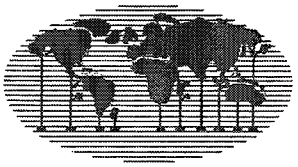

ITTO

FINAL REPORT

THE DEVELOPMENT OF A STRATEGIC FRAMEWORK FOR EFFECTIVELY MARKETING LESSER-USED TROPICAL TIMBER SPECIES IN GHANA

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FORIG-ITTO Project PD 179/91 Rev. 2
Utilization and Marketing of Lesser-Used Tropical Species

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May, 1998

EXECUTIVE SUMMARY

Introduction

This report presents the results of a survey of the Ghanaian wood processing industry that was conducted to obtain information related to the marketing of lesser-used tropical timber species. The survey questionnaire was developed in consultation with researchers at the Forestry Research Organization of Ghana who have been involved in evaluating the physical, mechanical, and processing characteristics of Ghanaian lesser-used species. A total of 68 surveys were administered to managers in the forest products industry during 1997 and a total of 48 usable questionnaires were returned. The final response rate for the survey in Ghana was 70.6 percent. Similar surveys were mailed out to importers and wholesalers of tropical hardwood products in the US and the UK/Ireland. The response rate obtained from the US was 68% , while the response rate from the UK/Ireland was 57.8%. This report provides information on the extent of use for fourteen Ghanaian lesser-used species, presents recommendations for the end-uses of six lesser-used species, provides a marketing framework for introducing and promoting lesser-used species, and provides a plan for monitoring and evaluating the performance of lesser-used species in the marketplace.

Results of the Ghanaian Survey

The size of the firms responding to the survey in Ghana ranged from a low of 30 employees to a high of 1,600 employees, with the majority of firms employing between 100 and 500 workers. The production capacity data again seem to indicate that the Ghanaian sawmill industry is dominated by medium-size firms, with 72.7 percent of the firms producing between 11 and 50 m^3 of lumber in an eight hour shift. A substantial number of firms (7) produced less than ten m^3 per day while five firms produced more than 50 m^3 per day and just two firms produced in excess of 100 m^3 per day. A total of nine respondents produce veneer, with the daily rated production capacity heavily skewed towards firms that produce less than 100 m^3 per day (7 companies). A total of thirteen firms produce mouldings and all of these firms produce less than 25 m^3 of mouldings per day.

The survey data indicate that just over forty percent of the raw material inputs used by respondent firms were derived from their own forest concessions. Fully one-third of the respondent firms (16 companies) do not have concessions and purchase all of their raw material requirements on the open market. An additional 12.5 percent of respondents (6 firms) derived less than 25 percent of their own log requirements from their concessions. In contrast, just 20.8 percent (10 firms) obtained ninety percent or more of the raw materials from their own concessions.

Almost all of the survey respondents export their products. The main export markets were Germany (37.9%), the UK (20.6%), France (11.0%), and Italy (10.0%). Almost three-quarters of the exports reported were air-dried lumber (71.6%), followed by kiln-dried lumber (13.3%), sliced veneer (6.3%), and rotary peeled veneer (4.4%). Virtually all of the respondents exported primary wood products such as lumber, plywood, or veneer, with very few firms exporting value-added wood products. The vast majority of respondents (66.7%) relied exclusively on a single channel intermediary as part of their distribution strategy.

Impact of tropical hardwood boycotts

Respondents reported that tropical hardwood boycotts have had only a moderate impact on their export sales, yet they also recognize that boycotts of tropical timber could present a more significant risk to their business activities in the future. The tropical hardwood boycotts in Europe were perceived to be the second most significant risk facing the Ghanaian timber industry. Respondents felt that the single greatest risk confronting their business operations was the lack of a long-term forest concession policy in Ghana. This factor was rated significantly higher than all of the other factors in terms of level of perceived risk.

Respondents were next asked to evaluate the effectiveness of a variety of strategies in responding to a boycott of tropical hardwood products. The single most effective strategy was perceived to be the adoption of a sustainable forest management program. This factor was rated as being significantly more effective than all other factors. Two other factors, cooperation with environmental groups and the development of the value-added wood processing sector, were also perceived to be very effective. Taken together, it appears that the respondents perceive that, while the forest products industry in Ghana is

undergoing a period of dynamic change, the net result of this change will be a more efficient industry focused on the production of value-added wood products that are more competitive in international markets. The results also suggest that lesser-used species will play an important role in the raw material mix of the future. From a marketing perspective, the challenge is not so much gaining manufacturers acceptance of lesser-used species, rather it will be to provide them with the necessary technical information and promotional material to support their utilization of lesser-used species.

The utilization and marketing of lesser-used species

Two-thirds of the survey respondents are incorporating lesser-used species into their raw material mix, and more than half (54.2%) are exporting these products. Despite this, survey respondents report that their export customers are reluctant to accept products manufactured from lesser-used species.

The survey results show that a total of 47,949 m^3 of products using lesser-used species were manufactured by respondents in 1996. While thirteen of the fourteen lesser-used species included in the survey had been used by at least one respondent, the primary lesser-used species being utilized were Onyina (62.0%), Otie (17.1%), Ogea (7.9%), and Esa (6.1%). The main products manufactured from lesser-used species were rotary peeled veneer (71.0%), air-dried lumber (11.1%), and kiln-dried lumber (10.9%) The survey data suggests that many of the lesser-used species are utilized in the manufacture of specific products. For example, Onyina, Ogea, and Bediwonua were primarily used in the production of rotary peeled veneer, Denya, Bomsandua, and Wawabima were principally used in the production of air-dried lumber, and, Esa was used for kiln-dried lumber. Other species were used in a wide variety of products. For example, while 66% of the Esa was used in the production of kiln-dried lumber, substantial volumes were used to produce profile boards, air-dried lumber, and rotary veneer. Similarly, while 52% of the Otie was manufactured into lumber, substantial volumes were also used to produce rotary peeled veneer and other products.

Survey respondents were asked to evaluate the importance of a variety of factors in promoting the acceptance of lesser-used species. Whereas all of the factors were perceived as being somewhat important, two groups of factors were rated as being very important. The first group of factors, consisting of the availability of a reliable long-term supply and the availability of technical processing information, was rated as being significantly more important than all other factors. The second group of factors, the ability to export small trial volumes and acceptance of the lesser-used species by an influential manufacturer or trader, while rated as being less important than the first group of factors, was still perceived as being very important.

Acquisition of market information

Survey respondents indicated that all of the strategies, with the exception of one, were perceived as being effective in acquiring market information. However, three strategies (discussions with importers and import agents, direct discussions with customers (when possible), and reading market intelligence reports published by TEDB) were perceived to be most effective. Only one of the strategies, hiring an outside consultant, was perceived to be relatively ineffective. The remaining strategies were rated as being somewhat effective.

Two of these strategies, attending trade shows and attending industry exhibitions, warrant further discussion. During discussions with industry managers and association representatives in Ghana, the importance of these strategies for providing exposure to the potential of lesser-used species was emphasized. The managers indicated that while it is difficult for them to regularly attend international trade shows and exhibitions, the forums in the domestic arena are equally important mechanisms for promoting lesser-used species both to their domestic customers and to the foreign buyers who attend.

Results of the US and UK/Ireland Surveys on Lesser-Used Tropical Species

A similar survey to that conducted in Ghana was administered in the US to one hundred importers and wholesalers of tropical hardwoods and in the UK/Ireland to 38 importers and wholesalers. The high response rates (67% in the US and 57.8% in the UK/Ireland) is an indication of the interest of these importers and wholesalers in the utilization of lesser-used species. On average, tropical timber species represented 41.3 percent of the respondents lumber sales, 12.1 percent of their plywood sales, and 12.0 percent of their veneer sales in 1996. The results of the survey indicate that a high percentage (80.6% in the

US and 52.4% in the UK/Ireland) of the respondents are currently importing lesser-used tropical timber species. The survey participants indicated that, on average, their customers are reluctant to accept lesser-used species.

The survey respondents were asked to indicate how important different strategies would be in promoting market acceptance of lesser-used tropical timber species to their customers. By far, the most important factor in both surveys was the availability of a reliable long-term supply of the species. No other factor was rated as highly as this single factor. Three other factors, the availability of small trial volumes, the availability of technical information, and a low trial price, were also rated as being important in both surveys. Interestingly, the four top rated strategies were similar in both surveys.

Comparison of the Survey Results Obtained in Ghana, the US, and the UK/Ireland

Most of the survey participants in the three countries were aware of the boycotts that have been initiated against tropical hardwoods. Respondents in all of the countries felt that adopting sustainable forest management practices was an effective strategy in responding to the tropical hardwood boycotts. They also felt that the utilization of lesser-used tropical timber species constituted an important component of sustainable forestry. On average, the respondents indicated that the boycott of tropical timber has moderately reduced demand for their tropical timber products. A majority of the respondents in each of the countries reported that they are currently using or marketing lesser-used tropical timber species. Despite this, they reported that their customers are reluctant to accept lesser-used tropical timber species in place of the more traditional species. It appears obvious that the challenge for gaining a broader market acceptance of LUS lies not in convincing processors in the producing countries, importers, and wholesalers to use them, but rather to focus future market promotion activities on foreign manufacturers and end-users.

The data indicate that while the four highest rated marketing factors were all considered to be very important in gaining market acceptance of lesser-used species, by far the most important factor was the availability of a long-term supply. The other factors, in order of perceived importance were availability of technical material, availability of small trial volumes, and a low initial trial price. Two other factors were presented to the respondents in the US and the UK/Ireland that were not included in the Ghanaian survey. These factors related to the availability of a broad range of products manufactured from lesser-used species and the certification of lesser-used species as being sustainably produced. The survey respondents rated the availability of a broad product line as being only moderately effective and it received the lowest importance rating of all the factors. The other factor, certification of sustainability, on average was perceived as being only moderately important, although respondents in the UK/Ireland rated this factor as being substantially more important than did US respondents.

Recommendations

Based on the information derived from the surveys, a preliminary marketing strategy was developed to facilitate the introduction and acceptance of lesser-used tropical timber species from Ghana. The factors that comprise the marketing strategy include: 1) determine the technical characteristics of each lesser-used species, 2) identify appropriate end-uses for each LUS, 3) identify established species for which each LUS can be substituted, 4) establish a reliable resource and product supply, 5) identify and target appropriate niche markets, including domestic and regional markets, 6) develop effective promotional materials as part of a comprehensive promotional strategy, 7) develop an effective marketing strategy for each market segment, 8) assist local firms in acquiring reliable market information, and 9) provide technical and marketing support to the local industry, importers, and end-users.

In order to effectively monitor the market acceptance of lesser-used tropical timber species, it is recommended that FORIG and TEDB perform an annual survey of the timber industry. The objectives of the annual survey would be to monitor the utilization of lesser-used species, monitor market developments for products manufactured from lesser-used species, and identify problems related to the utilization and/or marketing of lesser-used species at an early stage. The annual survey should be supplemented with in-depth personal interviews of the managers of companies that are producing primary products (i.e., lumber, veneer and plywood production) from lesser-used species, as well as value-added companies who represent the end-users of these species.

Many of the managers in the Ghanaian forest products industry indicated that they would be willing to try lesser-used species in their manufacturing operations. The primary reason they are not doing this already is because there is not a reliable supply

of these species available. This has been primarily attributed to continued uncertainty about the future policy regarding the issuance of forest concessions. This report recognizes the need for a forest management policy that explicitly addresses the future of forest concessions in Ghana, particularly with respect to the harvest of lesser-used species from second-growth forests. Not only would such a policy help to promote the more efficient utilization of lesser-used species but, if properly designed and implemented, would help support the development of a sustainable forest management policy at the national level.

It is also suggested that TEDB and FORIG assemble a Lesser-Used Species Marketing Advisory Board. This advisory board, composed of managers of primary and value-added forest products companies, the Director of FORIG, the Managing Director of TEDB, the Head of FPIB, and representatives from the Forestry Department, would discuss issues that directly affect the supply and marketing of lesser-used species. In particular, it would provide a forum where value-added manufacturers could discuss their problems and concerns with primary processors and both industry groups could engage in a constructive dialogue with the government officials responsible for developing policies related to the forest resource and the forest products sector.

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BACKGROUND

Ghanaian Forest Resource

The west African country of Ghana, also known as the Gold Coast, is located along the northern edge of the Gulf of Guinea. Bordered by Burkina Faso to the north, Cote d'Ivoire on the west and Togo on the east, Ghana's land area totals 238,000 km^2. The climate in Ghana varies from semi-arid in the north to tropical in the south-west (Martin, 1991). The northern third of Ghana is comprised of Guinea savannah woodlands which gradually give way to the woodland-forest mosaic of the central and eastern regions of the country. In contrast, the southwest region of the country is primarily tropical rainforest (Martin, 1991).

Moving south and west, the tropical rainforest region consists of several different rainforest types. Dry semi-deciduous rainforests form a band around the perimeter of the region in the north and east where the Guinea savannah woodland-forest mosaic meets the rainforest habitat. The semi-deciduous rainforest successively gives way to moist semi-deciduous forest, moist evergreen forest and wet evergreen rainforest zones (Hall and Swaine, 1976; Martin, 1991).

At the start of the twentieth century it has been estimated that forests covered approximately 88,000 km^2, almost 40% of the total land area of the country. By 1950, following World War II, the area of the forest zone had been reduced to approximately 42,000 km^2. During the aftermath of the war, many western European nations turned their attention to the tropical hardwood resource of colonial west Africa. The reasons for this include the decimation of the forest resources of western Europe caused by two world wars, the necessity of replacing housing destroyed during the war and the loss of eastern European countries as trading partners.

The rapid rise in affluence in western European countries during the 1960s and 1970s continued to fuel demand for the high quality tropical hardwoods from west Africa. As a result, by 1990 the rainforests of Ghana were estimated to total just 19,000 km^2, Table 1. Of even greater significance is the fact that the tropical rainforest resource of Ghana does not exist as a single contiguous area but rather is constituted of 252 forest reserves and a large number of open forest areas (TEDB, 1996), Table 3.

Table 1. Classification of land area in Ghana (in hectares).

Classification	Area
Total land area	23,800,000
High Forest Zone	8,800,000
Forest Reserves	1,591,300
Production	1,159,000
Protection	423,200
Savannah Reserves	879,600
Production	51,500
Protection	828,100
Wildlife Reserves	1,210,000
Open (unreserved) Forest	374,000

Source: ODA Forestry Commission Overseas Consultancy Report, 1995.

Table 2. Timber harvest volumes in Ghana.

Year	Harvest
1960-1964	1,594,000*
1965-1969	1,462,000*
1970-1974	1,705,000*
1975-1979	1,046,000*
1980-1984	516,000*
1985-1989	931,000*
1990	1,290,000
1991	1,229,000
1992	1,318,000
1993	1,682,000
1994	1,800,000
1995	1,200,000
1996	1,300,000

* Harvest volume represents the average annual harvest volume over the period.
Source: ODA Forestry Commission Overseas Consultancy Report, 1995.

Table 3. Ownership and distribution of forest concessions in Ghana.

Year	On reserve	Off reserve
Number of forest concessions	252	528
Number of concession holders	128	285
Distribution of concessions		
Concessions <2,500 ha	88	148
Concessions 2,500-10,000 ha	123	333
Concessions 10,001-50,000 ha	33	42
Concessions >50,000 ha	8	5

Source: ODA Forestry Commission Overseas Consultancy Report, 1995.

Table 4. Species classification, royalty rates, and exploitation levels of commercial timber species in Ghana.

Timber species	Royalty (cedis/m3)	Exploitation rate*
Scarlet species		
Afrormosia	13,220	1,368
Albizia	8,000	462
Asanfina	13,000	355
Daniella	4,608	679
Edinam	6,000	474
Hyedua	11,000	906
Kusia	4,080	605
Kyere	8,000	1,079
Mahogany	7,200	906
Makore	6,580	350
Odum	6,500	860
Sapele	10,200	277
Utile	10,920	126
Wawa	4,600	438
Red species		
Akasa	7,000	111
Aprokuma	4,608	62
Bombax	4,000	81
Bonsamdus	6,800	62
Canarium	4,608	71
Candollei	6,000	173
Ceiba	4,608	70
Dahoma	4,000	98
Emeri	6,400	197
Guarea	6,740	79
Kaku	4,080	51
Kyenkyen	4,608	41
Mansonia	8,940	61
Niangon	6,400	99
Papao	8,000	177
Walnut	7,080	70
Pink species		
Afam	4,000	
Afrena	4,000	
Akwana	4,000	
Alstonia	4,000	
Ananta	4,000	4
Asoma	4,000	1
Avodire	5,600	14
Berlinia	4,000	
Bombax	4,000	81
Bompagya	4,000	
Celtis	4,608	4
Danta	5,600	38
Denya	4,000	2
Esia	4,000	4
Kokote	4,000	
Kroma	4,000	
Ofram	4,400	31
Okure	4,000	
Otie	4,608	52
Pamprana	4,000	
Potrodom	4,000	10
Sterculia	4,608	16
Wama	4,000	
Wonton	6,800	1
Yaya	4,000	16

* Five year average level of exploitation in relation to the sustainable harvest level established for each species.
Source: ODA Forestry Commission Overseas Consultancy Report, 1995.

Ghanaian Forest Products Industry

The Ghanaian timber industry represents one of the most important industrial sectors within the domestic economy, directly employing 75,000 workers and providing a livelihood to approximately 2 million people. In 1994, the contribution of the timber industry to the domestic economy was estimated at approximately 451 billion cedis, accounting for 8.4 percent of the gross domestic product of Ghana. More importantly, timber exports rank third in foreign exchange earnings behind cocoa and minerals (ISSER, 1996). Foreign exchange earnings from timber exports in 1995 totaled almost US$145 million, accounting for approximately 18% of Ghana's total foreign exchange earnings (ISSER, 1996).

The timber industry consisted of over 200 logging operations, over 130 sawmill operations and 23 veneer operations in 1996 (FPIB, 1997), Table 5. The majority of the sawmills and veneer mills are located in and around the city of Kumasi. A second, somewhat smaller group of timber processors are situated around the port city of Takoradi, located in the southwest corner of Ghana.

Table 5. Structure of the forest products industry in Ghana.

Industry type	Number of firms
Logging	250
Lumber manufacturers	110
Veneer manufacturers	15
Plywood manufacturers	9
Furniture/furniture components*	200
Profile boards	12
Doors	6
Flooring	4
Toys	4

* Only forty of these firms are large to medium-sized while just 4 firms export their products
Source: ODA Forestry Commission Overseas Consultancy Report, 1995.

Kumasi, the capital of the Ashante region and the second largest city in Ghana, was originally surrounded by tropical rainforests. As a result, the ready availability of logs and infrastructural support services played a key role in the development of the sawmill industry in the Kumasi area. However, within a decade the availability of logs declined as a result of excessive logging of the more accessible forest reserves. The result was an increased cost of production as the industry was forced to transport logs from more distant forest reserves.

The Ghanaian timber industry is primarily composed of privately owned firms and displays a highly competitive structure. The concentration ratios of the eight largest firms in the logging industry and the sawmill industry are .276 and .397, respectively.

Firm size within the sawmill industry (based on value of exports) is very heterogenous, ranging from US$7.5 million to US$3,000. In 1996 there were 24 firms with lumber exports exceeding US$2 million while 20 firms had lumber exports of less than US$25,000. The majority of the processing firms are owned and operated by Lebanese businessmen.

Entry and exit barriers within the industry are quite low, particularly for the smaller, less capital intensive operations. As a result, the number of small timber firms operating tends to follow economic trends. For example, following almost a decade of poor economic conditions, the number of log exporters totaled just 95 in 1985 (less than one quarter the number that were operating in 1975), while the number of sawmills totaled just 49 (approximately half the number operating in 1975). As the Ghanaian economy improved and demand for tropical hardwood products increased, the number of logging operations rose to 351 by 1988 before dropping off to approximately 200 in 1996. In contrast, the number of sawmills has continued to increase to 105 in 1988 and 130 in 1996.

Management structure within the timber industry tends to be autocratic and informal, with management decisions being made by the firms owner. Greater emphasis is placed on operational plans rather than strategic plans. As a result, the time horizon for planning is usually short-term and planning activities tend to be performed on an informal basis.

Within the forest products industry there are several state-owned timber companies which account for just over ten percent of sawnwood and veneer production (TEDB, 1996). State-owned timber companies play a negligible role in the export of raw logs from Ghana. The government is working to return the publicly owned sawmills to profitability as a first step in the privatization process. Recently there have been some efforts to consolidate the state owned enterprises within the industry. For example, in 1990 the government combined the operations of the Takoradi Veneer and Lumber Company with Western Hardwoods Limited in an effort to produce a single, more competitive firm.

The majority of the sawmills in Ghana are equipped with outdated and inefficient processing equipment. To compensate for this, most firms take advantage of extremely low labor rates and employ a large labor force to perform many operations, particularly material handling (FORIG, 1990). The net result of this is an under-capitalized, labor-intensive industry.

This combination of capital-labor can be partly attributed to the existence of a poor investment climate, a huge supply of unskilled labor and wage rates that can be as low as US$1 per day for unskilled workers (although skilled workers earn considerably more). Consequently, the timber industry is a primary employer of labor in Ghana. It has been estimated that the timber industry provides direct employment to over 250,000 people, while providing indirect support to approximately 2 million people (TEDB, 1996).

Timber producers generally employ agents to export their products to Europe. This method of distribution separates the producer from the end-user of his product and restricts access to market information. As a result, Ghanaian producers encounter difficulties in developing a thorough understanding of market conditions. For example, many firms will only produce following the receipt of an order. This method of operation minimizes the risk faced by the producer, although it does introduce uncertainty into the production schedule.

The timber industry in Ghana is monitored and regulated by two public entities, the Timber Export and Development Board (TEDB) and the Forest Products Inspection Bureau (FPIB). The Timber Export and Development Board was established in 1985 under PNDC Law 123. TEDB is a public marketing board responsible for overseeing the promotion and export of forest products from Ghana. TEDB has been charged by the government with establishing minimum product prices based on current European prices for similar products produced in neighboring west African countries.

Timber export contracts must be submitted to TEDB for approval of contract prices. Export contracts that do not meet the minimum price levels are returned to the firm and must be renegotiated prior to receiving export approval. TEDB's operational funds are derived through a one percent tax levied on the FOB value of the export contract and payable in foreign currency.

The Forest Products Inspection Bureau (FPIB) was established in 1985 under PNDC Law 117. FPIB has been mandated with monitoring the harvest of logs from the forest reserves. In addition, FPIB is charged with the inspection of all timber shipments to ensure that the product being shipped corresponds to the product specified on the export invoice. FPIB receives its operating budget from a two percent tax levied on the FOB value of the export contract and payable in the local currency, the cedi.

Ghanaian Forest Products Exports

Exports of forest products represent a substantial source of foreign exchange earnings for Ghana, generating a total of US$170,522,677 in 1997. While forest products exports decreased by 25% from 1994 to 1997, they have increased by 94% since 1987, Table 6. The decline in forest products exports can largely be attributed to the fact that log exports were essentially banned in 1995. The log export ban has had a significant adverse impact on forest products export earnings considering the fact that log exports represented 29% of total forest products exports in 1994, the last year that unprocessed logs could be exported from Ghana.

Table 6. Value of Ghanaian forest products exports, 1987-1997.

Year	Value (US$)
1987	87,856,905
1988	101,903,939
1989	88,035,849
1990	134,740,432
1991	114,186,861
1992	121,703,197
1993	158,556,470
1994	230,265,005
1995	186,760,222
1996	144,332,200
1997	170,522,677

Source: FPIB Export Permit Report, 1988-1998.

The vast majority of forest products exports from Ghana are commodity products, Table 7. Exports of boules, lumber, rotary veneer, and plywood totaled US$125,595,795 in 1997, representing 73.7 percent of total forest products exports. The average unit value of all forest products exports in 1997 was approximately US$400 per cubic meter, ranging from just US$89 per cubic meter for air-dried lumber exported overland to neighboring countries to US$2,167 per cubic meter for furniture parts.

Table 7. Value and unit value of the primary Ghanaian forest products exports, 1996.

Product	Value ($US)	% of total exports	Unit value ($US/m3)
Air dried lumber	51,947,720	30.5	365
Kiln dried lumber	41,804,825	24.5	328
Sliced veneer	26,072,799	15.9	891
Boules	12,936,842	7.6	273
Peeled veneer	9,866,086	5.8	291
Plywood	9,040,322	5.3	384
Moulding	6,717,385	3.9	483
Furniture parts	6,533,896	3.8	2,167
Flooring	2,438,259	1.4	676
Overland lumber	828,27351	0.5	89
Other	1,254,054	0.8	514
Dowels	773,644	0.4	614
Poles	308,571	0.2	789
Total	**170,522,677**	**100%**	

Source: FPIB Export Permit Report, 1997.

As might be expected, the unit value of forest products exports increases as the degree of processing increases. Interestingly, the price premium received for kiln-dried lumber versus air-dried lumber would appear to be a relatively minor US$37 per cubic meter, Table 7. This average price premium is misleading because (a) it is a broad average across a wide variety of species with highly differentiated market prices and (b) many of the species exported as lumber from Ghana are only available air-dried or kiln-dried and are not available in both conditions. The fact that the groups of species exported as air-dried versus kiln-dried lumber differ means that the price information can be difficult to interpret and is not directly comparable between the two groups. An analysis of the export data indicates that the size of the price premium between air dried and kiln dried lumber is species specific and is generally found to be larger for the higher valued species. For example, the price premium obtained for kiln-dried Wawa lumber was US$58/$m^3$, while for Sapele it was US$72/$m^3$, and for Odum it was US$127/m^3.

There has been a significant shift in the composition of forest products exports over the period 1987-1996, although commodity products continue to dominate the export mix, Table 8. Over the past ten years exports of value-added products have increased from 10.1 percent of exports to 26.8 percent. Export share increases were registered for every product category with the exception of air-dried lumber which saw its export share drop from 46.3 percent to 33.9 percent. To a large degree, this drop can be attributed to an export tariff that was imposed on air-dried lumber in an effort to shift the industry towards the export of kiln-dried lumber. The largest export share increase occurred for sliced veneer which went from a 6.6 percent export share in 1987 to a 16.6 percent export share in 1996.

Ghanaian forest products exports are dominated by lumber products which accounted for almost 55% of total export value in 1997. The Ghanaian sawmill industry is in the midst of a transition from the production and export of air-dried lumber to kiln-dried lumber, mandated by a government imposed export tariff on air-dried lumber. As a result, exports of air-dried lumber in 1997 remained constant with their 1991 volume but dropped by 27 percent since 1995, Table 9. In contrast, kiln-dried lumber exports have increased more than sevenfold since 1991, reaching a volume of 127,398 m^3 in 1997. The ratio of kiln-dried lumber to air-dried lumber exports has increased from .102 in 1991 to .895 in 1997.

Table 8. Change in forest products export mix from 1987-1996.

Product	Export share 1987	Export share 1996
Logs	41.9%	0.0%
Air dried lumber	46.3%	33.9%
Kiln dried lumber	n/a*	21.0%
Sliced veneer	6.6%	17.2%
Boules	0.2%	7.3%
Peeled veneer	1.3%	5.1%
Plywood	0.2%	5.0%
Moulding	0.6%	3.8%
Furniture parts	2.0%	2.1%
Flooring	0.04%	2.0%
Overland lumber	n/a	0.8%
Other	0.9%	0.7%
Dowels	0.0%	0.5%
Poles	0.0%	0.5%

* Kiln dried lumber exports were not reported as a separate category in 1987 and are included in the air-dried lumber category.
Source: FPIB Export Permit Report, 1988 and 1997.

Table 9. Ghanaian exports of air-dried and kiln-dried lumber (m^3), 1991-1997.

Year	Air-dried lumber	Kiln-dried lumber
1991	146,320	14,934
1992	182,456	28,972
1993	188,896	35,018
1994	188,624	60,217
1995	194,068	80,464
1996	140,297	84,919
1997	142,392	127,398

Source: FPIB Export Permit Report, 1998.

Table 10. Principal markets for Ghanaian forest products exports, 1996.

Importing Country	Value ($US)	% of total exports
Germany	23,847,125	16.5
Italy	20,879,503	14.5
UK	20,283,872	14.1
France	14,390,710	10.0
USA	9,468,874	6.6
Holland	7,776,323	5.4
Ireland	7,495,290	5.2
Saudi Arabia	5,840,065	4.0
Taiwan	5,348,099	3.7
Spain	4,768,671	3.3
Belgium	3,914,299	2.7

Source: FPIB Export Permit Report, 1997.

Markets for Ghanaian forest product exports.

Approximately 80 percent of Ghanaian forest products exports go to the European marketplace, Table 10. The four largest markets for Ghanaian forest products, Germany, Italy, the UK, and France, account for 55.1 percent of total exports. The export trend over the past ten years indicates that the mix of countries to which Ghanaian producers export forest products has become more diversified, Table 11. In 1987, the UK and Germany imported over 50 percent of all Ghanaian forest products exports. By 1996 the value of forest products exports destined for the UK and Germany had fallen by half to approximately 30 percent, while exports to other countries increased substantially.

Table 11. Principal markets for Ghanaian forest products exports, 1987 vs. 1996.

Importing Country	1987 % of total exports	1996 % of total exports
Germany	28.7	16.5
Italy	10.3	14.5
UK	26.4	14.1
France	7.5	10.0
USA	2.4	6.6
Holland	0.5	5.4
Ireland	6.0	5.2
Saudi Arabia	1.6	4.0
Taiwan	0.0	3.7
Other Asia	0.2	5.2
Total	**89.5**	**86.0**

Source: FPIB Export Permit Report, 1988 and 1997.

It is interesting to note that despite the efforts of environmental groups in the UK, Germany, Holland, and Belgium to restrict imports of tropical hardwood products, these four countries continue to import substantial volumes of wood products from Ghana, accounting for almost 40 percent of total exports, Table 11. However, since 1987 their share of Ghanaian exports have declined from 55.9 percent to 38.7 percent. It is also noteworthy that Ghanaian exports of wood products to the less environmentally sensitive regions of Asia and sub-Saharan Africa have increased by more than 700 percent since 1987.

The logic behind the tropical hardwood boycotts in some European countries has been that reducing the demand for these products will inevitably result in a reduced timber harvest. Unfortunately, this logic did not take into account the rapid globalization of the forest products industry that was occurring at about the same time. As a result, reduced demand in the traditional European markets simply resulted in Ghanaian producers shifting their attention to other, less environmentally sensitive markets in neighboring countries as well as in east Asia. This has had serious consequences as high demand for Ghanaian timber in Asia resulted in increased timber harvest levels with timber being harvested on speculation. When timber harvests exceeded demand, substantial volumes of logs were left in storage yards at the docks in Takoradi where they suffered serious degradation. In acknowledgement of the ineffectiveness of the boycotts, the German government in 1997 removed their ban on the use of tropical hardwoods in publicly funded construction projects.

Timber harvest levels, which have generally averaged 1.3 million m^3 per annum, jumped to 1.7 and 1.8 million m^3 in 1993 and 1994, respectively. The vast majority of this increase can be attributed to the export of unprocessed logs to Asia countries that, in the past, had been relatively small markets for Ghanaian forest products. Log exports which averaged approximately 200,000 m^3 in 1991 and 1992, jumped to 500,000 m^3 in 1993 and 575,000 m^3 in 1994. While there were no logs exports to Asian countries in 1991 and 1992, log exports to Asia totaled 364,597 m^3 in 1993 and 517,437 m^3 in 1994, accounting for 73.1 percent and 90.3 percent of total log exports, respectively. As a direct result of the adverse impact of Asian demand for logs, the government of Ghana imposed a moratorium on the export of logs in 1995.

Tables 12 through 19 provide a summary of the Ghanaian export data and indicate the primary export markets for individual product categories. The data indicates that the vast majority of exports in each product category go to a small number of countries. In general, over three-quarters of the exports in each product category go to five or less trading partners. This pattern can be attributed to several factors and is at least a partial reflection of the fact that Ghanaian forest products manufacturers have traditionally relied on foreign export brokers and agents to market their products overseas. This pattern is also a reflection of the historical trade relationships established during the colonial period, although the exclusivity of these trade relationships is changing as a result of the globalization of the timber industry.

Table 12. Principal markets for Ghanaian air-dried lumber exports, 1996.

Importing Country	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Germany	28,454	292	20.3
Saudi Arabia	18,548	312	13.2
Holland	12,154	413	8.7
Ireland	12,115	423	8.6
USA	11,570	455	8.2
UK	10,465	369	7.5
Italy	9,808	285	7.0

Source: FPIB Export Permit Report, 1997.

Table 13. Principal markets for Ghanaian kiln-dried lumber exports, 1996.

Importing Country	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Taiwan	15,336	311	18.1
UK	14,678	322	17.3
France	13,946	329	16.4
Germany	9,859	398	11.6
Hong Kong	8,122	298	9.6

Source: FPIB Export Permit Report, 1997.

Table 14. Principal markets for Ghanaian boule exports, 1996.

Importing Country	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Germany	19,847	249	55.5
France	9,704	413	27.1
Italy	3,105	242	8.7

Source: FPIB Export Permit Report, 1997.

Table 15. Principal markets for Ghanaian sliced veneer exports, 1996.

Importing Country	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Italy	13,002	897	46.7
Germany	3,375	880	12.0
UK	3,300	803	11.8
Spain	2,102	902	7.5

Source: FPIB Export Permit Report, 1997.

Table 16. Principal markets for Ghanaian rotary veneer exports, 1996.

Importing Country	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
USA	12,554	297	49.2
Italy	4,975	222	19.5
Germany	2,056	317	8.1
France	2,045	373	8.0
Egypt	1,975	240	7.7

Source: FPIB Export Permit Report, 1997.

Table 17. Principal markets for Ghanaian plywood exports, 1996.

Importing Country	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
UK	12,095	395	64.0
Belgium	2,471	353	13.1
Niger	1,488	277	7.9
Australia	1,130	411	6.0

Source: FPIB Export Permit Report, 1997.

Table 18. Principal markets for Ghanaian moulding exports, 1996.

Importing Country	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Germany	4,577	569	47.6
France	2,362	405	24.6
UK	1,577	820	16.4

Source: FPIB Export Permit Report, 1997.

Table 19. Principal markets for Ghanaian furniture parts exports, 1996.

Importing Country	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
UK	1,146	2,174	77.9
Ireland	135	2,332	9.2

Source: FPIB Export Permit Report, 1997.

Table 20. Principal species for Ghanaian forest products exports, 1996.

Timber Species	Value (US$)	% of total exports
Wawa	42,464,154	29.4
Asanfona	17,861,954	12.4
Odum	16,739,485	11.6
Ceiba	11,525,958	8.0
Mahogany	8,201,011	5.7
Mixed Redwoods	6,957,694	4.8
Niangon	5,323,529	3.7
Sapele	3,128,674	2.2
Ofram	2,855,817	2.0
Emire	2,649,147	1.8
Koto/Kyere	2,531,161	1.8
Makore	2,419,415	1.7

Source: FPIB Export Permit Report, 1997.

Species mix of Ghanaian forest products exports

The forest products industry in Ghana has traditionally focused its attention on the export of a relatively small number of well known, or noble, timber species. While much attention has been paid to the idea of utilizing lesser used timber species as a component of sustainable forest management, the operationalization of this idea has proven rather elusive. Tables 20 through 31 provide a summary of the Ghanaian export data and indicate the primary species exported for individual product categories. The data indicates that the vast majority of exports in each product category are comprised of a small number of species. In general, over three-quarters of the exports in each product category consist of five or less species.

Table 21. Principal species for Ghanaian forest products exports, 1987 vs. 1996.

Timber Species	1987 % of total exports	1996 % of total exports
Wawa	24.7	29.4
Asanfona	4.8	12.4
Odum	12.6	11.6
Ceiba	1.5	8.0
Mahogany	5.7	5.7
Mixed Redwoods	0.7	4.8
Niangon	0.5	3.7
Sapele	3.6	2.2
Ofram	2.0	2.0
Emire	6.4	1.8
Koto/Kyere	5.3	1.8
Makore	3.3	1.7
Utile	8.9	1.4

Source: FPIB Export Permit Report, 1988 and 1997.

Table 22. Principal species for Ghanaian air-dried lumber exports, 1996.

Timber Species	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Wawa	48,930	252	34.9
Odum	26,974	402	19.2
Mahogany	16,096	422	11.5
Ofram	6,285	237	4.5
Mixed redwoods	5,716	334	4.1
Edinam	4,506	344	3.2
Others	31,790		22.6
Total	140,297		100

Source: FPIB Export Permit Report, 1997.

The timber export data indicates that just five species, Wawa, Asanfona, Odum, Ceiba, and Mahogany, represented two-thirds of the forest products exported from Ghana in 1996, Table 20. In fact, a single species, Wawa, accounted for almost 30 percent of all forest products exports in 1996. This reliance on a small fraction of the timber species in Ghana to support the forest products industry is not unusual. Export data for 1972 (the earliest year for which detailed export data is available) indicates that five species, Wawa, Utile, Sapele, Makore, and Mahogany, accounted for over 80 percent of forest products exports from Ghana, Table 21. In fact, just two species (Wawa and Utile) represented over 57 percent of forest products exports in 1972.

The mix of timber species utilized by the forest products industry has changed over time based on resource availability and market preferences. For example, while the two predominant species have remained the same (Wawa and Odum) between 1987 and 1996, several new species have gained increasing market acceptance during this period (Ceiba and Asanfona), Table 21. The total export volume of the six LUS included in this project are summarized in Table 32. This transition between species would seem to indicate that end-users in overseas markets are willing to accept new species in place of the traditional species. The key to the successful introduction of a new species is to understand the process by which these new species have been introduced into the market and identify those factors that promote the acceptance of new species by end-users.

Table 23. Principal species for Ghanaian kiln-dried lumber exports, 1996.

Timber Species	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Wawa	69,302	309	81.6
Kyere	6,611	611	7.8
Odum	3,778	555	4.4
Others	5,228		6.2
Total	84,919		100

Source: FPIB Export Permit Report, 1997.

Table 24. Principal species for Ghanaian overland lumber exports, 1996.

Timber Species	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Wawa	6,453	77	48.2
Chenchen	5,517	81	41.2
Mixed redwoods	631	130	4.7
Ceiba	564	170	4.2
Other	222		1.7
Total	13,387		100

Source: FPIB Export Permit Report, 1997.

Table 25. Principal species for Ghanaian sliced veneer exports, 1996.

Timber Species	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Asanfina	1,550	908	67.9
Sapele	149	839	6.5
Makore	142	891	6.2
Koto/Kyere	100	843	4.4
Mahogany	88	849	3.8
Akasa	65	944	2.8
Other	188		8.4
Total	2,281		100

Source: FPIB Export Permit Report, 1997.

Table 26. Principal species for Ghanaian rotary peeled veneer exports, 1996.

Timber Species	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Ceiba	18,849	261	73.8
Otie	1,685	356	6.6
Koto/Kyere	1,257	367	4.9
Ofram	1,106	367	4.3
Other	2,627		10.4
Total	25,524		100

Source: FPIB Export Permit Report, 1997.

Table 27. Principal species for Ghanaian boules exports, 1996.

Timber Species	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Wawa	17,525	225	49.0
Niangon	7,810	466	21.8
Otie	3,745	227	10.5
Ofram	2,886	212	8.1
Emire	2,354	379	6.6
Other	1,452		4.0
Total	35,772		100

Source: FPIB Export Permit Report, 1997.

Table 28. Principal species for Ghanaian moulding exports, 1996.

Timber Species	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Wawa	6,831	477	71.1
Odum	892	895	9.3
Albizia	493	755	5.1
Other	1,394		14.5
Total	9,610		100

Source: FPIB Export Permit Report, 1997.

Table 29. Principal species for Ghanaian plywood exports, 1996.

Timber Species	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Ceiba	16,944	384	89.7
Otie	1,272	367	6.7
Koto/Kyere	554	421	2.9
Other	118		0.6
Total	18,888		100

Source: FPIB Export Permit Report, 1997.

Table 30. Principal species for Ghanaian furniture parts exports, 1996.

Timber Species	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Odum	744	2,000	50.5
Mixed redwoods	522	1901	35.5
Other	206		14.0
Total	1,472		100

Source: FPIB Export Permit Report, 1997.

Table 31. Principal species for Ghanaian flooring exports, 1996.

Timber Species	Volume (m^3)	Unit value (US$/$m^3$)	% of total exports
Odum	2,013	726	59.0
Papao/Apa	936	970	27.4
Afromosia	286	1,262	8.4
Other	178		5.2
Total	3,413		100

Source: FPIB Export Permit Report, 1997.

Table 32. Volume of six lesser-used species exports, 1987 vs. 1996.

Timber Species	Volume (m^3) 1987	Volume (m^3) 1996
Onyina *(Ceiba petandra)*	19,499	36,382
Esa *(Celtis mildbraedii)*	113	108
Essia *(Petersianthus macrocarpus)*	0	38
Denya *(Cylicodiscus gabunensis)*	33	84
Ohaa *(Sterculia oblonga)*	0	14
Chenchen *(Antiaris toxicaria)*	91	7,205

Source: FPIB Export Permit Report, 1988 and 1997.

Marketing Strategies To Promote Sustainable Forest Management In Tropical Regions

In many tropical countries the predominant management philosophy in the timber industry emphasizes the minimization of manufacturing costs to provide a competitive advantage in the production and export of commodity products. Reliance on this philosophy forces firms to compete solely on the basis of price, thus providing them with minimal or negative profit margins and reducing their bargaining power with importers and manufacturers. A more appropriate competitive strategy for the tropical regions would be the development of differentiated products that can be marketed to niche markets in Japan, Europe and the United States. Adoption of this type of competitive strategy would allow firms to match the needs of the marketplace with the resources available while providing the opportunity to perform a greater share of value-added manufacturing locally. While this strategy would provide companies and governments in tropical regions with a variety of benefits, it requires that managers in the timber industry accept a shift in management philosophy and become more market-oriented. This section will explore four areas where marketing activities can promote sustainability of the tropical forest resource, including: 1) greater access to market information, 2) certification of sustainability, 3) market development for lesser-used tropical timber species and, 4) market development for non-traditional forest products.

Increased access to market information

Currently the timber industry in the tropical region is confronted with a paradigm shift from exploitation to sustainability. This period of change is one of uncertainty where many managers perceive a high level of risk within the business environment As a result, their reluctance to commit to a new method of doing business is natural until they have had the opportunity to assess the long-term implications of this change on their markets and competitiveness. Acquiring accurate market information is a crucial component of strategy development during this period of transition and uncertainty within the industry. The acquisition of current market information plays a key role in informing managers of the impacts of new developments in the industry and contributes towards reducing the perceived level of risk within the business environment. The acceptance of sustainability as the new competitive paradigm will increase as the perceived level of risk is reduced.

One of the major reasons why firms in tropical regions focus on exporting commodities rather than value-added products is their lack of market information. This lack of market information regarding the wants and needs of consumers in geographically distant markets makes it difficult for tropical producers to develop and manufacture new products for these markets. Cooper (1979) found that the failure of a new industrial product in the marketplace could be attributed largely to inadequate market analysis prior to the introduction of the new product and the subsequent failure to develop an effective marketing strategy. Smith and Eastin (1990) arrived at a similar conclusion in a case study analysis of rubberwood lumber in southeast Asia, where the initial introduction of this product was adversely affected by an ineffective marketing strategy.

Webster (1969) identified six factors that contribute to the failure of new industrial products, including the failure to focus on a specific market segment, underestimating the marketing effort required, inadequate knowledge of the industrial buying process, and inadequate knowledge of influential industry members. Other research in the area of new industrial product introduction indicates that the primary cause of new product failure is inadequate market knowledge and misdirected marketing strategies (Cooper 1979; Davis 1988; Lawless and Fischer 1990).

Timely access to market information strongly impacts the ability of a manager to respond effectively to changes in the business environment (Robinson and Pierce 1984; Dilts and Prough 1987; Covin and Slevin 1989). This factor is of critical importance for managers operating in developing countries whose primary markets are geographically distant and whose access to current market information is problematic. The ability to obtain and process accurate and timely market information is critical during the development and implementation of business strategies. The lack of this type of market information contributes to an increased level of uncertainty and risk in the business environment (Galbraith 1973; Anderson and Paine 1975).

Aldrich (1979), in his book "Organizations and Environments", asserts that *"variation in information about the environment, as filtered through members perceptions, is the major factor explaining organizational change"*. The process of information gathering provides the firm with a method of reducing uncertainty in the environment (Meyer et. al. 1990). Although information gathering is regarded as an important step in identifying and defining problems within the business environment, managers of export oriented firms tend to be highly unsystematic in their search for information (Keegan 1974). Over time, many firms restrict the focus of their information gathering to those areas of the environment that have been successfully utilized in the past (Cyert and March 1963). Known as the concept of limited search, this technique results in a firm overlooking critical changes in other sectors of the environment. While exploring the relationship between firm size and access to market information, Darling and Postnikoff (1985) found that the strategic options of a small firm may be limited their ability to gather and process environmental information is restricted due to limited financial resources.

During my conversations with the managers of forest products firms in Ghana and the Philippines, they indicated their frustration in acquiring accurate market information regarding export markets. This lack of market information was identified as the most important factor impacting their ability to gain an accurate understanding of their export markets and restricted their ability to develop and implement effective marketing strategies. The ability of managers to acquire market information is restricted by three factors: a poorly developed and unreliable communication infrastructure, the reluctance of importers and wholesalers to share market information for fear of being bypassed along the distribution channel, and the relatively high expenses associated with performing international market research at the individual firm level. This information substantiates the fact that managers in tropical countries are intensely aware of the positive impact of accurate market information on the strategic decision-making process

but, given the small size of most firms, acquiring this type of information is extremely difficult and, as a result, the level of uncertainty in the decision-making process is increased.

In addressing the need of managers in tropical countries for accurate and timely market information, it appears there are three options available. The first option involves each firm individually developing its ability to acquire market information. This could involve each firm conducting market research in those markets that are important to it. In contrast, each firm could contract the services of a market research organization to acquire this information. However, both of these options are time consuming, expensive and often perceived to be beyond the financial means of smaller firms. A second option relies on an external organization to acquire market information for a group of firms or the entire industry. In the case of Ghana this could involve the Timber Export Development Board working cooperatively with member firms to perform in-depth market research on those markets and issues that are of particular importance. Finally, individual firms can work cooperatively with importers and wholesalers to develop cooperative relationships that facilitate the flow of information from the marketplace. While this is an efficient and inexpensive method of acquiring market information, it requires that producers work with importers to assure them that this information will not be used by the producer to bypass the importer and sell directly to the customer.

Certification of sustainability

More and more, sustainability is becoming an important factor applied by consumers in some countries when making their purchase decision for wood products. The largest home center chains in both the US and the UK (Home Depot and B&Q) now require that their suppliers of timber products be able to demonstrate the sustainability of their products (Burbidge 1993; Knight 1993). In addition, a number of firms in other European countries also require that the timber products they stock be certified as having been sourced from sustainably managed forests. Although a number of studies indicate that consumers are currently influenced more by price/quality factors than by environmental considerations, it is clear that this relationship is changing. For example, a recent survey of furniture customers in the U.K. found that 83% of respondents felt that retailers should not purchase products manufactured from non-sustainably harvested timber (Knight 1993). In addition, educational programs developed by environmental and academic organizations are teaching children about the value of preserving and protecting forests and will strongly affect their purchasing decisions as the consumers of the future.

Although the entire process of certification is still relatively new, several groups have already begun offering services in this area. The certification process is based on establishing an audit system to ensure products marketed as sustainable can be traced to ensure that they have indeed originated from a sustainably managed forest or concession. The basic structure of the certification process involves three stages. The first stage consists of certification of a forest or concession area as being sustainably managed through a management audit. Forest management audits are requested, and

paid for, by individual firms and are almost always performed at the individual forestland or concession level. Audits are performed by a specialized team of independent scientists and typically focus on three elements: timber resource sustainability, forest ecosystem maintenance, and the socio-economic benefits of the forest operation. The second stage of the process involves ensuring that management systems have been established to ensure that products from certified forests can be tracked through the distribution channel from the forest to the retail establishment. Finally, the third stage involves the continuous monitoring of the certified forest area to ensure continued compliance with the guidelines of sustainability.

One of the major factors that has hindered the establishment of an international system of timber certification has been the absence of an internationally recognized accrediting organization to ensure that the different certification programs each conforms to a basic set of criteria to ensure comparability between individual firms and programs. The establishment of the Forest Stewardship Council in 1993 as an independent organization to oversee and regulate the certification process appears to have solved the major problem regarding sustainable certification (de Haes 1993). Currently, a number of firms offer certification of sustainability services, including the Rain Forest Alliance (US), Scientific Certification Systems (US), the Blue Angel (Germany), Societe Generale de Surveillance (SGS), Silviconsult (UK), and the Soil Association (UK). In addition, there is currently an international effort underway to develop a certification program within the ISO framework.

Sustainable certification, for both temperate and tropical timber, appears to be an important trend for the future of the forest products industry. However, given the costs associated with the certification process and sustainable forest management, it might not be appropriate for all firms. Recent reports estimate the cost of certification to range from US$.30 to US$.60 per hectare in developed countries. In addition, increased logging costs associated with sustainable forestry would add an additional US$40 to US$60 per cubic meter of timber harvested (Ghazali and Simula 1994). Obviously these costs would be higher in lesser developed countries.

Offsetting these higher production costs are the assertions of consumers in developed countries that they would be willing to pay higher prices for sustainably source timber products. A recent study in the U.K. found that sixty-six percent of consumers would be willing to pay higher prices, up to thirteen percent higher, for sustainably sourced products. A similar survey in the U.S. reported sixty-eight percent of respondents would be willing to pay up to fifteen percent higher for sustainably sourced products (Winterhalter and Cassens 1993; MORI and WWF 1991). It should be noted however, that there is a fundamental difference between actual purchase behavior and professed purchase behavior, particularly with respect to environmentally sensitive topics.

In assessing the end-use markets for forest products, it appears that markets for commodity construction materials will likely be less affected by certification than will markets for value-added products (i.e., doors, windows and furniture) where consumer perceptions are much more important. As a result, not all firms will be affected equally

by a requirement to certify their operations. For example smaller firms and firms located in developing countries will find it harder to justify the additional costs of certification than will larger firms operating in developed countries. It is important that managers of timber firms understand that they have other options to certifying their operations. For example, a manager can opt to source raw materials from certified firms, de-emphasize their trade relationships in environmentally sensitive markets, or simply ignore the situation.

Developing markets for lesser-used tropical species

Despite the fact that tropical timber species number in the thousands, the international timber trade has traditionally focused on a relatively small proportion of timber species. For example, in Ghana the number of timber species that reach commercial size exceeds 400. Despite this, timber export statistics from Ghana indicate that only 45 species have been exported at least once over the past twenty years and less than ten species represent over 90% of current Ghanaian timber exports (FPIB 1995).

The focus by the international timber trade on a few species has significant implications for forest management in tropical regions. Tropical timber species, particularly in West Africa, rarely occur in pure stands. Rather, these species tend to be dispersed throughout the forest in very low stocking levels. The focus of timber traders on established timber species, in combination with low stocking levels, compel logging companies to perform harvest operations that impact large areas of forest. This practice has contributed to non-sustainable forest practices through the establishment of an extensive network of logging roads, high levels of harvest damage to the remaining trees, depletion of the genetic stock of established timber species, early re-entry into forest blocks, and discouragement of sustainable forest management practices.

One approach for reducing tropical deforestation is to alleviate the pressure on the forest resource by developing markets for lesser-used tropical species (LUS). This strategy implies that tropical forests can be sustainably managed by adopting a more intensive management regime that fully utilizes the timber species located within a specific harvest block, thus reducing pressure on other harvest blocks within a concession. Despite the market potential of many LUS, to date there has been little success in developing commercial markets for timber obtained from these species.

While LUS have the potential to substitute for traditional species in some markets, it is important to note that forest products manufacturers are inherently conservative and reluctant to accept substitutes for traditional species. Their reluctance focuses on three concerns: the reliability of supply of the new species, the performance of the new species in the manufacturing process, and concerns regarding the in-service performance of new species. Research in the area of new species introduction indicates that raw material preferences within the international timber trade are slow to change (Smith and Eastin 1990). However, as the supplies of traditional species inevitably declines, manufacturers will be forced to consider alternative species.

The challenge in marketing LUS focuses on describing a conceptual model of the introduction process and providing a framework to assist in the development of marketing strategies to successfully introduce LUS as new industrial materials. Exploratory research in Ghana and the Philippines indicates that the decision to evaluate a new timber species is related to the availability of technical information, knowledge of the appropriate end-use applications of a new species, raw material processing attributes, resource availability, and promotional incentives that reduce the risk associated with the trial use of a new species (Eastin 1995). However, the development of an effective marketing strategy requires a thorough understanding of the interrelationships between the factors that influence end-user acceptance of new species in industrial markets.

Developing markets for non-traditional forest products

Another way to more fully utilize the tropical forest resource, and an important component of sustainability, is the development of markets for non-traditional forest products (NTFP's). Non-traditional forest products (e.g., gums, resins, medicinal extractives and nuts/berries), and are typically used by indigenous groups and developing international markets for them can provide substantial economic benefits. NTFP's can also provide an opportunity to generate income and employment opportunities on forest lands that are protected from timber harvest (i.e. watersheds) or are uneconomic to harvest (i.e. steep slopes). Recent research in Brazil has indicated that the economic returns generated from the sale of NTFP's on some sites can exceed the returns obtained from converting forestland into pasture land or for agricultural end-uses (Peters et. al. 1989).

A number of private, non-profit, organizations have formed with the goal of assisting indigenous peoples develop markets for NTFP's as a strategy for protecting the forest from deforestation. However, given the unique characteristics of this type of activity, the marketing of NTFP's is confronted with its own set of unique problems. Pendleton (1992) identifies a series of eight factors which must be present in order for a NTFP activity to be successful: 1) there must be an economically viable volume of products available in an area to be harvested, 2) there must be markets (current or potential) for the products or their derivatives, 3) NTFP activities must be economically viable in both the short-term and long-term, 4) the economic value of NTFP's must equal or exceed other types of forest utilization, 5) the NTFP's must be accessible for harvest, 6) the NTFP's must be readily available, 7) there should be a long-term supply of these resources, and 8) harvest operations must be sustainable.

The primary challenge associated with marketing NTFP's is identifying and developing markets suited to the unique characteristics of these small-scale industries. In most cases, the volume of products harvested are quite limited and well below the volumes required by even small firms in developed countries. A second imposing challenge relates to the acquisition of market information for these products. As a result, the marketing challenges in this area are imposing but certainly worth the effort. Several non-profit organizations (i.e. Cultural Survival Enterprises, Conservation International)

have undertaken projects with local community groups that have successfully developed profitable market niches for NTFP's in developed countries.

While most forest products firms might not be interested in developing markets for NTFP's, it is important for more firms to note that the opportunity exists to work with indigenous groups to develop markets for these products. Occasionally an opportunity may occur where selective logging and the harvest of NTFP's may enjoy a symbiotic relationship. Timber firms need to be sensitive to the possibility of these collaborations and be willing to take a chance in this area. Not only will it assist them in developing a sustainable forest management plan, but it can provide tremendous opportunities to develop positive public relations in their primary markets of Europe and the United States. Managers should not underestimate the amount of public goodwill that can be generated from this type of enterprise.

Activities by a broad range of non-governmental organizations, including environmentalists and academics, have created a heightened sense or urgency regarding the fate of tropical rain forests. In response, consumers have expressed concern regarding the purchase of any products manufactured from tropical timber. Recent surveys in the U.K. and the United States demonstrate this concern on the part of consumers. However, these same surveys hold forth a glimmer of hope. Consumers appear to be willing to pay higher prices for products that are manufactured from sustainably managed timber, although it should be emphasized that willingness to pay and purchase behavior are not the same.

As a result of these developments, there has been tremendous pressure to achieve sustainability within the timber industry by the year 2000. While achieving sustainability may not be appropriate or even necessary for all firms, most will find that it is in their best interests to move in this direction. Achieving sustainability represents an opportunity to increase market share in some niche markets as well as increasing profitability. However, taking advantage of this requires that managers increase their use of marketing tools in order to become more market-oriented so that they can better identify the most profitable, and appropriate, niche markets.

TERMS OF REFERENCE FOR THE MARKETING CONSULTANT

The terms of reference for the marketing component of the Lesser-Used Tropical Timber Species Project (PD 179/91 Rev.2) were as follows:

① Identify and recommend appropriate technologies for piloting and promotion of lesser-used tropical timber species,
② Recommend new and traditional products from lesser-used tropical timber species with market potential,
③ Prepare and recommend appropriate marketing strategies for lesser-used tropical timber species, and
④ Prepare an appropriate method or model for the appraisal and evaluation of the effectiveness of market promotion activities for lesser-used tropical timber species in the market.

RESEARCH METHODOLOGY

Exploratory interviews regarding the appropriate end-use applications for the various species included in the lesser-used species project were conducted during 1994 and 1995. These exploratory interviews were conducted with a wide variety of experts in research institutes, the Forest Management Bureau (FMB), the Timber Export Development Board (TEDB), the Forest Products Inspection Bureau (FPIM), the Institute of Renewable Natural Resources (IRNR), and managers of wood processing facilities in Ghana.

Three surveys were performed in order to evaluate the importance of different factors related to the introduction and acceptance of lesser-used species. The first survey consisted of a census of the Ghanaian wood processing industry. The sample frame was developed from the Export Permit Report published by the Forest Products Inspection Bureau. The survey questionnaire was developed in consultation with the researchers at FORIG and TEDB who were already involved in the lesser-used species project, Appendix B. The survey was administered in person by a market analyst with TEDB to the managers of the companies selected to participate in the project. A total of 68 companies were chosen to participate in the survey and a total of 48 questionnaires were obtained. The final response rate for the survey in Ghana 71 percent. A summary of the Ghanaian survey data is provided in Appendix D.

The second survey was focused on importers and wholesalers of tropical hardwood lumber and veneer in the US. A purposive sample of one hundred companies was developed from the Directory of Hardwood Lumber and Veneer Importers Association. A variety of factors were considered in the development of the sample frame including firm size, ratio of tropical hardwood products in the total product mix of the firm, and the geographic location of the firm. Given the relatively large size of the sample and its geographic dispersion, a mail survey was deemed to be the most efficient method for collecting data. The survey questionnaire was developed in conjunction with the questionnaire administered in Ghana to ensure the comparability of the data, Appendix C. The survey was shortened from the four pages used in Ghana to just two pages by removing extraneous questions. A two dollar bill was included in each questionnaire in an effort to increase the response rate. The survey was mailed to participants in February, 1997 and, following two survey mailings, a total of 68 usable surveys were received, providing an effective response rate of sixty-eight percent.

The third survey was focused on importers and wholesalers of tropical hardwood lumber and veneer in the UK and Ireland. A purposive sample of 38 companies was provided by the TEDB office located in London. Participants in the UK and Ireland were mailed the same survey as the participants in the US. Survey questionnaires were mailed with a cover letter explaining the purpose of the research and a $2 mail voucher was included to encourage participation. The survey was mailed to participants in May, 1997 and, following two mailings, a total of 22 usable surveys were received, providing an effective response rate of 62.9 percent.

Development of a Theoretical Marketing Framework for Lesser-Used Tropical Species

Introduction

Since World War II, deforestation in the tropics has been increasing at an accelerated rate (Richards and Tucker 1988; Laarman and Sedjo 1992; Sargent and Bass 1992). During the past thirty years more than forty percent of the tropical rain forests have been cut down (Lean, Hinrichsen, and Markham 1990; Steger and Bowermaster 1990). In addition, logging activities in tropical rain forests are estimated to degrade approximately 11 million hectares of forest each year (Myers 1984; Repetto and Gillis 1988). More problematic, however, is the fact that roads constructed during logging operations open new areas of previously inaccessible rain forest to farmers and ranchers who frequently employ slash and burn techniques to clear away the forest (Richards and Tucker 1988; Poore et. al. 1989). The additional deforestation resulting from slash and burn practices is estimated to exceed 34 million hectares per year, more than three times the area affected by logging operations (Ryan 1990). Deforestation from all sources is estimated to deplete approximately one percent of the tropical forest resource annually (Poore et. al. 1989).

Although deforestation in the tropics can be largely attributed to fuelwood gathering and shifting agriculture, demand for tropical hardwoods in developed countries obviously plays a contributing factor (Laarman and Sedjo 1992). Despite widespread efforts by environmental groups to reduce demand for tropical hardwoods, the rate of deforestation has not declined. Rather, growing populations in the developing countries continue to increase the pressure on tropical forest resources (Clouser and Libbey 1992). The United Nations Population Division estimates that the world's population will have increased by 3.2 billion people over the next 35 years, with much of the growth occurring in developing countries (United Nations 1989). As a result, demand for wood products (including fuelwood) is expected to grow by 3.5 billion cubic meters over the same time period (Sharma et. al. 1992).

Despite the fact that the number of tropical timber species numbers in the thousands, the international timber trade has traditionally focused on a relatively small fraction of timber species. For example, in Ghana the number of timber species that reach commercial sizes exceeds 400. Despite this, timber export statistics from Ghana indicate that only 45 species have been exported at least once over the past twenty years and less than ten represent over 90% of current Ghanaian timber exports (FPIB 1995).

The focus by the international timber trade on a few species has significant implications for tropical forest management in tropical regions. Tropical timber species, particularly in West Africa, rarely occur in pure stands. Rather, these species tend to be dispersed throughout the forest with very low stocking levels. The focus of timber traders on established timber species, in combination with low stocking levels, compel logging companies to perform harvest operations that impact large areas of forest. This practice has contributed to non-sustainable forest practices through the establishment of an extensive network of logging roads, high levels of harvest damage to the

remaining trees, depletion of the genetic stock of established timber species, early re-entry into forest blocks, and discouragement of sustainable forest management practices.

One approach for reducing tropical deforestation is to reduce pressure on the forest resource by developing markets for lesser-used species (LUS). This implies that tropical forests can be sustainably managed by adopting a more intensive management regime that fully utilizes the tree species located within a specific harvest block, thus reducing pressure on other harvest blocks within a concession. Despite the market potential of many LUS, to date there has been little success in developing commercial markets for timber obtained from these species.

While LUS have the potential to substitute for traditional species in some markets, it is important to note that forest products manufacturers are inherently conservative and reluctant to accept substitutes for traditional species. This reluctance focuses on three concerns: reliability of supply of the new species, the performance of the new species in their manufacturing process, and concerns regarding the in-service performance of the new species. Research in the area of new species introduction indicates that raw material preferences within the international timber trade are slow to change (Smith and Eastin 1990).

The challenge in introducing LUS focuses on developing a conceptualized framework to assist in the development of marketing strategies to successfully market LUS as new industrial materials. However, the development of an effective marketing strategy requires a thorough understanding of the interrelationships between the factors that influence end-user acceptance of new species in industrial markets. Exploratory research has indicated that the decision to evaluate a new timber species is related to the availability of technical information pertaining to the appropriate end-use applications of the species, its raw material processing attributes, resource availability and price, and promotional incentives that reduce the risk associated with the trial use of a new species.

The objective of the current project was to develop a conceptual model of the process of introducing LUS into the marketplace. In order to accomplish this objective it was important to: (1) identify those marketing factors perceived to impact the introduction of LUS, (2) identify non-marketing factors perceived to impact the introduction of LUS, (3) identify incentives perceived to be effective in encouraging evaluation and trial use of LUS, (4) develop a conceptual model of the introduction process for LUS, and (5) develop a theoretical marketing strategy for introducing LUS.

Methodology

Exploratory Interviews

Exploratory interviews were conducted with the managing directors of twenty-three sawmills in Kumasi, Ghana. Given the exploratory nature of the research, participants were selected based on their experience with marketing LUS and their expressed willingness to participate in the study. In order to include a wide range of managerial

experience in marketing LUS, the sample frame included a wide range of firm sizes, with large firms representing the biggest segment (13 firms) of the sample. Of the participants interviewed, each was responsible for international sales/marketing and had some experience in marketing LUS.

A research questionnaire was developed to assist in guiding the interviews. The questionnaire was pre-tested by the managing directors of two sawmills with extensive experience in marketing LUS as well as by the managing director of the Timber Export Development Board of Ghana. The purpose of the questionnaire was to provide a general structure for the interviews, although many of the interviews departed from the prepared questions in order to more fully explore related areas, obtain specific examples, and solicit the experiential insights of the participants. The interviews were carried out during a two week period in March, 1995 and were administered by two people. Given the sensitive nature of some of the information requested, the interviews were not audio taped. Rather, all information was noted on the questionnaire during the course of the interview. Based on the information obtained during the course of the project, a conceptual framework for the introduction of LUS was developed.

Theoretical foundation of the model

The introduction of a new industrial product is fraught with difficulties given the complexity of the industrial buying process (Lehmann and O'Shaughnessy 1974). A review of the literature in this area indicates that most research has focused on the introduction of new industrial products as opposed to new industrial raw materials (Webster 1969; Webster and Wind 1972; Lehmann and O'Shaughnessy 1974; Baker 1975; Cooper 1979; Choffray and Lilien 1980; Moore 1987; Davis 1988). A second stream of research has addressed the causes of failure for new industrial products (Webster 1969; Cooper 1979; Davis 1988; Lawless and Fischer 1990). Little research has been conducted in the area of forest products and the introduction of new industrial products (Smith and Eastin 1990).

Many practitioners have argued that the performance of a firm is strongly related to its degree of market orientation (Jaworski 1988; Kohli and Jaworski 1990; Narver and Slater 1990; Jaworski and Kohli 1993; Webster 1993; Slater and Narver 1994a; Slater and Narver 1994b; Slater and Narver 1995). If true, this might imply that a market oriented firm might be more successful in introducing a LUS than would a firm without a market orientation. While this may be true, this observation is tempered by two influencing factors. First, adopting a market orientation is not appropriate for all firms given the substantial resources and commitment required for effective implementation (Kohli and Jaworski 1990). Second, being market oriented is not a binary function whereby a firm is, or is not, market oriented. Rather, many firms develop a market orientation through a transitional process rather than making an abrupt transformation overnight (Kohli and Jaworski 1990; Narver and Slater 1990).

In fact, it is not entirely clear that the market orientation model as developed and proposed by Narver and Slater (1990) and Kohli and Jaworski (1990) is pertinent to, or appropriate for, small-sized firms. The conceptual models proposed in each of these

seminal studies was, to a large degree, based on information obtained from large firms. Similarly, given the structure of the business enterprise in west Africa, it is doubtful that the current models of market orientation are appropriate. There are at least three distinguishing features of businesses in west Africa that argue against employing the current models of market orientation. First, even the larger, export-oriented forest products firms in west Africa tend to be small by North American standards. Second, many of these firms are family owned and tend to be run as sole proprietorships with most business decisions being made by the owner. Finally, these firms usually exist within small, under-developed local economies, and as a result many have focused on export markets. However, given their small size and limited resources, the managers of these companies frequently have limited access to market intelligence and oftentimes have no knowledge of the final end-user of their products.

Following an extensive review of the marketing literature and a series of exploratory interviews with the managing directors of eighteen sawmills in Ghana with experience in marketing LUS, a conceptual model describing the relationship between a series of basic marketing concepts and moderating factors, and the market acceptance of a newly introduced LUS was developed, Figure 1. The basic marketing factors that influence the introduction of a LUS are postulated to be: product-specific factors, market research, adoption of the marketing philosophy, and the commitment and innovativeness of management. Additionally, the market success achieved by a LUS is moderated by regulatory factors.

Basic marketing factors

1. Product-Specific Factors

Outside of those considerations related to the physical supply of a new species, there are three product-specific factors that were perceived by managers in Ghana to influence the introduction and market acceptance of LUS. These factors are: 1) the availability of technical information related to the physical and mechanical properties of LUS, 2) the determination of appropriate end-use applications for LUS, and 3) the performance of the LUS within the context of the manufacturing process (i.e., machinability and dimensional stability).

Without exception, the participants indicated that the ready availability of accurate technical information is critical to the successful introduction of a LUS. Not only does this information provide potential customers with information related to the physical and mechanical properties of the LUS but, perhaps more importantly, it provides the customer with an opportunity for comparing the new species with other species and competing materials thus forming the basis for evaluating the suitability of the new product in the manufacturing process prior to purchase. For a new industrial product such as a LUS, this type of information provides the potential customer with the information necessary for determining the most appropriate product application.

Despite the importance of technical information, most participants indicated that technical information could not replace a manufacturing trial in the potential customer's manufacturing process. While technical information can indicate the potential suitability

Insert Figure 1. here

of a LUS for a specific end-use, it is the performance of the new species during the manufacturing process that determines its acceptance. While the performance of a LUS during a manufacturing trial can lead to the adoption of the new species, several participants emphasized that the availability of technical information is important in persuading a potential customer to initially consider and evaluate new species. Thus the importance of technical information for influencing the purchase behavior of potential customers should not be underestimated.

2. Market Research

While it can be argued that the introduction of new products into the market is critical to the long-term performance of a business, too often this process is implemented in a non-systematic manner. Cooper (1979) found that the failure of a new industrial product in the marketplace could be largely attributed to inadequate market analysis prior to the introduction of the new product and the subsequent failure to develop an effective marketing strategy. Smith and Eastin (1990) arrived at a similar conclusion in a case study analysis of the initial introduction of rubberwood lumber in southeast Asia. Webster (1969) identified six factors that contribute to the failure of new industrial products, including the failure to focus on a specific market segment, underestimating the marketing effort required, inadequate knowledge of the industrial buying process, and inadequate knowledge of influential industry members. Other research in the area of new industrial product introduction indicates that the primary cause of new product failure is inadequate market knowledge and misdirected marketing strategies (Cooper 1979; Davis 1988; Lawless and Fischer 1990).

Many of the study participants indicated that the introduction of a LUS is a long-term process that can exceed the resources of the firm. While each participant had attempted to introduce a LUS in the past, very few reported being successful. In response to a question regarding the use of market research to obtain the required market information prior to developing a marketing strategy, most indicated that they had done little or no market research prior to introduction. While many of the participants acknowledged that market research represents an important component for developing an effective marketing strategy, they also indicated that market research is an expensive endeavor, particularly considering the high level of risk associated with introducing a new species. The following factors were cited most frequently as restricting a firms ability to conduct market research: the high cost of market research, lack of knowledge of the process, distance from the market, and little or no support from channel intermediaries.

This last point, the absence of support from channel intermediaries, is of particular importance and has significant implications for the introduction of LUS and could require that suppliers in Ghana develop more direct channels to European processors. Given the historical development of the timber trade in Ghana, most producers sell their products through European import agents. In the past, these agents often established branch offices in Ghana and maintained close ties with local firms. However, in response to Ghanaian government regulations, these export agents were forced to move their offices back to Europe where they soon developed closer ties with end-users

of tropical hardwoods. The impact of this transition has been that Ghanaian managers are much more restricted in their access to market intelligence. In fact, many managers indicated that the importers they do business with are now extremely reluctant to provide them with information regarding their European customers.

Many participants expressed a desire for government agencies and industry associations to increase their involvement in the area of conducting and disseminating market research. When queried on this point, they indicated that given the current structure of the forest products industry in Ghana, existing government regulations and the poorly developed communications infrastructure, the process of conducting market research is simply too costly and time consuming for firms to undertake individually. In addition, many participants felt that increasing the number of marketable timber species in an effort to shift the forest products industry towards a basis of sustainability was in the interest of both the industry and the government. As a result, many managers felt that the government should assume some responsibility for helping to develop markets for LUS.

a.) New product adoption process

The adoption process has been discussed extensively within the marketing literature and is widely accepted by marketing scholars (Baker 1975; Barnes and Ayars 1977; Kotler and Armstrong 1991). Kotler and Armstrong (1991) define adoption as the mental process through which an individual progresses subsequent to learning about a new product up to the time when a decision is made to purchase (adopt) the product. The adoption process consists of the following stages: awareness, interest, evaluation, trial, and adoption.

When a new industrial product is first introduced into the market, potential customers are made aware of its presence through product promotion activities. These promotion activities inform potential customers of the attributes of the new product and show how the new product may satisfy their needs. For those potential customers who demonstrate an interest in the new product, an evaluation of the product can provide important information. At this stage of the adoption process, an evaluation of the new product usually involves a mental assessment of the benefits and costs of the new product based on product information obtained from a variety of sources including the manufacturer, independent groups, competitors and acquaintances.

Promotional strategies also play an important part in encouraging potential customers to evaluate and purchase new products. A well designed and effective promotional strategy is essential in favorably influencing the perceptions of potential customers towards the new industrial product being introduced. Favorable perceptions can later lead to an increased level of market acceptance for the new product over a shorter time period (Webster and Wind 1972; Sheth 1973).

Many participants acknowledged that promotional activities represented an effective strategy for increasing awareness of LUS. Several managers suggested that the most effective promotional strategy involved providing potential customers with risk-free

opportunities to evaluate a LUS in their manufacturing operation. These risk-free strategies could include: small trial shipments, deferred payment, credit guarantees, or preferential access to supplies of LUS. This strategy would provide the potential customer with the opportunity to evaluate the LUS within their manufacturing process while incurring a minimal level of risk, thus encouraging them to try the new species and providing them with the opportunity to make a more informed decision.

b.) Adopter classifications

Equally important to the successful introduction of a new industrial product is the concept that not all potential customers display the same propensity for trying and adopting new products (Baker 1975; Kotler and Armstrong 1991). For example, there may be certain religious, social, economic or political constraints that impact a potential customers receptivity towards a new product. In addition, potential customers have different attitudes towards risk. Since the purchase of any new product is associated with a specific level of risk, those potential customers who possess a low aversion to risk would be more likely to try a new product (Kotler and Armstrong 1991). Thus, it is important that a manager be able to identify differences in customer innovativeness and risk aversion as a way to focus their marketing activities on customers who display the greatest propensity for trying a new product.

Baker (1975) discusses a methodology for classifying potential customers into categories based upon their receptivity towards new products. The five categories defined by Baker include: innovators, early adopters, early majority, late majority, and laggards. For the purposes of his discussion, Baker defines his adopter categories to correspond to the standard deviations of a normal distribution, although he indicates that there is little empirical evidence to support this. As a result, he proposes that 2.5% of potential customers can be classified as innovators, followed by early adopters (13.5%), early majority (34%), late majority (34%) and laggards (16%). While his segments are arbitrarily defined, they are based upon the premise that when a new product is introduced into the market only a small proportion of the population is initially willing to try it. As the new product is accepted by innovators, and is seen to perform well for them, other customers may be encouraged to try the product.

Thus, for each new product there is a small number of users who are pioneers or innovators, while the vast majority of potential users will try a new product only after it has been shown to function well. From the standpoint of a manager, it is the innovators who should be initially targeted when a new product is introduced onto the market. If the innovators can be persuaded to evaluate and adopt the new product, then it becomes much easier to market the product to other, less-innovative, customers. In the case of new industrial materials, research in the forest products industry in southeast Asia indicates that if a LUS is evaluated and accepted by an influential industry innovator, it is more readily accepted by other firms in the industry (Smith and Eastin 1990). Acceptance by an influential industry innovator, (often called a product champion), indicates to other manufacturers that the LUS under consideration is acceptable and reduces the risk associated with evaluating the new species.

It developed from the interviews that, while some of the managers exhibited an intuitive understanding of the concept of adopter categories, it was rarely a factor of consideration when introducing a LUS. Most participants indicated that they provided incentives to encourage trial use of new species but that they usually provided these incentives to their customers and rarely looked outside of their current customer portfolio. In all cases there was no explicit effort made to identify innovative customers or to focus a marketing strategy on these customers. None of the managers indicated that an effort had been made to identify a champion to evaluate a LUS prior to its being introduced into the market at large.

c.) Industrial market segmentation

This process of industrial market segmentation provides a manager with a tool for decomposing a large market (i.e., the forest products industry) into a series of smaller, differentiated segments (i.e., lumber, furniture, cabinets, etc.). The variables used during the segmentation process may be quantitative (i.e., annual sales, or number of employees) or qualitative (i.e., type of product manufactured, or raw material used). Irrespective of the segmentation variable employed, the objective of the segmentation process is to identify discrete groups that possess a minimum of internal variability while maximizing the variability between each group (Wind and Cardozo 1974). The process of segmenting an industrial market allows a manager to identify individual groups that possess a particular characteristic of interest. For example, segmenting the wood products industry by the type of product manufactured would provide a manager with the ability to match the technical specifications of a LUS with the technical raw material requirements of a particular industrial market segment (Day, Shocker and Srivastava 1979; Choffray and Lilien 1980; Davis 1988).

Following the market segmentation process, promotional strategies can be developed that target innovators within specific market segments (Crawford 1983; Lawless and Fisher 1990). The promotional strategy could either be directed towards all manufacturers within the market segment, or it could be targeted to a subset of innovative manufacturers. These innovative manufacturers could then be used as "champions" to influence acceptance of the new product within the industry as a whole (Moore 1987).

Most participants indicated that they do not actively analyze their customer base, or segment their markets. Most manufacture products to a set combination of species and products that have well defined markets in Europe. Import agents are then relied upon to sell the products. Lack of market information and inadequate knowledge of customer requirements restricts the ability of Ghanaian managers to develop effective marketing strategies.

3. Marketing Philosophy

The final component of the framework involves adopting a marketing philosophy within the firm (Kotler 1988; McCarthy and Perrault 1990; Kotler and Armstrong 1991). Kotler (1990) defines the marketing concept as "determining the needs and wants of target markets and delivering the desired satisfactions more effectively and efficiently than

competitors." In developing a marketing strategy, managers utilize the five marketing variables: product, price, promotion, distribution and service. The marketing philosophy is relatively new to the forest products industry where managers have traditionally employed a commodity selling approach. This approach emphasizes the efficient production of commodity products in an effort to achieve cost efficiencies with respect to competitors. In addition, it implicitly assumes that markets exist for the product and that price is the primary factor that influences the purchase decision of consumers.

During the course of the interviews it became obvious that few of the firms have adopted a marketing philosophy. Rather, the dominant management philosophy is a production-sales orientation. In fairness to the companies involved it should be noted that their ability to adopt a marketing orientation has been significantly restricted by regulatory factors. In addition, physical separation between the end-use markets and manufacturers adversely impacts the ability of managers to adopt a marketing orientation.

Several managers also indicated that they have been frustrated in their efforts to become more customer oriented because of the reluctance of export agents to share market information. In particular these managers indicated that export agents often refused to identify customers and were unwilling to share information on the technical requirements of their customers manufacturing processes. The net effect of this lack of information sharing within the channel of distribution has been that manufacturers in Ghana have, to a large degree, been cut off from the end-users of their products. This trend has been accentuated by the low level of infrastructure development within the telecommunications industry. While most forest products firms in Ghana have installed telephone systems, their operation is erratic and unpredictable.

Moderators

Regulatory factors

Governmental regulations and policies have long been identified as having a substantial impact on the business environment. Porter (1990) indicates that the most effective role for a government is in challenging firms to become more competitive and signaling firms about issues of national importance. However, there is always a danger that governments will become too closely involved in the business environment, a development that has negative implications for the competitiveness of local firms.

During the course of the interviews, regulatory factors were identified as the primary reason why most firms in Ghana have been unable to shift from a sales orientation to a marketing one. Government regulations restrict how most of the marketing variables are employed, thus influencing the type of marketing strategies that are available to a firm. For example, all international export sales contracted by forest products manufacturers must be reviewed and approved by a government board. Given the inconsistent communication system that exists in Ghana, this becomes a time consuming exercise. For those contracts where prices are deemed to be low, the contracts are returned to the firm for re-negotiation. Obviously this can have a substantial impact on a firm's reputation and reliability.

Similarly, government regulations make it almost impossible to arrange for trial shipments of LUS to be shipped to potential customers on a no-fee basis. While it is technically possible to arrange for trial shipments of LUS, paperwork and customs regulations make it almost impossible in a practical sense. Finally, government regulations were recently passed prohibiting export agents from receiving commissions from local firms for the sales that they arrange with customers in Europe. Prior to the regulation, export agents frequently established offices in Ghana and were readily accessible to managers of forest products firms. This accessibility, and the sense that export agents worked for the local industry, created an environment within which agents felt comfortable in sharing market information with local managers. However in response to the new regulations, most export agents closed their local offices in Ghana. In addition, commissions are now paid by the end-user of the products rather than by the Ghanaian producers. This change has engendered a change of partnership on the part of the export agents from their Ghanaian customers to their European customers, thus restricting the access of Ghanaian firms to current market intelligence.

Summary

This research proposes a conceptual framework that identifies the factors that influence the market acceptance of LUS. Exploratory research of the forest products industry in Ghana indicated that three factors influence the market acceptance of LUS: product-specific factors, market research, the marketing concept, and the commitment and innovativeness of management. In addition, regulatory factors are thought to have a moderating effect on the market acceptance of LUS.

The results of the exploratory interviews indicate that very few forest products firms have successfully introduced LUS into the marketplace. This lack of success can be attributed to the informal and unplanned process which most firms have employed in developing marketing strategies. In the future it would be interesting to conduct similar exploratory interviews with European import agents and manufacturers as a further corroboration of the conceptual model developed in Ghana.

RESULTS AND DISCUSSION

Results Of The Ghanaian Survey On Lesser-Used Species

Firm size

Firm size was determined based on the number of workers employed by the responding firm. Firm size ranged from thirty employees to 1,600 employees, with the majority of firms employing between 100 and 500 workers, Table 33. An analysis of the survey data indicates that over half of the respondent firms employ between 100 and 500 employees. Small firms (less than 100 workers) comprised 22.9 percent of the respondents while large firms employing over 500 employees represented 16.7 percent of the sample. The average number of employees of the respondent firms was 350, indicating that most of the firms involved in the export of forest products from Ghana are medium-sized.

Production capacities

Another indicator of firm size is the production capacity of a firm during an eight hour production shift. The survey data for the production capacity of lumber producers is presented in Table 34. Almost all of the respondents were engaged in the production of lumber with only three firms indicating that they did not produce lumber. The daily production capacity data indicate that the Ghanaian forest products industry is dominated by medium-size firms, with 72.7 percent of the firms producing between 11 and 50 m^3 of lumber during an eight hour shift. A substantial number of firms (7) produced less than 10 m^3 per day while five firms produced more than 50 m^3 per day and two firms produced in excess of 100 m^3 per day.

Production data was also obtained for veneer production and moulding production. A total of nine respondents were involved in the production of veneer. The daily rated production capacity of the veneer manufacturers was heavily skewed towards those firms that produce less than 100 m^3 per day (7 companies), with only two firms producing over 100 m^3 per day. A total of thirteen firms reported that they were engaged in the production of mouldings with all of these firms producing less than 25 m^3 of mouldings per day.

Table 33. Profile of survey respondents based on number of workers employed.

Firm Size	***Number of firms***	***Percent of respondents***
Small (1-100 employees)	11	22.9%
Medium (101-500 employees)	27	56.2%
Large (above 500 employees)	8	16.7%
No response	2	4.2%

Table 34. Summary of lumber production capacity of respondents mills during an eight hour shift.

Production volume	***Number of Firms***	***Percentage of Total***
1-10 cubic meters	7	15.6%
11-25 cubic meters	17	38.6%
26-50 cubic meters	15	34.1%
51-75 cubic meters	3	6.8%
76-100 cubic meters	0	0.0%
Over 100 cubic meters	2	4.6%

Raw material acquisition

In recent years the issuing of new forest concessions and the renewal of existing concession contracts has become an matter of increasing uncertainty to managers in the forest products industry. As a result, the level of uncertainty regarding the sourcing of raw material supply has increased substantially. To better understand the sourcing of raw materials, respondents were asked to provide information regarding their sources of raw material inputs for their manufacturing operations.

Respondents indicated that an average of 41.1 percent of the raw material inputs into their manufacturing operations were derived from their own forest concessions, Table 35. While this might seem to imply that many manufacturers are obtaining a substantial proportion of their raw material requirements from their own concessions, the survey data indicates a different story. Fully one-third of the respondent firms (16 companies) do not have concessions and purchase all of their raw material requirements on the open market. An additional 12.5 percent of respondents (6 firms) derived less than 25 percent of their own log requirements from their concessions. In contrast, only 20.8 percent (10 firms) obtained ninety percent or more of the raw materials from their own concessions. Thus, the majority of the raw material inputs used by the responding firms were obtained from other concessions, other manufacturers, or were purchased from farmers wanting to clear their farm land. A substantial, yet unknown, volume of timber is also obtained from both legal and illegal chainsaw operators.

Table 35. Summary of raw material inputs derived from respondents own concessions.

Raw material source	***Number of Firms***	***Percentage of Total***
100% from own concessions	6	12.5%
76-99% from own concessions	9	18.8%
51-75% from own concessions	3	6.2%
26-50% from own concessions	8	16.7%
1-25% from own concessions	6	12.5%
0% from own concessions	16	33.3%

Table 36. Export markets served by survey respondents.

Export Market	*Number of firms*	*Percentage of Exports*
Germany	36	37.9
UK	35	20.6
France	26	11.0
Italy	23	10.0
Spain	7	2.8
USA	10	2.1
Other		15.6

Exports

Virtually all of the respondents export at least part of their production, with only two firms indicating that they did not export, Table 36. The main export markets were Germany (37.9%), the UK (20.6%), France (11.0%), and Italy (10.0%). Almost three-quarters of the exports reported were air-dried lumber (71.6%), kiln-dried lumber (13.3%), sliced veneer (6.3%), and rotary peeled veneer (4.4%). Virtually all of the respondents exported primary wood products such as lumber, plywood, or veneer, with very few firms exporting value-added wood products, Table 38.

Respondents were also asked to provide information on the distribution channels they use to export products. In particular, they were asked to estimate what percentage of their exports were through an import broker or agent versus exporting direct to the final customer. The survey data shows that the vast majority of respondents employed a single type of distribution channel strategy for exporting their products, Table 37. Almost two-thirds of the respondents indicated that they either export exclusively through import agents or brokers (39.6%) or they export direct to the final customer (27.1%). Approximately one third (31.2%) of the respondents have developed a distribution strategy incorporating both import agents and direct sales to the end-user. Only about fifteen percent of the respondents (7 firms) reported using a somewhat balanced distribution strategy where at least thirty percent of their exports were directed into both types of distribution channels.

Table 37. Summary of distribution channels for export products.

Type of distribution channel	*Number of firms*	*Percent of Total*
100% through a broker/agent	19	39.6%
50-99% through a broker/agent	11	22.9%
1-49% through a broker/agent	4	8.3%
100% direct to the final customer	13	27.1%
Other type of distribution channel	1	2.1%

Table 38. Export market and product matrix for survey respondents in 1996 (in cubic meters).

Country	Air Dried Lumber	Kiln-Dried Lumber	Rotary Veneer	Sliced Veneer	Profile Boards	Plywood	Boules	Flooring	Totals	
Germany	57,946	7,144	3,169	472		287	1,726		**70,744**	*37.9%*
United Kingdom	28,367	9,339				629	84		**38,419**	*20.6%*
Italy	11,271	1,011	150	3,889	21		272	2,135	**18,749**	*10.0%*
France	9,228	2,102	2,031	6,863			263		**20,487**	*11.0%*
USA	3,315	22	455	91			78		**3,961**	*2.1%*
Belgium	1,054	165	894	91			81		**2,285**	*1.2%*
Spain	4,860	26	68				227		**5,181**	*2.8%*
Holland	3,328	22		91	546		945		**4,932**	*2.6%*
Ireland	2,649	22		91			80		**2,842**	*1.5%*
West African sub-region	1,150								**1,150**	*0.6%*
Other	10,687	4,981	1,391	190		303	446	102	**18,100**	*9.7%*
Totals	**133,855**	**24,834**	**8,158**	**11,778**	**567**	**1,219**	**4,202**	**2,237**	**186,852**	
	71.6%	*13.3%*	*4.4%*	*6.3%*	*0.3%*	*0.6%*	*2.2%*	*1.2%*		***100%***

Table 39. Respondent perceptions of how tropical hardwood boycotts have affected demand for their products.

	Average Impact Rating*
Impact of boycott on demand	3.72

* The impact on demand was measured using a Likert-like scale where 1=No effect and 7=Significant reduction.

Impact of tropical hardwood boycotts

Tropical hardwood boycotts have been initiated in a number of developed countries, particularly in Europe, in an effort by environmental groups to reduce market demand for tropical hardwoods. Tropical hardwood boycotts have been around for over ten years and virtually all of the Ghanaian respondents (92%) were aware of them. Respondents were asked to evaluate the impact that tropical hardwood boycotts have had on the demand for their products. The survey results indicate that respondents feel that boycotts in developed countries have had a moderately negative impact on the demand for their products, Table 39. One of the reasons why the boycotts in Europe have not had a more substantial impact on the forest products industry in Ghana is the fact that exporters have begun to look towards the less environmentally sensitive countries of Asia to replace lost markets in Europe. To a large degree, exporters have been successful in implementing this strategy, but this success has resulted in other problems.

Although respondents reported that tropical hardwood boycotts have had only a moderate impact on their export sales, they also recognize that boycotts of tropical timber could present a more significant risk to their business activities in the future. The tropical hardwood boycotts in Europe were perceived as the second most significant risk facing the Ghanaian timber industry, Table 40. However, respondents reported that the single greatest risk confronting their business operations was the lack of a long-term forest concession policy in Ghana. This factor was rated significantly higher than all of the other factors in terms of level of risk. Other factors that were perceived to represent more than a medium level of risk included government regulations, timber resource availability, and the economic environment in Ghana. The remaining six factors were perceived to represent lower levels of risk to the timber industry.

Respondents were next asked to evaluate the effectiveness of a variety of strategies in responding to the tropical hardwood boycotts, Table 41. The single most effective strategy was perceived to be the adoption of sustainable forest management practices. This factor was rated as being significantly more effective than all other factors. Two other factors, cooperation with environmental groups and the development of the value-added wood processing sector, were also perceived to be very effective. Four strategies were rated as being relatively ineffective while the least effective strategy was perceived to be ignoring the boycott. It is interesting to note that while the Asian markets have recently become more prominent in the Ghanaian export statistics, the strategy of shifting the export focus to less environmentally sensitive markets was not rated as being a particularly effective strategy.

Table 40. Perceived level of risk posed by different factors in Ghana.

Risk Factor	*Average Risk Rating**
Lack of a forest concession policy	5.81
Tropical hardwood boycotts	4.74
Government regulations	4.64
Timber resource availability	4.40
Economic environment	4.38
Accessibility of foreign exchange	3.27
Timber certification/labeling programs	3.22
Political environment	3.15
Confiscation/expropriation of property	2.79
Restriction on repatriation of profits	2.58
Sustainable forest management	2.52

* Risk was measured using a Likert-like scale where 1=No risk, 4=Medium risk, and 7=High risk.

Table 41. Perceived effectiveness of different strategies in responding to a boycott.

Strategic Response	*Average Effectiveness Rating**
Adopt sustainable forest management	6.30
Cooperate with environmental groups	5.47
Shift product mix to value-added products	5.07
Certify timber products	4.81
Utilize lesser-used species	4.76
Advertise to consumers	4.65
Advertise to industry	4.15
Export to less environmentally sensitive markets	3.68
Export to regional markets	3.30
Focus on domestic markets	2.64
Reduce prices	2.17
Ignore the boycott	1.89

* Effectiveness was measured using a Likert-like scale where 1=Not effective, 4=Somewhat effective, and 7=Very effective.

Table 42. Impact of boycotts on strategic developments in the forest products industry.

Strategic Impact	*Average Impact Rating**
Sustainable forest management	6.04
Development of value-added industry	5.32
Increased use of lesser-known species	5.26
International competitiveness	4.57
Participation in industry associations	4.47
Capital investment in processing equipment	4.09
Capital investment in manufacturing facilities	3.78

* Impact was measured using a Likert scale where 1=Strongly discouraged, 4=No impact, and 7= Strongly encouraged.

Respondents were also asked to estimate the impact of the tropical hardwood boycotts on the strategic development of the forest products industry in Ghana. Interestingly, the respondents perceived that one of the impacts of boycotts has been to encourage and support the development of the value-added industry, Table 42. The primary impact of the boycotts from a strategic perspective, however, has been to promote the development of sustainable forest management practices, including the increased utilization of previously ignored lesser-used species. While each of these strategic developments has the potential to increase the international competitiveness of the Ghanaian forest products industry in the future, at present they were perceived to have had little impact on international competitiveness. A cautionary note should be sounded regarding the fact that respondents reported that tropical hardwood boycotts have had a negative impact on new investments in manufacturing plants and processing equipment.

Taken together, it appears that respondents perceive that while the forest products industry in Ghana is undergoing a period of dynamic change, the net result of this change will be a more efficient industry focused on the production of value-added wood products that are more competitive in international markets. The results also suggest that lesser-used species will play an important role in the raw material mix of the future. From a marketing perspective, the challenge is not so much gaining manufacturers acceptance of lesser-used species, rather it is to provide manufacturers with the necessary technical information and promotional material to support the increased utilization of lesser-used species.

Table 43. Utilization and marketing of lesser-used species in Ghana.

	Yes	*No*
Process LUS	32 (66.7%)	16 (33.3%)
Export products from LUS	26 (54.2%)	22 (45.8%)

Utilization and marketing of lesser-used tropical species

The results of the industry survey suggest that Ghanaian manufacturers are already processing lesser-used species. Two-thirds of the respondents reported that they incorporate lesser-used species into their raw material mix, Table 43. Of those companies that process lesser-used species, more than half (54.2%) are exporting these products. Despite this apparent success in developing markets overseas for lesser-used species, survey respondents reported that their export customers are reluctant to accept products manufactured from the lesser-used species, Table 44.

This reluctance to try lesser-used species is perhaps best symbolized by a Ghanaian manufacturer who reported sending his foreign customer a shipment of lumber that included a substantial volume (about 25%) of a lesser-used species. This lesser-used species was very similar to the traditional species with which it was mixed, both in terms of visual and technical characteristics. Some time later the exporter inquired as to the performance of the shipment of lumber and was informed by his customer that he had encountered no unusual problems during the processing of the lumber. The exporter then informed the customer that part of the shipment had consisted of a lesser-used species that could be supplied at a substantial price discount. Despite his favorable experience with the lesser-used species, the customer chose to continue importing the higher priced, traditional species on the grounds that he was more familiar with the performance of this species. In addition, requested that lesser-used species not be included in future shipments of lumber.

Table 44. Respondents perceptions of customer acceptance of lesser-used species.

	Average Acceptance Rating*
Acceptance of LUS by foreign customers	3.62

Acceptance of LUS was measured using a Likert-like scale where 1=Not at all, 4=Reluctantly, and 7=Very Readily.

To develop a better understanding of the extent to which lesser-used species are utilized in Ghana and the range of products for which they are used, survey respondents were asked to estimate the volume of lesser-used species they utilized in the production of a wide range of products. The survey results indicate that 47,949 m^3 of lesser-used species were processed by respondents in 1995, Table 45. While thirteen of the fourteen lesser-used species included in the survey had been used by at least one respondent, the primary lesser-used species being processed were Onyina (62.0%), Otie (17.1%), Ogea (7.9%), and Esa (6.1%). The main products manufactured from lesser-used species included rotary peeled veneer (71.0%), air-dried lumber (11.1%), and kiln-dried lumber (10.9%).

An analysis of the survey data suggests that many of the lesser-used species are utilized in the manufacture of specific products. For example, Onyina, Ogea, and Bediwonua were primarily used in the production of rotary peeled veneer; and Denya, Bomsandua, and Wawabima were principally used in the production of air-dried lumber. Other species were used in a wide variety of products. For example, while 66% of the Esa was processed into kiln-dried lumber, substantial volumes were used to manufacture profile boards, air-dried lumber, and rotary veneer. Similarly, while 52% of the Otie was manufactured into lumber (both kiln-dried and air-dried), substantial volumes were used to manufacture rotary peeled veneer and other products.

Table 45. Summary of end-uses for each of the lesser-used species included in the project, as reported by respondents (in cubic meters).

Species	Air Dried Lumber	Kiln-Dried Lumber	Rotary Veneer	Sliced Veneer	Profile Boards	Plywood	Other	Totals	
Albizia ferruginea ***(AWIEMFOSAMINA)***	593 *(8)*				50			**643**	*1.3%*
Antrocaryon incraster ***(APROKUMA)***	9		151					**160**	*0.4%*
Bombax brevicupse ***(ONYINAKOBEN)***	22		601			398		**1,021**	*2.3%*
Canarium schweinfurthii ***(BEDIWONUA)***	83 *(2)*		708 *(2)*			28		**819**	*1.8%*
Ceiba pentranda ***(ONYINA)***	684 *(5)*		26,747 *(4)*			246 *(2)*		**27,677**	*62.0%*
Celtis spp. ***(ESA)***	407 *(5)*	1,800	123		415 *(2)*			**2,745**	*6.1%*
Chrysophyllum giganteum ***(AKASA)***	200	364 *(2)*		42				**606**	*1.3%*
Cylicodiscus gabonensis ***(DENYA)***	786 *(4)*					100	50	**936**	*2.0%*
Daniela ogea ***(OGEA)***	119 *(2)*		3,665 *(4)*					**3,784**	*7.9%*
Distemonanthus benthamianus ***(BONSAMDUA)***	890 *(6)*							**890**	*1.9%*
Petersianthus macrocarpus ***(ESIA)***	150 *(2)*							**150**	*0.3%*
Pycnanthus angolensis ***(OTIE)***	1,160 *(3)*	3,080 *(2)*	2,001 *(3)*			31	1,931 *(2)*	**8,203**	*17.1%*
Sterculia rhinopetala ***(WAWABIMA)***	270 *(3)*		45					**315**	*0.7%*
Strombosia glaucescens ***(AFENA)***								**0**	*0.0%*
Totals	**5,343**	**5,244**	**34,041**	**42**	**465**	**803**	**1,981**	**47,949**	
	11.1%	*10.9%*	*71.0%*	*0.1%*	*1.0%*	*1.7%*	*4.1%*		***100%***

- Numbers in parentheses indicate the number of firms who reported using a particular lesser-used species. Where there is no number in parentheses this indicates that only one firm reported using the species for the particular end-use application.

Table 46. Perceived importance of different factors in promoting the acceptance of lesser-used species.

Strategic Factor	*Average Importance Rating**
Availability of technical information	6.17
Availability of long-term supply	6.15
Acceptance by influential trader/manufacturer	5.32
Ability to export small trial volumes	5.24
Low initial trial price	4.38
Risk-free trial shipments	4.11
Money-back guarantees	3.48

* Importance was measured using a Likert-like scale where 1=Not important, 4=Somewhat important, and 7=Very important.

The survey results indicate that forest products manufacturers in Ghana have some experience in the marketing of lesser-used species, both to their domestic customers as well as their foreign customers. To incorporate their experiences into this study, respondents were asked to evaluate the importance of a variety of factors in promoting the acceptance of lesser-used species, Table 46. Whereas all of the factors were perceived as being somewhat important in promoting the acceptance of lesser-used species, two groups of factors were rated as being very important. The first group of factors, consisting of the availability of technical processing information and the availability of a reliable long-term supply, was rated as being significantly more important than all of the other factors. The second group of factors, acceptance of a lesser-used species by an influential manufacturer or trader and the ability to export small trial volumes, while rated as being less important than the first group of factors, was still perceived as being very important.

Acquisition of market information

An important consideration in the development of an effective marketing strategy for introducing lesser-used species into the marketplace involves establishing an efficient flow of information between producers, their customers and the end-users of lesser-used species. Unfortunately, importers and wholesalers are often reluctant to provide foreign manufacturers with detailed market information or to identify their customers for fear that foreign manufacturers will use this information to bypass them and sell their products direct to the end-user. Thus, the establishment of an effective flow of information between the market and the manufacturer requires that a high degree of trust be established between manufacturer and importer.

This reluctance of importers and agents to provide detailed market information, particularly with respect to their customers, is a particular problem for Ghanaian producers. As noted earlier, fully forty percent of Ghanaian exporters rely entirely on import agents to sell their products while an additional twenty percent sell more than seventy percent of their exports to import agents and brokers. Having little direct contact with foreign markets and customers, these producers find it difficult to obtain accurate market information.

Table 47. Perceived importance of different strategies for acquiring market information.

Strategic Factor	*Average Importance Rating**
Discussions with importers/agents	6.22
Discussions with customers	6.21
TEDB market intelligence reports	5.71
Discussions with other manufacturers	5.28
Industry journals	4.93
Attend industry exhibitions	4.81
Attend industry trade shows	4.65
Industry associations	4.58
Conduct own market research	4.54
Hire a consultant to conduct market research	3.11

* Importance was measured using a Likert-like scale where 1=Not important, 4=Somewhat important, and 7=Very Important.

Survey respondents were asked to evaluate the importance of a variety of factors in acquiring market information. The results of the survey data indicate that all of the strategies, with the exception of one, were perceived as being effective in acquiring market information, Table 47. However, three strategies (discussions with importers and import agents, direct discussions with customers (when possible), and reading market intelligence reports published by TEDB) were perceived as being most effective. Only one of the strategies, hiring an outside consultant, was perceived as not being important. The remaining strategies were rated as being somewhat important.

Two strategies (attending trade shows and attending industry exhibitions) warrant further discussion. During discussions with industry managers and association representatives in Ghana, the importance of these strategies for gaining market exposure for lesser-used species was emphasized. These managers indicated that, while it is difficult for them to regularly attend international trade shows and exhibitions, these forums in the domestic arena have been equally important mechanisms for promoting lesser-used species both to their domestic customers and to the foreign buyers who attend.

It is important to note that while trade shows and industry exhibitions were perceived as effective forums for acquiring market information, they also provide important opportunities for manufacturers, research institutions, and industry associations to showcase products manufactured from lesser-used species and provide potential customers with information about these species. This opportunity is important and should not be overlooked when developing a marketing strategy to promote the lesser-used species.

Table 48. Perceived importance of different strategies for identifying new customers and market opportunities.

Strategic Factor	*Average Importance Rating**
Customer recommendations	5.55
Customer leads from importers or agents	5.47
Direct contact from new customers	5.33
Customer leads from TEDB	4.77
Industry trade shows	4.65
Company sales staff	4.39
Industry exhibitions	4.21
Information from an industry association	4.09
Customer leads from other manufacturers	3.78

* Importance was measured using a Likert-like scale where 1=Not important, 4=Somewhat important, and 7=Very Important.

Finally, survey respondents were asked to rate the importance of different strategies for identifying new customer and market opportunities. The highest rated strategies were reported to be customer recommendations, customer leads from import agents, and direct contact from new customers, Table 48. The third strategy, direct contact with new customers, provides support for the argument that participation in trade shows is an effective strategy for promoting lesser-used species and developing new customers. The remaining strategies were perceived as being somewhat important strategies for identifying new customers and market opportunities.

Results of the US and UK/Ireland Surveys on Lesser-Used Tropical Species

A similar survey to that conducted in Ghana was administered in the US to one hundred importers and wholesalers of tropical hardwoods and in the UK/Ireland to 38 import brokers and agents. The high response rates (68% in the US and 58% in the UK/Ireland) should be interpreted as an indication of the interest of importers and wholesalers in these countries regarding the utilization of lesser-used species. The survey instrument is presented in Appendix C.

On average, tropical timber species represented 41.3% of lumber sales, 12.1% of plywood sales, and 12.0% of veneer sales for the US respondents in 1996. In the UK/Ireland survey the percentage of tropical timber species in the total sales was similar to that in the US: 44.3% of lumber sales, 13.6% of plywood sales and 8% of veneer sales. US survey respondents indicated that they imported 25.3% of their tropical hardwood imports from Africa, 49.2% from South America, and 24.5% from Southeast Asia. British and Irish respondents reported a somewhat different mix of supply sources than did the Americans. On average, 52.6% of their imports were from Africa, 24% were from S. America, and 22% were from Southeast Asian countries. Please note that these figures are averages and that most of the respondents imported products from more than one region.

The results of the survey indicate that a high percentage of the US respondents (80.6%) are currently importing lesser-used tropical timber species, while only about half (52.4%) of the UK/Ireland respondents are importing LUS. The participants in both surveys indicated that, on average, their customers are reluctant to accept lesser-used species. However, a small percentage of respondents (14.9% in the US and just 4.8% in the UK/Ireland) indicated that their customers accepted lesser-used species quite readily. A similar percentage in both countries (14.9% in the US vs. 4.8% in the UK/Ireland) suggested that their customers were not willing to try lesser-used species at all.

The survey respondents were asked to indicate how important different strategies were in promoting market acceptance of lesser-used tropical timber species in the US. By far, the most important factor for respondents in both surveys was the availability of a reliable long-term supply of the lesser-used species, Table 49. No other factor was rated as highly as this single factor. Three other factors (the availability of small trial volumes, the availability of technical information, and a low trial price) were rated as being important in both surveys. Interestingly, the top four strategies were virtually the same in both surveys. While all other factors were perceived as being of lesser importance by the US respondents, the respondents in the UK/Ireland felt that sustainable certification of tropical timber and acceptance of lesser-used species by an influential company would be effective strategies. The importance ratings for these two strategies provided by respondents in the UK/Ireland were significantly higher than those provided by the US firms.

Table 49. Perceived importance of different factors in promoting the acceptance of lesser-used species (US and UK/Ireland respondents).

Strategic Factor	***Average Importance Rating* (US firms)***	***Average Importance Rating* (UK/Ireland firms)***
Availability of long-term supply	6.46	6.67
Availability of small trial volumes	5.48	5.90
Availability of technical information	5.36	5.86
Low initial trial price	5.18	5.90
Availability of promotional materials	4.81	5.20
Money-back guarantees	4.72	4.71
Acceptance by influential trader/manufacturer	4.48	5.33[a]
Certification of sustainability	4.39	5.52[a]

* Importance was measured using a Likert-like scale where 1=Not important, 4=Somewhat important, and 7=Very Important.

[a] indicates that the difference in importance rating between the US and UK firms was significant at the .05 percent level.

The respondents were also asked to identify the single most important factor in promoting the acceptance of lesser-used tropical species. The results of this question indicate that the single most important factor was the availability of a reliable supply of products, followed by a low trial price, Table 50. The results of this question were interesting in that they are somewhat different from the importance ratings presented in Table 49. However, when the two sets of data are taken together, it is possible to develop a better understanding of the factors that influence the development of an effective marketing strategy for promoting lesser-used tropical species: the availability of a reliable long-term supply, a low trial price, the availability of promotional materials, and the availability of technical information.

Table 50. Summary of factors identified as being the single most important in promoting lesser-used species.

Strategic Factor	**Number of Responses (UK/Ireland)**	**Number of Responses (US)**
Availability of a reliable long-term supply	8	28
Low trial price	8	24
Availability of promotional materials	3	11
Availability of technical information	3	8
Color/appearance of the species	1	7
Consistency of the wood grain	1	7
Processing characteristics	4	5
Substitutes for an established species	4	4
Availability of small trial volumes	2	4
Acceptance by an influential company	1	2

Comparison of the Results Obtained from the Ghana, US and UK/Ireland Surveys on Lesser-Used Tropical Species

Most of the survey participants in the three countries were aware of the boycotts that have been initiated against tropical hardwoods. All of the respondents in the UK/Ireland had heard of them while 97% of the respondents in the US and 92% of the respondents in Ghana were aware of them. Respondents in all of the countries felt that adopting sustainable forest management practices was an effective strategy in responding to the tropical hardwood boycotts. They also felt that the utilization of lesser-used tropical timber species constituted an important component of sustainable forestry.

On average, the respondents indicated that the boycott of tropical timber has moderately reduced demand for tropical hardwood products. A substantial number of respondents in Ghana (25%) reported that the boycotts had substantially reduced the demand for tropical hardwood products, while smaller number of respondents in the US (6%) and the UK/Ireland (9.6%) reported substantial declines in demand. In contrast, a large proportion of the respondents in each country (39.6% in Ghana, 38.8% in the US, and 14.3% in the UK/Ireland) felt that the boycotts have had no impact on the demand for tropical hardwood products.

A majority of the respondents in each of the countries reported that they are currently using or marketing lesser-used tropical timber species. Over 80% of the respondents in the US and two-thirds of the respondents in Ghana are using LUS, while just over half (52.4%) of the respondents in the UK/Ireland are using them. Despite their reported high use of LUS, respondents reported that their customers are reluctant to accept lesser-used tropical timber species in place of the more traditional species. It appears obvious that the challenge for gaining a broader market acceptance of LUS lies not in convincing processors in the producing countries, importers, and wholesalers to use them, but rather to focus future market promotion activities on foreign manufacturers and end-users.

Respondents in each country were also asked to evaluate the effectiveness of a variety of strategies in promoting the acceptance of LUS. The results of the survey data are presented in Tables 46 and 49. A comparison of this data across the different countries included in the study provides some interesting insights into what factors might constitute an effective marketing strategy for LUS. The survey data on strategies for promoting the effectiveness of LUS was analyzed two ways, raw averages across all of the countries and weighted averages taking into account the different sample size obtained from each country, and the results were consistent in both cases.

The weighted averages for the importance of the different marketing strategies in promoting market acceptance of lesser-used tropical timber species are presented in Table 51. The data indicates that the four highest rated marketing factors were all considered to be very important in gaining market acceptance of lesser-used species. By far, the most important factor was the availability of a long-term supply. The other

factors, in order of perceived importance were: the availability of technical material, the availability of small trial volumes, and a low initial trial price.

Two other factors were presented to the respondents in the US and the UK/Ireland that were not included in the Ghanaian survey. These factors were: the availability of a broad range of products manufactured from lesser-used species and the certification of lesser-used species as being sustainably produced. Survey respondents rated the availability of a broad product line as being only moderately effective and it received the lowest importance rating of all the factors. The other factor, certification of sustainability, on average was perceived as being only moderately important. However, the UK/Ireland respondents felt that this strategy would be very effective while US respondents felt that it would only be moderately effective in promoting the market acceptance of lesser-used species.

Table 51. Perceived importance of different factors in promoting the acceptance of lesser-used species (weighted average for all respondents).

Strategic Factor	***Average Importance Rating****
Availability of long-term supply	6.43
Availability of technical information	5.79
Availability of small trial volumes	5.54
Low initial trial price	5.15
Acceptance by influential trader/manufacturer	4.91
Certification of sustainability	4.71
Money-back guarantee	4.39
Availability of a wide product line	4.33

* Importance was measured using a Likert-like scale where 1=Not important, 4=Somewhat important, and 7=Very Important.

End-Use Applications for Lesser-Used Species in Ghana

In identifying appropriate end-uses for the lesser-used species included in this study, a variety of characteristics were taken into account. These characteristics can be summarized as visual/aesthetic characteristics (color and texture of the wood), physical properties (relative density, volumetric shrinkage, drying, preservative treatability, and durability), mechanical properties (strength), processing characteristics (sawing, machining, and finishing), and potential market opportunities for individual products. The information used to determine end-uses was derived from earlier components of the lesser-used species project. In addition, the recommendations of the furniture consultant for this project, Mr. Karl-Gosta Nilsson, were instrumental in determining the most appropriate end-use applications for each of the selected lesser-used species. Once the appropriate species/product combinations were identified, prototype products were manufactured and tested. The results of the manufacturing and testing process provided a basis for determining the final species/product combinations. A summary of the recommended end-use applications, as well as the target markets for these products, is presented in Table 52.

It should be noted that late in the project the number of species included in the project was changed from fourteen to six. As a result, the species data obtained from the survey of Ghanaian sawmills and reported in the results section of this report (Table 45) does not match the abbreviated list of species presented in Table 52. In addition, two of the six species listed in Table 52, Kyenkyen and Ohaa, were not included in the initial group of fourteen species but were added later. Finally, the results of the Ghanaian survey indicate that Onyina is being processed in significant volumes (27,677 m^3 in 1995) and probably should not be considered a lesser-used species any longer.

Table 52. Summary of recommended end-uses for some Ghanaian lesser-used species.

Species	Outdoor Chairs	Outdoor Tables	Deck Boards	Sunbed/ Recliner	Parquet Flooring	Pallets
Antiaris toxicaria ***(KYENKYEN)***						D/E
Ceiba pentranda ***(ONYINA)***						D/E
Celtis spp. ***(ESA)***	D	D	D/E	D	D	
Cylicodiscus gabonensis ***(DENYA)***			D/E		D	
Petersianthus macrocarpus ***(ESIA)***	D	D	D/E	D	D	
Sterculia oblonga ***(OHAA)***	D	D	D/E	D	D	

D signifies that the product is suitable for the domestic market.
E signifies that the product is suitable for the export market.

FINAL RECOMMENDATIONS

Based on the information derived from the market surveys, a preliminary marketing strategy was developed to facilitate the introduction and acceptance of lesser-used timber species from Ghana, Table 53. The factors that constitute the marketing strategy include: 1) determine the technical characteristics of each LUS, 2) identify appropriate end-uses for each LUS, 3) identify established species for which each LUS can be substituted, 4) develop a reliable resource and product supply, 5) identify and target appropriate niche markets, including domestic and regional markets, 6) develop effective promotional materials as part of a comprehensive promotional strategy, 7) develop an effective marketing strategy for each market segment, 8) assist local firms in acquiring reliable market information, and 9) provide technical and marketing support to the local industry, importers, and end-users.

Determine the technical characteristics of each LUS. It is crucial that the appropriate technical and processing information be developed to ensure the successful introduction of the lesser-used species. The information that needs to be available to local processors includes the physical and mechanical properties of the wood. But the development of technical information needs to extend beyond deriving the basic wood properties. More importantly, the information about the basic wood properties needs to provide the basis for developing kiln drying schedules, preservative treatment processes, and providing recommendations on the processing characteristics of each species. This technical information should be summarized in a series of technical publications that can be provided to manufacturers interested in processing lesser-used species.

Identify appropriate end-uses for each LUS. The technical information should provide the basis for making recommendations about the appropriate end-uses for each lesser-used species. While the technical characteristics and properties of a species are a good indicator of the end-use applications for which it might be appropriate, they are not fool proof. To ensure that a LUS is appropriate for a specific end-use application, it is important that prototype products be manufactured, tested, and evaluated. These prototype products could also be used as demonstration products at international and domestic trade shows and industry exhibitions.

Identify established species for which each LUS can be substituted. The technical information should also be used to identify higher priced traditional species for which each lesser-used species can be used as a substitute. This information should provide the basis for encouraging end-users to try a LUS as a substitute for the higher priced traditional species that an end-user is currently processing. Emphasis should be focused on the fact that the LUS is technically similar to the traditional species but is available at a discounted price.

Develop a reliable resource and product supply. Nothing is more frustrating to an end-user than investing a substantial amount of time, energy, and capital in evaluating a lesser-used species only to find that, at the end of the process ,the species is not available. It is critical to the successful introduction of lesser-used species that no marketing programs be initiated until a reliable supply of product is available for customers to purchase. The premature development of demand for a lesser-used species prior to the availability of supply can undermine all of the previous efforts that have gone into developing a marketing strategy for introducing the lesser-used species. Time and again, industry managers in Ghana and the Philippines emphasized the fact that it is one thing for research organizations to develop the necessary technical, processing, and end-use information to begin marketing lesser-used species. However, it is quite another matter entirely for government agencies to put into place the requisite polices that allow for the develop and acquisition of lesser-used species from the forest. These managers noted that until these policies are in place and seen to be effective, then there was little incentive for them integrate lesser-used species into their raw material mix.

Identify and target appropriate niche markets, including domestic and regional markets. Each lesser-used species possesses a unique set of wood properties which, to a large extent, define the types of products that can be manufactured. In addition, within the wood processing industry is a group of manufacturers who are innovative and therefore more willing to try a lesser-used species. In order to maximize the chances for successfully introducing lesser-used species into the marketplace, it is important that each lesser-used species be promoted, at least initially, to those manufacturers who would be most likely to try the species.

Develop effective promotional materials as part of a comprehensive promotional strategy. While the technical information developed about each lesser-used species should be a component of the promotional material, the basic function of the promotional material should be to encourage processors to try these species. The promotional material should include attractive photographs of the lesser-used species and the products manufactured from them. They could also include wood specimens of each lesser-used species. The promotional material should also include general information on each lesser-used species including the volume of the available resource, basic wood properties, a summary of the technical information, and a listing of the appropriate end-use applications. Where appropriate, the promotional material should emphasize the ability of the lesser-used species to substitute for traditional species that may be higher priced or in short supply. Finally, the promotional strategy should identify the appropriate outlets and forums for making this information available to manufacturers and exporters.

Develop an effective marketing strategy for each market segment. Having developed the information described in the previous steps, it is time to synthesize this information into a marketing strategy that will maximize the chances of gaining the acceptance of the lesser-used species in the marketplace. This includes identifying the appropriate product mix and targeting these products to those customers who are most likely to try a lesser-used species. It means establishing a pricing policy that will encourage end-users to try lesser-used species in preference to the more established species. It means identifying distributors who have experience selling lesser-used species or who have demonstrated a willingness to invest the required time and effort in promoting these species and their products to their customers. It also means effectively integrating the promotional strategy into the marketing strategy. For example, this may include exhibiting products manufactured from lesser-used species at international exhibitions and trade shows. The net result of this process should be the development of a marketing strategy that effectively promoted lesser-used species to potential end-users.

Assist local firms in acquiring reliable market information. Not only is the acquisition of market information important for providing support for the identification of appropriate niche markets for each species, but it is equally important for identifying those product/market combinations where a specific lesser-used species would have the greatest chance of gaining market acceptance. This is true for both the domestic market and export markets. The process employed for acquiring market information should include both formal and informal channels, but should be institutionalized so that it can be used over the long-term.

Provide technical and marketing support to the local industry, importers, and end-users. Having invested a tremendous amount of resources in developing the information required to effectively market lesser-used species, FORIG should be prepared to provide assistance to local processors who are interested in incorporating these species into their raw material mix. In particular, FORIG should have a program in place to provide technical assistance in transferring prototype processing technologies to industrial scale manufacturing operations. However, given the structure of the wood processing industry in Ghana, it is equally important that they be able to provide technical assistance to smaller processing companies. FORIG and TEDB should also provide assistance to local firms in the marketing of lesser-used species by making available the technical information required to develop effective promotional materials.

Table 53. Marketing framework for introducing and promoting Ghanaian LUS.

Marketing Factors	***Strategic Considerations***
1. Determine the technical characteristics of each LUS	❖ Describe the physical and mechanical properties ❖ Describe the processing and finishing properties
2. Identify appropriate end-uses for each LUS	❖ Use technical information to identify the specific end-uses for which each LUS is best suited
3. Identify established species for which each LUS can be substituted	❖ Use technical information to determine if the LUS can be used as a substitute for one or more traditional species
4. Develop a reliable resource and product supply	❖ Document the availability of an adequate long-term supply of each lesser-used species being promoted ❖ Don't begin promoting a LUS until an adequate supply of the product is available to customers
5. Identify and target appropriate niche markets, including domestic and regional markets	❖ Focus marketing efforts on appropriate market niches by considering appropriate end-use applications and the ability of LUS to substitute for traditional species ❖ Identify appropriate distribution channels by looking for appropriate importers and wholesalers who specialize in tropical hardwoods ❖ Be willing to provide customers and end-users with support and information on the use of LUS ❖ Don't overlook the potential for supplying products from LUS into domestic and regional markets where customers may be more willing to try these new species, particularly if trial prices are low
6. Develop effective promotional materials as part of a comprehensive promotional strategy	❖ Document the resource availability of each species ❖ Produce an LUS brochure incorporating all species ❖ Produce individual pamphlets for each new species ❖ Include technical information in brochures and pamphlets ❖ Distribute promotional material at trade shows and industry exhibitions ❖ Display products at international and domestic trade shows and industry exhibitions ❖ Display and provide small samples of LUS at trade shows and industry exhibitions ❖ Make promotional materials and samples readily available to importers, distributors, and end-users
7. Develop an effective marketing strategy for each market segment	❖ Low prices encourage trial use and promote a more rapid penetration of the market ❖ Promotional and technical materials encourage trial use ❖ Assurance of a long-term supply encourages trial use ❖ Provision of small volumes encourages trial use ❖ Adapt marketing strategy for each market segment
8. Assist local firms in acquiring reliable market information	❖ Establish an information linkage throughout the distribution channel ❖ Develop the ability to use market information to monitor developments in the business environment
9. Provide technical and marketing support to the local industry, importers, and end-users	❖ Provide a program to transfer processing technologies from FORIG to the local industry ❖ Provide a program to provide marketing support (technical information and promotional material) to the local industry ❖ Provide a program to provide marketing support (technical information and promotional material) to distributors and end-users

MONITORING AND EVALUATION

In order to effectively monitor the market acceptance of lesser-used tropical timber species, it is recommended that FORIG and TEDB perform an annual survey of the timber industry. The objectives of the annual survey would be to monitor the utilization of lesser-used species, monitor market developments for products manufactured from lesser-used species and identify problems related to the utilization or marketing of lesser-used species at an early stage. The annual survey should be supplemented with in-depth personal interviews of managers of companies that are performing primary processing operations (lumber, veneer and plywood production) with lesser-used species as well as with the managers of value-added companies.

The annual survey should be kept short to encourage good response but designed so that the maximum amount of information can be derived from the questions. The initial annual survey should also be designed to be a longitudinal survey so that the results obtained from later surveys will be comparable with earlier survey results. The annual survey would allow researchers at FORIG and market analysts at TEDB to identify problems as they develop, note trends in market acceptance of lesser-used species and market preferences, identify ways to make product promotion and technical support materials more effective, identify new species to be investigated, monitor market/product shares over time, and modify marketing and promotional strategies in response to changes in domestic and/or international markets.

TEDB market analysts should supplement the annual survey with in-depth interviews with managers of companies involved in the processing and sale of lesser-used species as well as with end-users. These in depth interviews would provide TEDB market analysts with useful information related to the marketing activities associated with lesser-used species and identify potential problems. This strategy would also help provide useful information to supplement the quantitative information derived from the industry survey.

It is also suggested that TEDB and FORIG assemble a Lesser-Used Species Marketing Advisory Board. This advisory board, composed of managers of primary and value-added forest products companies, the Director of FORIG, the Managing Director of TEDB, the Head of FPIB, and representatives from the Forestry Department, would discuss issues that directly affect the supply and marketing of lesser-used species. In particular, it would provide a forum where value-added manufacturers could discuss their problems and concerns with primary processors and industry managers could engage in a constructive dialogue with the government officials responsible for developing policies related to the forest resource and the forest products sector.

Many of the managers in the Ghanaian forest products industry indicated that they are willing to try lesser-used species in their manufacturing operations. The primary reason they are not already doing this is because there is no ready supply of these species available. This has been primarily attributed to continued uncertainty about the future policy regarding the issuance of forest concessions. This report recognizes the need for

a policy that explicitly addresses the future of forest concessions in Ghana, particularly with respect to the harvest of lesser-used species from second-growth forests. Not only would such a policy help to promote the more efficient utilization of lesser-used species but, if properly designed and implemented, would support the development of a sustainable forest management policy at the national level.

The government should also establish and support a research program to investigate the silvicultural characteristics of the lesser-used species in Ghana. To a large extent, much of the area being established in the industrial plantations are exotic species such as Gmelina arborea and Albizia falcaterra. In addition, it would be very useful to know which of the Ghanaian lesser-used species, if any, have the necessary silvicultural characteristics to be used in plantation forestry. This research could be performed by FORIG and would identify the indigenous species that meet the silvicultural and economic criteria for plantation forestry. A proposal for this type of future research could be submitted to international funding agencies such as the International Tropical Timber Organization and the Food and Agriculture Organization.

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Appendix A

Results of a Survey Conducted by the Timber Export and Development Board (TEDB) Regarding the Utilization Lesser-Used Species by Processors, Furniture Manufacturers, Retailers, and Building Contractors in Ghana

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EXECUTIVE SUMMARY

One of the cardinal objectives of the 1994 Ghana Forest and Wildlife Policy is to promote the development of a viable and efficient forest industry for the optimum utilization of Ghana's forest resources for the benefit her economy and the social development of her peoples. Among the strategies to achieve this objective is one that seeks to develop the marketability and utilization of the abundant lesser-known and therefore lesser-used timber species in her forest.

In line with this policy, the Government of Ghana sought the help of the International Tropical Timber Organization (ITTO) to undertake a project to study the "Industrial Utilization and Improved Marketing of some Lesser-Used Ghanaian Timber Species from Sustainably Managed Forests". Six species namely *Ceiba petandra* (Onyina), *Celtis mildbraedii* (Esa), *Petersianthus macrocarpus* (Essia), *Cylicodiscus gabunensis* (Denya), *Sterculia oblonga* (Ohaa), and *Antiaris toxicaria* (Chenchen) were chosen for the study

This local market study therefore forms part of the "Improved Marketing" component of the project. It aims to establish availability of the species in Ghana's forests and determine the extent to which the species are known in terms of their physical and working properties. Other aims include assessing the extent of processing and usage, identifying difficulties associated with processing and finally evolve a framework for increased processing and utilization in the country.

The results of the study indicate that the species are indeed abundant in the forests and are among those targeted by the Forestry Department for active promotion. All the species are known in the processing industry and have found use in one or more products. Some of them, particularly, Ceiba and Chenchen have, in fact, become so well known and used that they probably do not fit the description of Lesser-Used Species (LUS) any more. In spite of this, both processors and users of the species have concerns relating to technical issues of processing, durability and long-term behaviour in service. This is especially so because most working knowledge of the species have so far been obtained through trial and error methods.

To effectively promote the species therefore, there is the need to further assure the industry of the availability of the species, develop technical processing data on them and disseminate the information efficiently to relevant stakeholders using methods that include training and exhibitions. The Forestry Department, Forestry Research Institute of Ghana and the Timber Export Development Board should all have roles in this. It is further suggested that some effort be made to utilize more of the species in government buildings and furniture. Lastly incentives such as tax relief and reduction in royalties may help to increase utilization of the species.

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Results of a Survey Conducted by the Timber Export and Development Board (TEDB) Regarding the Utilization Lesser-Used Species by Processors, Furniture Manufacturers, Retailers, and Building Contractors in Ghana

INTRODUCTION

Studies conducted in Ghana's forests since the mid 1980s by the Forest Resources Management Project (FRMP) indicate that the country abounds in many different kinds of timber species with good commercial potential. Of the over 680 species identified, it is reported that about 126 occur in sufficient volumes to be of commercial interest. However until the early 1990s, only about 30 species were regularly exploited and processed commercially.

The full impact of this kind of commercial timber exploitation on the forest ecology is yet to be assessed. But some warning signs have already appeared in some of the studies indicating that a number of Ghana's indigenous species are nearing economic extinction.

On the other hand the FRMP reports have also mention the need to expand the species base for industry as one of the ways of reducing negative logging impacts on the forest ecology. The reports in fact go further to suggest species which should be actively promoted because of their abundance in the forests.

In the light of these findings, the ITTO, at the instance of the Ghana Government, agreed to support this project on "Industrial Utilization and Improved Marketing of Lesser Used Species". It was the belief of both the ITTO and the Government of Ghana that, apart from helping to attain the year 2000 target for Sustainable Forest Management of Tropical High Forests, the project had a good potential for helping to meet some of Ghana's development needs. Six species namely *Ceiba petandra* (Onyina), *Celtis mildbraedii* (Esa), *Petersianthus macrocarpus* (Essia), *Cylicodiscus gabunensis* (Denya), *Sterculia oblonga* (Ohaa), and *Antiaris toxicaria* (Chenchen), were selected for the study.

This local market study was conducted as part of the Improved Marketing component of the project. This is because it appears more logical to first gain acceptance of the species at home before trying to sell them overseas.

The objectives of the local market study therefore were:
(a) to determine the supply potential of the selected Lesser Used Species (LUS)
(b) to find the extent of usage
(c) to evolve strategies to promote increased processing and utilization of the 6 selected LUS on the domestic market.

METHODOLOGY

Previous domestic market studies undertaken by the Timber Export Development Board (TEDB) formed the basis for the preparation of questionnaires for this survey.

The questionnaires thus prepared were randomly distributed to stratified operators in processing and users of timber products. These were sawmills, plymills, furniture producers, retailers and homebuilders based mainly in Kumasi, Takoradi and Accra where most activities of timber and the construction industry take place in Ghana.

The questionnaires to millers were administered in person by staff of the project while those to other operators and users were administered through their trade associations. The relevant trade associations are the Furniture Producers, (FAWAG), Small Scale Carpenters Association (SSCA), Timber Retailers Association (TRA), Ghana Real Estate Developers Association (GREDA), and the Ghana Building and Civil Contractors Association (GBCCA).

Survey of the mills were performed to determine the availability of the selected LUS in own concessions and/or areas of operation, assess the extent of processing and evaluate the importance of different factors that are likely to influence marketability of the species on the domestic market. 60 mills were given survey questionnaires. 42 representing a response rate of 70% returned usable responses.

The survey of Retailers sought to establish knowledge of the species, their presence in their product mix, sources and regularity of supply as well as the degree of demand. The information gathered was to help assess the extent and factors that affect usage and thus be able to develop a marketing framework for acceptability of the selected LUS on the domestic market, particularly as substitutes for established species. 80 retailers were selected randomly in Sekondi-Takoradi, Kumasi and Accra for the survey. A total of 52 usable responses were returned, providing a response rate of 58%.

Furniture producers from both FAWAG and SSCA were given questionnaires to determine the extent of familiarity and usage of the species, their working and other properties as well as factors that affect their acceptance on the local market. 100 questionnaires were given out. 45 usable responses were returned.

Finally the survey of the membership of GREDA and GBCCA was to evaluate the importance of different factors related to the introduction and acceptability of the selected LUS in construction works. 50 survey questionnaires were distributed through their association. A response rate of 78% was achieved but only 12 or 24% were usable. Most questionnaires were returned because the respondents had never used the species.

RESULTS OF THE SURVEY

SAWMILLS AND PLYMILLS

Concession ownership and availability of the selected LUS
Concession ownership
Survey respondents were asked to indicate which of them owned concessions. Out of the 42 usable responses received, 20 or 47 % indicated that they were operating their own concessions. This reflects the general situation in the country where most concessions are in the hands of log producers rather than millers.

Table 1 indicates the degree of dependence of respondents on their own concessions for logs supply. Of those respondents who operate their own concessions, 5 firms depended between 10 and 30% on their concessions for logs while 6 firms indicated a dependence of between 31 and 60%. The rest of 9 firms said that their concessions supplied them with between 61 and 100% of logs as shown in Table 1.

As most respondents failed to indicate their production capacities, the degree of dependence on own concessions could not be related to logs requirement of the firms. However, previous knowledge of these firms and their sizes would appear to indicate that the lower the degree of dependence on own concessions, the larger the firm. This is true to the extent that the heterogeneous nature of Ghana's forest and the varied nature of contracts received often create difficulties especially for the big firms, to satisfy total log requirements with supplies from own concessions.

Availability of the selected LUS in concessions
14 of the firms who own concessions indicated that they carried out stock surveys of the concessions between 1993 and 1997. Estimates of available volumes within exploitable girths of the listed LUS as revealed by the surveys are indicated in Table 2. Other respondents simply indicated that the listed LUS were abundant in their concessions.

Table 1: Dependence on own concessions for logs supply.

Percentage dependence	Number of Firms
10-30	5
31-60	6
61-100	9
Total	**20**

Table 2: Availability of selected LUS in concessions (m^3).

Firm	Species					
	Ceiba	**Celtis**	**Chenchen**	**Essia**	**Denya**	**Sterculia**
1	208,826	61,359	93,143	6,241	15,389	4,909
2	1,040	2,540	660	1,770	960	400
3	360	100	360	460	100	50
4	600	100	400	180	100	-
5	500	820	450	50	150	150
6	800	1,000	400	200	-	-
7	-	800	-	800	1,500	-
8	1,000	5,000	800	-	1,500	-
9	20	28	18	22	-	-
10	450	300	400	250	-	-
11	150	365	60	360	560	-
12	560	2,842	330	500	70	-
13	20		30	10	-	
14	1,000	-	400	300	400	-
Totals	**215,326**	**75,254**	**97,451**	**11,143**	**20,729**	**5,509**

The Table does not show any significant trend in the presence of the selected species within the surveyed concessions. That notwithstanding, the over all picture is one that shows Ceiba to be most prevalent followed by Chenchen, Celtis, Denya, Sterculia and Essia in that order.

With the exception of the first firm (Glikstens W.A.) which indicated that the information was mostly from its forest reserve concessions, the other respondents indicated that they operate mostly in outside reserve areas. This perhaps explains the low figures given by the other firms, as farmers who mostly work in outside reserves are likely to remove commercially unpopular species to facilitate their farming activities.

The first firm's figures would further seem to support the conclusions of a study by the Planning Branch of the Forestry Department that listed the LUS under discussion as among a number which should receive active promotion in trade. In that study, "Timber yields from the Forest Reserves of Ghana" (1995)[1] which was a follow up to the Ghana Forest Inventory Project (1989) [2] , the Annual Allowable Cut (AAC) for the selected LUS are summarized in Table 2. Meanwhile the "Ghana Forest Inventory Project" (1989) had estimated that the stocking levels (number of trees) for each of the listed LUS was more than the figures indicated in Table 3.

Table 3. Inventory data for the selected LUS included in the project.

Species	AAC (trees/year)	Stocking Level (trees)	Stock Life (years)
Ceiba	2,870	300,000	105
Celtis	14,100	600,000	43
Chenchen	3,630	340,000	94
Essia	4,250	300,000	71
Denya	2,060	200,000	97
Sterculia	1,200	60,000	50

The inventory information from the 14 respondents show no significant trends and can therefore not be relied upon to draw conclusions regarding availability of the listed LUS. However, work already done by the Forestry Department which are quoted above indicate good prospects for long-term industrial processing of the selected LUS, assuming sustainable management of the forests in which they occur.

Processing of the selected LUS

The mill-respondents indicated an average yearly processing rate of the selected species as in Table 4. The total yearly consumption of the selected LUS as indicated in the survey, represents about 1.6% of the total national logs consumption (1,113,000 m^3) for 1995 (The Ghana Timber Industry, Basic Information Facts and Figures TEDB). Though the survey covered only about 42 out of a possible 134 sawmills and veneer mills in the country, the processing rate of the listed LUS, nevertheless reflects the general consumption pattern of LUS which necessitated the survey in the first place.

Table 4. Milling rate (logs input) of selected LUS per month (m3).

Products	Species						
	Ceiba	Celtis	Essia	Denya	Sterculia	Chenchen	Total
Lumber	200	650	340	150	1,517	2,306	6,433
Plywood	6,320	1,000	-	-	-	1,000	7,050
Sliced Veneer	-	-	-	-	-	4,106	4,106
Rotary Veneer	2,000	-	-	-	-	400	2,400
Mouldings	-	-	15	-	-	-	15
Sleepers	-	-	150	180	-	-	330
Total	6,520	1,650	505	303	1,517	7,812	18,334

However, Table 4 indicates that Chenchen, Sterculia and Celtis are the most preferred species for lumber production. Together they form more than 70% of the monthly LUS input into sawmills. Lumber is the only product to which all the other species are manufactured.

Ceiba is the most frequently used species accounting for about 88% of the LUS in rotary veneer and plywood production. Chenchen and Celtis are the other preferred species for the same products. Among the species, Chenchen was the only one, which was indicated as having been regularly sliced although Ceiba was also indicated but with no figures given. Denya and Essia were favoured for sleeper production.

Problems associated with processing and marketing of the LUS
Survey respondents were asked to indicate problems associated with processing. The three main problems mentioned, are ranked below:

- Insufficient knowledge of processing techniques as most of the species requires preservative treatment and drying.
- Difficulty in sawing Denya
- The foul smell of fresh Essia
- Susceptibility of Denya and Essia to splitting even during air drying thus giving low yields in lumber output.

Forty percent of respondents actually indicated having rejected orders for processing LUS. Aggregating their reasons and ranking them in order of importance, the following were obtained:

- ❖ Uncertainty about long-term supplies of the species
- ❖ Unavailability of Technical information on species
- ❖ Technologies for processing not well known
- ❖ Low market prices for orders placed
- ❖ Processing of some of the species too difficult and likely to increase cost
- ❖ Species require kiln drying which is presently not available in their mills
- ❖ Lack of public knowledge of the species and their performance in service
- ❖ Chemical treatment cannot presently be undertaken in firm
- ❖ Possible increases in processing cost as a result of introduction of new technologies

Those who indicated having regularly processed LUS also shared some of these views. Fortunately most of the technical concerns are the subject of investigation in other aspects of the same project and should hopefully be resolved to pave the way for increased processing of the selected LUS.

Table 5. Factors that influence the promotion of LUS.

% of respondents	Factors for promoting LUS
100	Availability of the species must be properly established
100	Need to develop Technical information that clearly describes working properties of the LUS and the primary species which they can substitute
80	Well-structured educational programs for processors and the public, using the technical information developed
60	Financial help to purchase treatment and kiln drying facilities
55	Tax relief and reduced royalties for working with LUS and introduction of other fiscal measures to discourage processing of primary species
48	Demonstration of wood products manufactured with LUS at exhibitions or trade fairs
45	Full involvement of industry in all programs to promote the LUS

Factors for promoting species

Asked to indicate factors that in their opinion could positively influence promotion of the species (Table 5), the following were mentioned by the respondents:

It is clear from the foregoing above that millers would want availability of the species properly established before getting actively involved in promotion. This is to be expected and understood, as it is important for establishing credibility in the market place. Fortunately, as mentioned earlier on in this chapter, all the selected LUS belong to the group of species which the Forestry Department, has designated as promotable.

Assuming therefore that the species are available in the right quantities, the increasing kiln drying capacity in the country and the development and dissemination of technical information such as the working properties of the species to industry should help encourage processing of the LUS.

RETAILERS

80 retailers were given questionnaires. 52, representing 65% responded. The respondents were from the main wood retailing centers popularly known as Timber Markets in Sekondi-Takoradi, Kumasi and Accra (Table 6).

Table 6. Summary of survey respondents for retail industry.

Retailing Center	**Number of respondents**	**Percentage**
Sekondi-Takoradi	9	17
Kumasi	33	64
Accra	10	19
Total	52	100

Table 7. Most frequently traded species of the selected LUS.

Retail Center	Chenchen	Essia	Denya	Ceiba	Sterculia	Esa
Sekondi-Takoradi	40%	30%	-	30%	-	-
Kumasi	42%	27%	17%	-	10%	-
Accra	39%	31%	15%	-	8%	8%
Average	40%	29%	11%	10%	6%	3%

Retailers knowledge of LUS

In an attempt to find out whether survey respondents knew about the selected LUS, 75% of them indicated that they had at one time or the other traded in one or more of the species. This was an indication that the species were known and already being traded. The survey respondents indicated that the most popular and frequently traded species was Chenchen, Table 7. 40% of the respondents expressed this opinion. Essia, Denya, Ceiba, Sterculia and Esa followed in that order.

A surprising observation is the low rating for Ceiba and in particular its absence from the markets in Kumasi and Accra. The probable reason is that most of the respondents were lumber retailers. Ceiba appears to find most use in plywood production.

Survey respondents were asked when they began trading in the LUS. Responses from each of the main trading centers showed consistent increases in percentage terms, of the number of retailers trading in the species from 1994 to 1997 (Table 8). Again this is an indication of the growing familiarity and popularity of the LUS on the domestic market, perhaps the fruit of the promotional efforts of the Timber Export Development Board, the Forestry Department and the Forestry Research Institute of Ghana.

Figures of volumes traded during the periods were however missing from the survey results as respondents kept no records of these. Attempts to recall figures from memory showed inconsistencies, which were thought better left out of this report.

Table 8: Year respondents began trading in LUS.

Trading Center	Year and Percent of respondents			
	1994	1995	1996	1997
Sekondi-Takoradi	22%	44%	66%	89%
Kumasi	30%	55%	67%	88%
Accra	10%	40%	80%	100%
Average	21%	46%	71%	92%

Table 9. Sources of LUS supplies.

Retail Centers	Sawmills		Chain Sawyers	
	Number	%	Number	%
Sekondi-Takoradi	3	33	6	67
Kumasi	23	70	10	30
Accra	2	20	8	80
Total	28		24	

Sources of supply to retail outlets

The survey respondents named two main sources of supply of LUS to their retail outlets, sawmills and chain saw operators. Table 9 shows the number of survey retailers who receive their LUS supplies from the two sources.

The overall picture from the table shows that the survey respondents are receiving their supplies almost equally from both sawmills and chain sawyers. But a closer look at what is happening at the individual centers may suggest that the large number of mills in the Kumasi area probably have more positive influence on the supply of LUS to retailers than do chain sawyers. The reverse appears true for Accra, which virtually has no mills, and appears therefore to depend more on chain sawyers.

Regularity of Supplies and degree of demand for LUS products.

Having established the sources of supplies, the survey respondents were asked to indicate how regular these sources were. The overall picture as shown in Table 10 is one of regularity of supplies as indicated by 59% of all the survey respondents. But while Kumasi and Accra indicated some regularity of supplies and some irregular, respondents in Sekondi-Takoradi said supplies from both sawmills and chain sawyers were not regular.

Table 10. Regularity of selected LUS supplies to retail outlets.

Retail Centers	Regularity of Supplies from Sources		
	Very regular	Regular	Not regular
Sekondi-Takoradi	-	-	7
Kumasi	4	16	12
Accra	2	7	1
Total	6	23	20
Percentage	12%	47%	41%

Table 11. Degree of demand for LUS products.

Retail Center	Demand High		Demand Low	
	Number	%	Number	%
Sekondi-Takoradi	0	0	8	89
Kumasi	24	73	9	27
Accra	4	40	5	50
Total	28	-	22	-

Demand for the selected LUS products

Regularity of supplies appears, as expected, to be linked to the degree of demand as shown in the survey results in Table 11. In Kumasi area where the highest number of respondents said supplies were regular, demand for LUS was reported by 73% of respondents as high. On the contrary, in Sekondi-Takoradi area where LUS supplies to retailers was indicated as not regular, 89% of respondents said that demand was low. The relatively high demand for LUS in Accra as indicated in the survey may be xplained by the sheer size of the market in Accra that appears able to accommodate many varied products as well as customers.

In terms of overall numbers, opinions appear to be about equally divided among survey respondents on whether demand for LUS products is high or low (Table 11). Also what is considered high or low demand as obtained in the survey responses are rather subjective as they are not backed by any trading records.

Reasons for high demand

The survey results indicated various reasons for high demand (Table 12). 49% of the survey respondents who said demand was high, attributed it generally, to their good working properties, while 21% and 17% attributed high demand for LUS products to beauty and good finishing properties respectively.

Interestingly, affordability and availability did not appear to be strong considerations as shown by the rather small percentage of respondents who thought so as shown in Table 9. This is of course a surprising departure from normal marketing situations. The reason could, as indicated by one respondent, be due to scarcity of the established species on the market and customers therefore making do with any species provided the working properties are well understood and considered good. The tendency for local wood users especially carpenters in the Small-Scale group to mix up species in the manufacture wooden products such as doors and window frames may also account for this observation.

Table 12. Reasons for high demand.

Reason	Beauty	Working prop.	Finishing prop.	Affordable	Available
Number of Respondents	6	14	5	1	3
Percentage	21%	49%	17%	4%	9%

Table 13. Reasons for low demand.

Reason	Odor	Appearance	Working prop.	Poor finishing	Expensive	Availability
Number of respondents	6	2	5	5	1	2
Percentage	27%	11%	24%	24%	4%	9%

Reasons for low patronage

According to survey respondents who thought LUS products enjoyed low patronage, the majority attributed this to bad odor, Table 13. This observation obviously refereed to only one species, Essia and could therefore not be generalized for all the LUS.

It is significant to note again, as indicated in the responses in Table 13 that price and availability are not strong considerations for demand. Apart from the odour problem with Essia, it would appear that dissemination of research results aimed at improving the working and finishing properties of LUS generally should help to improve the demand situation for the selected LUS.

Promotion of the selected LUS

Finally, the survey respondents were asked to indicate if in their opinion the selected LUS were worth promoting and why. 42 retailers representing 86% of total respondents said, "Yes" while the rest said "No". Table 14 lists the various reasons given by the respondents.

Checking through the list of species that the various respondents dealt with, it was clear that their responses were biased towards those, which the retailers were more familiar with. For example, those who said "Yes" to promotion because of species durability indicated dealing more with Essia and Denya than with the others, which are known to be non-durable. A strong and positive element however is the indication that the species have good working properties. It is also significant to note that non mentioned lack of knowledge of the species as a reason for not encouraging promotion.

From the foregoing, it can be said that the selected LUS is already quite familiar to retailers as some have traded in them since 1994 and before. The properties of the species according to the respondents are generally satisfactorily. What remains to be done is to actively promote them to increase their acceptance on the market.

Table 14. Reasons for promotion or non-promotion of species.

	YES		NO	
Reason	**Number**	**Percent**	**Number**	**Percent**
Species durable	16	38%	-	-
Good Working Properties	21	50%	-	-
Available	2	5%	-	-
Affordable	1	2%	-	-
High demand	1	2%	-	-
Established species scarce	1	2%	-	-
Poor working properties	-	-	3	43%
Not durable	-	-	2	29%
Bad odor	-	-	2	29%
Total	**42**		**7**	

FURNITURE PRODUCERS AND SMALL SCALE CARPENTERS

100 survey questionnaires were distributed through the secretariats of FAWAG and the SSCA to their members. 45 usable responses were returned. Out of the number, 36 representing 80% of respondents knew about the selected species but 67% had any working knowledge of them. Their experiences with the species ranged from 6 months to more than three years in some cases.

Uses of the selected LUS

The survey respondents were asked to name the most frequently used species among the lot and for what products they are used. It came out that the most frequently used species, according to 40% of the respondents are Chenchen and Ceiba in the form of plywood. They are used as components of indoor furniture, mainly as back covers of wardrobes, wall units, kitchen cabinets and so on. They also find a lot of use in painted ceilings as indicated by 36% of survey respondents.

31% of the survey respondents indicated that they had successfully produced garden furniture from Esa, Essia and Denya. Essia was the most popular species for door and window frames as well as roof trusses. One respondent reported having used Yellow Sterculia for masonry work. Other products in which the LUS have found use include coffins and fencing.

The survey respondents were asked to give reasons why they chose particular species for products. They were asked to rank characteristics of the species as Excellent (3 points), Good (2 points), Poor (1 point). The aggregate of the responses is what obtains in Table 15. The information shows that the choice of most survey respondents of the species with the overall best characteristics is Chenchen. Denya rated second followed by Ceiba and Essia and then Esa and Sterculia in that order.

Table 15. Reason for choice of LUS.

SPECIES	CHARACTERISTICS						
	Availability	Beauty	Working Prop.	Gluability	Nailability	Finishing	Total Score
Chenchen	14	9	9	9	10	7	58
Denya	4	2	4	6	4	4	24
Ceiba	6	3	4	4	4	2	23
Essia	5	4	4	4	3	3	23
Esa	8	4	2	2	1	2	19
Sterculia	2	2	3	1	2	2	12

When asked to mention particular problems associated with any of the species, only Chenchen and Ceiba came for specific mention as being subject to cracks insect infestation and discoloration. Other respondents without naming the species involved also mentioned these problems. It is of course known that Esa and Sterculia are also non-durable if not treated. Other problems mentioned generally include bad odour and poor finishing characteristics. 27% of the respondents said they had no problems at all working with the species.

Sources and regularity of supplies

The survey respondents indicated the main sources of supply of the selected LUS as mills, the timber markets and chain saw operators. In fact 31% indicated the open market as their source while 13% and 8% of respondents said their sources were chain sawyers and sawmills respectively. The rest did not indicate their sources of supply.

With regards to regularity of supply, 35% of the survey respondents indicated that supplies were not regular while 13% said they always got what they wanted. In this regard, Ceiba and Chenchen in the form of plywood were mentioned as the most readily available on the market,

The survey results indicated that hardly any of the respondents kept stocks of the LUS, though each one of them kept some stocks of the more common species. The main reason given was one of locking up working capital in stocks, which are not in high demand and many of which are susceptible to insect and fungal attacks.

General impressions and incentives to promote LUS

The survey respondents were of the general opinion that in spite of whatever problems associated with the LUS, they still had good potential for being processed into tertiary products for exports. Increased use of the LUS may contribute to the reduction in exploitation of the established species.

When asked to indicate strategies and incentives that may improve patronage of the LUS, the respondents mentioned the following without any priority:

- Competitive pricing
- Financial support at favourable interest rates to acquire machinery
- Provision of kiln drying facilities to facilitate custom drying
- Making the LUS more available by encouraging mills to process them
- TEDB be encouraged to mount educational campaigns on radio and TV
- Mount exhibitions and fairs
- Introduce export bonuses for exports of LUS products

BUILDING CONTRACTORS

As mentioned earlier, a response rate of 78% was achieved with the survey of the membership of GREDA and the Ghana Building and Civil Contractors Association. However only 12 or 24% were usable. Many returned the questionnaire reporting that they had no knowledge or experience with the species. Of the responses received, 20% said they had known and used the species since 1995 while the rest have experienced them only in 1997.

Uses of the LUS in the building industry

The selected LUS in various forms have found use in the building industry. The response scores in Table 16 indicate these.

Ceiba appears most popular here because most ceilings in Ghana are constructed with plywood made mostly from Ceiba. Considering survey results previously discussed, it is surprising that Essia which was indicated by both timber retailers and carpenters as being the most preferred for door and window frames, did not even come up for mention by the builders. A probable reason could be that these are big time contractors who undertake government and other big jobs for which architects specify species for construction. Generally however the use of LUS in the building industry does not appear to be extensive.

Table 16. Uses of LUS in the building industry.

Species	Ceiling	Masonry	Paneling	Door/Window	T&G	Total Score
Ceiba	6	2	2	-	-	10
Chenchen	-	4	1	-	-	5
Denya	-	-	2	2	-	4
Esa	-	-	-	1	1	2
Sterculia	-	1	-	-	-	1

Preferred characteristics of the selected LUS
The survey respondents were asked to score Excellent (3), Good (2), and Poor (1) for species characteristics as known and used by them. The responses are as shown in Table 17 below.

The table confirms Ceiba's popularity among the LUS but this is probably skewed in favor of the use of plywood as the main wood product for constructing ceilings in the building industry

Asked if they had encountered any special problems working with the selected LUS currently being used by them, cases of insect attacks and discoloration due to fungal attacks were mentioned.

Sources of supply
The sources of supply as stated by the respondents are mainly the Timber markets in the big towns and cities and indications are that the LUS are always available (mostly referring to Ceiba plywood) for purchase. For this reason and also the fact that some of the LUS are susceptible to both insect and fungal infestation, stocks are not kept in any significant quantities. Other reasons given for not keeping stocks include warping as reported for Chenchen and not many jobs requiring the use of the species.

General impressions and strategies for promoting LUS
Most respondents stated that with the established species becoming more and more difficult to get, this might be the time to promote some of these species which may be worthy substitutes for them. The survey respondents generally agreed that Species like Denya, Essia and Esa if treated could well substitute for Odum and even Dahoma as structural timber in the housing and building industry in general.

Table 17. Choice of species by characteristics.

Species	Characteristics/Properties						
	Availability	Beauty	Working	Gluing	Nailing	Sanding	Total
Ceiba	12	9	12	10	12	7	62
Chenchen	6	4	5	6	6	4	31
Essia	4	6	5	5	5	4	29
Esa	4	5	4	4	4	4	25
Denya	2	2	2	2	2	2	12
Sterculia	2	2	3	1	2	2	12

The survey respondents mentioned some incentives and strategies that might help to promote the species. Without ranking them in any order of importance they include:

- Species should be well treated against infestation
- Competitive pricing
- Technical information should be made available to industry
- Mount educational campaigns and hold exhibitions and fairs
- Provide Financial support to users
- Government should provide tax incentives
- Award certificates of recognition to users of LUS.
- Encourage processing of the species by millers

RECOMMENDATIONS

Framework for Developing Domestic Market Acceptability of the selected LUS
From the information obtained in the surveys, the following framework for developing market acceptability of the selected LUS is made.

1. *Need for more work to establish the resource base of the selected LUS*
   This is most important as most users would want to be sure of long-term availability of the species before committing themselves to it.
2. *Development of technical information*
   There is need to quickly develop technical information that adequately describes the physical, mechanical and working properties of the species, and which identify appropriate end-uses and possible substitutes for established species.
3. *Development of promotional materials*
   Promotional materials including brochures and pamphlets containing the technical information described above should be developed for training and educational purposes. The promotional materials should also have information on total availability and areas where the LUS can be obtained in Ghana.
4. *Disseminating information on the species*
   The promotional materials should be made available to mills, retailers, furniture producers and carpenters, architects and builders through demonstration sessions, workshops, exhibitions and trade shows. It should be possible to set up a team of experts to provide technical assistance in the form of extension services to firms in order to overcome problems associated with using the LUS. Public organizations like the Forestry Research Institute (FORIG), Timber Export Development Board (TEDB) the Woods Industries Training Center (WITC) and the Forest Products Inspection Bureau (FPIB) can all be actively involved in these campaigns.
5. *Setting up control testing laboratories*
   The timber industry and the organizations mentioned above could pool resources to establish control testing facilities either at FORIG or WITC for the selected LUS and all other species.

6. *Guidance to purchase the right processing equipment*
   TEDB could also provide guidance to industry in the procurement of relevant equipment to process the species especially into tertiary products where they are likely to have the best potential.
7. *Provision of fiscal incentives*
   Relief in taxes and royalties could be introduced as fiscal measures to encourage the processing of LUS, once it is established that they are available for long-term utilization by industry. This will encourage low prices for quicker market acceptability and penetration.
8. *Lobbying governmental policy for use of LUS in public buildings*
   TEDB and FPIB could initiate a lobby for a governmental policy on the use of LUS in public buildings. This will force architects and other specifiers of wood in public building to consider LUS.
9. *Funding research organizations for further work on species*
   A national effort aimed at promoting the species should involve industry especially in funding research and sustainable management of the forest resource.
10. *Product development research*
    Further research work should target species for selected products based on existing technological capabilities of Ghana's wood processing sector.

CONCLUSIONS

Based on the survey results as outlined above we can conclude as follows:

That the selected Lesser-Used Species (LUS) under study are all fairly well known in the country. In the survey results from the mills through retailers to end-users, majority of the respondents had at least made contact with the species at one time or the other. Some may never have used or handled any of the species, but none claimed never to have heard of them.

So far it appeared that working knowledge of the species have been acquired by those currently processing them, on trial and error basis. There is therefore the need to develop and make available, technical information on processing to industry and interested members of the general public, to encourage increased use of the species. Processors would also need to be assured of long-term species availability so that they can sustain the interest of end-users, especially those in further processing for export. As it is with the introduction of any new product fiscal and other incentives may have to be provided to encourage complete acceptance of the LUS by millers, other processors and end-users. Finally, end-users particularly need to be convinced of the behaviour of the species in service in the long-term.

REFERENCES

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Forestry Department (1989): Ghana Forest Inventory Project Seminar Proceedings 29-30 March 1989, Accra.

Timber Export Development Board (1996): The Ghana Timber Industry, Basic Information Facts and Figures.

APPENDIX A
PARTICIPATING COMPANIES

Processing Mills

Pan Timbers
A.B.T.S
S. Anthony Co. Ltd
Ashanti Curls & Lumber Ltd
Techiman Sawmill
Ehwia Wood Product
SKOD Techiman
Subri Industrial Plantations Ltd
Nabe Wood Processing Co. Ltd
General Development Co. Ltd
Western Hardwood Ltd.
JCM
Dupaul Wood Treatment Ltd
Anthony Timber Co. Ltd.
West African Hardwoods
F.E. Ghassoub
Ridge Timbers
Daniel Sawmill
Furwoco
Intex Co. Ltd
Pekendon Wood Products Ltd
Gliksten W.A. Ltd
Gyamfi Wood Processing
Sunstex Ltd
Thompson moir and Galloway Ltd
Topbell Integrated Gh. Ltd
Oti Yeboah Complex Ltd
Anda Timbers Gh. Ltd
Ghana Wood sawmill Ltd.
Star Sawmill Prod. Ltd
Ghassoub Ltd
Nafy Timbers
Timber Industries Ltd.
CreamTimber Moulding Ltd
Swiss Lumber Co. Ltd.
Rad Forest Products Co. Ltd
Mondial Veneer Gh, Ltd
Western Veneer & Lumber co. Ltd
Ghana Primewood Products Ltd.
John Bitar & Co. Ltd
Said Ltd
Karmanga Sawmill

Retailers

Alisco Enterprise
Kojo Nyame Enterprise
Anloga Wood Dealers
Akwatialine Wood Products
God is King
Money Palava Ent.
Amadu Industries
Kofi Nayo Ent.
Nana Owusu Ent.
Nana Sei Wood Co.
Appiah Woodwork Enterprises
Domfe Tech. Services
Kyei Baffuor Ent.
Eye Ewurade Shop
Sasco Saliu Ent
Nana Owusu Enterprise
Pat Enterprise
Alhaji Buda Ali
Nyame Bekyere Shop
James Ent.
Henaya Ent.
Enye Nyame Den Ent.
Freedom Wood Ent.
Alhaji Ent
Dada Sansa Wood Ltd
Jackson Ent,
King of Kings Ent.
Yusuf Abubkar Yahya
Alhaji Sani Ent.
Abdullai Fodi Ent.
Alhaji Sharabutu Ent.
Osei Ntim Wood Retailers
Alhaji Sani Abubakar Ent.
Wood Dealers Ent.
Oppong Agyemang Wood Co.
Sam Mav Ent.Ltd
Shaibu Issah & Brothers
Ambition Partnership Ent
Osei Bonsu Nketiah
K.H.A. Alasawa Ent.
Kwabena Ansah Ent.
Woso Yebi Whe Ent.
Nyame ne Hen Ent.
J.K. Okoh and Sons Ent.
Kwame Asante Ent.
Koomson & Sons Ent.
Alhaji K.K. Anti Ent.
Kofi Amaniampong Ent Ne
Nyinara Ye Ent.

Kwabena Ansah Ent.
T.C. Adinkrah Ent.
Nyame Te Ase Ent.
Yusuf Issah & Partners Ent.

Furniture Producers

New Builders carpentry Shop
Aidoo Furniture Works
Coffie Furniture Works
His Majesty Furniture Works
Ansu Gyeabuor Furniture Works
Jica Furniture Works
Peace & Love Furniture & Joinery
J. K. Amoah Furniture
Ayikoo Enterprise
Grant Furniture Works
Kwesi Ampah Carpentry Shop
Pergamon Joinery Ltd.
Peewood Processing
Scanstyle Mim Ltd
Hasnem Furniture Works
Ashanti Furniture Co. Ltd
Modern Furniture Ltd.
Amonoo Furniture Works
Owusu Furniture Works
Ameyaw Furniture Works
Daakye Furniture Works
Franko Furniture Works
Experience Carpentry Works.
Madol Construction Ltd.
God is Great Furniture Works
Asem Beba Dabi Wood works
Suban Pa Furniture Works
Nhyira Nka Boafo Wood Works
Grace Furniture Works
Adom wo wim Furniture
Ato Kwamena Furniture Works
Onipa Ho Ye Hu Wood Works.
Akan Centre Furniture Co. Ltd.
New Form Furniture & Construction
Emmanuel Furniture Works
Gyamfi Furniture Works
Gbada Furniture Works
Holy Cross Furniture Works
Paul Logah Wood Works
K.B. Furniture & Leather works
Akoto Furniture Works
Dwen wo Ho Furniture Works
Asunti Furniture works
Asunafo Wood Works
Hope Furniture Works

BUILDING CONTRACTORS

Premfisa Company Limited
William Ohrt
Tekoa Limited
Amenhen Associates Limited
Jenito Enterprise
Samcota Limited
Halifam Construction Limited
Lintop Limited
Flexcon Mb. Limited
T.T. U-stay Developers Limited
Afanora Construction Limited
Jonco Wood & Construction\

Appendix B

Survey Questionnaire Used in Ghana

Ghanaian Timber Industry Questionnaire

Name of firm: _____ Date: _____
Person Interviewed: _____ Title: _____

Section I. Strategic Responses to Tropical Hardwood Boycotts

1. Are you aware of the efforts by European environmental groups to initiate a boycott against tropical hardwoods?
_____ Yes _____ No

2. How has the tropical hardwood boycott affected demand for your products in Europe?

No Effect						*Significant Reduction*
1	2	3	4	5	6	7

3. How effective do you feel each of the following marketing strategies would be in helping your firm respond to the tropical hardwood boycott in Europe?

	Not Effective						*Very Effective*
Advertising campaign aimed at European industry	1	2	3	4	5	6	7
Advertising campaign aimed at European consumers	1	2	3	4	5	6	7
Reduce prices to stimulate demand	1	2	3	4	5	6	7
Export to less environmentally sensitive markets	1	2	3	4	5	6	7
Shift export focus to regional West African markets	1	2	3	4	5	6	7
Shift focus to domestic markets	1	2	3	4	5	6	7
Shift product mix to higher value products	1	2	3	4	5	6	7
Increase the number of species utilized	1	2	3	4	5	6	7
Implement sustainable forest management	1	2	3	4	5	6	7
Cooperate with environmental groups	1	2	3	4	5	6	7
Develop a sustainable timber certification program	1	2	3	4	5	6	7
Ignore the boycott	1	2	3	4	5	6	7

4. In your opinion, what impact has the European boycott had on the Ghanaian forest products industry with respect to the following factors?

	Strongly Discouraged			*No Impact*			*Strongly Encouraged*
Participation in industry associations	1	2	3	4	5	6	7
Capital investments in processing equipment	1	2	3	4	5	6	7
Capital investments in new manufacturing facilities	1	2	3	4	5	6	7
Development of value-added industry	1	2	3	4	5	6	7
Sustainable forest management	1	2	3	4	5	6	7
International competitiveness	1	2	3	4	5	6	7
Increased utilization of lesser-known timber species	1	2	3	4	5	6	7
Other: _____	1	2	3	4	5	6	7

5. In your opinion, what level of risk does each of the following factors pose for your firm at the present time?

	No Risk			*Medium Risk*			*High Risk*
Political environment	1	2	3	4	5	6	7
Confiscation/expropriation of property	1	2	3	4	5	6	7
Economic environment	1	2	3	4	5	6	7
Tropical hardwood boycott in Europe	1	2	3	4	5	6	7
Accessibility of foreign exchange	1	2	3	4	5	6	7
Restrictions on repatriation of profits	1	2	3	4	5	6	7
Government regulations	1	2	3	4	5	6	7
Timber resource availability	1	2	3	4	5	6	7
Sustainable forest management	1	2	3	4	5	6	7
Timber certification/labeling programs	1	2	3	4	5	6	7
Lack of a forest concession policy	1	2	3	4	5	6	7

Section II. Marketing of Lesser-Used Timber Species

6. Does your firm currently process lesser-used timber species? _____ Yes _____ No

7. Does your firm currently export lesser-used timber species? _____ Yes _____ No

8. In general, how readily do your European customers accept lesser-used timber species?

Not at all		*Reluctantly*				*Very Readily*
1	2	3	4	5	6	7

9. In your opinion, how important is each of the following factors in promoting market acceptance for lesser-used timber species from Ghana?

	Not Important						*Very Important*
Availability of technical species information	1	2	3	4	5	6	7
Availability of long-term supply	1	2	3	4	5	6	7
Low initial trial price	1	2	3	4	5	6	7
Risk-free trial shipments	1	2	3	4	5	6	7
Money-back guarantees	1	2	3	4	5	6	7
Acceptance by influential trader/manufacturer	1	2	3	4	5	6	7
Ability to export small trial volumes	1	2	3	4	5	6	7
Other: _____	1	2	3	4	5	6	7

10. What factor do you feel is most important in encouraging acceptance of lesser-used timber species?

_____

_____

11. In your opinion, how important is the utilization of lesser-used species to sustainable forest management?

Not Important						*Very Important*
1	2	3	4	5	6	7

Section III. Acquisition of Market Information

12. How important are each of the following methods to your firm for acquiring market information?

	Not Important						*Very Important*
Industry associations	1	2	3	4	5	6	7
Conduct our own market research	1	2	3	4	5	6	7
Hire an outside firm to conduct market research	1	2	3	4	5	6	7
Attendance at industry trade shows	1	2	3	4	5	6	7
Attendance at industry conferences	1	2	3	4	5	6	7
Discussions with customers	1	2	3	4	5	6	7
Discussions with other manufacturers	1	2	3	4	5	6	7
Discussions with importers/agents	1	2	3	4	5	6	7
TEDB market intelligence reports	1	2	3	4	5	6	7
Industry journals	1	2	3	4	5	6	7

13. In your opinion, what is the most important method of acquiring market information?

_____

_____

14. What percentage of your exports go: through a broker/agent? _____%
direct to the final customer _____%

15. How important are the following methods to your firm in identifying new market opportunities?

	Not Important						*Very Important*
Customer leads provided by TEDB	1	2	3	4	5	6	7
Customer leads provided by other manufacturers	1	2	3	4	5	6	7
Customer leads provided by importers/agents	1	2	3	4	5	6	7
Attendance at industry trade shows	1	2	3	4	5	6	7
Attendance at industry conferences	1	2	3	4	5	6	7
Customer recommendations	1	2	3	4	5	6	7
Company sales staff	1	2	3	4	5	6	7
Industry trade associations	1	2	3	4	5	6	7
New customers contacting us directly	1	2	3	4	5	6	7

Section IV. Company Demographics

16. What percentage of your raw material requirements are provided by your own concessions? _____ %

17. What is the production capacity of your manufacturing facility during an eight hour shift (in cubic meters)?

Lumber: _____ Veneer: _____ Moulding: _____

18. How many people are employed by your firm? _____

19. Approximately what volume of products did you export to the following countries in 1994 (in cubic meters)?

Country	*Air Dried Lumber*	*Kiln-Dried Lumber*	*Rotary Veneer*	*Sliced Veneer*	*Profile Boards*	*Joinery*	*Flooring*	*Other:*
Germany								
United Kingdom								
Italy								
France								
West African sub-region								
Other:								
Other:								

20. We are interested in learning more about your use of lesser-used species. Please estimate the volume of timber (in cubic meters) that you used for each of the following product lines in 1994.

Species	*Air Dried Lumber*	*Kiln-Dried Lumber*	*Rotary Veneer*	*Sliced Veneer*	*Profile Boards*	*Joinery*	*Flooring*	*Other:*
Albizia ferruginea ***(AWIEMFOSAMINA)***								
Antrocaryon incraster ***(APROKUMA)***								
Bombax brevicupse ***(ONYINAKOBEN)***								
Canarium schweinfurthii ***(BEDIWONUA)***								
Ceiba pentranda ***(ONYINA)***								
Celtis spp. ***(ESA)***								
Chrysophyllum giganteum ***(AKASA)***								
Cylicodiscus gabonensis ***(DENYA)***								
Daniela ogea ***(OGEA)***								
Distemonanthus benthamianus ***(BONSAMDUA)***								
Petersianthus macrocarpus ***(ESIA)***								
Pycnanthus angolensis ***(OTIE)***								
Sterculia rhinopetala ***(WAWABIMA)***								
Strombosia glaucescens ***(AFENA)***								

Appendix C

Survey Questionnaire Used in the US and the UK/Ireland

Survey on the Introduction and Marketing of Lesser-Used Tropical Species

1. Are you aware of the efforts by environmental groups to boycott tropical hardwood products?
   _____ Yes _____ No

2. To what extent have these boycott activities affected the demand for your tropical timber products?

No Effect						***Significant Reduction***
1	2	3	4	5	6	7

3. Does your firm currently import any lesser-used tropical timber species? _____ Yes _____ No

4. How readily do you think your customers would accept a lesser-used tropical timber species?

Not at all			***Reluctantly***			***Very Readily***
1	2	3	4	5	6	7

5. In your opinion, how important would the following factors be in promoting the market acceptance of a lesser-used tropical timber species?

	Not Important						***Very Important***
Availability of technical information	1	2	3	4	5	6	7
Availability of promotional materials	1	2	3	4	5	6	7
Low trial price	1	2	3	4	5	6	7
Reliability of supply	1	2	3	4	5	6	7
Money-back guarantee for trial shipment	1	2	3	4	5	6	7
Acceptance of the species by an influential company	1	2	3	4	5	6	7
Availability of small trial volumes	1	2	3	4	5	6	7
Product certification of sustainability	1	2	3	4	5	6	7
Other: _____	1	2	3	4	5	6	7
Other: _____	1	2	3	4	5	6	7

6. What factor do you feel would be most important in encouraging importers to stock a lesser-used tropical timber species?

_____

_____

7. In your opinion, how important would the availability of a range of products be in encouraging you to stock a lesser-used species (e.g., solid lumber, mouldings, and panel products all produced from the new species)?

Not Important						***Very Important***
1	2	3	4	5	6	7

8. Please indicate where you would go to get information about lesser-used tropical timber species.

a. _____

b. _____

c. _____

d. _____ ***(Please turn over)***

9. In your opinion, how important is the utilization of lesser-used species to the sustainable forest management of tropical forests?

Not Important						***Very Important***
1	2	3	4	5	6	7

10. Approximately what volume of each of the following products did your company sell in 1996?

Lumber: _____ board feet Veneer: _____ square feet
Plywood _____ square feet

11. Approximately what percentage of your total sales in 1996 were tropical hardwoods?

Lumber: _____ % Veneer: _____ %
Plywood _____ %

12. Approximately what percentage of your tropical hardwood imports in 1996 originated from the following regions. *Total should equal 100 percent.*

Africa: _____ %
South/Central America: _____ %
Southeast Asia: _____ %
Other: (Please specify)
_____ _____%
100%

13. How many people were employed by your firm in 1996? _____

14. Please indicate your company's approximate sales in 1996?

_____ $0 - $1,000,000
_____ $1,000,001 - $5,000,000
_____ $5,000,001 - $10,000,000
_____ $10,000,001 - $25,000,000
_____ $25,000,001 - $50,000,000
_____ more than $50,000,000

****

Thank you very much for your time and effort in filling out this questionnaire. Please return it to us in the stamped/addressed envelope provided. We appreciate your participation in this study and if you would like to receive a summary of the project results, please check this box.

****

Appendix D

Summary of Survey Results Obtained in Ghana

Summary of the Results from the Survey of the Ghanaian Timber Industry

Section I. Strategic Responses to Tropical Hardwood Boycotts

1. Are you aware of the efforts by European environmental groups to initiate a boycott against tropical hardwoods?
_____ Yes _____ No

	Frequency	Percent
Aware	44	91.7
Not aware	4	8.3

2. How has the tropical hardwood boycott affected demand for your products in Europe?

No Effect ***Significant Reduction***

1 2 3 4 5 6 7

BOYAFECT

	Frequency	Percent
1	8	16.7
2	11	22.9
3	3	6.3
4	7	14.6
5	6	12.5
6	6	12.5
7	6	12.5

	Sample Size	Minimum	Maximum	Mean	Std. Deviation
BOYAFECT	47	1	7	3.72	2.08

11. In your opinion, how important is the utilization of lesser-used species to sustainable forest management? ***(1=Not Important, 7=Very important).***

UTILLUS

	Frequency	Percent
3	2	4.2
4	4	8.3
5	6	12.5
6	9	18.8
7	27	56.3

	N	Minimum	Maximum	Mean	Std. Deviation
UTILLUS	48	3	7	6.15	1.18

3. How effective do you feel each of the following marketing strategies would be in helping your firm respond to the tropical hardwood boycott in Europe? ***(1=Not Effective, 7=Very Effective).***

	Sample Size	**Effectiveness (Mean Rating)**	**Standard Deviation**
Advertising campaign aimed at European industry	47	4.15	2.01
Advertising campaign aimed at European consumers	48	4.65	1.99
Reduce prices to stimulate demand	46	2.17	1.52
Export to less environmentally sensitive markets	47	3.68	2.11
Shift export focus to regional West African markets	46	3.30	1.82
Shift focus to domestic markets	47	2.64	1.76
Shift product mix to higher value products	45	5.07	1.80
Increase the number of species utilized	46	4.76	1.95
Implement sustainable forest management	47	6.30	1.23
Cooperate with environmental groups	45	5.47	1.50
Develop a sustainable timber certification program	47	4.81	1.91
Ignore the boycott	45	1.89	1.51

4. In your opinion, what impact has the European boycott had on the Ghanaian forest products industry with respect to the following factors? ***(1=Strongly Discouraged, 4= No Impact, 7= Strongly Encouraged)***

	Sample Size	***Effect (Mean Rating)***	***Standard Deviation***
Participation in industry associations	45	4.47	1.31
Capital investments in processing equipment	46	4.09	1.98
Capital investments in new manufacturing facilities	46	3.78	1.92
Development of value-added industry	47	5.32	1.67
Sustainable forest management	46	6.04	1.07
International competitiveness	47	4.57	1.86
Increased utilization of lesser-known timber species	47	5.26	1.52

5. In your opinion, what level of risk does each of the following factors pose for your firm at the present time? ***(1=No Risk, 4=Medium Risk, 7=High Risk)***

	Sample Size	***Risk (Mean Rating)***	***Standard Deviation***
Political environment	47	3.15	1.83
Confiscation/expropriation of property	48	2.79	2.19
Economic environment	47	4.38	1.69
Tropical hardwood boycott in Europe	47	4.74	1.85
Accessibility of foreign exchange	48	3.27	2.21
Restrictions on repatriation of profits	48	2.58	2.12
Government regulations	48	4.65	1.90
Timber resource availability	47	4.40	2.21
Sustainable forest management	48	2.52	1.75
Timber certification/labeling programs	46	3.22	2.12
Lack of a forest concession policy	48	5.81	1.77

Section II. Marketing of Lesser-Used Timber Species

6. Does your firm currently process lesser-used timber species?

	Frequency	Percent
Yes	32	66.7
No	16	33.3

7. Does your firm currently export lesser-used timber species?

	Frequency	Percent
Yes	26	54.2
No	22	45.8

8. In general, how readily do your European customers accept lesser-used timber species?
(1=Not at all, 4=Reluctantly, 7=Very Readily)

ACCEPLUS

		Frequency	Percent
	1	7	14.6
	2	7	14.6
	3	3	6.3
	4	15	31.3
	5	3	6.3
	6	2	4.2
	7	5	10.4
Missing	9	6	12.5

	N	Minimum	Maximum	Mean	Std. Deviation
ACCEPLUS	42	1	7	3.62	1.87

9. In your opinion, how important is each of the following factors in promoting market acceptance for lesser-used timber species from Ghana? (1=Not Important, 7=Very Important).

	Sample Size	***Importance (Mean Rating)***	***Standard Deviation***
Availability of technical species information	48	6.17	1.33
Availability of long-term supply	46	6.15	1.37
Low initial trial price	48	4.38	1.91
Risk-free trial shipments	46	4.11	2.07
Money-back guarantees	46	3.48	2.22
Acceptance by influential trader/manufacturer	47	5.32	1.70
Ability to export small trial volumes	46	5.24	1.46

Section III. Acquisition of Market Information

12. How important are each of the following methods to your firm for acquiring market information? ***(1=Not Important, 7=Very Important)***

	Sample Size	***Importance (Mean Rating)***	***Standard Deviation***
Industry associations	48	4.58	2.07
Conduct our own market research	46	4.54	2.02
Hire an outside firm to conduct market research	44	3.11	1.75
Attendance at industry trade shows	48	4.65	1.80
Attendance at industry conferences	47	4.81	1.75
Discussions with customers	47	6.21	.88
Discussions with other manufacturers	46	5.28	1.76
Discussions with importers/agents	46	6.22	.96
TEDB market intelligence reports	48	5.71	1.76
Industry journals	45	4.93	1.84

14. What percentage of your exports go: through a broker/agent? _____%
direct to the final customer _____%

EXPAGENT

		Frequency	Percent
	0	13	27.1
	30	2	4.2
	40	2	4.2
	50	1	2.1
	60	1	2.1
	70	1	2.1
	80	4	8.3
	90	3	6.3
	95	1	2.1
	100	19	39.6
Missing	999	1	2.1

EXPCUST

		Frequency	Percent
	0	19	39.6
	5	1	2.1
	10	3	6.3
	20	4	8.3
	30	1	2.1
	40	1	2.1
	50	1	2.1
	60	2	4.2
	70	2	4.2
	100	13	27.1
Missing	999	1	2.1

15. How important are the following methods to your firm in identifying new market opportunities? ***(1=Not Important, 7=Very Important).***

	Sample Size	*Importance (Mean Rating)*	*Standard Deviation*
Customer leads provided by TEDB	47	4.77	1.99
Customer leads provided by other manufacturers	46	3.78	2.06
Customer leads provided by importers/agents	47	5.47	1.57
Attendance at industry trade shows	48	4.65	1.80
Attendance at industry conferences	48	4.21	1.86
Customer recommendations	47	5.55	1.67
Company sales staff	46	4.39	1.86
Industry trade associations	46	4.09	1.90
New customers contacting us directly	48	5.33	1.42

Section IV. Company Demographics

16. What percentage of your raw material requirements are provided by your own concessions? _____%

	Sample Size	Mean	Median	Mode
	48	41.44	35.00	0

		Frequency	Percent
Valid	0	16	33.3
	9	1	2.1
	10	2	4.2
	20	2	4.2
	25	1	2.1
	30	2	4.2
	40	4	8.3
	45	1	2.1
	50	1	2.1
	60	1	2.1
	70	1	2.1
	75	1	2.1
	80	4	8.3
	85	1	2.1
	90	2	4.2
	95	2	4.2
	100	6	12.5
	Total	48	100.0

17. What is the production capacity of your manufacturing facility during an eight hour shift (in cubic meters)?

	Mean	Median	Mode
Lumber	29.15	20.00	30
Veneer	13.34	.00	0
Moulding	2.60	.00	0

		Frequency	Percent
Lumber Production	0	3	6.3
	3	1	2.1
	8	1	2.1
	10	5	10.4
	12	4	8.3
	13	1	2.1
	15	1	2.1
	18	1	2.1
	20	7	14.6
	25	3	6.3
	30	8	16.7
	35	3	6.3
	40	1	2.1
	50	3	6.3
	60	2	4.2
	70	1	2.1
	115	1	2.1
	160	1	2.1
	Total	47	97.9

		Frequency	Percent
Veneer Production	0	38	79.2
	10	2	4.2
	14	1	2.1
	19	1	2.1
	70	3	6.3
	154	1	2.1
	210	1	2.1
	Total	47	97.9

		Frequency	Percent
Moulding Production	0	34	70.8
	2	1	2.1
	4	1	2.1
	5	4	8.3
	7	1	2.1
	8	2	4.2
	15	2	4.2
	18	1	2.1
	25	1	2.1
	Total	47	97.9

18. How many people are employed by your firm?

	N	Minimum	Maximum	Mean	Std. Deviation
EMPLOY	46	30	1600	348.89	409.54

		Frequency	Percent
Number of Employees	30	1	2.1
	40	1	2.1
	60	1	2.1
	64	1	2.1
	65	1	2.1
	70	2	4.2
	82	1	2.1
	85	1	2.1
	95	1	2.1
	100	1	2.1
	102	1	2.1
	103	1	2.1
	105	1	2.1
	115	1	2.1
	116	1	2.1
	120	1	2.1
	125	1	2.1
	127	2	4.2
	130	1	2.1
	148	1	2.1
	150	1	2.1
	200	1	2.1
	211	1	2.1
	215	1	2.1
	223	1	2.1
	250	3	6.3
	275	1	2.1
	350	2	4.2
	400	2	4.2
	410	1	2.1
	430	1	2.1
	500	1	2.1
	565	1	2.1
	800	1	2.1
	860	1	2.1
	1146	1	2.1
	1285	1	2.1
	1350	1	2.1
	1500	1	2.1
	1600	1	2.1
Missing	9999	2	4.2