

# A Case Study to Determine Drivers and Barriers of Appalachian Forest Products in Central America

Scott W. Lyon<sup>1,2</sup>  
Henry Quesada-Pineda<sup>1</sup>  
Robert L. Smith<sup>1</sup>

## Resumen

El propósito de esta investigación fué determinar las fortalezas y debilidades de los productos forestales de la región de los Apalaches en Centro América. Oportunidades comerciales para empresas ubicadas en la región de los Apalaches fueron evaluadas y estrategias para facilitar el ingreso al mercado Centroamérica fueron determinadas. En este artículo se presentan resultados de una investigación tipo caso de estudio que se realizó durante el año 2010 en cuatro países centroamericanos: Costa Rica, El Salvador, Guatemala, y Panamá. El recurso forestal en El Salvador, Costa Rica y Panamá se ha limitado y la industrial local carece de apoyo del gobierno, reduciendo la presencia de materias primas. Las inconsistencias y las diferencias en la dimensión entre la industria forestal de los Apalaches y Centroamérica es una de las barreras más importantes que limita un mayor intercambio comercial entre las regiones. La mejor estrategia que empresas en los Apalaches pueden seguir para ingresar al mercado centroamericano es integrarse con empresas locales, ofrecer productos de alto valor agregado, y mantener precios similares a la competencia. El estudio también demostró que fuentes de abastecimiento internacionales son necesarias para llenar las necesidades de la creciente infraestructura regional.

**Palabras clave:** marketing internacional, centroamérica, productos forestales apalaches.

## Abstract

The purpose of this research was to determine drivers and barriers of Appalachian wood product competitors in Central America. Potential market opportunities for Appalachian forest product companies in Central America were evaluated and strategies were developed to increase exports of Appalachian wood products to Central America. The findings support the claim that United States forest product companies have not put enough effort into marketing forest products to Central America. Forests in El Salvador, Panama, and Costa Rica are limiting harvests and the industry lacks support from the government, reducing the amount of raw material and production. Inconsistencies between Appalachian and Central American wood products industries (e.g., dimensions) act as a barrier to the efficient exchange of wood products. The best market strategies for Appalachian forest products companies to increase sales into Central America are: partner with local wholesalers, offer higher value-added products, and maintain similar pricing with competition. An outside source of wood is needed to meet the needs of growing regional infrastructure.

**Key words:** international marketing, central america, appalachian forest products.

1. Virginia Tech, Blacksburg, Virginia, USA

2. [swlyon@vt.edu](mailto:swlyon@vt.edu)

## Introduction

Appalachian forest products companies have a unique opportunity to meet the current demand for wood products in Central America. According to Salamone (2000), "the United States forest product companies have overlooked Central America as an opportunity to expand their markets." In the future, there will be a greater need for international forest products in Central America due to increasing population size, tourism and deforestation. Because of improvements in health care, sanitation and education, the Central American population has almost quadrupled from 11 million in 1950 to 40 million in 2008 (Fox 1990; World Bank 2010).

In addition to increasing population size, tourism is booming in Central American countries. Nicaragua had an 11% increase in tourists from abroad in the first five months of 2009 (Rogers 2009). In the first year after breaking ground for the expansion of the canal in 2007, Panama has experienced an 11,2% increase in tourism investment. Panama offers a variety of tourist destinations including beaches, Spanish ruins, and islands (Aparicio 2008). Ecotourism has played a big part in Central America's tourism trade because 8% of the world's animal and plant species live in Central America (Schieber 2009). Costa Rica is one of the most visited destinations for ecotourism, including 132 protected areas for flora and fauna (Sánchez-Azofeifa *et al.* 2003). In addition to ecotourism, some retired U.S. citizens are moving to the Costa Rican coast to benefit from an inexpensive retirement and tropical environment (Kristof 2010).

The tourism increase in Central America has resulted in a growing need for wood products. A shortage of hotel rooms was observed in 2007 due to a 19% increase in the number of tourists since 2005 (Fallas 2008). Due to the rapid increase of tourism in Costa Rica, foreign investors have provided funding to help expand the infrastructure. In 2007, twenty-five percent of Costa Rica's foreign investment was provided to tourism. To meet the wood demand as more hotels are built in Central America, some countries such as Costa Rica, Panama, and El Salvador look to their neighboring countries and continents to procure supplies (Quesada *et al.* 2009).

In Guatemala, the use of forest products has been increasing over the past few decades due to wood-frame construction for roofs, walls and floors. In the late 1990s, the Guatemalan government estimated a shortage of 536,000 housing units (Salamone 2000). Because of the increase in the housing market, manufacturing plants began to appear and produce furniture and cabinets to fill the newly built homes (Salamone 2000). Costa Rica was thought to be short 150,000 housing units for its increasing population (Salamone 2000). Also, Costa Rica needs to construct more than 50,000 hotel rooms by 2012 to lodge the growing number of tourists visiting the country (Quesada *et al.* 2009). Although concrete and

steel remain the dominant building materials in Central American countries, wood products are frequently used in interior applications (e.g., cabinets, furniture) (Salamone 2000; Fry 2008).

In September 2007, the Panama Canal expansion started which caused a strong demand for concrete plyform used in the canal construction. Panama was the 12th largest importer of U.S. plywood at 2,5 million square feet (3/8-inch basis) by quantity in 2009. Since 2000, U.S. wood products exports to Panama have been at their highest level (Anderson 2010).

Another driver for the import of international wood products is deforestation and related issues, which continues to be a major challenge today for all Central American countries. For instance, the Panama government removed Law No. 7 that provided tax incentives for landowners to reforest their properties. This removal resulted in illegal logging and a decrease of reforestation projects (Muñoz 2007). Guatemala has been losing 54,000 ha of forest each year and only replants about 10,000 ha per year, which is not nearly enough to meet the growing demand for timber (Hurtarte *et al.* 2006). Also, the natural forests of Costa Rica have been exploited due to shortages of wood for housing and furniture (Montagnini *et al.* 2005).

In most Central American countries, forest plantations were developed in the 1960s and 1970s through incentives offered by the government (FAO 2009a). The main issue for plantations in Panama is that they are new and long term projects developed and maintained by landowners. The landowners need to borrow money to maintain the plantations and the banks are less likely to lend money for plantations because they are new and long-term projects (FAO 2009b). Reforestation rates of plantations in Panama have been decreasing over the past decade (Miyata 2007). Problems exist in Guatemalan forest plantations because they are spread throughout the country on poor growing sites and lack an inherent quality of seed (FAO 2009c). Honduras has a rich volume of natural forests resulting in a reduced need for plantations (FAO 2009d). El Salvador has very little forested area (107,000 ha), therefore, it needs to import a large volume of timber and fuelwood to meet the demand (Earthtrends 2003; FAO 2009e). Most of the natural forests in El Salvador were deforested for coffee plantations, sugarcane, and cotton to meet the international demand (FAO 2009e).

Although some Central American countries have little forested land, some countries have a strong wood product production industry. Costa Rica's medium-density fiberboard production competes with the U.S. in sales to Central American countries (Salamone 2000). In 2009, Costa Rica remained the number one producer of wood-based panels in Central America with 65,000 m<sup>3</sup> (Table 1).

**Table 1.** Central American countries forest product removal and production for 2009 (Adapted from FAO 2010)

	Units x 1,000	Costa Rica	Nica- ragua	Hon- duras	Pana- ma	El Sal- vador	Guate- mala
Industrial Roundwood	Cubic Meter	1,198	93	822	174	682	454
Wood Fuel	Cubic Meter	3,410	6,003	8,641	1,173	4,210	16,960
Wood Chips and Particles	Cubic Meter	-	-	-	4	-	-
Wood Residue	Cubic Meter	-	80	-	2	457	-
Sawnwood	Cubic Meter	1,132	54	79	30	16	366
Wood Charcoal	Metric Ton	11	23	26	5	21	21
Wood-based panels	Cubic Meter	65	8	6	7	-	31
Other Fiber Board	Metric Ton	7	-	1	-	-	-

In some cases, the Central American forest products industry is very complicated. In Nicaragua, the forest products industry lacks retail outlets and most raw materials are in low supply and therefore harvested illegally. Forest product mill employees lack education and on-the-job training. They use old machinery for production with poor manufacturing techniques, and a small number of dry-kilns are found in the industry. Even those facilities that have dry kilns are not familiar with the proper drying procedures (Hammett *et al.* 1999).

### Appalachian Forest Product Industry Background

The Appalachian region stretches from southern New York to northern Mississippi including Pennsylvania, Ohio, Maryland, West Virginia, Virginia, North Carolina, South Carolina, Tennessee, Kentucky, Georgia, and Alabama (Appalachian Regional Commission 2010). The economy in this region was fueled historically by forestry, mining, farming and industry.

An increase in global competition has caused the decrease of domestic markets for U.S. furniture. This increase in competition has taken a toll on the Appalachian hardwood lumber industry (Bowe *et al.* 2001). The forest products industry in the Appalachian region must be innovative in their marketing strategies to find potential markets for their products (Naka *et al.* 2009). In the past few years, the Appalachian region has suffered from the economic crisis resulting in forest product mill closures and loss of employment due to an increase in competition. Therefore, the region may need to increase product competitiveness by expanding export markets and improving product promotion (Wang *et al.* 2010). International marketing of wood products is essential for the Appalachian region to strengthen the economy (Hammett 1996). Exporting wood products offers many advantages for firms entering the global market such as increased profits and credit, market growth, and economic strength (Parhizkar 2008; McMahon and Gottko 1989).

Forest products export studies found several factors that impact successful export of products. Ifju and Bush (1993) suggested that small, domestically-oriented companies view themselves as non-exporters, but they still have potential to export. Many non-exporting companies are trying to enter a global market but have not because of lack of market information regarding product specifications and distribution channels (Ifju and Bush 1993). Ringe *et al.* (1987) found that Kentucky hardwood lumber exporters invested in global market information and built long-term relationships with overseas customers resulting in greater success with exporting products overseas. Overall, lack of market information is a main barrier for potential exporters of forest products overseas. A 2002 study of Appalachian hardwood lumber exports (Parsons 2002) showed that the lack of employee manpower and production limitations did not significantly affect exporting, but the need for marketing information was a major hurdle for companies.

Free trade agreements have been developed by governments to help companies compete in global markets. The Dominican Republic-Central American Free Trade Agreement (CAFTA-DR) was established in 2006 in El Salvador, Guatemala, Honduras and Nicaragua, in Dominican Republic in 2007 and in Costa Rica in 2009. The CAFTA-DR may help to increase the opportunity for exports of wood products from the Appalachian region. CAFTA-DR will phase out tariffs between the U.S. and Central American countries within 15-20 years. Some tariffs were immediately duty free after the trade agreement went into effect (USDA FAS 2009).

Immediately after the establishment of CAFTA-DR, 79% of wood products (including panels and composite wood products) were duty-free. After the first 5 years, an additional 6% more will be duty free and the remaining 15% will become duty-free in the last 10 years (U.S. Department of Commerce 2010). This means all wood products included in the CAFTA-DR will be duty free within 10 years of establishing the free trade agreement. Each country involved in CAFTA has set up their own tariff schedule as to when products will become duty free (U.S. Export Assistance Center 2011).

The purpose of this research was to determine drivers and barriers for Appalachian wood product companies in Central America. Previous research suggests that United States forest product companies have overlooked Central America as an opportunity to expand their markets (Salamone 2000). To understand the forest products market in Central America, an extensive market analysis was performed through interviews and observation of industries in Central America. The overall goal of this study is to evaluate potential market opportunities for Appalachian forest product companies in Central America through a case study methodology. To accomplish this goal, 3 objectives were examined to understand the forest products market in Central America:

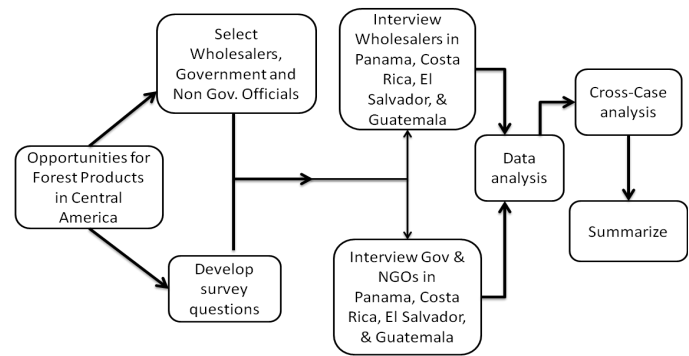
1. Identify main competitors of forest product companies in Central American countries.
2. Investigate distribution channels of forest products.
3. Investigate local production, demand, and policy of forest products in Central American countries.

## Methodology

Interviews with 4 top importers of forest products and 2 forestry related government and non-government agencies were conducted in each of four countries (i.e., Costa Rica, Guatemala, El Salvador, and Panama). Topics for the forest product company survey included current imports, product line, cultural opinions, transportation, and trade barriers. Forestry agency questions focused on forestry management, wood products imported, supplier attributes, state of the forest products industry in the target countries, transportation issues (e.g. customs documentation, inspections) and barriers to importing. The complete methodology can be found in Lyon (2011).

Participating companies and agencies were purposively selected by the U.S. Commercial Service's Gold Key member program to save time and money (Smith *et al.* 2008; Parhizkar 2008). The program arranges business meetings with prescreened contacts to develop potential business partners or customers. By prescreening contacts, the service helps to find the clients that are the best fit for interviewing; however, these preselected companies may not represent all companies in the country.

These interviews were used as part of a case study to better understand the forest products market in Central America and gain more detailed information (Yin 2009; Easterby-Smith *et al.* 1991; Figure 1). In case study research, personal interviews are the most important sources of information (Yin 2009) and have been useful in identifying barriers and customer preferences in marketing research (Sofaer 1999). Conducting personal interviews is the most effective method for gaining information about international markets (Wai-Chung 1995). When interviewing, qualitative researchers should set aside all past knowledge of the subject matter and observe and listen to the interviewee (Psathas 1973; Babbie 2010). Qualitative methods often used in case studies help researchers identify patterns and discern similarities and differences (Sofaer 1999) in the data. The cross-case analysis approach will be used to examine patterns in the case study (Babbie 2010). Qualitative research is also used to gain a more in-depth understanding of a particular issue (Mohd 2008; Patton 1987).



**Figure 1.** Central American case study to learn more about the wood products industry (Adapted from Mohd 2008; Yin 2009).

## Results and Discussion

Wood products wholesalers and manufacturers interviewed had 100-500 employees on average, with one wholesaler that had over 2,000 employees. Their customer base consisted of retailers, homeowners, contractors, manufacturers, and government offices. The government and non-government agencies are responsible for either managing the forests or certifying the forests that are sustainably managed.

### Forestry Management

Forests in Panama, Costa Rica, and Guatemala are mainly Forest Stewardship Council (FSC) certified by the Smartwood program through Rainforest Alliance. There are currently no certified forest lands in El Salvador because of expensive certification costs and the Ministry of Agriculture and Livestock lags behind the widely accepted sustainable forest management practices. Many of the companies and agencies interviewed claimed no incentives are available for companies to offer certified wood products; users primarily look at price and quality of a product when purchasing instead of certification.

Companies and agencies interviewed reported that a lack of incentives from the government is preventing reforestation. In Guatemala, government incentives are given to landowners to help fund reforestation, protection, and management of natural forests over a 5-6 year plan. One agency stated that instead of harvesting forests, it is better to preserve the forest in order to protect watersheds for local communities. A government official in Costa Rica claimed that the government has created an incentive to preserve forestland in order to encourage ecotourism. A non-governmental organization in El Salvador claimed that the agriculture bank had given incentives to replant native tree species, but these incentives are not enough to meet the demand for wood products.

The agencies in the majority of the countries stated that the forests are managed by each country's government. For example, local residents may own the property, but they must ask permission of the governing agency before



harvesting in Panama and Costa Rica. In some instances, Guatemalan communities must pay a pre-harvest tax before cutting timber, which may prevent communities from harvesting.

Plantations seem to be the main source for raw materials for wood products in Central America. Most of the harvesting in Panama and Costa Rica occurs in plantations instead of the natural forests. The government agency stated some land in Panama used for pine plantations has poor quality soils and is not suitable for growing other more valuable timber species such as teak (*Tectona grandis*). Plantations in Panama plant around 11,000 hectares annually and grow typically 60% teak (*Tectona grandis*), and other species such as Caribbean pine (*Pinus caribaea*), eucalyptus (*Eucalyptus spp.*) (Table 2). In plantations, companies replant more teak (*Tectona grandis*) than native species because teak (*Tectona grandis*) is highly marketable overseas to Asia and Europe. Typically, privately owned plantation forestlands in Guatemala grow pine (*Pinus spp.*), whereas public lands grow broadleaf species such as mahogany. Plantations in Guatemala grow 11,000 hectares a year annually of teak (*Tectona grandis*), gmelina (*Gmelina arborea*), and palo blanco (*Tabebuia donnell-smithii*) (Table 2).

Table 2. Response of interviewees about current species planted in each Central American country.

	Panama	Costa Rica	Guatemala	El Salvador
Teak ( <i>Tectona grandis</i> )	×	×	×	×
Caribbean pine ( <i>Pinus caribaea</i> )	×	×		
Pine ( <i>Pinus spp.</i> )			×	×
Eucalyptus ( <i>Eucalyptus spp.</i> )	×	×		×
African mahogany ( <i>Khaya spp.</i> )	×			
Gmelina ( <i>Gmelina arborea</i> )	×	×	×	×
Chancho blanco ( <i>Vochysia guatemalensis</i> )		×		×
Palo blanco ( <i>Tabebuia donnell-smithii</i> )			×	
Laurel ( <i>Cordia alliodora</i> )		×		×
Cortez blanco ( <i>Tabebuia donnell-smithii</i> )				×

At the time of plantation harvest, typically only small diameter trees are cut, yet the forest products industry does not have a strategy for production and marketing of

small diameter trees. Costa Rica replants 6 000 hectares annually in plantations. The main species replanted are melina (*Gmelina arborea*), teak (*Tectona grandis*) and chancho blanco (*Vochysia guatemalensis*) (Table 2). El Salvador has 6,000 hectares of plantations and 1,000 additional hectares are planted a year. The plantations in El Salvador do not require a management plan. The species growing in the El Salvador plantations consist of teak (*Tectona grandis*), eucalyptus (*Eucalyptus spp.*), laurel (*Cordia alliodora*), Cortez blanco (*Tabebuia donnell-smithii*), and pine (*Pinus spp.*) (Table 2).

The natural forests comprise 19% of the land mass in El Salvador, yet only 1 500 hectares are managed for forestry.

### Wood Products Imported

The companies interviewed largely import pressure treated lumber, softwood lumber, panels, hardwood lumber, hardwood veneer, flooring, and furniture/parts. A few wholesaler companies in Panama and El Salvador imported pressure treated lumber from the United States treated with alkaline copper quaternary (ACQ). Some of the wood product wholesalers interviewed have interacted with wood product brokers in the U.S. for softwood lumber (Southern yellow pine) and panels, but all of the buyers were familiar with Southern yellow pine lumber (*Pinus spp.*) from the United States. The buyers claimed that Southern yellow pine (*Pinus spp.*) was comparable to Caribbean (*Pinus caribaea*) and radiata (*Pinus radiata*) pine they current purchase. Companies in Panama and Costa Rica primarily import softwood lumber from Chile, Brazil, Honduras, and Uruguay, which is dried to 12-14% moisture content. Chile is the main exporter of radiata pine (*Pinus radiata*) to Central America, the primary softwood species used in building construction. Other softwood species used in construction come from Brazil or Uruguay, such as elliotis pine (*Pinus elliotis*), loblolly pine (*Pinus taeda*), and slash pine (*Pinus elliotii*).

Companies in Guatemala and El Salvador import softwood lumber and other building materials primarily from Chile, United States and Canada, as well as purchase softwood from local sawmills. Pine lumber is also used in Costa Rica, Panama, Guatemala, and El Salvador for furniture production, so Eastern white pine (*Pinus strobus*) may be a substitute for the current species being used in furniture.

Imported panel products consist of oriented strand board (OSB), plywood, medium-density fiberboard (MDF), particle board, and concrete plyform. Buyers stated that China and Chile are the top exporters of plywood to Central America. The companies were introduced to specialized wood products such as fire-retardant lumber/panel, mold and insect resistant lumber/panel, and engineered wood products (e.g., I-joint beams, glulam, laminated veneer lumber). The majority of buyers agreed there will be a need for specialized wood products in the future because of the tropical climate in Central America. Some of the

buyers were not aware of the engineered wood products available from the Appalachian region. The buyers stated the need for composite products such as medium-density fiberboard, plywood, and oriented strand board for current and future building construction.

The buyers frequently purchased certified wood products, but they believed that their customers take into account the price and quality of the product and are less interested in buying certified. A few buyers claimed that the market for certified forest products has improved over the past few years and they expect it to increase because of environmental concerns. In some instances, countries do not understand the meaning of sustainably managing forests. A government agency in Panama directly stated, “Panamanians don’t understand sustainability.”

When asked about future demands for wood products, some respondents believed demand would increase in the future. One Costa Rican wholesaler stated that using wood for building construction will make more affordable housing available for low income families and that there is still a lot of land available for development. A government agency stated that Costa Rica is required to be carbon neutral by 2021, therefore the need for utilizing wood in construction may increase over the next few years to meet that goal.

The majority of the buyers were familiar with Appalachian hardwoods and they were willing to import them if they were priced similarly to the native tropical species in the region. Appalachian hardwoods can be used in doors, mouldings, cabinets, furniture, flooring, and ceiling panels. Lighter colored hardwood species are found in many kitchen cabinets since customers can easily match appliances and other kitchen items to them. Appalachian hardwoods such as hard maple (*Acer saccharum*), soft maple (*Acer spp.*), red oak (*Quercus rubra*), and American beech (*Fagus grandifolia*) would meet similar color specifications. Flooring and furniture are primarily manufactured using dark reddish species, therefore, black cherry (*Prunus serotina*) and black walnut (*Juglans nigra*) from the Appalachian region could be a substitute for the tropical hardwood species currently used, such as Guanacaste (*Enterolobium cyclocarpum*) (Table 3).

Table 3. Hardwood lumber species used in Central American countries.

Species	Uses	Primary Countries of Use
Almendo ( <i>Dipterix panamensis</i> )	Exterior Applications	Costa Rica, Panama, Guatemala, El Salvador
Guapinol ( <i>Hymenaea courbaril</i> )	Interior Applications	Costa Rica
Cedro Amargo ( <i>Cedrela odorata</i> )	Furniture/Interior Applications	Guatemala, Costa Rica

Continues on the next column

Species	Uses	Primary Countries of Use
Guanacaste ( <i>Enterolobium cyclocarpum</i> )	Furniture/Interior Applications	Costa Rica, Panama
Cenízaro ( <i>Samanea saman</i> )	Furniture/Interior Applications	Costa Rica
Pucte ( <i>Bucida buceras</i> )	Furniture/Interior Applications	Guatemala
Danto ( <i>Vatairea lundellii</i> )	Construction/Interior Applications	Guatemala, Costa Rica
Manchiche ( <i>Lonchocarpus castilloi</i> )	Construction/Furniture/Interior Applications	Guatemala
Santa Maria ( <i>Calophyllum brasiliense</i> )	Furniture/Interior Applications	Guatemala, Costa Rica
Chanco blanco ( <i>Vochysia guatemalensis</i> )	Furniture/Interior Applications	Costa Rica, Panama, Guatemala, El Salvador
Palo blanco ( <i>Tabebuia donnell-smithii</i> )	Furniture/Interior Applications	Guatemala, El Salvador
Laurel ( <i>Cordia alliodora</i> )	Furniture/Interior Applications	El Salvador, Costa Rica
Caoba ( <i>Mahogany</i> ) ( <i>Swietenia Macrophylla</i> )	Furniture/Interior Applications	Guatemala, Costa Rica, Panama, El Salvador
Teak ( <i>Tectona grandis</i> )	Furniture/Interior Applications	Guatemala, El Salvador, Costa Rica, Panama
Melina ( <i>Gmelina arborea</i> )	Construction Furniture	Costa Rica, Guatemala, Panama, El Salvador

### Supplier Attributes

Buyers from the wholesalers and manufacturers were asked what criteria they take into account when selecting a wood product supplier. Buyers stated they are looking for a long history of business, on-time delivery, quality of the product, competitive price, variety and availability of products, and long-term relationships. Companies preferred to buy products from other companies that have been conducting business for a long time rather than a new start-up company. Companies did repeated business with suppliers who were on-time with deliveries of products. Respondents said that wood products purchased from suppliers need to be made with high quality materials. For example, a few importers complained that some plywood from China is made with poor quality materials causing the plywood to delaminate. Importers stated wood products being sold to them must be sold at a competitive price to Central American countries. For example, wood products from Chile were found to be of high quality and sold to Central American countries at a competitive price. Some companies required their suppliers to have a large assortment of products available for fast shipping. Some

wholesalers stated they had problems with suppliers not meeting lead times and not having products in stock when purchasing. When companies are looking for new suppliers, they want to have a long-term relationship by making frequent orders and helping to promote products at tradeshows. Suppliers should have a representative at the tradeshow to help with any product demonstrations and questions from potential customers.

### State of the Forest Products Industry in Costa Rica, Panama, Guatemala, and El Salvador

Companies and agencies were asked about the current state of the forest products industry in their country. In Panama, a state agency stated that the industry has been on a downward spiral since 1993 and only 5 large wood product companies exist with more than 50 employees (Table 4). Panama's forest products industry is technologically limited and there is a long distance between the forest and the primary processing facilities, which leads to problems with logistics. Costa Rica has only a few large wood products companies and the small-medium enterprises are technologically limited and segmented throughout the country (Table 4). Forest products companies in Costa Rica on average employ only 11 workers in the industry. Most companies use small diameter logs for production. Raw material typically comes from plantations and the rate of reforestation has begun to drop because of high land costs and legal restrictions.

Table 4. Responses from interviews when asked about the Central American forest products industry in each country

	Panama	Costa Rica	Guatemala	El Salvador
Limited Technology	X	X	X	X
Few large companies	X	X		
Lack of Raw Material				X
Lack of Government Promotion	X	X		X

The companies researchers viewed in Guatemala, Costa Rica, and Panama were more technological advanced with computer numerical control (CNC) machines than companies in El Salvador. Most companies visited in El Salvador were small family operated furniture companies with less than 10 employees using obsolete equipment and production techniques. Companies stated that the government does not help in the promotion of wood products in Panama, Costa Rica and El Salvador (Table 4). Pallet production is the main wood product industry in Costa Rica used for exporting agricultural crops overseas. In Guatemala, an agency promotes the use of wood products at a few tradeshows throughout the year (Table 4). One agency in Guatemala pointed out that companies are technologically limited and produce low value-added products (Table 4). The main industries are pallet and

furniture production and companies tend to use small diameter trees as a raw material.

The industry in El Salvador uses limited technology and the raw material is scarce because of poor quality trees (Table 4). Approximately 80 to 90 percent of the forest products industry is furniture production. Agencies and companies stated that the majority of small to medium enterprises were not familiar with kiln drying as a method to dry lumber, yet the wholesalers and manufacturers interviewed required their lumber to be kiln dried when purchasing.

Local small to medium enterprises may reduce shipping costs if lumber is properly dried by reducing the overall weight (Simpson 2001). Since companies only have a small supply of raw materials, they must import hardwood species from Nicaragua and Guatemala. In 2011, the El Salvadorian government is taking a stand to prevent illegal harvesting; therefore, companies in El Salvador will be required to obtain a permit to harvest trees. This permit must accompany the wood product through the harvesting and manufacturing process, which may persuade some companies to look elsewhere for raw material.

Overall, the wood products industry in Central America is limited due to lagging technological advances and lack of governmental support.

### Transportation Issues

Transportation of wood products was a challenge for some companies, but was not an issue for others. In Panama, Costa Rica and Guatemala, companies did not report a problem with logistics. The main problem in these countries was delayed delivery of products due to port strikes in exporting countries. Also, some products entering the Central American countries have experienced delays due to phytosanitary issues, such as lack of appropriate markings and paperwork to show that the product meets customs requirements. Custom authorities delay arrivals of products because of necessary inspections. Table 5 shows the main ports of entry of imports entering the Central American countries.

Table 5. Main ports of entry for wood products in Central America.

Country	Port	Coast
Guatemala	Puerto Barrios	Caribbean
El Salvador	Puerto Barrios, Guatemala	
	Puerto Cortes, Honduras	
Costa Rica	Port of Limón	Pacific
	Caldera Port, Puntarenas	
Panama	Panama City Port	

Most imports to El Salvador arrive by ship to either Guatemala or Puerto Cortes, Honduras and are then trucked to El Salvador. Companies have had problems when importing from South America because containers have been lost in transit at ports.



## Barriers to Importing

Companies were asked about potential barriers that Appalachian forest product companies face when exporting to Central America. The interviewees stated the most critical barriers to importing wood products are: lumber dimensions, language and wood product knowledge (Table 6). The top barrier reported by companies and agencies interviewed was incompatible dimensions of wood products offered by the U.S. Lumber dimensions seemed to be an important barrier for exporting to Central America, since lumber is purchased and sold in Central America in the unit of “varas.” A vara measures 32,908 in or 83,587 cm in length (Rowlett and UNC 1999). Companies stated that they preferred exporters to supply products to meet the specific dimensions required in their country.

**Table 6.** Responses from interviewees when asked about barriers to importing wood products to Central American countries.

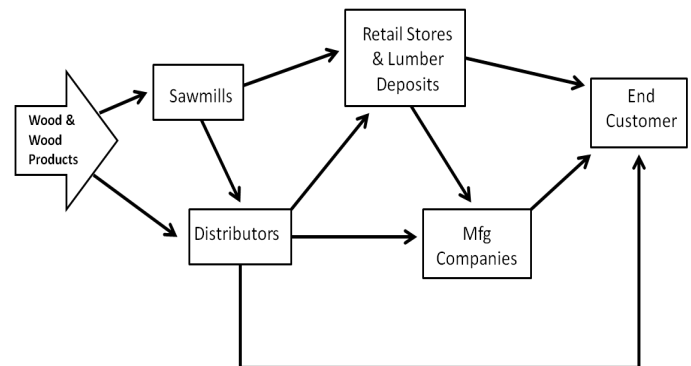
Barrier	Country(ies)	Problem
Lumber Dimensions	Costa Rica Guatemala El Salvador	Use different lumber dimensions than the U.S.
Language	Costa Rica Panama El Salvador Guatemala	Most buyers only speak Spanish
Price	El Salvador	Competition with Chilean wood products
Wood Product Knowledge	Costa Rica Panama El Salvador Guatemala	Builders, architects, and designers lack knowledge of wood and wood products
Wood Product Distribution	Guatemala El Salvador	Lack of proper distribution of wood products to the country and end-users

Most companies stated that they import wood products from Chile because they offer high quality products at a competitive price. Companies stated the United States must price products similarly to Chilean wood products in order to be successful as an exporter to Central America. A manufacturer in El Salvador stated, “U.S. furniture is high in cost and low in quality.”

Another barrier reported by companies and agencies interviewed was the lack of knowledge of the wood attributes. Companies and agencies stated that many builders and engineers have little knowledge of wood and wood products for practical uses. When designing homes and commercial buildings, architects and engineers primarily use construction materials with which they are experienced and familiar, usually cement and steel in Central America.

Distribution of wood products seemed to be challenging for some companies, but was not an issue for others. In Costa Rica, Panama, and El Salvador hardware stores and lumber deposits offer wood products to customers

(Figure 2). Companies stated Guatemalan wood product distribution is currently a problem because of the lack of retail stores stocked with treated, dried and proper dimension lumber. A clearly defined supply chain needs to be implemented in Guatemala to target markets effectively.



**Figure 2.** Distribution of forest products in Central American countries (Adopted from Quesada 2008)

Another barrier reported from the companies was language. Some companies interviewed stated that they had trouble negotiating the import of forest products from the United States because of the language barrier. Companies with importing experience from the United States have primarily made purchases from a broker that speaks Spanish fluently.

## Summary and Conclusions

The goal of this research was to examine the opportunities for Appalachian wood products in Central America using a case study design. Objective 1 was to identify the main competitors of the forest products companies in Central American countries. The researchers found that Central American wood products companies purchase wood products from either local companies, neighboring countries, South America, China and a small amount from the U.S. Central American wood products importers purchase from South America because of the high quality and competitively priced products.

Objective 2 examined the distribution channels of the Central American forest products industry. The researchers found that wood products imported by Central America primarily enter the countries through a wholesaler and are then distributed to retailers or lumber deposits. In Guatemala, the research found that these countries lack wood product retailers and lumber deposits to help distribute wood products to the end-consumer.

The last objective was to investigate the local production, demand, and policy of forest products in Central America. The demand for wood and wood products is high throughout Central America. Since the start of the expansion of the Panama Canal, wood products are being used for construction of the canal and also in homes and



businesses developing because of the strong economy. In Costa Rica, the demand for wood products is rising because of the initiative to be carbon neutral by 2021. The source for available raw materials in El Salvador is decreasing because of strict environmental regulations and the large amount of wood needed to fill growing demand. Although Guatemala has numerous amounts of forest, environmental concerns have caused a decrease in the amount of forests harvested. The research found that production is low because of strict environmental regulations, lack of governmental support and the low amount of raw material available for production. Because of the low production of wood products in Central America, companies primarily import wood and wood products to meet the demand. Most Central American countries produce lumber in specific dimensions and countries exporting to this region need to either produce to the specific dimensions or educate the consumers on the benefits of using alternate dimensions.

The majority of Central American wood products companies interviewed were willing to import wood products from the Appalachian region. In order for Appalachian companies to perform well in the Central American wood products market, they need to educate the public about wood and its uses, sell products that are of equal quality, produce products in the current dimensions used in Central America, price competitive with Chilean wood products, and partner with a local company to reduce any trade barriers. The best market strategies for Appalachian wood product companies to access the Central American market are to partner with local wholesalers, offer higher value-added products than local suppliers, and keep prices similar to local competition. Central American lumber dimension requirements have caused problems in the past when importing from the United States. Appalachian wood products companies need to produce products in the standard dimensions required in Central America to be successful exporters.

El Salvador is the smallest of the Central American countries and has a very high population density. This country seems to offer the highest potential for Appalachian wood products because of the high demand for building materials, scarce raw material source and strict environmental regulations. Although port access may be a problem, the country is still accessible through its neighboring countries. The export of Appalachian forest products may be most successful in Panama and Costa Rica because of the need for building materials to meet the demands of tourism and population growth. Also, these countries have strict environmental regulations and a lack of available resources to meet the growing need.

This research may support the claim that United States forest products companies should consider expanding their international markets into Guatemala, El Salvador, Costa Rica and Panama. Wholesalers and government officials in Central American countries reported that

the majority of the general public is unfamiliar with the properties and uses of wood since steel and cement are the preferred building materials currently. They also noted that the wood products industry lacks support from the government and forest harvesting has been declining. These factors are leading to a reduction of raw material and production, therefore, an outside source of wood may be necessary to meet the needs of growing regional infrastructure. Because the Appalachian region's forest products industry offers products that are similar to those currently imported in Guatemala, El Salvador, Costa Rica and Panama, they have a unique opportunity to expand their markets into Central America.

## Acknowledgements

The researchers would like to thank the USDA's Federal-State Marketing Improvement Program and Virginia Department of Agriculture and Consumer Services for providing funding and supporting this work. Thank you to the Central American companies and agencies that cooperated with the research effort.

## References

- Anderson, J.P. 2010. Rebuilding of Panama Canal eats up concrete form supply. Random Lengths The Weekly Report on North American Forest Products Markets. Random Lengths Publications, Inc. Eugene, OR, USA. 66 (11):2. (Mar. 19) 12p.
- Aparicio, J. 2008. Panamá is an example of Costa Rica to become tourist destination.(on line). La Nación. San José, CR. March 12, 2008. Section of Economy. Accessed Oct. 1, 2009. Available on [http://www.nacion.com/In\\_ee/2008/marzo/12/economia1459662.html](http://www.nacion.com/In_ee/2008/marzo/12/economia1459662.html)
- Appalachian Regional Commission. 2010. The Appalachian Region. Accessed February 3, 2010. Washington, DC, USA. Appalachian Regional Commission. Available on [http://www.arc.gov/appalachian\\_region/TheAppalachianRegion.asp/](http://www.arc.gov/appalachian_region/TheAppalachianRegion.asp/).
- Babbie, E. 2010. The practice of social research. 12th ed. Belmont, CA, USA. Wadsworth Cengage Learning. 530 p.
- Bowe, SA; Smith, RL; Araman, PA. 2001. A national profile of the U.S. hardwood sawmill industry. Forest Products Journal 51(10): 25-31.
- Earthtrends. 2003. Earthtrends country profiles. Forests, Grasslands, and Drylands- El Salvador. (on line). Washington, DC, USA. The World Resource Institute. Accessed Oct. 1, 2009. Available on [http://earthtrends.wri.org/pdf\\_library/country\\_profiles/for\\_cou\\_222.pdf](http://earthtrends.wri.org/pdf_library/country_profiles/for_cou_222.pdf)
- Easterby-Smith, M; Thorpe, R; Lowe, A. 1991. Management research: an Introduction. London, UK. Sage Publications. 262 p.
- Fallas, H. 2008. Country caters to tourists with tight supply of rooms. (on line). La Nación, San José, CR. Mar. 10, 2008. Section of Economy. Accessed Oct. 2, 2009. Available on [http://www.nacion.com/In\\_ee/2008/marzo/10/economia1453775.html](http://www.nacion.com/In_ee/2008/marzo/10/economia1453775.html)

- Food and Agriculture Organization of the United Nations (FAO) 2009a. Planted forests. Nicaragua. Descriptive of plantation resources. Rome, IT. FAO. Accessed Oct. 1, 2009. Available on <http://www.fao.org/forestry/country/18316/en/nic/>
- Food and Agriculture Organization of the United Nations (FAO) 2009b. Planted forests. Panama. Descriptive of plantation resources. Rome, IT. FAO. Accessed Oct. 1, 2009. <http://www.fao.org/forestry/country/18316/en/pan/>
- Food and Agriculture Organization of the United Nations (FAO) 2009c. Planted forests. Guatemala. Descriptive of plantation resources. Rome, IT. FAO. Accessed Oct. 1, 2009. Available on <http://www.fao.org/forestry/country/18316/en/gtm/>
- Food and Agriculture Organization of the United Nations (FAO) 2009d. Planted forests. Honduras. Descriptive of plantation resources. Rome, IT. FAO. Accessed Oct. 1, 2009. Available on <http://www.fao.org/forestry/country/18316/en/hnd/>
- Food and Agriculture Organization of the United Nations (FAO) 2009e. Planted forests. El Salvador. Descriptive of plantation resources. Rome, IT. FAO. Accessed Oct. 1, 2009. Available on <http://www.fao.org/forestry/country/18316/en/slv/>
- Food and Agriculture Organization of the United Nations (FAO) 2010. ForeSTAT. (on line). Rome, IT. FAO. Accessed Apr. 4, 2010. Available on <http://faostat.fao.org/site/626/default.aspx#ancor>
- Fox, RW. 1990. Neighbors' problems, our problems: population growth in Central America. Negative population growth. Forum Series. (on line). Teaneck, NJ, USA. Negative Population Growth Inc. Accessed Oct. 2, 2009. Available on [http://www.npg.org/forum\\_series/NeighborsProblemsOurProblems.pdf](http://www.npg.org/forum_series/NeighborsProblemsOurProblems.pdf)
- Fry, M. 2008. Concrete-block farmers in Mexico. *Geographical Review* 98(1):123-132.
- Hammett, AL. 1996. Expanding export markets. Forest products from the Southern United States. New York, USA and London, UK. Garland Publishing. 159p.
- Hammett, AL; McCrary, JK; Bauer, GP. 1999. Forest products in Nicaragua. *Forest Products Journal* 49(6):12-20.
- Hurtarte, EO; Hernández, ES; García, IB. 2006. Guatemala's national forest programme-integrating agendas from the country's diverse forest regions. *Unasyuva* 255(57): 33-41.
- Ifju, PA; Bush, RJ. 1993. Export barriers and incentives in the Eastern hardwood lumber industry. *Forest Products Journal* 43(3):45-48.
- Kristof, ND. 2010. The happiest people. *The New York Times*. Jan. 7. New York, NY, USA. Accessed March 10, 2010. Available on <http://www.nytimes.com/2010/01/07/opinion/07kristof.html>
- Lyon, S W. 2011. Breaking down barriers: Opportunities for Appalachian forest products in Central America. M.Sc. Thesis. Blacksburg, Virginia, USA, Virginia Tech. 174p.
- McMahon, RO; Gottko, J. 1989. Export marketing activities of small-firm lumber manufacturers. Oregon, US, Oregon State University, College of Business and College of Forestry, Studies in Management and Accounting for the Forest Products Industry. 18p. (Monograph n° 31).
- Mohd, K. 2008. A case study: A strategic research methodology. *American Journal of Applied Sciences* 5(11):1602-1604.
- Montagnini, F; D. Cusack; B. Petit; M. Kanninen. 2005. Environmental services of native tree plantations and agroforestry systems in Central America. *Journal of Sustainable Forestry* 21(1). 51-67.
- Miyata, Y. 2007. Markets for biodiversity: certified forest products in Panama. *Journal of Sustainable Forestry*. 25(3-4). 281-307.
- Muñoz, M. 2007. Manejo forestal en Panamá. (en línea). La Prensa, Ciudad de Panamá, PA, 25 nov. 2007. Consultado 4 oct. 2009. Disponible en <http://biblioteca.presna.com/contenido/2007/11/25/25-portada1.html>
- Naka, K; Parsons, BA; Hammett, AL. 2009. Hardwood lumber industry in the Appalachian region: Focus on exports. *The Forestry Chronicle* 85(1):75-81. (Jan.-Feb.).
- Parsons, BA. 2002. An examination of Appalachian forest products exports. M.Sc. Thesis. Blacksburg, Virginia, USA, Virginia Tech. 108p.
- Parhizkar, O. 2008. Identifying impact factors on successful exporting of the United States hardwood Industries to Mexico, Asia, and Europe. Ph.D. Dissertation. Blacksburg, Virginia, USA, Virginia Tech. 220p.
- Patton, MQ. 1987. How to use qualitative methods in evaluation. Beverly Hills, CA, USA. Sage Publications. 176p.
- Psathas, G. 1973. Phenomenological sociology: issues and applications. New York, NY, USA. Wiley-Interscience. 369p.
- Quesada, H. 2008. Market opportunities for US forest products in Central America Presentation. Graduate Research Seminar. West Lafayette, IN, USA, Purdue University.
- Quesada, HR; Smith, L; Stopha, J. 2009. Market opportunities for Virginia's wood products in Central America. Blacksburg, Virginia, USA, U.S. Department of Agriculture. Federal-State Marketing Improvement Program Grant. 29p.
- Ringe, JM; Graves, DH; Hansen, BG. 1987. Characteristics and marketing methods of Kentucky hardwood lumber exporters. *Forest Products Journal* 37(5):31-34.
- Rogers, N. 2009. Tourism grows despite worldwide slump. (on line). *The Nica Times*, Managua, NI, July 24-30, 2009. Accessed Oct. 5, 2009. Available on [http://www.nicatimes.net/nicaarchive/2009\\_07/0724091.htm](http://www.nicatimes.net/nicaarchive/2009_07/0724091.htm)
- Rowlett, R. 1999. How Many? A Dictionary of units of measurement. (on line). Chapel Hill, NC. USA, University of North Carolina at Chapel Hill. Accessed Dec. 21, 2010. Available on <http://www.unc.edu/~rowlett/units/dictV.html>
- Salamone, A. 2000. Opportunities in Central America. (on line). Washington, DC, USA, USDA Foreign Agricultural Service. Accessed Oct. 2, 2009. Available on <http://www.fas.usda.gov/ffpd/wood-circulars/jun00/camerica.pdf>

- Sánchez-Azofeifa, GA; Daily, G; Pfaff, A; Busch, C. 2003. Integrity and isolation of Costa Rica's national parks and biological reserves: examining the dynamics of land cover change. *Biological Conservation* 109:123-135.
- Schieber, B. 2009. Guatemala at the International Tourism Trade Fair (FITUR 09). *The Guatemala Times*. GT. Jan. 28. Accessed Oct. 2, 2009. Available on <http://www.guatemala-times.com/news/central-america/747-guatemala-at-the-international-tourism-trade-fair-fitur-09.html>
- Simpson, W. T. 2001. Dry kiln operator's manual. Madison, WI, USA, Department of Agriculture, Forest Service, Forest Products Laboratory. USDA Agricultural Handbook AH-188. 274p.
- Smith, RL; Miller, CR; Parhizkar, O. 2008. Improving the international competitiveness of the forest products industry through Improved transportation methods. Blacksburg, VA, USA, Virginia Tech. Center of Forest Products Marketing and Management. Department of Wood Science and Forest Products. Prepared for the U.S. Department of Agriculture. Federal-State Marketing Improvement Program. 129p.
- Sofaer, S. 1999. Qualitative methods: What are they and why use them? *Health Service Research* 34:5. (Part 2). 1101-1118.
- Department of Agriculture. Foreign Agricultural Service (USDA. FAS). 2009. International agricultural trade report. CAFTA-DR free trade agreement early assessment of the agreement. (Oct. 25). Washington, DC. USA, USDA Foreign Agricultural Service. Accessed June 7, 2011. Available on <http://www.fas.usda.gov/itp/cafta/CAFTA-DR%20Report.pdf>
- U.S. Department of Commerce. 2010. Trade Stats Express. Washington, DC, USA, U.S. Department of Commerce. Accessed April 4, 2010. Available on <http://tse.export.gov/TSE/TSEhome.aspx>
- U.S. Export Assistance Center. 2011. Dominican Republic-Central America-United States Free Trade Agreement (CAFTA-DR). Washington, DC, USA, U.S. Department of Commerce's International Trade Administration. Accessed April 1, 2011. Available on <http://export.gov/FTA/cafta-dr/index.asp>
- Wai-Chung, H. 1995. Qualitative personal interviews in international business research: Some lessons from a study of Hong Kong transnational corporations. *International Business Review* 4(3):313-339.
- Wang; J; Armstrong, JP; Wu, J; Lin, W. 2010. An analysis of Appalachian hardwood products in the Chinese market. *Wood Fiber Science* 42(1):71-80.
- World Bank. 2010. Country data profile. (on line). The World Bank Group. Washington, DC, USA. The World Bank Group. Accessed Mar. 4, 2010. Available on [http://ddp-ext.worldbank.org/ext/ddpreports/ViewShareReport?&CF=&REPORTID=9147&REQUEST\\_TYPE=VIEWADVANCED&DIMENSIONS=64](http://ddp-ext.worldbank.org/ext/ddpreports/ViewShareReport?&CF=&REPORTID=9147&REQUEST_TYPE=VIEWADVANCED&DIMENSIONS=64)
- Yin, R. 2009. Case study research: Design and methods. 4th ed. Newbury Park, CA, USA, Sage Publication. 171p.