesser known species
3. Joint ventures
4. Providing down payments on products to be purchased
5. Offering credit
6. Advising on quality issues
7. Other _____

18. If you answered **NO**, is your company interested in working directly with tropical hardwood product producers in the future in any of the following ways? (Place circle all that apply)

1. Product development research
2. Using products made of lesser known species
3. Joint ventures
4. Providing down payments on products to be purchased
5. Offering credit
6. Advising on quality issues
7. Other _____

Section III. Certified Tropical Hardwoods

Generally, certification means that the forests from which wood products come are managed in a sustainable manner and that the trees are harvested in an environmentally sound manner. Such wood is said to be certified. Forest management and harvesting are monitored by an entity that “certifies” the company managing forests or producing wood products. Companies who purchase certified wood, manufacture it into a product, and sell a certified finished product often obtain a chain-of-custody certification. The chain of custody certification helps insure that certified wood was used in the product.

Your Company’s Certified Product Purchases

1. Does your business buy/specify **certified** tropical hardwood products? (Please circle the appropriate response).

1. YES
 2. NO
- _____ If you answered “NO”, Do you plan to buy/specify certified tropical hardwood products in the future?
1. YES
 2. NO

If you answered “NO” (your business does not buy certified tropical hardwood products) please place the survey in the enclosed POSTAGE PAID envelope and mail back to us.

If you answered “YES” (your business does buy certified tropical hardwood products), please continue to the next question 2 below on Page 6.

2. Does your company have a chain of custody certification for the certified tropical hardwood products you purchase/specify? (Please circle the appropriate response).

1. YES, WE ARE CERTIFIED BY _____
2. NO
3. I DO NOT KNOW

3. Approximately what percent of your company’s total hardwood wood purchases/specifications (by value) are tropical species?

____%

4. Approximately what percent of your company's tropical hardwood wood purchases/specifications (by value) are certified?

____%

5. On average, how much more does your company pay for certified tropical hardwood products than for comparable non-certified tropical hardwood products? (Please circle the appropriate response).

1. WE DO NOT PAY MORE FOR CERTIFIED TROPICAL HARDWOOD PRODUCTS
2. 1 - 5 % MORE
3. 6 - 10 % MORE
4. 11- 15 % MORE
5. 16 - 20 % MORE
6. OVER 20 % MORE

6. Has your company ever requested that your non-certified tropical hardwood suppliers become certified? (Please circle the appropriate response).

1. YES
2. NO

Your Company's Certified Product Sales

7. What is the approximate value of **certified tropical hardwood products** sold/specified by your company in 2003?

\$_____

8. How did the percent of sales of tropical hardwood certified products sold/specified by your company change in the past 5 years? (Please circle the appropriate response).

1. DECREASED DRAMATICALLY
2. DECREASED SOMEWHAT
3. REMAINED THE SAME
4. INCREASED SOMEWHAT
5. INCREASED DRAMATICALLY

9. How do you perceive the percent of sales of tropical hardwood certified products sold/specified by your company to change in the next 5 years? (Please circle the appropriate response).

1. DECREASE DRAMATICALLY
2. DECREASE SOMEWHAT
3. REMAIN THE SAME
4. INCREASE SOMEWHAT
5. INCREASE DRAMATICALLY

10. Does your company actively promote its products as certified to customers?

1. YES
2. NO

11. Does your company's certified products carry an "Eco-Label" indicating that they are certified?

1. YES
2. NO

12. Why did your company enter into the certified wood product market? (Please circle all reason(s) that apply).

1. WAS THE ONLY PRODUCT AVAILABLE
2. SEEKING TO INCREASE SALES VOLUME
3. SEEKING TO DIVERSIFY PRODUCTS
4. SEEKING TO EXPAND MARKET SHARE
5. SEEKING TO INCREASE PROFIT PER UNIT
6. BUSINESS OWNER'S COMMITMENT TO ENVIRONMENTAL ISSUES
7. IMPROVE COMPANY IMAGE
8. REDUCE BUSINESS RISK FROM NOT CARRYING THE PRODUCT
9. OUR COMPETITION WAS SELLING CERTIFIED PRODUCTS
10. OUR CUSTOMERS DEMANDED IT

13. Has your company experienced any unexpected benefits due to participating in certification?

1. NO
2. YES (PLEASE SPECIFY) _____

14. Has your company experienced any unexpected costs due to certification?

1. NO
2. YES (PLEASE SPECIFY) _____

THANK YOU!!!

Please return this survey in the included *postage paid* envelope.

Your response has insured that this thesis study will be a success. Thank you for your cooperation and time in completing this survey.

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VITA

Shadia Duery was born on 1977 in La Paz, Bolivia (South America). She received her Bachelor of Science degree in agriculture with a major in natural resources in the “Escuela Agrícola Panamericana” El Zamorano in Honduras, Central America, on December 2001. She received a scholarship from the German Government in its “Deutsche Stiftung fuer Entwicklung” program for her universities studies in Honduras. She started with her path in the forest area with a one year research of the dry forest in the community of Oropolí, Honduras; in this research she compared the conservation status of the Honduran dry forest with a well conserved dry forest in Oaxaca, Mexico. Continuing with her career in the forest she did an internship of fourteen months in the U.S. Forest Service in Washington State in a coniferous forest. After that she went back to her country to work in the private sector as the manager of the farm forest plantations of Bolivian Timber SRL, where she worked with tropical tree species. Currently she is finishing a double master's degree at Louisiana State University in forest products marketing and environmental planning and management.