



International Tropical
Timber Organization



International Trade Centre
UNCTAD / WTO

Tropical timber products

*Development of further processing
in ITTO producer countries*

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Tropical timber products: Development of further processing in ITTO producer countries
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Joint ITC-ITTO report on tropical timber trade – provides theoretical framework for assessing national competitiveness in further processing industries; includes key statistic and market data, regional overviews on further processing of tropical timber in Asia-Pacific, Latin America-Caribbean, Africa – separate chapters discuss industry structure and location, employment and competitiveness, policy issues, future global demand and outlook for ITTO producers; examines market preferences in terms of wood species, technologies applied in producing countries, tariff and non-tariff barriers affecting trade, certification and labelling issues – sets forth recommendations for ITTO, member governments and trade and industry associations for future action – appendices cover methodology, statistical tables on exports and four country- or product-specific case studies.

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Foreword

Further processing – and hence value adding – is entrenched in the International Tropical Timber Agreement (ITTA). The objectives of this agreement include the promotion of ‘increased and further processing of tropical timber from sustainable sources in producing member countries with a view to promoting their industrialization and thereby increasing their employment opportunities and export earnings’. The term ‘further processing’, as defined in the ITTA, includes the transformation of logs into primary wood products such as sawnwood, veneer and plywood, and also processing for the manufacture of much higher added-value products such as joinery and furniture.

Further processing can play an important role in forest conservation. With its capacity to earn export revenues and foster a skilled workbase it addresses poverty, probably the single biggest underlying cause of forest destruction. The many functions of tropical forests, such as biodiversity conservation and water supply, will be increasingly valued as the wealth of a nation increases – as we have seen in many countries with more developed economies.

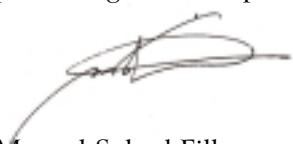
The ITTA thus prescribes further processing of domestic tropical timber resources as an approach to promote local employment, increase export earnings and foster sustainable development. Although almost all tropical timber producing countries have achieved considerable progress in expanding their capability to process tropical timber for export, so far most of this growth has taken place in the local processing of logs into export sawnwood, veneer and plywood.

However, exports of unprocessed timber and primary processed timber products are becoming less important in international trade in general, and the present trend to shift trade to higher added-value secondary processed products will accelerate in the future.

Among tropical developing countries, the most remarkable development of further processing capability has taken place in Indonesia and Malaysia, countries which are also leading exporters of primary tropical timber products.

What lessons can be learned from the success stories? According to the wide-ranging report presented in these pages, the three elements for a successful export-oriented further processing industry are a strong presence in export markets, well-developed domestic markets, and a strong primary processing sector. It suggests that assistance from international organizations such as ITTO will be necessary to boost the sector in many countries, and it makes a number of specific recommendations.

The International Trade Centre, and in particular its tropical timber specialist, Jukka Tissari, are pleased that they could contribute to this important study and hope it will serve as a useful reference for policy-makers and professionals in government, trade and industry as they work to grow the further processing industry in ITTO producer member countries. Meanwhile, the promotion of further processing in the tropical timber sector will remain a key element of ITTO’s work.



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Geoffrey Loades was the editor of the report. Alison Southby carried out an editorial review and Carmelita Endaya prepared the copy for printing.

Contents

Foreword	iii
Acknowledgements	v
Note	xiii
Executive summary	xiii
CHAPTER 1	
Introduction	1
Background	1
Objectives	1
Project activities	2
Data sources and limitations	4
Structure of the report	5
CHAPTER 2	
Theoretical framework for assessing national competitiveness in further processing industries	7
Raw material and product flows	7
Competitive advantages of producers	8
Demand conditions	10
Related and supporting industries	10
Factor conditions	10
Company strategy, structure and rivalry	11
Clusters	11
Factors influencing manufacturing strategies in further processing	14
CHAPTER 3	
Regional overviews on further processing in producing countries	16
Asia-Pacific region	16
Resource situation	16
Exports of further processed wood products	18
Export trends by individual products	21
Major markets	23
Imports of further processed wood products	27
Net trade	28

Price information	29
Industry structure and location	30
Labour issues	32
Competitiveness	34
Research and training	36
Policy issues	36
Latin America-Caribbean region	37
Resource situation	37
Exports of further processed wood products	38
Export trends by individual products	40
Major markets	42
Imports of further processed wood products	44
Net trade	44
Price information	45
Industry structure and location	46
Labour issues	48
Competitiveness	48
Research and training	50
Policy issues	51
Africa	52
Resource situation	52
Exports of further processed wood products	54
Export trends by individual products	57
Major markets	57
Imports of further processed wood products	59
Net trade	59
Price information	60
Industry structure	60
Labour issues	63
Competitiveness	64
Research and training	65
Policy issues	66
CHAPTER 4	
Global demand outlook for further processed wood products	68
Global imports of further processed wood products	68
Outlook for ITTO producer countries	70
Market preferences on wood species	72
Fashion trends in terms of colour and grain	73
Most commonly supplied species	73
CHAPTER 5	
Assessment of further processing technologies applied in producing countries	75
Introduction	75
Levels of sophistication of production facilities in developing countries	75
Assessment of wooden furniture and joinery	76
Category 1: Basic portable tools and universal woodworking machines	76
Category 2: Basic woodworking machines (bandsaw, planer, thicknesser, spindle moulder, boring machine etc.) for production in small batches	78

Category 3: Basic woodworking machines (bandsaw, planer, thicknesser, spindle moulder, boring machine etc.) for production of larger batches, using low cost mechanization and jigs suitable for serial production whenever possible	79
Category 4: Special purpose machines (four-side planer moulders, copying lathes, edge banders, CNC moulders etc.)	81
Category 5: Integrated machining lines (linked machines used for production of panel furniture, doors, surface finishing, robots used for painting, integrated lines, etc.)	82
Assessment of other products	82
Upholstered furniture	82
Rattan furniture	82
Mouldings and picture frames	83
Finger-jointed and laminated solid wood panels	83
Parquet flooring	84
Structural elements	85
Product development	86
Equipment selection	87
Management methods	89
Human resource development	90
Institutional infrastructure	92
Lack of support structures	92
Associations	92
Design centres	92
Common service facilities	93
Research institutes	93
Quality labels	94
Specialized consulting engineers	94
Standards and building codes	95
CHAPTER 6	
Tariffs and non-tariff measures affecting trade in further processed products	96
Import tariffs	96
Non-tariff measures	97
Timber certification and labelling of forest products	98
Trade in wood products vs. sustainable forest management	98
Current developments	99
Prominence of certification in the marketplace	100
Certification of further processed products	102
Launching the concept of green value-added products	104
CHAPTER 7	
Conclusions	106
Asia-Pacific	106
Latin America-Caribbean region	108
Africa	109
Conclusions on processing technologies	110
Evolution of processing technologies	110
Research and development or design	110
Selection of appropriate equipment and maintenance	111
Human resources needs	112
Quality labels	112
Caveat	112

Chapter 8	
Recommendations for future action	113
Structure of recommendations	113
Recommendations for ITTO	113
Recommendations for ITTO on international level	113
Recommendations for ITTO at a country level	118
Recommendations to governments in the ITTO producer countries	119
Recommendations for industry and trade associations in the ITTO producer countries	120
Proposed priority projects for ITTO	120
Appendices	
I. Methodology	125
II. Statistical tables on exports	130
III. Case study on Malaysia: development of SMEs and human resources in the furniture industry	133
IV. Case study of 59 further processing enterprises in Ecuador	136
V. Case study on the development of further processing in Ghana and Côte d'Ivoire	144
VI. Case study on the development of the processing of coconut stem wood	147
References	151
Tables	
1. Product coverage of the report	5
2. Resource status in producing countries in the Asia-Pacific region	17
3. Export structure of further processed products from ITTO producer countries in the Asia-Pacific region	20
4. Export structures of further processed products in major ITTO producers in the Asia-Pacific region, 1998	21
5. Major export destinations of selected further processed products from top three ITTO exporters in the Asia-Pacific region, 1993 and 1998	24
6. Imports of further processed products by Asia-Pacific ITTO producers, 1998	28
7. Net trade on further processed products in Asia-Pacific ITTO producers, 1998	28
8. Number of registered companies engaged in further processing in major ITTO producers in the Asia-Pacific region	30
9. Indonesia: structure of mouldings and joinery industry	31
10. Number of workers employed in further processing in major ITTO producers in the Asia-Pacific region	33
11. Comparative labour productivity in furniture industries in the Asia-Pacific region	33
12. Comparative wage rates in value-added processing in the Asia-Pacific region	34
13. Resource status in producing countries in the Latin America-Caribbean region	37
14. Export structure of further processed products from the ITTO producer countries in the Latin America-Caribbean region	39
15. Export structure of further processed products by ITTO producers in the Latin America-Caribbean region, 1998	39
16. Major export destinations of selected further processed products from top three ITTO exporters in the Latin America-Caribbean region, 1993-1998	42
17. Imports of further processed products by Latin America-Caribbean ITTO producers, 1998	44

18. Net trade on further processed products in Latin America-Caribbean ITTO producers, 1998	45
19. Brazil: comparison of average export prices of further processed wood products, 1996-2000	45
20. Brazil: major furniture production centres, 1997	47
21. Ecuador: cost structures in further processing industries	49
22. Resource status in producing countries in Africa	52
23. Export structure of further processed products in the ITTO producer countries in Africa	55
24. Export structure of further processed products by ITTO producers in Africa, 1998	56
25. Exports of further processed products by destinations from African ITTO producers, 1998	58
26. Imports of further processed products by African ITTO producers, 1998	59
27. Net trade on further processed products in African ITTO producers, 1998	59
28. Comparison of average export prices of Ghana's wood products, 2000	60
29. Côte d'Ivoire: list of major producers, by type of product	62
30. Ghana: list of major producers by type of product	63
31. Africa: comparative salary rates in value-added processing	64
32. Africa: comparative cost structures in furniture production	64
33. OECD imports of selected further processed wood products 1992-1999	68
34. Summary on import tariffs of further processed products in selected ITTO producer and consumer countries	97

Figures

1. Raw material and product flows in forest industries	8
2. Porter's diamond model: determinants of national competitive advantage	9
3. Cluster chart for wooden furniture industries	12
4. Key factors for determining manufacturing strategies in further processing of wood products	14
5. Trends in the export structure of further processed wood products in the ITTO producer countries in the Asia-Pacific region 1989-1999	19
6. Exports of further processed wood products by ITTO producer countries in the Asia-Pacific region, 1989-1999	20
7. Exports of wooden furniture by type from ITTO producer countries in the Asia-Pacific region, 1989-1999	22
8. Exports of profiled wood and builders' joinery by type from ITTO producer countries in the Asia-Pacific region, 1989-1999	23
9. Trends in the export structure of further processed wood products in the ITTO producer countries in the Latin America-Caribbean region, 1989-1999	38
10. Exports of further processed wood products by ITTO producer countries in the Latin America-Caribbean region, 1989-1998	40
11. Exports of wooden furniture by type from ITTO producer countries in the Latin America-Caribbean region, 1989-1998	41
12. Exports of profiled wood and builders' joinery by type from ITTO producer countries in the Latin America-Caribbean region, 1989-1998	41
13. Trends in the export structure of further processed wood products in the ITTO producer countries in Africa, 1989-1999	55
14. Exports of further processed wood products by ITTO producer countries in Africa, 1989-1998	56
15. Exports of wooden furniture by type from ITTO producer countries in Africa, 1996-1999	57
16. OECD: imports of wooden furniture, by products, 1992-1999	69
17. OECD: imports of builders' joinery, by products, 1992-1999	69

Note

The following abbreviations are used:

ABIMOVEL	Associação Brasileira das Indústrias do Mobilário
ACP	African, Caribbean and Pacific countries (group of States)
AIMA	Asociación Ecuatoriana de Industriales de la Madera
APEC	Asia-Pacific Economic Cooperation Forum
APEX	Agencia de Promoção de Exportações (Brazil)
ASMINDO	Indonesian Furniture & Handicraft Association
ATIBT	Association Technique Internationale des Bois Tropicaux
ATO	African Timber Organization
CAD	Computer-aided design
CAM	Computer aided manufacturing
CDI	Centre for Development of Industry
CEN	European Committee for Standardization
CEPI	Confederation of European Paper Industries
CFA	Communauté Financière Africaine
CNC	Computer numeric controls
CNPq	Conselho Nacional de Pesquisa e Desenvolvimento (Brazil)
COMEXT	Statistical Office of the European Union
COMTRADE	United Nations Statistics Division Commodity Trade Database
CORMADERA	Corporación de Desarrollo Forestal y Maderero del Ecuador
CORPEI	Corporación de Promoción de Exportaciones e Inversiones (Ecuador)
EMS	Environmental management system
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FAWAG	Furniture and Wood Products Association of Ghana
FINEP	Financiadora de Estudos e Projetos (Brazil)
FOB	Free on board
FPIB	Forest Products Inspection Bureau (Ghana)
FPRDI	Forest Products Research and Development Institute (Philippines)
FSC	Forest Stewardship Council
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GSP	Generalized System of Preferences
ha	Hectare
IBAMA	Brazilian Institute for Environment and Renewable Natural Resources
IFF	Intergovernmental Forum on Forests
ILO	International Labour Organization
IMF	International Monetary Fund
ISA	Indonesian Sawmillers' and Woodworking Manufacturers' Association

ISO	International Organization for Standardization
ITC	International Trade Centre UNCTAD/WTO
ITTA	International Tropical Timber Agreement
ITTC	International Tropical Timber Council
ITTO	International Tropical Timber Organization
LUS	Lesser-used species
m^3	Cubic metre
MDF	Medium density fibreboard
MFN	Most favoured nation
MRE	Ministério das Relações Exteriores (Brazil)
MTIB	Malaysian Timber Industry Board
n.a.	Not available
NGO	Non-governmental organization
NTM	Non-tariff measure
OECD	Organisation for Economic Co-operation and Development
p.a.	Per annum
PCA	Philippine Coconut Authority
PEFC	Pan-European Forest Certification
PROMOVEL	Programme for promoting Brazilian furniture exports
SFM	Sustainable forestry management
SITC	Standard International Trade Classification
SME	Small and medium-sized enterprise
SPIB	Syndicat des Producteurs Industriels du Bois (Côte d'Ivoire)
SWOT	Strengths, Weaknesses, Opportunities, Threats
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
UNSD	United Nations Statistics Division
T&G	Tongued and grooved
WSDP	Woodworking Sector Development Programme (Ghana)
WTO	World Trade Organization
WWF	World Wide Fund for Nature

Executive summary

Changing raw material sources

The production level of large-sized logs from natural forests of the International Tropical Timber Organization (ITTO) producer member countries is expected to continue to decline over the coming years, most rapidly in the Asia-Pacific region. The primary and further processing industries have already started to adapt their manufacturing methods, technologies and designs accordingly. Increasingly, logs of smaller dimensions produced on fast-growing plantations (rubberwood, gmelina, acacia, eucalyptus, teak, etc.) will be used. Malaysia and Thailand have already demonstrated the potential for such plantation wood by producing 80% of their furniture exports in rubberwood. In the Latin America-Caribbean region, Brazil is making progress towards establishing eucalyptus as an environmentally benign material for solid wood furniture and joinery products. Where end-use specifications allow, plantation-grown teak is partly replacing teak supplies from natural forests, which are becoming increasingly scarce in the key Asian producer country, Myanmar.

While the international tropical timber trade tends to concentrate on a limited number of well-known species, in marketing manufactured wood products there are other elements, such as technical specifications and aesthetic appearance, that come into play, and which are not necessarily species-related. A well-known species may bring a 'plus' to a product, but it may not be a *sine qua non* of further processed products.

Future expansion of the further processing and related trades cannot come from increased logging alone; it has also to be derived from adding value to the gradually diminishing volumes harvested from natural forests, which are more and more being brought under sustainable management systems. Further processing will create opportunities for new applications of the lesser-used species. However, for these to be fully exploited, there will need to be significant shifts in market acceptance and established trade flows, both of which appear unlikely to happen unless there is a concerted effort by the industry.

Reconstituted wood, whether in the form of wood-based panels or laminated solid wood products, will be used in increasing volumes to make up for the dwindling supplies of tropical logs from natural forests. Greater use, for example, will be made of new bio-composite board manufactured from oil palm residues, coconut shell or flattened bamboo. Various combinations of wood, bamboo, rattan and other fibrous plants with metal frames have already been used to good effect in the Philippines, and achieved some commercial success. Imported woods, mainly North American hardwoods, are also now partially replacing tropical timbers in further processing in the Asia-Pacific region.

Exports and net trade

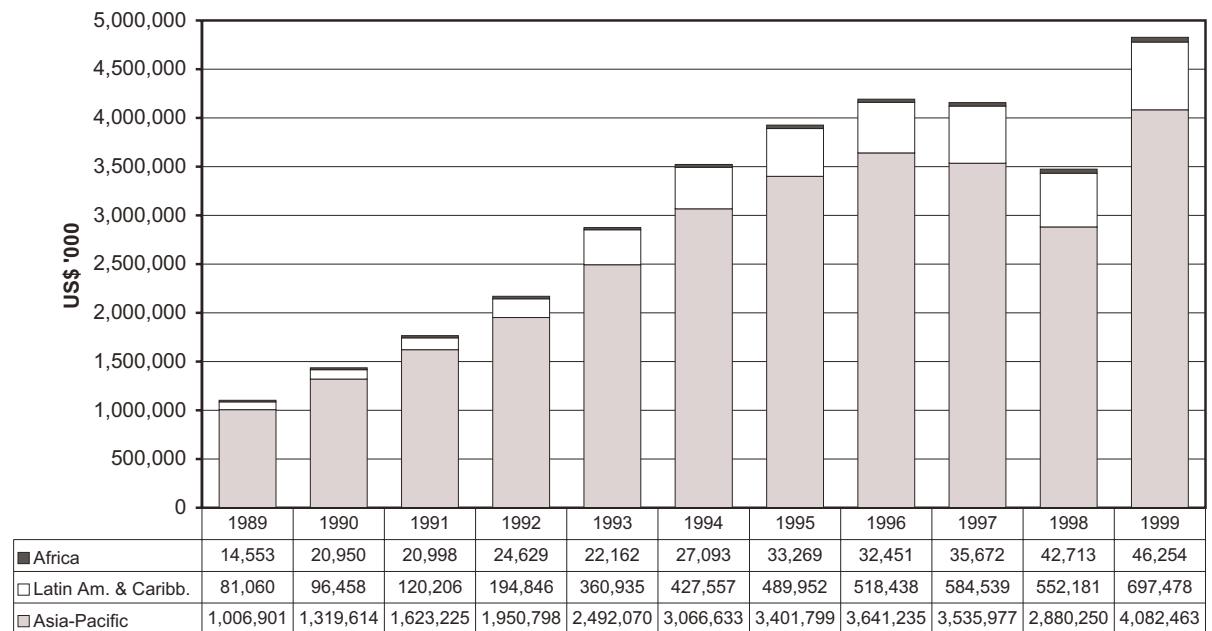
The ITTO producer countries exported further processed products to a total value of US\$ 3.5 billion in 1998, and as much as US\$ 4.8 billion in 1999 (see table A and figures A and B). The Asia-Pacific region exported 83% of the total, while most of the balance (16%) was from the Latin America-Caribbean region. Exports from Africa amounted to approximately 1% of the ITTO producers' total.

Table A Exports of further processed products, by leading ITTO producer countries, 1998 (in millions of United States dollars)					
Country/Region	Furniture and parts	Builders' joinery	Profiled wood (incl. mouldings)	TOTAL	Share of regions (%)
Asia-Pacific	1,897.6	668.5	314.2	2,880.3	82.9
of which:					
Malaysia	911.4	169.2	168.4	1,249.0	
Indonesia	239.1	406.7	91.1	736.8	
Thailand	471.1	31.9	50.1	553.1	
Philippines	257.9	59.7	4.5	322.1	
Others	18.1	1.0	0.1	19.3	
Latin America-Caribbean	331.1	162.4	58.8	552.2	15.9
of which:					
Brazil	277.7	134.9	46.3	458.8	
Bolivia	8.9	13.9	5.0	27.8	
Honduras	19.6	1.4	1.0	22.1	
Colombia	14.4	0.7	1.2	16.3	
Others	10.5	11.4	5.2	27.1	
Africa	9.7	5.4	27.6	42.7	1.2
of which:					
Côte d'Ivoire	0.7	3.8	16.9	21.4	
Ghana	8.7	0.5	5.0	14.2	
Others	0.3	1.1	5.7	7.1	
All ITTO producers	2,238.4	836.3	400.5	3,471.1	100.0
<i>Share of products (%)</i>	<i>64.4</i>	<i>24.1</i>	<i>11.5</i>	<i>100.0</i>	

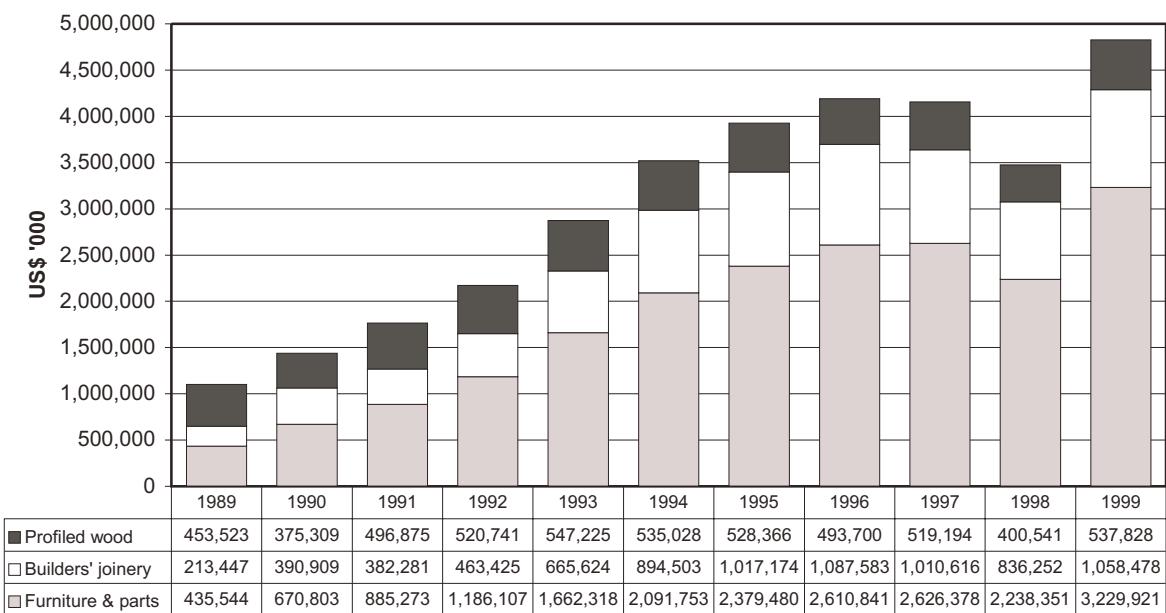
Sources: COMTRADE (UNSD), COMEXT (EU).

*Note: All figures rounded, and may not add up to totals.

Trade in furniture and parts was the mainstay of exports in 1998, accounting for 64% of the total value of wood exports, and Asian producers were by far the biggest suppliers. Malaysia alone exported furniture to the value of US\$ 911 million. Thailand (US\$ 471 million) and Brazil (US\$ 278 million) were the next largest exporters. The Philippines (US\$ 258 million) and Indonesia (US\$ 239 million) were also significant furniture exporters, although it is interesting to note that the latter generated even greater revenue from its exports of builders' joinery items (US\$ 407 million). In 1999, Indonesia's furniture exports bounced back strongly again. In joinery items, Malaysia (US\$ 169 million) and Brazil (US\$ 135 million) were the second and third largest exporters. This product category comprises doors and windows and their frames, as well as parquet panels, concrete shuttering and 'other' unspecified products such as cellular wood panels.

Figure A Exports of further processed wood products, by ITTO producer regions, 1989-1999

Sources: COMTRADE (UNSD), COMEXT (EU).

Figure B Exports of further processed wood products, by type, 1989-1999

Sources: COMTRADE (UNSD), COMEXT (EU).

In profiled wood, Malaysia and Indonesia topped the export charts with US\$ 168 million and US\$ 91 million, respectively. This product category mainly comprises mouldings, unassembled strips and friezes for parquet flooring, as well as tongued and grooved wood, using both softwoods and hardwoods.

In terms of their trade balances, the majority of ITTO producer countries in 1998 were net exporters. Their combined trade surplus was US\$ 3.17 billion, (table B). In the Asia-Pacific region, all countries were net exporters of further processed wood products, but in profiled wood India was marginally a net importer – an indication of the timber shortages experienced in that country. While Latin America was a net exporter overall, five countries in the region were net importers (Venezuela, Panama, Peru, Ecuador and Suriname). In Africa, most countries were net importers of furniture, but this was more than counterbalanced by net exports of profiled wood and builders' joinery.

Table B**Net trade in further processed products, by ITTO producer countries, 1998
(in millions of United States dollars)**

Region	Wooden furniture and parts	Builders' joinery	Profiled wood (incl. mouldings)	TOTAL
	Net trade (exports minus imports)			
Asia-Pacific	1,821.2	658.7	296.6	2,776.6
Latin America-Caribbean	176.6	142.5	47.9	367.0
Africa*	- 6.9	5.0	27.5	25.6
				3,169.2

Sources: COMTRADE (UNSD), COMEXT (EU).

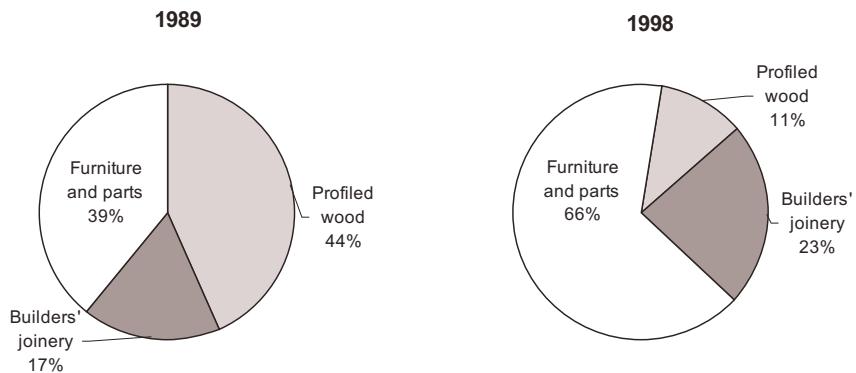
*Note: Overestimate, because recent import data not available for Ghana, the Democratic Republic of the Congo, Togo and Liberia.

Product trends in exports

Figures C-E serve to illustrate the changing composition of further processed wood products exported to world markets by ITTO producer regions. The Asia-Pacific region has broken away from its former dependence on mouldings and its exports are now furniture-dominated. Wooden furniture accounted for 66% of total exports in 1998, builders' joinery 23% and profiled wood 11%. Again, in the Latin America-Caribbean region, furniture has gained a larger share of total exports, at the expense of builders' joinery. Around 60% of the region's exports were in furniture and parts, 29% builders' joinery and the remaining 11% profiled wood. Profiled wood is still the main product of African ITTO producers, representing 64% of total trade in 1998. Furniture exports have grown in both relative and absolute terms, from a previously modest 10% to a now visible 23% share of the total. Most of this growth has taken place in the last two years (1997/98) and has come largely from the garden or outdoor furniture market segment, on which African producers have concentrated.

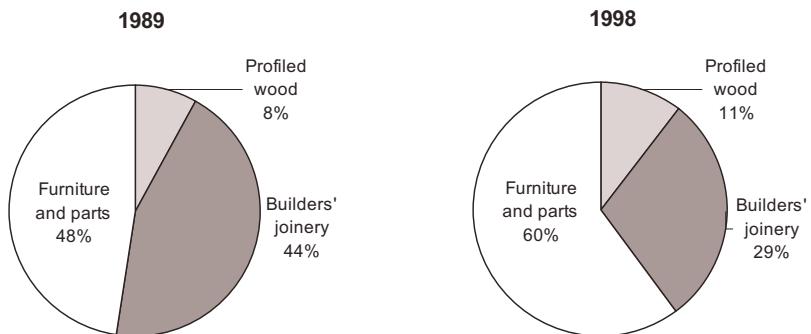
Furniture is more of a fashion item, while builders' joinery and mouldings are more technical or functional in nature. This means that their demand

Figure C Changes in export structure of further processed wood products from the ITTO producer countries in the Asia-Pacific region



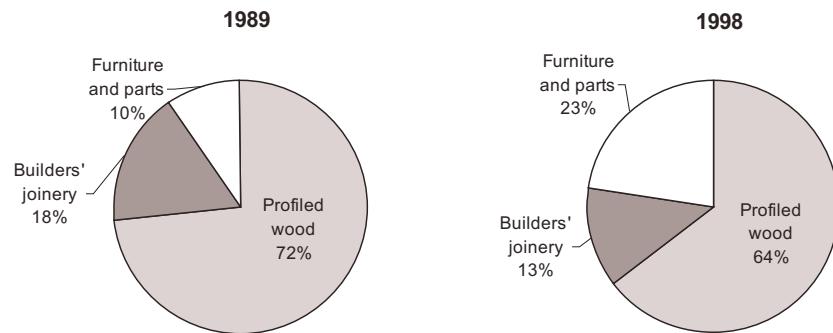
Sources: COMTRADE (UNSD), COMEXT (EU).

Figure D Changes in export structure of further processed wood products from the ITTO producer countries in the Latin America-Caribbean region



Sources: COMTRADE (UNSD), COMEXT (EU).

Figure E Changes in export structure of further processed wood products from the ITTO producer countries in Africa



Sources: COMTRADE (UNSD), COMEXT (EU).

dynamics are somewhat different. Demand for furniture is directly related to consumer factors whereas for builders' joinery and mouldings it is derived demand, driven largely by new construction and renovation activity.

Future outlook

It is evident that in the ITTO producer countries, the further processing of wood products as an industry will grow faster than primary processing, which has shown a downward trend over the past decade. There are, however, differences between countries when it comes to their abilities to tap the potential benefits of value-added manufacturing and exports. The leading producers of further processed products, such as Malaysia, Indonesia, Thailand, the Philippines and Brazil, have already established their presence in the export markets. They also have well-developed domestic markets and strong primary processing industries. These three elements have proved to be the ones that constitute a solid foundation on which to build an export-oriented further processing industry.

Many African producer countries, on the other hand, are still struggling to strengthen their ailing **primary** processing sectors, consolidate domestic markets for wood products and to curb the unsustainable exporting of unprocessed logs. This has prevented them from seriously engaging in the export of further processed products.

World trade in furniture and other further processed wood products has continued to grow at a much faster rate than both world GDP (which has averaged 4-5% per year in recent years) and global production of wood products (3-4% per year). There has been a significant opening up of trade in the furniture sector, in particular, during the past decade, as evidenced by the fact that the ratio of exports to production worldwide rose from 17% in 1993 to 24% in 1997. And it is expected to rise even further, to some 28% in 2001-2002.

Because trade in furniture and further processed wood products has been slower to open up than that in many other goods, it has experienced particularly dramatic growth over the past decade. Furthermore, developing countries have been able to expand their participation in international trade at the expense of industrialized nations.

It is expected that the global trade in further processed wood products will continue to expand by 9 to 10% per year in the medium term, i.e. at the same average annual rate achieved over the past three years. A weighted average over the decade 1989-1998 actually shows a growth rate per year of 13.6% for all ITTO producers. The Latin America-Caribbean region recorded the fastest relative annual growth (+23.8%), followed by Africa (+12.7%) and then Asia-Pacific (+12.4%). Total ITTO producer country exports (US\$ 3.47 billion in 1998, *see table A*) are projected to reach US\$ 5.1 billion in 2001, and US\$ 6.6 billion by 2003.

Most of the new exports will be targeted at gaining market share in the leading OECD import markets, and are thus likely to change considerably the traditional trade flows of value-added products. Key factors driving the export growth include:

- The excellent quality of many tropical timbers, which lend themselves well to further processing, and a widening base of sustainably produced utility species from plantation forests;

- The wage cost differentials between wood processing industries in developing countries and those in developed countries;
- Improved technical and managerial skills;
- Transfer of more advanced processing and finishing technologies;
- Systematic market promotion efforts by leading exporters; and
- Supportive institutions and rational policies, resulting in an enabling environment for exporters.

ITTO producer countries can either contribute on their own to most of these key factors or simply ensure that they stay in the vanguard of progress in order to maintain their competitive advantages. Nevertheless, some further reduction of tariffs and of non-tariff barriers will be needed in the importing countries if future growth is to be facilitated. High tariffs already appear to be a particular obstacle in the way of trade growth between developing countries. In this respect, both importers and exporters should reciprocally avoid tariff escalation.

The positive long-term trend, however, has to be viewed against the backdrop of a predicted general slowdown of demand for furniture in the major markets (the United States in particular). ITTO producer countries must therefore seek new market niches, distribution systems and methods of promotion. It will be equally important for them to introduce market-specific designs and to launch new furniture ranges at shorter intervals than in the past in order to create more distinctive and professional supplier profiles with which to face the competitors in the local marketplace.

Industrial development in further processing of tropical timber

In the past, importing countries limited their buying to logs and primary processed wood (planks and panels) in order to keep for themselves the benefits derived from further processing, i.e. job creation and added value. The growth of further processing in many developing countries has until now been impeded by the small size and poor infrastructure of their local markets, weak transport systems and, above all, the low purchasing power of their local populations. With significantly improved economic situations in many producing countries, they are able to devote more attention to increasing the value-added aspect of their exports of forest products.

In the **Asia-Pacific** region Indonesia and Malaysia in particular, with the Philippines and Thailand to a lesser extent, have all become major suppliers to the world's furniture markets. As far as India is concerned, however, its substantial local market (albeit mainly for low-priced, low-quality products) and its traditional belief in the merits of 'small-is-beautiful', have led it largely to neglect further processing of wood on an industrial scale so far.

In the **Latin America-Caribbean** region, Brazil has developed a high-volume industry based on further processing, mainly located in the temperate zone of the country, which is where the domestic markets are concentrated and where the supplies of plantation timbers are available. The other producing countries in the region are all striving, each in their own way, to develop processing industries, but they have yet to become significant sources of export revenue.

Africa appears to lag behind other tropical regions in the pace at which it moves towards industrialization. The countries with the most acute timber supply problems have led the way towards further processing. Ghana started

the move with a total log export ban in 1995 and has made extensive efforts to promote both further processing and exports. Practically all the export-oriented further processing industries are foreign-owned and many produce components for the captive markets of their overseas owners.

Processing technologies

In terms of the current state of processing technologies, the ITTO producer countries show a great deal of heterogeneity. The different categories, or levels, of technological advancement that currently exist are summarized below.

1. Facilities that use basic portable tools and universal woodworking machines.
2. Facilities that use basic woodworking machines (bandsaw, planer, thicknesser, spindle moulder, boring machine etc.) to produce in small batches.
3. Facilities same as in 2, but producing larger batches, using low cost mechanization and jigs suitable for serial production whenever possible.
4. Facilities that use special purpose machines (four-side moulders, copying lathes, edge-banders, CNC [computer numeric controls] moulders, etc.).
5. Facilities with integrated machining lines (linked machines used for production of panel furniture, doors, surface finishing, robots used for painting, integrated lines).

Categories 1 and 2 typify the technological status of further processing in ITTO producer countries, consisting of a great number of microenterprises, usually employing 20 to 50 persons.

Category 3 is the first one to which the term 'industrial production' can really be applied. With the use of jigs, higher quality machines, low-cost mechanization and well-maintained, simple machines it is possible to produce interchangeable components. Production units at this level of sophistication are in a position to enter export markets. Products tend to be standardized, and a series of up to 500 components may be put into production.

This is the category of firms that would be the most receptive to technical support by ITTO, or by other international organizations. Many enterprises in this group are preparing to take the next crucial step from supplying only the domestic market to becoming engaged in exporting. In addition, there are particularly good opportunities for network development among these types of companies.

In most ITTO producer countries, it is still comparatively rare to find companies that have reached **Categories 4 and 5** in terms of technological advancement, but there do exist a number of export-oriented large-scale manufacturers in countries like Malaysia, which qualify for inclusion in these groups.

Companies in ITTO producer countries may need to evolve through all the steps described above, but if there is sufficient investment funding available it is possible for production to be started straight from Categories 3 to 5. All groups are important to their local region as a source of employment and income, and in some countries all categories may be present. Experience shows that the most enduring and successful companies have tended to evolve through all these phases. The key challenge for ITTO producer countries, therefore, is how to accelerate the process.

Policy measures

A wide range of policy instruments for promoting increased further processing (e.g. log export bans, minimum local processing quotas and differentiated export taxation according to the degree of processing) have been tried. The experience is varied, and in some cases industrial growth has taken place at what is considered excessively high economic cost.

Substantial quantities of logs and rough sawn timber are still being exported by several countries in Africa, but there is a definite and irreversible trend towards limiting or simply banning log exports in order to promote primary processing. Côte d'Ivoire has followed the example of Ghana in banning log exports, and has since experienced steady growth in value-added processing. Cameroon's decision in 1999 to ban exports of the most valuable commercial species was the most recent and important decision in this respect. Gabon (the largest log exporter in Africa), the Congo and the Central African Republic have all implemented policies based on applying a minimum percentage of domestic processing to individual companies.

In the Asia-Pacific region, Papua New Guinea and Sarawak of Malaysia are still exporting logs, while Peninsular Malaysia, Thailand and the Philippines are net exporters of primary and further processed products. Indonesia largely banned log exports from the early 1980s, but allowed them again after the economic crisis of 1998. Brazil has also banned log exports. What is needed, however, is a more comprehensive mix of policy instruments as opposed to trade regulations.

Growth potential of SMEs

Industrial policies should address the strategic potential of small and medium-sized enterprises (SMEs) as a source of employment and income. SMEs tend to be overlooked in public policy making as they are often operating in the informal sector. The relative importance of SMEs is typically high in many segments of the further processing industry, particularly furniture, and they can play a key role in satisfying domestic demand. Being labour-intensive, small-scale enterprises tend to make a positive contribution to the general socioeconomic development objectives of a country, although problems are often encountered with regard to their effective control, particularly when it comes to sources of wood supply. The situation, however, is quite different for joinery and mouldings, which tend to require more sophisticated technologies and larger units of production, and so these operations may achieve large-scale exports.

In targeting development policies at SMEs, the main issues to be addressed are the following:

- Access to the markets. This is not usually a problem as producers tend to be located in, or near to, main consumption centres.
- Access to raw materials at competitive costs becomes a problem as SMEs are at a disadvantage because of their small size. This can become a hindrance in organizing the flow of raw materials from domestic, non-transparent timber markets controlled by various intermediaries and often leads to timber shortages just when exports are growing.

- Access to knowledge and technology is a major problem area. SMEs tend to fall behind because of their strong reliance on traditions: e.g. they may be using high-value timber for secondary use, simply through force of habit and thus be gaining revenues far below the timber's real potential.
- Access to capital is difficult to find at competitive rates because domestic bank finance is scarce, interest rates are generally high and collateral requirements are strict.
- Access to designers is limited, therefore they rely on simply copying or producing according to the buyer's design.
- There are shortages of skilled labour and in-house training (apprenticeships, on-the-job training, etc.) is usually too much of a burden.
- Managerial skills are poor and opportunities to develop them outside the company are rare.

Larger companies are partly suffering from the same problems but they have greater internal resources to solve them. Nevertheless, governments should consider both SMEs and large companies in the provision of training and educational programmes, research and development funds, and other technical services aimed at enterprise development.

Competitiveness

There is a closer physical and economic link between primary processing (sawmilling and production of veneer or plywood) and forest management than between primary and further processing because of the bulky nature and low value of wood as a raw material. Semi-finished products, such as rough sawn lumber, veneer or standard plywood, can be efficiently transported over long distances, and then further processed practically anywhere. Any comparative advantage derived purely from resource endowment therefore tends to decline with the increasing degree of processing. The economies of scale tend to behave similarly, i.e. the higher the degree of processing, the less the dependence on plant size as a factor in cost competitiveness. But there are some important exceptions to this rule: small-scale sawmilling, for example, can also be competitive in certain suitable conditions.

For these reasons, the competitiveness of the value-added products of timber-producing countries will probably depend upon one, or preferably all, of the following factors:

- Low-cost local inputs (notably wood and labour) to compensate for the high costs of imported inputs;
- High total productivity (measured over all elements of production, i.e. wood, labour, capital, energy and operating supplies); and
- Superior quality of products (including design).

In the case of Africa, the lower costs of raw materials and labour are still not sufficient to guarantee the competitiveness of further processed wood products in export markets (table C). The low productivity of the local workforce, lower raw material recovery rates and higher freight costs all cancel out part of the initial competitive advantage. In fact, the issue of labour productivity remains key to all efforts to improve the competitiveness of wood processing in tropical countries, especially as wages are bound to increase in the future.

Table C Comparative cost structures in furniture production

Cost factor	Company in a developed country	Company in African ITTO producer
Sales price	100	75
Labour	5 hours	30
Raw material	14 b/ft	21
Overheads	5 hours	30
Total cost		81
Profit	19	6.8

Source: Fieldwork (July 2000).

Another factor that serves to further reduce the economic efficiency of operations in Africa is that the only use made of the waste material from processing is as a fuel. It is not turned into a raw material to produce, for example, reconstituted panels (as in particleboard, MDF, etc.). Added to this, managerial shortcomings, poor quality finishing and a lack of good designs – as well as the general unreliability of African producers in supplying international markets – are all factors that contribute to there being a significant difference in selling prices, which is only partly explained by transportation costs.

Investing in value-added production is costly, and it is hardly possible at all in conditions where even the primary processing sector is not capable of exporting according to the strict quality standards required in today's world markets. In-depth research studies need to be carried out into exactly what true competitive advantages each individual producer country possesses. It might then be possible to avoid strategies based on the unrealistic assumption that providing public-sector support to the development of further processing is a 'cure-all' solution.

Industrial development needs among ITTO producer countries

The majority of the further processed products currently exported by ITTO producers are made-to-order, with little innovation or design input. While this results in highly competitive prices in the global marketplace for furniture, the prices are often not profitable for producers. Price competitiveness inevitably requires low-cost production. In order to encourage the manufacturing of value-added products in producer countries, there is a growing need for an injection of technical and design know-how into these industries, and for larger and stronger units to be created, capable of efficiently supplying international markets. The existing producer infrastructure is not, in most cases, capable of providing such support.

Again, with Africa as the most prominent example, most companies appear to have adopted a step-by-step approach to restructuring and adding value to their output. The first step is to produce kiln-dried planks, flooring strips or dimension lumber, and then to proceed into moulding, finger jointing and edge gluing. Kiln drying is now a common export specification and as such it is an indispensable step towards further processing. This progressive approach not only requires investment and technical adaptation, but also a revamp of both commercial and administrative practices and training. There are many examples of successful straight entries into the further processing industry, but

these are all based on imported know-how (and expatriate staff) from foreign companies, which brings with it both technical experience and a ready access to distribution channels. Such arrangements are costly, and usually too costly for the African industry.

In the Latin America-Caribbean region, the main stumbling blocks for exports have been the lack of appropriate designs and product development and, to a lesser extent, the absence of industry-specific training programmes and institutions.

The growth of the industrial-scale value-added products sector in the most successful Asian exporting countries has been driven by the availability of low-cost production factors. This advantage was boosted in the latter part of the 1990s by an unexpectedly significant devaluation of national currencies. With currently escalating labour costs and a dwindling supply of natural tropical timbers, the Asian scenario is expected to change in the future. There will be a need to consolidate production capacities and to accelerate the shift towards the manufacture of higher-priced value-added products in these countries. Part of the future expansion in further processing will come from the lowest-cost producer countries, where labour-intensive production still has the potential to thrive. Alongside these regional dynamics of value-added industries, the biggest producers will gradually move into higher-value markets. For example, Malaysia is moving from OEM (original equipment manufacturing) to ODM (original design manufacturing), and is aggressively seeking new market outlets for higher-value products. In these efforts, external support can be useful in facilitating access to new customers and technology transfer.

Recommendations for future action

Several possible lines of future action for pursuing the development of the further processing sector were identified during fieldwork and in contacts with government agencies and industry associations. The key recommendations for ITTO, which focus on actions designed to directly benefit the further processing industries, are summarized below.

Recommendations for ITTO at the international level

- Promote sustainably produced further processed products of tropical timber in the international markets:
 - Support the preparation of export promotion materials for further processed wood products of tropical origin, by presenting them as being made from an environmentally benign raw material, which has a rich variation of valuable properties (health aspects, structural properties, appearance, insulation, recycling, carbon store, etc.) that cannot be offered by substitutes.
 - Prepare and disseminate publicity material which highlights the potential of further processing to rationalize the use of forest resources, and to offer an internal incentive for sustainable forest management.
 - Defend and train the tropical wood industries against falling victim to discriminative trade and negative international publicity.
 - Disseminate information on suppliers of sustainably produced further processed tropical wood products from producer countries to buyers in the international markets (preferably through an on-line database with free access).

- Improve market and product information, and export promotion:
 - Collect and disseminate to producers comparative information on product quality requirements (tests, tolerances, gluing, finishing, etc.), environmental standards and purchasing policies of the major distributors and retail chains, as found to be relevant to tropical timber and lesser-used species.
 - Carry out in-depth surveys on the demand patterns and prices for further processed products in the major markets, including products of lesser-used species and certified wood.
 - Keep producers abreast of development in electronic commerce in the wood products sector by means of:
 - Analysing its opportunities and threats to tropical wood processors;
 - Revealing the current adoption rates and growing importance of e-commerce in trade;
 - Supporting the adoption of productive e-commerce practices and tools;
 - Improving the cost-efficient access of ITTO producers to the electronic marketplace;
 - Supporting the build-up of a human-skills base for e-commerce in producer countries.
 - Help organize international and regional conferences on pertinent aspects of further processing (markets, technologies, certification, etc.) in ITTO producer countries.
- Support studies on non-conventional raw materials, imported consumables, and industry restructuring:
 - Commission detailed studies on product-specific applicability of lesser-used species (LUS), plantation timbers, products made of other fibrous plants, and the possibilities for introducing new combinations of materials.
 - Compile information on the research and development performance of non-conventional raw materials, and help provide the necessary testing skills and facilities needed to meet the challenges in this area.
 - Carry out comparative studies on the availability, costs and distribution channels of non-wood materials and equipment used in the further processing industries (imported supplies such as machine spares, tools, lubricants, abrasives, chemicals, finishes, etc.). Overpricing and supply limitations often cause additional bottlenecks, which can hold back a further processing industry's development.
- Support the international dimension of human resources development:
 - Prepare training materials and support national and regional training centres in efforts to improve the skills of local trainers for the further processing industries on subjects such as optimized sawing, wood drying and saw doctoring (process control, defects, etc.), which will eventually improve the quality of parts and components.
 - Help managers, technicians and furniture designers to participate in training courses abroad.
 - Give ITTO producer countries an infusion of design ideas and know-how by engaging freelance designers from the main ITTO consumer countries.

- Promote innovative approaches to technology transfer and financing:
 - Promote the development of technology transfer and joint investment, and give the further processing industries an infusion of technical and design skills through partnerships between ITTO producer and consumer countries.
 - Identify the availability of green financing (ethical and fair trade foundations, climate funds, etc.) and other sources of non-conventional capital for investment in sustainable tropical forestry and downstream further processing.

Recommendations for ITTO at the national level

- Strengthen the strategic orientation of SMEs and institutions involved in further processing:
 - Support the analysis of competitive advantages possessed by producer countries and the preparation of sector development strategies for further processing.
 - Support the establishment of new trade and industry associations, help develop their agendas, and strengthen the services provided by existing national associations to the further processing industries.
 - Formulate and implement product-specific marketing assistance programmes for SMEs, and provide information on niche markets (e.g. hand-carved furniture, car interior fittings), the component trade, contract furniture markets and other emerging possibilities for exports.
- Target support at enterprise level:
 - Support marketing missions and the production of innovative export promotion materials, including adoption of e-commerce tools in pilot enterprises: disseminate the experiences gained.
 - Analyse the opportunities and constraints for networking among further processing enterprises, and promote appropriate procedures for increasing cooperation and supplier networks.
 - Provide training and support to optimized sawing techniques, kiln-drying, appropriate use of jigs, quality control and methods of finishing.
 - Support further processing companies in efforts to attain certification of forest management and chain-of-custody, and to convince their sub-contractors to follow suit.
 - Improve knowledge of and access to appropriate technologies in further processing through the provision of technical data, contact with suppliers (via fairs, magazines, etc.), and the facilitation of bilateral and multilateral technology transfer projects.

Recommendations for governments in the ITTO producer countries

- Prepare and implement comprehensive and stable development strategies for further processing industries, including as appropriate, *inter alia*:
 - A consistent policy for supporting sustainable raw material procurement and further processing as opposed to regulation by complex rules and ad hoc restrictions;
 - Tax concessions or similar fiscal incentives;

- Appropriate export regulations;
- Free trade (export) zones with a horizon corresponding to investors' planning cycles;
- Rationalization of import tariffs on raw materials and equipment;
- Improvements in transportation, communications and the information infrastructure;
- Strengthened support for the institutional infrastructure of industries (associations, research institutes, export promotion offices, etc.).

- Support the creation and implementation of national training programmes on further processing, with emphasis on middle managers and technicians, and with the following training priorities:
 - Support the training of craftsmen, through formal or informal apprenticeship schemes and national training programmes;
 - Improve skills in the correct use of modern adhesives, surface finishes and hardware fittings in knock-down furniture;
 - Support the training of machine operators for factories that produce in long series, e.g. by means of staff exchange programmes or a 'train the trainers' approach.
- Create curricula for courses to educate furniture designers, with emphasis on the marketable design of contemporary products for industrial (serial) production.
- Provide targeted (preferential rate) credit lines for the acquisition of further processing technology, working capital, mill construction and sustainable forestry.

Recommendations for industry and trade associations in the ITTO producer countries

- Bring the industry's initiatives and aspirations more forcefully to the attention of ITTO and other international organizations and participate actively on the international stage to promote the interests of the further processing industries.
- Collect and disseminate statistics, comparative information and studies both on domestic further processing industries and on those in competitive countries.
- Carry out market and investment promotion and publicity campaigns in a cost-efficient and coordinated manner.
- Promote the implementation of international quality and management system standards, as well as technical norms pertinent to further processing – and provide inspection services as required.
- Identify and capture non-traditional investment sources and new technologies available to the further processing sector.

Proposed priority projects for ITTO

Based on the above recommendations, ITTO might consider implementing the following priority projects:

A regional or prioritized country project to develop further processing of tropical wood in Africa

This follows directly from the African Timber Organization (ATO)/ITTO regional conference on further processing of African tropical timber in Libreville in September 2001. A viable project approach could serve as a development model for other regions or sub-regions.

At the national level, the feasibility of a *programme approach* to the support of further processing in Africa should be considered, drawing on experiences with existing industrial strategic plans from other producer countries. A pilot programme could be developed in one producer country, then modified and implemented in others at a later stage, based on lessons learned.

The key elements of such a programme could include:

- Raw material analysis
- Cost analysis
- Infrastructure development
- Market analysis
- Clustering and SWOT analysis
- Upgrading and transfer of processing technologies
- Human resources development
- Implementation of forest certification
- Export promotion
- Investment promotion and joint ventures

Production of a series of market research reports on further processed wood products in the main consumer markets (United States, European Union and Japan)

Several ITTO producer countries have stressed the need for more up-to-date market information. Irrespective of the region, the producers feel that they are not adequately informed on their export markets. The international furniture markets, in particular, have undergone significant changes over the past decade, and the repercussions have not been fully understood or properly interpreted by many ITTO producers. In-depth market research on the demand and supply of certified further processed wood products and their price structures in the major markets, plus analysis of the implications of certification for manufacturers and sustainable forest management, should form part of the project work.

Regional conferences on the pertinent aspects of further processing in ITTO producer or consumer countries

Based on the experiences gained from the 2001 Libreville ATO/ITTO Africa regional conference, other regional conferences (Latin America-Caribbean, Asia-Pacific) could be organized.

Key topics would include supply and demand trends, international trade, R&D, design, export promotion, certification, e-commerce and processing technologies. These conferences not only help to improve the skill and knowledge of industry managers, but also serve as catalysts for other new projects in each region.

In the interests of both synergy and cost-savings, it would probably be best to arrange for the conferences to take place alongside existing major international fairs on value-added wood processing in key tropical producer countries. Agendas could be tailor-made to address the specific needs of producers in the particular region. ITTO producers should find this a useful forum for engaging with development organizations as well as major private

sector agents (importers, distributors, consumer groups, non-governmental organizations [NGOs], designers, etc.). The promotion of public-private partnerships could be added as a new ingredient of future ITTO-supported conferences on further processing.

□ Collaborative projects on (i) promotion of technology transfer and joint investments and (ii) the injection of technical and design skills into the further processing industries

Collaborative projects between ITTO producer and consumer countries could be implemented in the fields of technology transfer and investment promotion, on a partnership basis (South-North cooperation). The aim would be to facilitate access by producer country enterprises to the technology and the environmentally-motivated capital funds of the consumer countries, who are promoting the responsible use of renewable natural resources. The sustainability criteria set out by such funds would have to be strictly fulfilled, and the social dimensions of industrial development properly addressed. Executing agencies could be found among the regional financing institutions, industry associations, technical cooperation agencies and research institutions. Furthermore, South-South cooperation in similar fields could evolve, for example, around Malaysia and Brazil as regional powerhouses of further processing and related technologies.

ITTO could facilitate the process by preparing guidelines and codes of conduct for implementing joint projects, and by convening meetings between the potential participants from producer and consumer countries. This would also serve to deepen ITTO's own relationships and interaction with the private sector and with the non-conventional funding channels for sustainable forestry.

Technical and design skills could be upgraded by means of staff exchange or training courses in the testing laboratories and design institutes of the more advanced countries. This approach would help the producer countries to narrow the skills gap between them and their export markets. Ideally, this would bring skills in quality control, technical testing and design up to an acceptable level from the consumer countries' point of view. Freelance designers from consumer countries could be involved.

A pilot project with one producer and one consumer country could be designed by ITTO in order to plan and test the methodology for the new concept described above.

□ The creation and implementation of national educational and training programmes on further processing, with the emphasis on (i) machine operators for serial production, (ii) middle managers, and (iii) designers

The category of companies likely to be the most receptive to technical support from ITTO is the medium-sized processors group that are already capable of serial production. They have probably just about reached a scale that could be described as 'industrial' and now want to embark on exports. Training and re-training will therefore be required in a number of different operating areas:

- Machine operators need to be trained to deal with the higher levels of production and stricter quality control requirements.
- Raising the scale of operations like this can also put middle managers under extraordinary pressure. Their management skills need to be upgraded, new production planning methods must be applied, and export procedures have to be learned.

- The training for furniture designers should focus on products for *mass* production. Here, designers from the export markets themselves could be brought in to undertake some of the training.

ITTO itself might fund and organize a series of regional or national training courses *for the trainers* of machine operators, furniture industry managers and furniture designers from the producer countries – after a few initial pilot courses, perhaps. ITTO already has experience of training courses in producer countries.

A pilot project to facilitate the adoption of e-commerce tools in the export promotion of further processed products of tropical origin

A project sponsored by ITTO, which shows tropical timber producer countries how to use the tools of the new technology in the sales, marketing and export promotion of further processed wood products, could build capacities and boost their efficiency and competitiveness. (Note: it would be important in this respect to advise producers of the differences in levels of e-commerce uptake between the business-to-consumers sector and the business-to-business sector, the latter being much higher.)

Chapter 1

Introduction

Background

Through its decision ITTC XXVII/21, the International Tropical Timber Organization (ITTO) decided to undertake a pre-project study, PPD 25/99 (I) entitled *Review of the Status of Further Processing of Tropical Timber in Producing Countries*. The International Trade Centre UNCTAD/WTO (ITC) was entrusted with implementing this study by providing consultancy services and by preparing a report, which would assist the ITTO Secretariat in assessing the status of further processing among its producing member countries.

Objectives

The objectives of this pre-project study are largely consistent with the ITTO 2001 Libreville Conference Action Plan. Under its **Forest Industry Goal 1: Promote increased and further processing of tropical timber from sustainable sources**, the following agreed action points justify the commissioning of this study:

- Commission and publish analytical studies that identify critical knowledge and information gaps.
- Assist in the promotion and transfer of new and/or improved techniques and technologies.
- Encourage and assist members, as appropriate, to promote investment in the timber processing industry by, *inter alia*, taking steps to, clarify the benefits of funding downstream processing for high-value, internationally competitive products.

Furthermore, under its **Economic Information and Market Intelligence Goal 1: Improve transparency of the international timber market**, and **Goal 2: Improve marketing and distribution of tropical timber exports from sustainably managed sources**, the following action points are addressed by this project:

- Cooperate with international organizations and other sources to improve the availability of trade and economic data relevant to the global timber market, and avoid duplication and overlap.
- Monitor and analyse statistical data and other relevant information, including any information on undocumented trade.
- Disseminate widely ITTO data on tropical timber production and trade to interested parties in a timely fashion, using technical publications, electronic online access and other media.
- Compile and disseminate information on consumer preferences with regard to currently traded tropical timber species.

- Identify new markets for lesser-used and lesser-known species, and determine the availability of those species.
- Promote wider use of tropical timber in high-value products, such as engineered products.

This project will also contribute to the achievement of the objectives of ITTO as expressed in Article 1 of the ITTA (International Tropical Timber Agreement) 1994:

- To provide an effective framework for consultation, international cooperation and policy development among all members with regard to all relevant aspects of the world timber economy;
- To contribute to the process of sustainable development;
- To enhance the capacity of members to implement a strategy for achieving exports of tropical timber and timber products from sustainably managed sources by the year 2000;
- To promote the expansion and diversification of international trade in tropical timber from sustainable sources by improving the structural conditions in international markets, by taking into account, on the one hand, a long-term increase in consumption and continuity of supplies, and, on the other, prices which reflect the costs of sustainable forest management and which are remunerative and equitable for members, and the improvement of market access;
- To promote and support research and development with a view to improving forest management and efficiency of wood utilization as well as increasing the capacity to conserve and enhance other forest values in timber producing tropical forests;
- To improve market intelligence with a view to ensuring greater transparency in the international timber market, including the gathering, compilation and dissemination of trade-related data, including data related to species being traded;
- To promote increased and further processing of tropical timber from sustainable sources in producing member countries with a view to promoting their industrialization and thereby increasing their employment opportunities and export earnings;
- To improve marketing and distribution of tropical timber exports from sustainably managed sources;
- To promote the access to, and transfer of, technologies and technical cooperation to implement the objectives of this Agreement, including on concessional and preferential terms and conditions, as mutually agreed;
- To encourage information-sharing on the international timber market.

Project activities

The ITTO Secretariat commissioned the following activities to be carried out in order to implement the work:

- Activity 1: Prepare a report on the current status of, and trends in, further processing of tropical timber in the producing countries, based on:*
 - National reports submitted by ITTO member governments:

- The contents of, and a standard format for, the questionnaire were prepared and submitted by ITC, and agreed by ITTO;
- National ITTO correspondents were contacted and some were interviewed during the fieldwork;
- Both export and import data were extracted from the COMTRADE (United Nations Statistics Division Commodity Trade Database) and COMEXT European Union (EU) databases; and
- Reliable national statistics were used whenever possible, to supplement the figures drawn from international databases.

– Surveys carried out through questionnaires:

- Relevant international and national agencies were approached with specific questions (United Nations Industrial Development Organization [UNIDO], International Labour Organization [ILO] and Association technique internationale des bois tropicaux [ATIBT]);
- Trade and industry, national manufacturers' and exporters' associations were contacted in key countries;
- Selected individual tropical timber processing companies, representative of the different products and countries, were interviewed; and
- Other visits were made by the consultants to verify statistical data during the fieldwork.

– Literature review:

- ITC's and ITTO's previous work on the subject of further processed products was reviewed;
- Recent reports on the subject by other international organizations were studied (UNIDO, ILO, ATIBT, EU and APEC [Asia-Pacific Economic Cooperation forum]);
- Reference was made to a wide variety of other published reports and articles on tropical timber processing in producer countries; and
- Information obtained from the Internet was checked and verified.

Activity 2: Assess the outlook for selected tropical timber further processed products into the 21st century, providing, inter alia, a view of products and markets where tropical timber producing countries are likely to be (or remain) competitive.

This assessment of outlook was based mainly on published market reports and literature, but consultants' views and comparable data obtained through the fieldwork interviews were also taken into account.

A theoretical framework for identifying competitive advantages between nations and locations was attached under this topic. From the fieldwork, data on competitiveness was not comprehensive enough to allow comparisons, and this aspect was not, anyway, within the scope of the project owing to data confidentiality requirements. ITC's data banks were consulted, as well as the opinions of experts in the tropical timber trade, consulting companies and industry analysts.

Activity 3: Consider possible actions that ITTO, member governments and the trade and industry sectors could undertake to continue and enhance their work related to the promotion of further processing of tropical timber in producer countries.

The combined consulting team, supported by the Senior Adviser contracted separately by the ITTO, has drawn up a set of action proposals for ITTO,

member governments and trade and industry bodies, consisting of realistic ways of promoting further processing, according to their specific mandates. Input from the fieldwork was fully taken into account in the preparation of these action proposals.

More specifically, action proposals were made concerning:

- The role of government (land tenure, regulation and promotion of sustainable forestry, export and import policies, industrial development, investment incentives, etc.);
- The industry and trade sector (adoption of quality systems, transfer of technology, improvement of product development, environmental benefits from more balanced trade, trade promotion, certification and labelling); and
- ITTO’s work (advice on future project portfolio, strategic move from generic promotion of tropical timber towards more specific awareness campaigns, etc.).

Activity 4: Present the report (including an Executive Summary) at the Twenty-seventh Session of the Forest Industry Committee (30 October–4 November 2000) and assist as appropriate the Committee’s Review of the Status of Further Processing of Tropical Timber in Producing Countries.

A detailed flow chart of activities carried out during the project implementation is given in appendix I.

Data sources and limitations

Statistical reports prepared on selected wood products have been based on SITC Rev. 3 of the COMTRADE database of the United Nations Statistics Division (UNSD). The figures in the tables reflect export data to all destinations as reported by the particular exporting country. No attempts were made to separate out the intra-regional trade flows from the total figures.

The SITC Rev. 3 classification scheme provides more detail in terms of the further breakdown of sub-groups than SITC Rev. 2, which provides more aggregated data.

The majority of developing countries do not produce detailed statistics for specific products. As a result, the data for these countries on the products selected at the SITC Rev. 3 level was incomplete. To compensate, equivalent (or ‘mirror’) statistics from importing countries were used instead, in so far as they were comparable.

Large variations in the data occurred frequently in earlier years but in more recent years, in many cases, more consistency has been developed. These variations could have been caused by a problem at the product-specific level. It can be assumed that the occasional lack of correlation between SITC 2 and SITC 3 did give rise to discrepancies in the structure at the product group level.

For Africa also, the COMEXT (Statistical Office of the European Union) databases were used. The COMEXT data relates to EU imports and is published with an 8-digit code (the so-called mirror statistics approach). The export data of African countries were therefore, in most cases, calculated from imports reported by other countries, as Europe represents by far the most important destination, absorbing on average between 90 and 95% of their exports.

It must be noted, also, that the report covers only the five product categories that form the bulk of exports of further processed wood products (table 1). The product scope is therefore more restricted than, for example, that in ITTO's Annual Review, where table/kitchenware, packaging/pallets, coopers' products and tools, handles, etc. are also covered. This has to be taken into account when comparisons with other sources are being made.

Table 1 Product coverage of the report

Product groups	Group breakdown	SITC 3	HS
Profiled wood (including mouldings)	Wood continuously shaped along any of its edges or faces, whether or not planed, sanded or finger-jointed (mouldings, strips and friezes for parquet flooring, not assembled, tongued and grooved, beaded wood, etc.)	248.3 248.5	4409.10 (conif.) 4409.20 (n-con.)
Windows	Windows, French windows and their frames	635.31	4418.10
Doors	Doors and their frames and thresholds	635.32	4418.20
‘Other’ builders’ joinery products	Assembled parquet panels Concrete shuttering ‘Other’		4418.30 4418.40 4418.90
Furniture and furniture parts	‘Other’ seats with wooden frames Office furniture, wood Kitchen furniture, wood Bedroom furniture, wood Other furniture, wood Furniture other than metal, wood or plastic Parts of furniture of all materials	821.16 821.51 821.53 821.55 821.59 821.79 821.80	9401.61/69 9403.30 9403.40 9403.50 9403.60 9403.80 9403.90

Source: UN Statistical Papers, Series M, No. 38/Rev. 2, Vol. II: Commodity Indexes for the Standard International Trade Classification, Revision 3.

The category ‘mouldings’ is included under ‘profiled wood’ and cannot be separated out with any degree of certainty. Both softwoods and hardwoods are covered under this item. In most parts of the report, export and import data on ‘windows’, ‘doors’ and ‘other joinery’ are presented in aggregate form (‘builders’ joinery’) for ease of data processing. Equally, there are seven sub-headings, which have been totalled under ‘wooden furniture and parts’. The detailed figures on furniture and joinery by type of individual product are presented by region only, in order to limit the volume of the report.

Structure of the report

A description of the methodology used is given in appendix I. An Executive Summary appears at the beginning of the report. It highlights the major findings and recommendations. Chapter 1 establishes the relevance of the work to the ITTO Libreville Action Plan and presents the activities as they were stated in the ITTO/ITC contract.

A theoretical framework for the assessment of national and industry competitiveness in the further processing of tropical wood has been attached to chapter 2.

Chapter 3 follows a regional approach, in which each of the three ITTO producer regions (Asia-Pacific, Latin America and the Caribbean, and Africa) is

discussed separately, but within a similar format. Key topics addressed in this chapter include export and import data, net trade on further processed wood products, industry structure and location, employment and competitiveness, and policy issues. Brief conclusions for the region are presented at the end of each region's sub-chapter.

Future global demand for further processed wood products is discussed briefly in chapter 4, including the outlook for ITTO producers and for market preferences in terms of wood species for various applications.

Chapter 5 focuses on the technologies applied in the further processing of tropical timber and describes a qualitative classification system for production facilities throughout the tropics. Owing to the crosscutting importance of technology issues, a product-specific assessment is provided on the relevant aspects of technology development. Separate chapters discuss issues such as product and human resources development, and the existing institutional infrastructure. Key development needs are identified for future attention.

In chapter 6, a brief summary of the outlook for the development of tariff and non-tariff barriers is provided. Issues such as certification and labelling are also covered, as they apply to the further processing industry. Main conclusions arising from the report's contents and the recommendations made to ITTO, member governments and trade and industry associations, appear in chapters 7 and 8.

The six appendices cover methodology, statistical tables on exports and four country- or product-specific case studies highlighting relevant aspects of the development of further processing in ITTO producer countries.

Chapter 2

Theoretical framework for assessing national competitiveness in further processing industries

Raw material and product flows

The wood products industry sector consists of a chain of successive manufacturing activities, each having traded outputs (figure 1). In the processing and distribution chain of wood products, added value is multiplied at each phase of further processing after the initial production. For this reason, the national trade plans and strategies of timber-producing countries tend to put emphasis on exports of high value-added products, such as joinery and furniture.

It should also be realized that there are growing opportunities to use non-wood fibre raw materials in combination with wood fibre in certain manufactured products. Some are forest-based (bamboo, rattan), while others are either agricultural by-products (rice husks, jute, cotton stalks) or from other plant sources (coconut palm, seagrass).

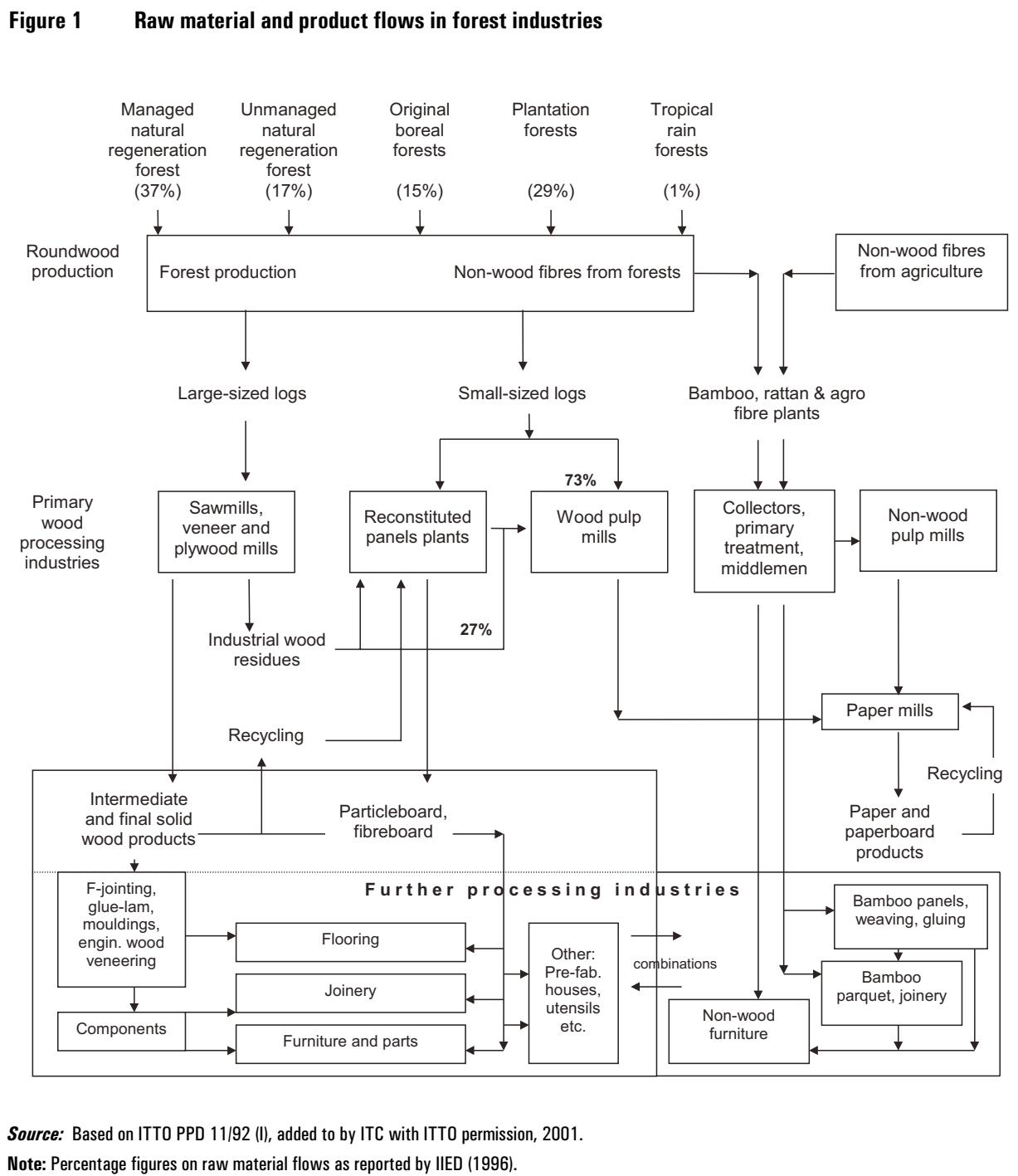
There is a closer physical and economic link between primary processing (saw milling and veneer or plywood production) and forest management than between primary and further processing owing to the bulky nature and low value of wood raw material. Semi-finished products such as rough sawn lumber, veneer or standard plywood can be efficiently transported over long distances and further processed practically anywhere.

The comparative advantage derived purely from resource endowment, therefore, declines as the degree of processing increases. The economies of scale tend to behave similarly, i.e. the higher the degree of processing, the less the dependence on plant size as a factor of cost competitiveness. But this conclusion has important exceptions, e.g. small-scale saw milling can also be competitive in suitable conditions.

For these reasons, timber-producing countries will have to base the competitiveness of their value-added products on either one, or preferably all, of the following factors:

- Low-cost local inputs (notably wood and labour);
- High total productivity (measured over all factors of production, i.e. wood, labour, capital, energy and operating supplies);
- Superior quality of products (including design).

Industrial policies of countries should recognize the strategic importance of small and medium-sized enterprises (SMEs) as a source of employment and income. SMEs tend to be overlooked in public policy making, as they are often operating in the informal sector. Typically, the relative importance of SMEs is high in many segments of the further processing industry, particularly in furniture, and they play a key role in satisfying domestic demand. Being labour-intensive, small-scale enterprises tend to make a positive contribution



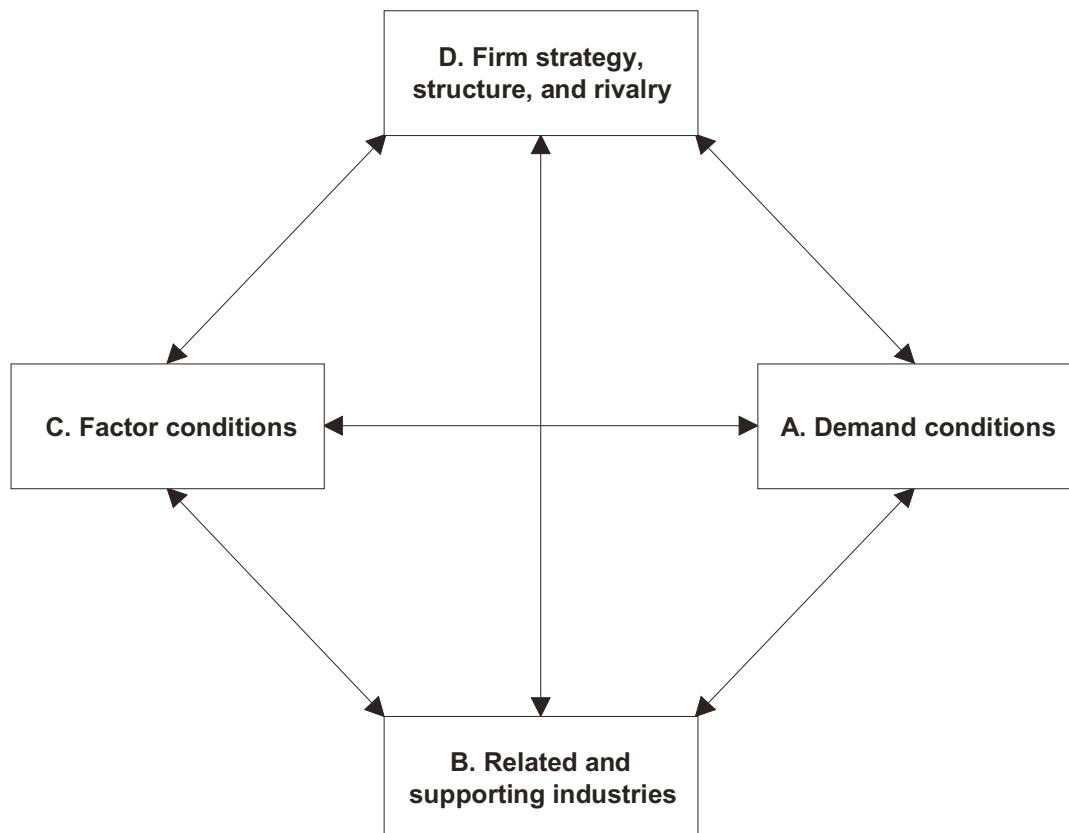
to the general socio-economic development objectives of a country, although problems are often encountered with regard to their effective control, particularly when it comes to sources of wood supply. The situation is quite different, however, for joinery and mouldings, which require more sophisticated technologies and larger units of production.

Competitive advantages of producers

One of the most lasting and useful theoretical structures for assessing the competitive advantages of a nation or a region is the one created by Michael

Porter. His diamond model aims to explain what factors are required for a country to achieve international success (figure 2). These factors create the environment where the companies are established and where they compete. The country has the best opportunities in those industries or segments where the competitive advantage ‘diamond’ is most favourable. Maintaining long-term competitive advantage requires all the factors to remain strong, otherwise that country’s competitive advantage can be taken over by international competitors.

Figure 2 **Porter’s diamond model: determinants of national competitive advantage**



Source: Michael Porter, *On Competition*, Harvard Business School Press, 1998.

A distinction should always be made between the two terms ‘comparative’ and ‘competitive’ advantage. Comparative advantage refers to a superior competitive position obtained from lower factor costs (labour, raw materials, capital or infrastructure) or economies of scale in production. But it no longer automatically confers competitive advantage in most industries because, in this era of globalization, companies can gain access to an optimal blend of inexpensive production factors, or can relocate their factories into regions that offer favourable conditions and costs. The competitive advantage thus arises not only from the availability of low-cost inputs or the sheer size of the company, but rather from superior *productivity* in using inputs (based on Michael Porter, *On Competition*, Harvard Business School Press, 1998).

In-depth studies need to be carried out into exactly what true competitive advantages each individual producer country possesses. It might then be possible to avoid strategies based on the unrealistic assumption that providing

public sector support to the development of further processing is a ‘cure-all’ solution. Alternative strategies can be considered, such as gaining more control over distribution channels to shorten the chain and thus reduce the number of intermediaries taking a profit.

Demand conditions

The composition of demand in their domestic markets has a major influence on how firms perceive, interpret and respond to buyers’ needs. Countries tend to gain competitive advantage in those industries or segments where the domestic demand gives local firms a clearer and earlier picture of buyers’ needs than their foreign rivals. Countries also gain advantage if domestic buyers force local firms to innovate faster and produce more sophisticated products than their foreign rivals. Often the *quality* of domestic demand is more important than the quantity in determining competitive advantage (Rytkönen, 1998, adapted from Porter, 1998).

Related and supporting industries

The presence in a country of internationally competitive supplier industries creates advantages for downstream industries in several ways. Competitive advantage grows out of close working relationships between world-class suppliers and the local industry, and benefits can accrue to both.

The most common benefits of having home-based suppliers are efficient, early, timely, and sometimes preferential access to the most cost-effective inputs. Perhaps the most important benefit is the amount of innovation and technology upgrading that it can bring. Firms gain quick access to new ideas and insights, and to suppliers’ innovations. They have the opportunity to influence suppliers’ technical efforts as well as to serve as test sites themselves for development work.

Factor conditions

Each country and industry has its own local set of production factors to deal with. The factors that are key to competitive advantage differ widely between countries and among industries. Factors of production are often described in very broad terms (e.g. raw materials, labour, land and capital), but these are too general to validate the competitive advantage between strategically different industries. In order to properly explore the role of factors in the competitive advantage of a country, the concept must be applied to competition between industries. Factors may thus be re-grouped as follows:

- ❑ *Human resources*: the quantity, the skills base and the cost of personnel (including management), taking into account standard working hours and workforce morale.
- ❑ *Physical resources*: the abundance, quality, accessibility and cost of land, water, minerals or timber deposits. Climatic conditions can also be considered a part of country’s physical resources, as can its location and geographic size. Indeed, location in relation to other countries that are suppliers or markets affects transportation costs and the relative ease of cultural and business interchange.
- ❑ *Knowledge resources*: the country’s stock of scientific, technical and market knowledge on goods and services. Knowledge resources reside in universities, government research institutes, private research facilities, trade associations, market research reports, databases, etc.

- *Capital resources*: the amount and cost of capital available to finance industrial investment. Globalization of capital markets and greater capital flows across borders are gradually making national financial conditions less distinct, but inequities still exist.
- *Infrastructure*: the type and quality of the available infrastructure, and the cost of using it insofar as it affects competition: includes energy supply, transportation and communication systems and access to information technology.

(Rytkönen, 1998: adapted from Porter, 1998)

Another way of classifying the competitiveness factors is to divide them into 'tangibles' and 'intangibles'. Tangible factors are either input cost factors (e.g. wood, energy, materials) or technology-based factors (machinery capacities, control systems, information and communication technologies). Intangibles are all factors contributing to improving quality and performance (research and development, innovation, education and skill levels, and the institutional and legislative infrastructure).

In the long term, international competitiveness cannot be based on external factors such as favourable exchange rates, low interest rates or low wages, because in time these advantages inevitably will be eroded.

SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis is a useful tool for positioning a country, region or industry in its competitive environment and assessing the conditions relevant to its future development.

Company strategy, structure and rivalry

Strategy, structure and rivalry are a group of factors that relate to the context in which firms are created, managed and operated in the dynamic setting of domestic competition. The goals, the strategies and the ways in which firms are organized within an industry can vary widely from one country to another. National advantage can result from a good match between these factors and the sources of competitive advantage in a particular industry.

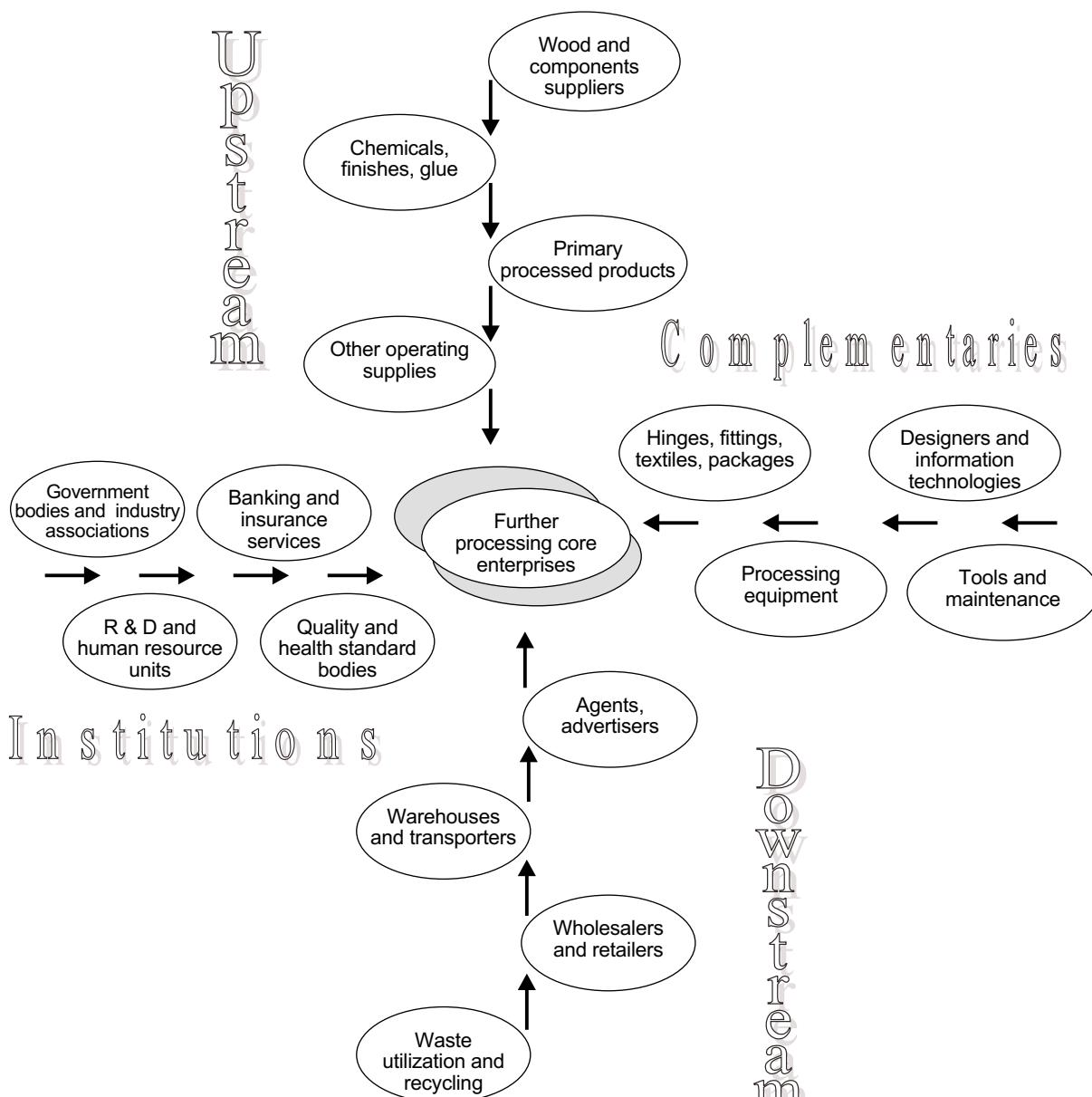
Important differences exist between countries in the area of management practices. The differences in their approach to training, the background and orientation of company and industry leaders, relationships with customers, and relationships between labour and management, can create competitive advantages or disadvantages. In many industries, the labour-management relationship is particularly significant because it is central to the ability of firms to improve and innovate.

Domestic rivalry creates pressure on firms to strive and excel. Local rivals push each other to lower their costs, improve quality and service, and create new products and processes.

Clusters

The notion of related and supporting industries (see figure 2, box B) assisting downstream industries has led to the concept of industrial clustering being widely adopted in many countries. Clusters are geographical concentrations of interconnected companies, specialist suppliers, service providers, firms in related industries and associated institutions (trade associations, standardization bodies, universities, etc.). Together, they form a working organism in their own particular field (e.g. the forest industry) through cooperation, competition and mutual supply-demand linkages.

Figure 3 Cluster chart for wooden furniture industries



Source: Adapted from Porter, 1998.

The cluster strategy has also been widely used as a planning tool, particularly in the more industrialized countries. It would be a useful tool for the tropical developing countries too – though their cluster ‘charts’ might not be as large or versatile. The approach should help decision-makers and planners to see the ‘business’ or ‘industrial’ park in their country as a group of interrelated players in an industry, instead of separate, isolated entities. Its particular strength lies in the interdependence between the core and the supporting, or related, industries. Clusters also help to improve the transparency of the various supply chains (something that can pose problems for the forest industries, e.g. in the case of trading of imported spare parts or tools). This type of vision is needed in the implementation of macroeconomic policies and in removing obstacles to growth. Clusters have actually proved very effective in attracting foreign investments and in creating export revenue (Porter, 1998).

Clusters may vary according to location, size and depth; therefore the concept offers a versatile tool for developing forest industries, or parts of them. Clusters can be identified within a city, a district, an entire country, or even across neighbouring countries if the cross-boundary linkages are strong enough. Various degrees of ‘symbiosis’ may occur between the cluster members. This can be explained by the fact that very different types of partners can be identified both upstream and downstream from the core industry. The level of competition between and among cluster members may also vary. While the majority of the industry’s needs may be available from a large number of competing suppliers, it is also possible that one particular component or service is obtainable from just one, sole, specialist provider.

In the case of wooden furniture industries, it is usually a case of a large number of specialist suppliers of different components and services. These would range from manufacturers of hinges and handles, glue, abrasives and lacquer to designers and their trainers in the universities, as well as suppliers of CAD/CAM software, hardware, processing equipment and maintenance. The wider the range of members, the more complex and dynamic the cluster becomes.

In practice, the steps involved in identifying a cluster are as follows:

- Identify a prominent firm or a group of firms (core industries);
- Find the vertical chain of firms and institutions both upstream and downstream;
- Look horizontally for companies that produce complementary products and services;
- Search for the institutions that provide specialized skills, technology, capital, information and infrastructure; and
- Seek out government bodies and regulators that influence cluster participants.

It is not possible to create a complete cluster model without all the key elements being in place. In perfect conditions, the cluster chart for wooden furniture could take the shape presented in figure 3.

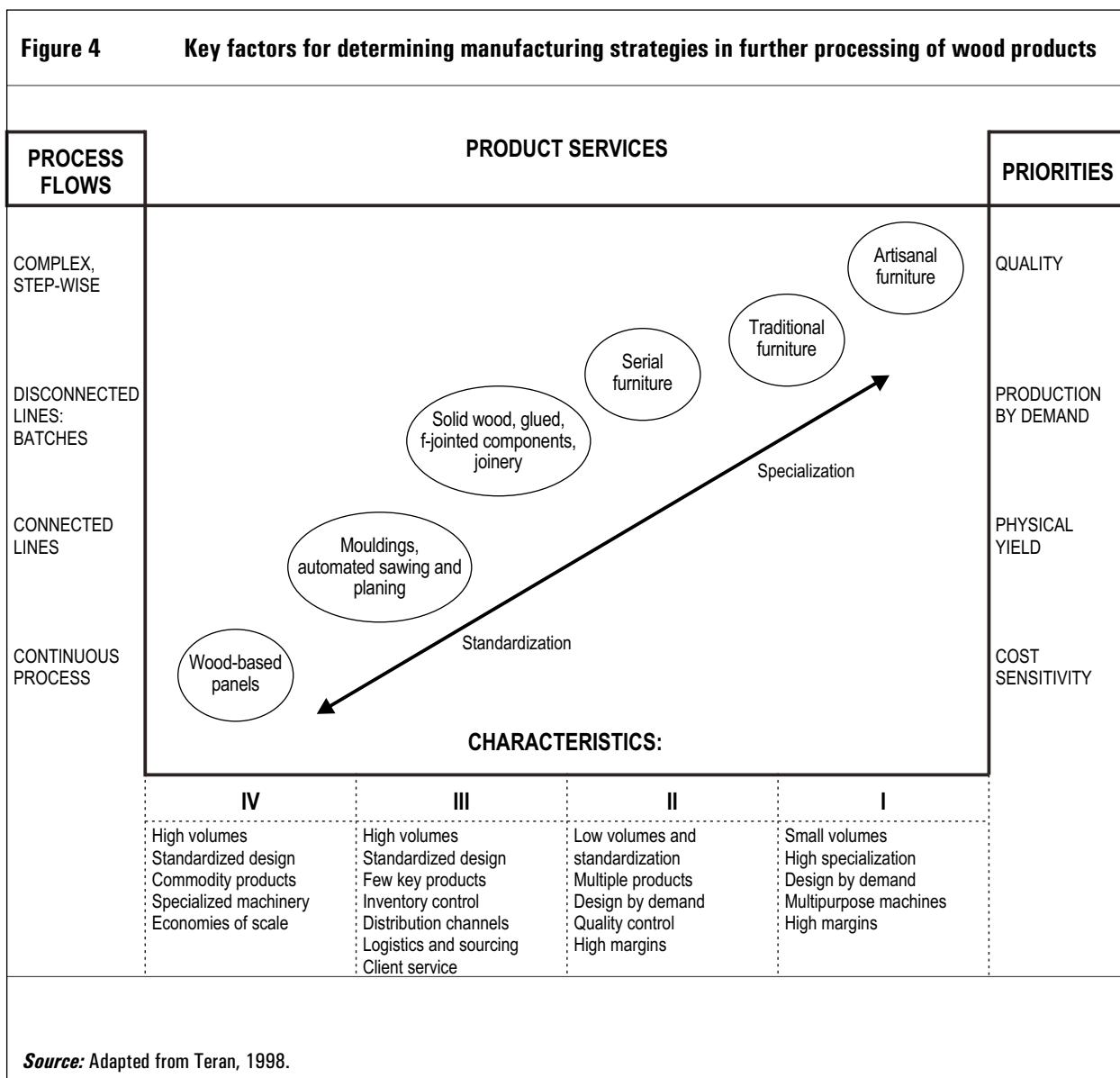
A good example of enduring clusters can be found in the Italian furniture industry, which is organized by product-specialized districts. Small, medium and large plants are actually working as a single networking unit, consisting of highly specialized sub-contractors who are competing with like suppliers inside the district. They have to remain innovative in terms of processes and products in order to survive. The continuous competition enables the district to offer a wide range of new models according to market requirements and on short lead times (*World Furniture*, 2000).

Factors influencing manufacturing strategies in further processing

The matrix presented in figure 4 describes the various manufacturing strategies that may evolve as a function of four factors:

- Types of products;
- Complexity of processes;
- Volumes of production; and
- Level of standardization.

The graph shows how an enterprise is forced to change its priorities and manufacturing processes if it adds value by product diversification and moves away from mass-production items towards specialized products. The decision-making process of a manufacturing strategy requires the consideration of four external factors, which need, also, to fit into the corporate strategy applied. The four external dynamics are:



- Markets (products, leading suppliers, trends in demand);
- Competition (major competitors and changes in the competitive environment);
- Customers (quality requirements, factors affecting customers' needs); and
- Technologies (production and information technologies).

This simplified model of the evolution of manufacturing strategies could serve as a useful guide for both the industries and the policy-makers in ITTO producer countries. It would of course require adaptation to local conditions and resources in order to make the conclusions valid and relevant.

Chapter 3

Regional overviews on further processing in producing countries

Asia-Pacific region

Resource situation

Overview

Overall, the production levels of tropical industrial logs in ITTO producer member countries in the Asia-Pacific region have been depressed since the economic crisis of 1997. In the future, some short-term surges in the export of logs can be anticipated in response to temporarily favourable economic conditions but, in the long term, the rapid economic growth in Asia is expected ultimately to push domestic log *processing* levels upwards in producing countries.

While Myanmar, Cambodia, Papua New Guinea, Malaysia, Fiji and Indonesia are net wood exporters, the further processing industries in the Philippines, Thailand and India are net importers of resources. Their reliance on external sources of supplies does not augur well for the long-term viability of value-added processing industries in these countries, since any change in the prices of raw materials will affect the competitiveness of the industry as a whole. These resource supply constraints have also been the reason for the much slower growth of the value-added manufacturing sectors in Thailand when compared to Malaysia and Indonesia. Although India is still a large importer of resources, its domestic resource potential is growing because of its extensive planting programmes (table 2). At the same time, India's exports of value-added products remain relatively small because it has a large domestic market to supply.

The numbers in table 2 (and similar tables in the sub-chapters on Latin America and Africa) are indicative only, and have some in-built limitations. Firstly, the potential fibre supply figure is theoretical and may never be fully achieved because of economic, physical, ecological, climatic, legal and marketing limitations, or any other adverse conditions. The figures are simply estimates of the possible size of the resource base in terms of wood fibre volumes in 2010 to help readers put the potential increases or declines in availability into perspective. It would take more detailed raw material studies to guide the practical and political decision-making on the development of the industry.

Industrial sources have suggested that the export of value-added products is predominated by what is termed 'commodity items', which derive their competitive edge from low prices. Furthermore, with growing certification concerns and a reduction in the supply of tropical timbers, there appears to be growing interest in the use of other timber sources. Significant increases in the use of plantation wood resources, particularly *Hevea brasiliensis*, have been reported. This is indeed the case in Malaysia and Thailand, where more than 80% of the wooden furniture exports are made of rubberwood.

Table 2 Resource status in producing countries in the Asia-Pacific region

Country	Forest area (thousand ha, 1995)	Potential wood fibre supply 2010 compared to 1996 potential
Malaysia	Natural: 16,325 Plantations: 2,478	Static; Peninsular deficit, Sarawak surplus
Thailand	Natural: 11,101 Plantations: 756	Increase
Indonesia	Natural: 120,600 Plantations: 8,317	Increase
Philippines	Natural: 5,798 Plantations: 483	Slight increase
India	Natural: 50,385 Plantations: 8,500	Increase
Myanmar	Natural: 26,875 Plantations: 261	Slight decline
Fiji	Natural: 757 Plantations: 88	Increase
Cambodia	Natural: 10,532 Plantations: 7	Decline
Papua New Guinea	Natural: 36,909 Plantations: 43	Increase

Sources: FAO: Global Fibre Supply Model 1998, SOFO 1999.

Country notes

In Indonesia, the forest resource base is impressive and 40% of it is largely unutilized. All forest types are included in the remaining area, such as bush, scrub and bush fallow, which together covers more than 15 million hectares (ha). There are, in addition, large areas of heathland forest, savannah forest, montane forest and some smaller categories, which are not productive and yet together cover more than 10 million ha. After excluding the ‘protection forest’, and ‘protected areas’, which amount to around 40 million ha, the total area of commercially productive natural forest shrinks to about 38 million ha. Almost half of that is in Irian Jaya, which is mainly inaccessible.

Estimates of the total area under plantations in Indonesia are somewhat unreliable. The verified total area of timber plantations at present is 2.8 million ha, of which 1.9 million is on Java and is mainly of teak, pine and mahogany already overcommitted to established industries. There are an additional 2.8 million ha of rubberwood plantations now being used to a limited extent for wood processing, and which could become more important in the future. According to Fraser, one of the consultants working on this report, the main problem is the competition from the pulp industry, which is absorbing all the available wood in Central Sumatra and East Kalimantan.

The lifting of the log export ban during the economic downturn led to a major flow of unprocessed wood out of Indonesia to Malaysia and other destinations. This trade was strengthened by the strong devaluation of the rupiah. Consequently, the raw material supply problems for the local furniture

industry worsened and, increasingly, it has been forced to buy from log brokers at higher and higher prices. Furniture firms supplying the domestic markets have suffered in particular from this situation (*Asian Timber*, 2000).

It has been estimated that some 50% of total annual logging volumes may come from illegal or uncontrolled operations. There have been suggestions, furthermore, that it is this robust illegal supply of logs that has effectively fuelled the development of further processing industries, and the two are, in fact, feeding off one another (*hardwoodmarkets.com*, June 2000). The government is reportedly considering two courses of action to improve the situation:

- The log export ban may be re-installed. The Indonesian Government imposed a heavy export tax on logs in the 1980s, a virtually prohibitive duty to curb log exports and to encourage domestic further processing. In 1998, log exports were resumed, to relieve a shortage of foreign currency revenues. (*Japan Lumber Reports*, 25 August 2000)
- The concession system could be revamped. State forest enterprises instead of private enterprises would be given the authority to manage concessions. Private logging contractors would, however, continue to harvest trees but under the stricter control of the State forest enterprises.

The **Malaysian** Government is encouraging the private sector to become more involved in the establishment of new rubberwood plantations. New high-yield clones are being used, in order to increase wood production in preference to maximising latex output. A new government scheme will give planters fiscal incentives as well as pioneer status for ten years with full 100% tax exemption (*FDM Asia*, July 2000).

Overall, therefore, it might appear that the major exporters of value-added products in the Asia-Pacific region are increasing their use of plantation-based wood resources for furniture manufacturing, while resources from the natural forests are being used in other product sectors such as mouldings, doors and builders' joinery. The important trend to note, however, is that the availability of tropical timbers is declining in all the producing countries in the Asia-Pacific region, because there is less and less production from the natural forests. This requires the further processing sector to seek alternative resources in increasing volumes. There would seem to be an opportunity to process more of the lesser-used species (LUS), but experiences with their commercialization have so far not been encouraging.

Cambodia has frequently been quoted as an example of a country where destructive logging and other land uses are decimating the forest cover at an alarming speed. The most pessimistic views suggest that the natural forest will be exhausted in just five years if the current rates of illegal logging (supported by deep-rooted corruption) continue unabated (*Maskayu*, 2000). The reorganization of Cambodia's forestry sector has been placed on the international agenda by the International Monetary Fund (IMF) and various donor countries to bilateral forestry programmes. It remains to be seen whether international economic pressure can bring about the necessary changes in a country where the underlying causes of forest devastation are deeply intrinsic – namely, prolonged civil war, cultivation growth rates varying along with population pressure and illegal logging. The extent to which foreign concessionaires are responsible has also to be taken into account.

Exports of further processed wood products

Overview

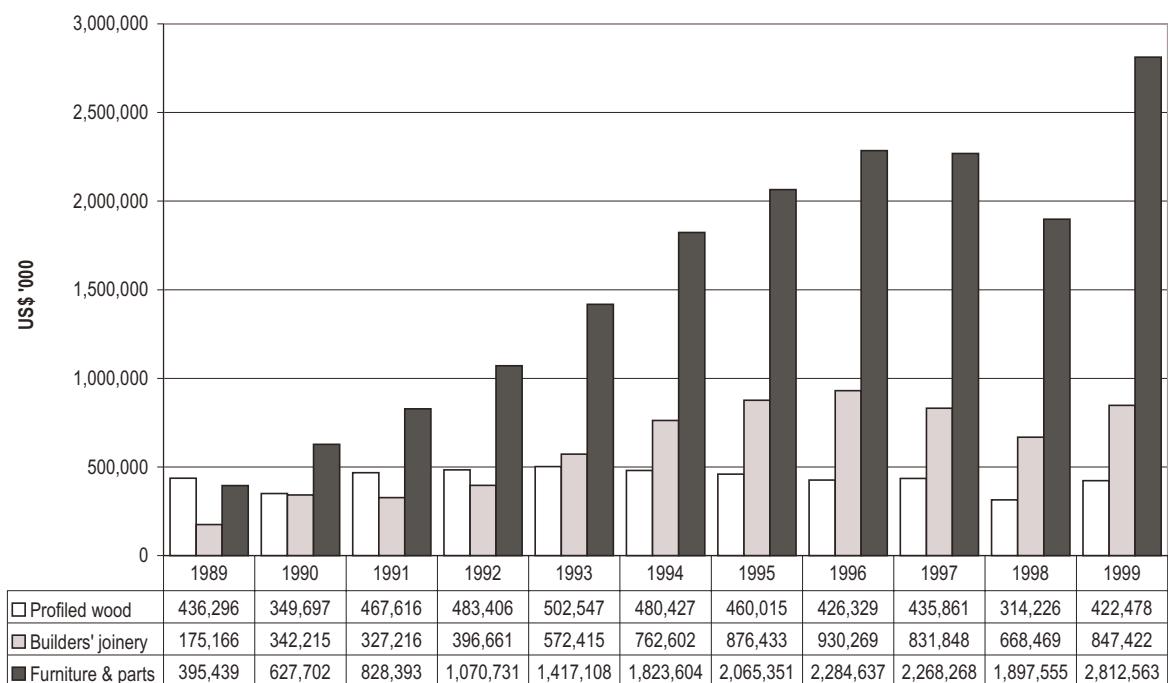
The total value of exports from the Asia-Pacific producer countries amounted to nearly US\$ 2.9 billion in 1998 (compared to US\$ 1.0 billion in 1989). After

impressive growth to a peak of US\$ 3.18 billion in 1996, severe market conditions and devalued local currencies in the midst of the 1997/98 Asian economic crisis led to exports declining for the first time in a decade. For Malaysia, exports dropped by 14% over the 1997-1998 period, while for Indonesia they declined by an even more severe 35%. In 1999, a vigorous re-growth was recorded. Nearly US\$ 4.7 billion export value was recorded (up 47% from 1998). This was mainly achieved by Indonesia, which doubled its exports in 1998-1999.

Structure of exports

Trends in the region's total exports, by major product categories over the 1989-1999 period, are presented in figure 5 and appendix II. They reveal an average growth rate of 12.4% per year for all further processed exports between 1989 and 1998. Table 3 shows the changing product composition of further processed wood products exported to the world markets by Asia-Pacific producers. The region has moved away from its former dependence on mouldings, and exports are now furniture-dominated. Wooden furniture constituted 66% of the total in 1998, with builders' joinery at 23% and profiled wood at 11%. These proportions are expected to remain about the same for some years, at least, because manufacturing capacity has also followed a similar trend.

Figure 5 Trends in the export structure of further processed wood products in the ITTO producer countries in the Asia-Pacific region 1989-1999



Source: COMTRADE (UNSD).

Table 3 Export structure of further processed products from ITTO producer countries in the Asia-Pacific region

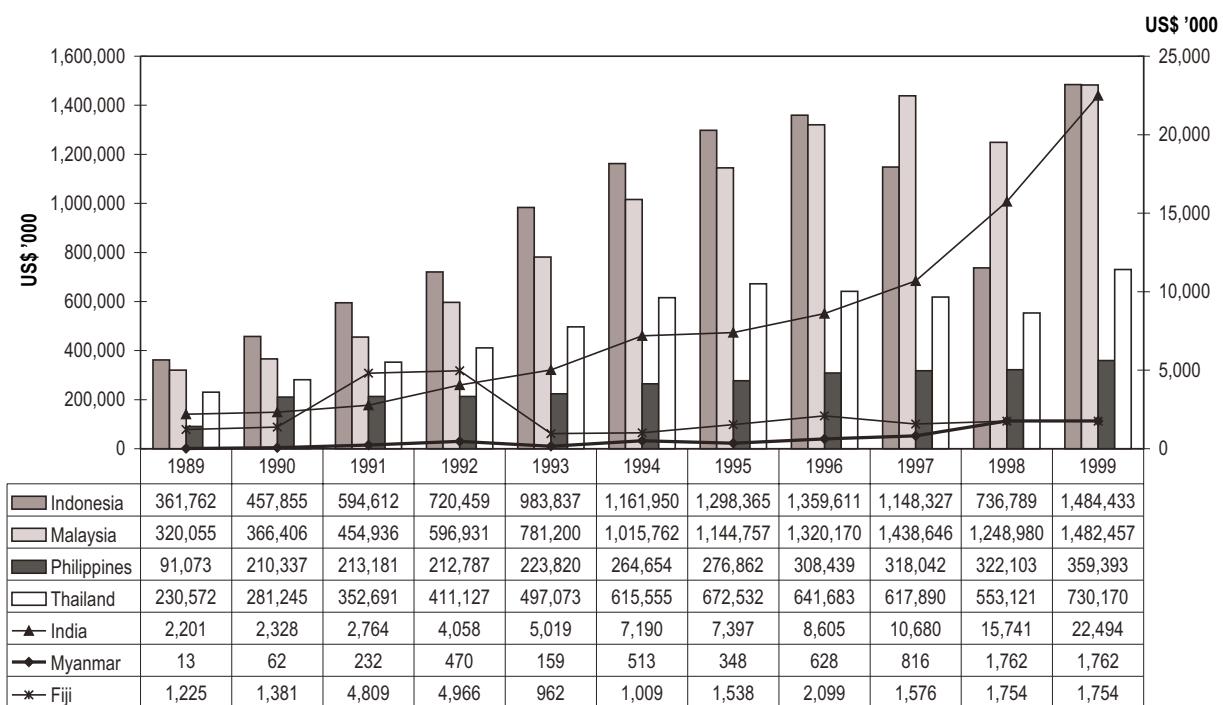
Category of products	1998		1989
	Total export value (US\$ million)	% share of total	% share of total
Wooden furniture and parts	1,897.6	65.9	39.3
Builders' joinery	669.5	23.2	17.4
Profiled wood (incl. mouldings)	314.2	10.9	43.3
TOTAL	2,880.3	100.0	100.0

Source: COMTRADE (UNSD).

Exports by country

The four major exporters of value-added wood products in the Asia-Pacific region are Malaysia, Indonesia, Thailand and the Philippines (figure 6). The contribution of all other producing countries in the region is very small. Although India's exports are significantly higher than those of the other remaining countries, they are still fairly modest compared to the four major exporters of the region. The appetite of India's large domestic market explains the relatively small export growth for value-added products.

Figure 6 Exports of further processed wood products by ITTO producer countries in the Asia-Pacific region, 1989-1999



Source: COMTRADE (UNSD).

Until 1997, Indonesia's exports of value-added products were growing at the fastest rate of all the producer countries in the Asia-Pacific region. At the onset of the economic crisis in mid-1997, however, Indonesia slipped to second place behind Malaysia. In 1999 Malaysia and Indonesia remained the largest exporters of value-added products in the region and they appear set to share this position for the foreseeable future.

It is also important to note that there appears to be a steady export flow of bamboo and rattan furniture from the major exporting countries. It is envisaged that products using these materials – possibly combined with tropical wood – will become significant export earners for these countries in the years to come. In the Philippines, rattan has traditionally accounted for most of the furniture exports but has more recently lost ground to tropical and imported temperate hardwoods, as well as various combinations of other raw materials. In 1999, for the first time, wooden furniture exports from the Philippines actually exceeded those of rattan and wickerwork.

Table 4 shows the relative proportions of the major categories of value-added products exported by the major exporting countries in the Asia-Pacific region. Furniture (wooden, bamboo, cane and rattan) makes the largest contribution to export earnings and with the depleting supply of tropical timber in these countries, this picture is not expected to change in the near future.

Table 4 Export structures of further processed products in major ITTO producers in the Asia-Pacific region, 1998

Countries	Total export value (US\$ million)	Wooden furniture and parts (%)	Builders' joinery (%)	Profiled wood (incl. mouldings) (%)
Malaysia	1,249.0	73.0	13.5	13.5
Indonesia	736.8	32.4	55.2	12.4
Thailand	553.1	85.2	5.8	9.1
Philippines	322.1	80.1	18.5	1.4
India	15.7	94.9	4.4	0.7
Myanmar	1.8	81.4	18.6	0.0
Fiji	1.8	100.0	0.0	0.0
TOTAL	2,880.3	65.9	23.2	10.9

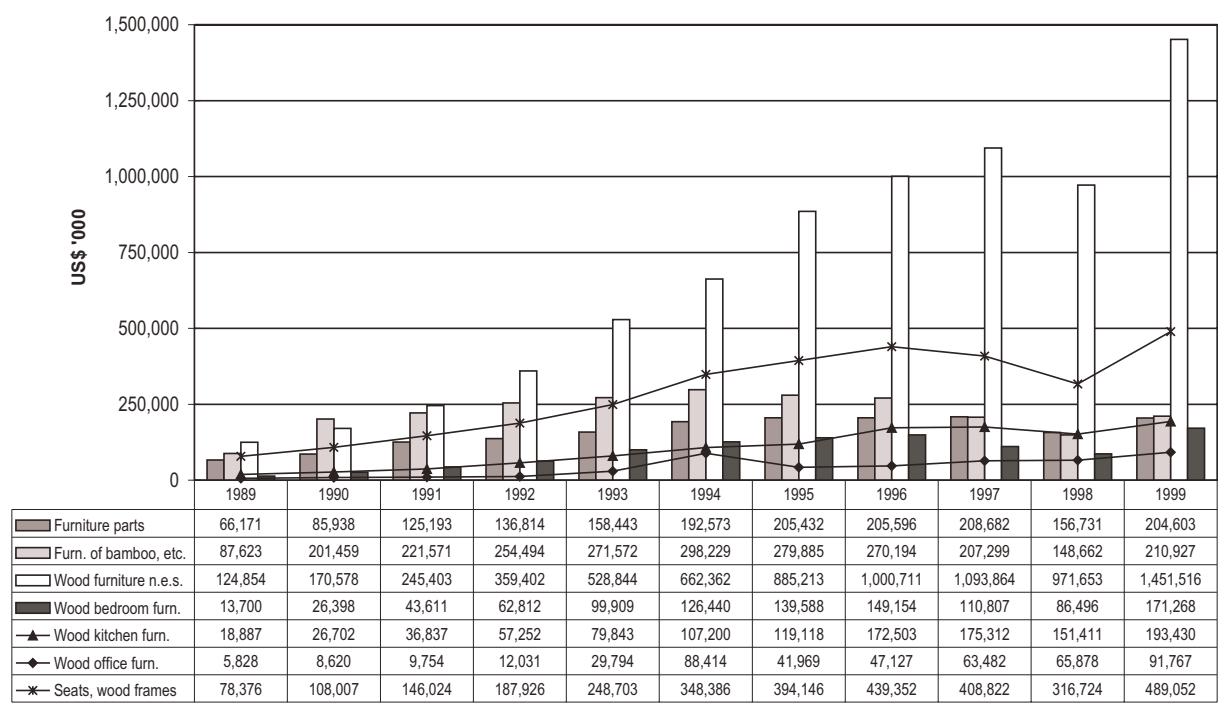
Source: COMTRADE (UNSD).

Export trends by individual products

Much of the export growth in **furniture** has taken place in the miscellaneous (not elsewhere specified) category, which falls outside the most commonly specified furniture types. This may reflect genuine difficulties in matching product classifications to established foreign trade headings, but at the same time the apparent growth of this category may also be the result of attempts to avoid specific import tariffs in the target markets.

Nevertheless, growth has been impressive, and miscellaneous furniture accounted for 51% (US\$ 972 million) of the total export value of furniture in 1998 (figure 7). The second largest product export category was seats with wooden frames, with 17% of the total (US\$ 317 million). Kitchen furniture accounted for 8% and posted sales of US\$ 151 million. Over the past decade, the trend has been for categories such as bamboo furniture, furniture parts and

Figure 7 Exports of wooden furniture by type from ITTO producer countries in the Asia-Pacific region, 1989-1999



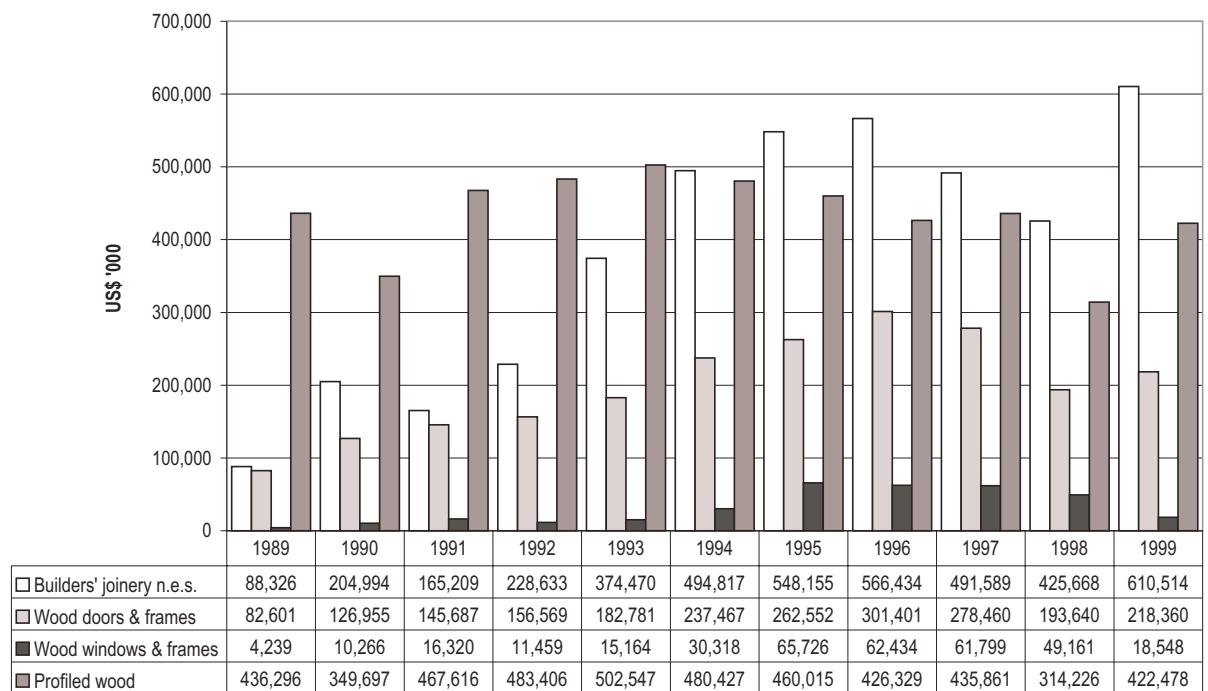
Source: COMTRADE (UNSD).

seats to lose ground to other products, and mainly to the miscellaneous furniture category. The region's move into ready-made furniture with higher value added is a key factor here.

In **builders' joinery**, the situation is similar in the sense that the broadest category of products accounts for most exports. Around 64% of all exports fall under 'other' builders' joinery, which comprises parquet panels, concrete shuttering and other items (figure 8). Doors and frames were 29% of total joinery exports, with windows and frames the smallest part at 7%. Back in 1989, doors accounted for 47% of exports, almost equal to the export value of furniture. But the role of doors in the total export picture has diminished ever since, with both furniture and, to a lesser degree, windows moving ahead. Meranti windows and laminated scantlings established a solid level of demand in European markets during the mid-1990s, and this was visible in this product category's share of exports from the Asia-Pacific region. Total value of exports of windows turned into a decline in 1996, as Indonesia's window exports started to diminish.

Profiled wood on its own used to be a bigger export item than joinery in the early 1990s but since 1993 its relative share of exports has declined. This can probably be attributed to the overall growth in the value-added element in products exported, implying that more profiled wood is now being used in the manufacture of the finished products.

Figure 8 Exports of profiled wood and builders' joinery by type from ITTO producer countries in the Asia-Pacific region, 1989-1999



Source: COMTRADE (UNSD).

Major markets

Export outlets

An overview of the main destinations of exports from the three main ITTO Asia-Pacific producing countries, by product, is given in table 5. In general, it is the Asian importing countries that continue to be the leading customers for the exports of Asian producers, but the United States and, in some cases, European countries have increased their shares of profiled wood imports from the region in recent years.

In **profiled hardwood** (including mouldings), the major export destinations are Japan, the United States and Taiwan Province (China). The most dramatic changes have been in the breakdown of the destinations for Thailand's profiled wood exports. Shares accounted for by Japan and Germany have dropped markedly, while the United States and the Netherlands have become Thailand's more important customers.

In **door** exports, the United States and the United Kingdom have always held quite strong positions as buyers from Asian countries. Of the markets closer to home, Japan and Singapore in particular have increased their purchases, notably between 1993 and 1998, and from all three producers. Importing countries appear to be shifting between different supplier countries in their search for cheaper or up-to-quality doors.

In **wooden furniture** ('other', not elsewhere specified) the United States and Japan have provided the main market pull for Asian producers. For each of the

three leading exporters, these two countries are the biggest markets. This furniture category remained the most important in terms of exports from the region throughout the period 1993-1998. And within the category, one of the most important products is garden furniture.

Table 5 Major export destinations of selected further processed products from top three ITTO exporters in the Asia-Pacific region, 1993 and 1998							
Exporting country	Destination	Share of total exports (%)		Exporting country	Destination	Share of total exports (%)	
Profiled hardwood		1993	1998	Doors		1993	1998
1. Malaysia	Japan	19.1	22.3	1. Indonesia	Japan	–	20.7
	United States	17.9	16.2		United Kingdom	31.4	17.7
	Australia	16.1	11.2		Singapore	7.8	12.9
	Taiwan Province (China)	12.2	7.2		Korea, Republic of	7.4	12.2
2. Indonesia	Taiwan Province (China)	24.9	23.3	2. Malaysia	Singapore	9.2	29.7
	Italy	18.3	13.1		United States	29.5	21.9
	United States	12.8	11.7		United Kingdom	21.4	17.8
	Singapore	12.0	11.4		Australia	9.1	8.5
3. Thailand	Japan	55.1	28.5	3. Philippines	United Kingdom	38.7	42.8
	United States	3.5	18.6		Japan	5.4	32.5
	Netherlands	5.7	12.4		United States	29.6	16.5
	Germany	24.1	4.0		France	–	4.8
Wooden furniture, n.e.s.		1993	1998	Furniture parts		1993	1998
1. Malaysia	United States	42.1	44.3	1. Malaysia	Japan	23.3	26.3
	Japan	24.3	17.2		United States	36.2	21.2
	United Kingdom	6.3	7.0		Taiwan Province (China)	9.9	10.7
	Singapore	8.8	6.5		Singapore	11.9	10.4
2. Thailand	United States	43.8	43.2	2. Indonesia	Japan	35.6	33.1
	Japan	35.6	32.9		United States	12.2	30.4
	United Kingdom	3.8	3.3		Malaysia	–	12.7
	Canada	1.4	3.1		Taiwan Province (China)	10.0	10.8
3. Philippines	United States	66.0	71.1	3. Thailand	Japan	87.5	71.6
	Japan	6.6	6.6		United States	2.0	8.1
	Australia	–	2.8		Taiwan Province (China)	4.2	5.4
	France	–	2.6		Hong Kong (China)	1.3	2.7

Source: COMTRADE (UNSD).

In **furniture parts**, most export deliveries are to the other Asian countries, with some to the United States. Taiwan Province (China) and Singapore have increasingly become involved in the trade of furniture parts, which are assembled and finished in their factories as ready-made furniture.

Local marketing

The local markets for furniture and other further processed products tend to be overlooked by planners of export-oriented programmes. It is clear, however, that many enterprises continue to depend primarily on there being a dynamic home market, whether local, regional or national. As the most densely populated region on the globe, the domestic markets for Asia-Pacific countries must play an important role in the future development of the entire value-added wood processing industry in the region – and the same applies to parts of other ITTO producer regions as well.

The small furniture producers market themselves by word of mouth. In certain countries they have no showrooms; they often exhibit their products at the roadside. These are the very local, lower-skilled craftsmen who can sometimes be found at their workbenches in the shade of a large tree. Better quality products are usually produced only at the special request of a customer (and not for stock – that would tie up scarce working capital), to be collected upon completion. Some samples of past work may be kept, but these are not exhibited.

Highly skilled craftsmen market their products in exactly the same way, with no showrooms or samples of past work. Their clientele keeps coming to them because of their reputation, which is passed on by satisfied customers.

Firms that manufacture series in small numbers mainly produce to customers' orders. Customers may range from an independent furniture retailer to the furniture department of a department store, if such categories exist. Usually such firms have a showroom attached to their factory, but sometimes this may be in a commercial area and occasionally it may even be located in another town, in which case it is probably managed by a family member. As soon as a furniture producer has its own retail outlet, it uses the publicity of the shop, with brochures describing the product (especially for kitchens), advertisements in the press, on radio and TV, and in flyers, etc.

Firms that produce series in larger numbers usually rely on contract work as an outlet for their production, the local market often being too small to absorb so many identical pieces. If their major products are mass consumption items, such as garden furniture or kitchens, they may establish their own chain of retail outlets (or sell through an existing chain). These firms are the most likely category to be exporting a substantial proportion of their production.

The marketing of joinery products is different, because of the lack of standards on the one hand and the individuality of homeowners on the other. People often insist on their doors and windows being different from those of their neighbours. Joinery is usually produced on the basis of an agreement with the general contractor for each individual unit built. The increasing rate of construction of high-rise buildings or rows of identical houses is gradually pushing up production rates. There are, however, only a few cases where the contractor buys standard joinery off the shelf. This situation is unlikely to change until national standards are established for doors and windows, and the bodies that finance the construction work (government, institutions, etc.) insist on their use.

Domestic and regional markets

ITTO producers in the Asia-Pacific region are geographically close to some of the biggest importers of further processed wood products in the world (Japan, China, Singapore, Republic of Korea, Taiwan Province (China)) and also have, among them, some of the most heavily populated countries such as India and Indonesia. It is therefore not surprising that the region has been the main driving force in the reshaping of international trade flows of furniture and other wood products.

China can be highlighted as likely to become the single most important factor in terms of regional market dynamics in the coming decade. There are several positive factors contributing to the reasons why the Chinese market holds such promise for expanding future trade in further processed wood products:

- Private home ownership has been allowed and encouraged by the government;
- The average floor area of the Chinese dwelling continues to increase;
- Acceptance in China of international furniture and flooring styles is growing;

- Furniture factories are being swiftly relocated into China from neighbouring countries (Taiwan Province (China), Singapore, Malaysia) in search of low-cost labour and other more favourable production factors;
- There has been an influx of brand name furniture and home interior product makers from Italy, Germany and the United States at the higher end of the Chinese market;
- The economy has been gradually opening up to less-regulated imports of all wood products just at the time when domestic wood resources are dwindling and ecological problems are restricting logging; and (inter-linked with this)
- Import tariffs are being lowered as China negotiates entry to the World Trade Organization.

Perhaps the most commonly cited reason for the growing demand for wood in China is the rise in average urban residential floor space per inhabitant. The size of this key indicator has almost tripled in the last 20 years, from 3.7 m² per capita in 1979 to 9.6 m² in 1999, and it is expected to continue to rise, perhaps to reach a level of 18 m² by 2010. Already now, levels of 15 m² are being attained in Beijing and other major cities – well above the national norm (*Asian Timber*, 2000).

In the most populated city of the country, Shanghai, the residential construction programme is bringing 200,000 new houses onto the market every year. The average wood consumption per house is estimated at 2.5 m³, which means that, in Shanghai alone, demand for wood for construction purposes is increasing by almost half a million cubic metres per year (www.hardwoodmarkets.com/2000). The construction of residential buildings is forecast to increase annually by a healthy 15% over the next five years. China's ninth five-year plan sets out a target of 240 million square metres of residential buildings every year (*Asian Furniture News*, 1999).

The number of urban households countrywide is estimated at 70 million units. While the majority of Chinese still reside in state-owned housing, the number of privately owned dwellings is on the rise, bringing along with it a booming home improvement and furnishing market. Hotel and public building projects (new construction and renovations) continue at a record pace, particularly in the southern coastal regions, and in spite of the fact that office space is in oversupply. Complete furnishing of vacant offices has become the new way to attract businesses. This is feeding a somewhat bubble-like demand for office furniture (*Asian Furniture News*, 1999).

Substitution pressure from plastics and metals, on the other hand, is affecting wood usage for windows and doors. In the lower market segments, plastics and steel are strongly preferred for cost, strength and fire safety reasons. It would appear that tropical wood has to find its niche at the higher end of markets (e.g. joinery), where owners of larger urban dwellings, or houses, seek attractive materials for doors and window frames, and equip their kitchens with tailor-made, complete sets of furniture.

In China, the furniture market situation is mixed. Domestic demand has not fully lived up to expectations, while exports have been flourishing. The first furniture boom was experienced in the early 1990s when two-digit economic growth drove up demand, especially for office furniture. Many foreign distributors and suppliers were then attracted to China, and business was healthy for some of them in the succeeding years. By the end of the decade, however, both Chinese-owned and joint-venture companies had established a substantial amount of new furniture manufacturing capacity on the mainland, and competition has become far stiffer.

The existing 30,000 Chinese furniture factories are still confronted with major challenges, mainly related to their raw material supply, product quality and design. Recent information indicates that the costs of wood raw material are on the increase, despite the fact that China has imported logs (e.g. from the windfall beech forests in France and Germany). At the same time, retailers are reporting a slump in demand for furniture in the major cities. This is partly explained by rising prices, but it is also due to the persistent quality problems experienced with Chinese furniture. In a recent survey carried out by the State Bureau of Quality and Technical Supervision, only 57% of the wooden furniture examined came up to the required national quality standards.

Consumer tastes in furniture are shown to favour natural wood surfaces, either veneered or in solid wood. Traditional domestic species are Chinese oak, ash and birch, while red oak and beech are commonly imported.

In furniture exports, China has established itself as an increasingly important supplier to the markets in the Asian region and to the United States. In European markets, by contrast, the influence of Chinese exports has hardly been felt. From the ITTO producers' point of view, China is not only one of the major competitors in their main export outlets, but it also manages to maintain a reasonably low level of imports at the same time. In this respect, non-tariff barriers, including a system of designated trade enterprises (DTEs), fragmented and disorganized distribution channels, and unclear customs and import licensing regulations, have all been contributory factors.

In trade, China emerged from out of the shadow of the larger ITTO exporters in the latter part of the 1990s, to topple them from their leading positions in terms of export value in several product categories. Data extracted from COMTRADE (UNSD) paint a clear picture of change. China surpassed the leading ITTO producers in exports of wooden seats, office furniture, bedroom furniture, 'other' wooden furniture, bamboo furniture and furniture parts, and was on the verge of taking over pole position in kitchen furniture. It gained the leading position in most product categories only in the 1997-1998 period, indicating that it took market share from South-East Asian exporters during their economic difficulties. China's total exports reached US\$ 1.34 billion in 1998 based on the furniture groups covered in this study. Its imports of the same items were as low as US\$ 57 million, and mostly in the form of furniture parts.

Imports of further processed wood products

Malaysia (US\$ 41 million) and the Philippines (US\$ 36 million) were the main importers of value-added products among the producing countries in the Asia-Pacific region (table 6). The after-effects of the 1997/98 economic crisis have significantly slowed the growth of imported value-added products into these countries. Furthermore, with the imposition of protective import tariffs by most of the producer countries in the Asia-Pacific region, imports of value-added products have remained on a low plateau. Imports were valued at a mere US\$ 103.7 million in 1998.

The trade flows of sawnwood have changed markedly in the wake of raw material shortages in countries such as Thailand and the Philippines. North American hardwoods and South American (Brazilian) tropical wood and pine have been imported in growing volumes in order to supply just the existing further processing industries in the region. Much of the North American hardwood ends up back in its 'country of origin' as finished furniture. Singapore has lost its place as leading manufacturer of furniture, but it is still an important hub for furniture trade. A major proportion of its imported further processed products is re-exported. Singapore companies have also been quick to react to escalating production costs and to relocate their factories to low-cost places such as China.

Table 6 Imports of further processed products by Asia-Pacific ITTO producers, 1998 (in millions of United States dollars)					
Countries	Wooden furniture and parts	Builders' joinery	Profiled wood (incl. mouldings)	TOTAL	Share (%)
Malaysia	22.9	4.4	13.7	41.0	39.5
Philippines	32.7	2.9	0.5	36.1	34.8
Thailand	9.7	0.9	2.4	13.0	12.5
Indonesia	5.4	1.3	0.7	7.4	7.1
India	5.0	0.4	0.3	5.6	5.4
Fiji	0.7	0	0	0.7	0.6
Myanmar	0	0	0	0	0.0
TOTAL	76.3	9.8	17.6	103.7	100.0
Share (%)	73.6	9.4	17.0	100.0	

Source: COMTRADE (UNSD).

Note: All figures rounded, and may not add up to totals.

Net trade

All countries in the Asia-Pacific region for which data was reported appeared in 1998 as net exporters of further processed wood products (table 7), in the main owing to their low levels of imports. Lack of reporting to COMTRADE (UNSD) by Cambodia and Papua New Guinea precludes a full appraisal of their trade, but they are both likely to have been net importers due to the absence of local export-quality manufacturing.

Table 7 Net trade on further processed products in Asia-Pacific ITTO producers, 1998 (in millions of United States dollars)				
Countries	Wooden furniture and parts	Builders' joinery	Profiled wood (incl. mouldings)	TOTAL
Net trade (exports minus imports)				
Malaysia	888.5	164.8	154.7	1,208.0
Indonesia	233.6	405.4	90.4	729.4
Thailand	461.4	31.0	47.7	540.1
Philippines	225.2	56.8	4.0	286.0
India	10.0	0.3	-0.2	10.1
Myanmar	1.4	0.3	n.a.	1.8
Fiji	1.1	n.a.	n.a.	1.1
TOTAL	1,821.2	658.7	296.6	2,776.6

Source: COMTRADE (UNSD).

Note: Minus denotes net imports: all figures rounded, and may not add up to totals.

In stark contrast to this prevailing net export situation in further processed (value-added) products, the overall picture in the region for primary processed wood products in 1998 was one of net imports. In its *Asia-Pacific Forestry Sector Outlook Study*, the Food and Agriculture Organization of the United Nations (FAO) projects that this net import situation for primary wood products in the region will continue, and even worsen by the year 2010 (FAO APFSOS, 1998).

This divergence of trends for these two inter-linked sub-sectors – primary wood products and further processed products – poses a major challenge to the countries that wish to achieve balanced and sustainable development of their forestry sectors. Maintaining a favourable net export situation will depend on the competitiveness of exporters, who can be assisted by the domestic application of enabling policies targeted at the further processing industries. Securing the supply of wood as a raw material is a critical issue. As domestic wood supplies dry up or change in quality, the importing of primary wood products as a source of supply becomes a more visible component of the wood trade flows of a country. This puts new demands on product development and processing technologies.

Price information

A substantiated analysis on the price developments of value-added products is very difficult to arrive at, because comparative information on the different types of products (with specifications) from the wide range of producers is extremely scarce. The general trend, however, is for a reduction in prices of value-added products from the producing countries of the Asia-Pacific region because of increased competition between them as they attempt to cater for worldwide demand. An example of this is the fact that a Malaysian Windsor-style chair, which was priced at US\$ 21 (FOB) in 1987, was US\$ 7.50 (FOB) in 1998. In Viet Nam in 1998 a similar chair was exported at a price of US\$ 6.50 (FOB) (*Asian Timber*, 2000).

The bulk of the value-added products exported from the Asia-Pacific region are less sophisticated than those from the more developed economies and are concentrated in the lower price-point market sectors. It is therefore imperative for exporters to diversify if they are to remain competitive and profitable in the future.

Price series data collected by ITTO suggest equally that the trend in both nominal and constant prices of exported mouldings is a declining one. Indonesian mouldings, for example, suffered a 25% price slide between mid-1997 and mid-1998, when the economic crisis was at its height, and when competition between the exporters in Asia was particularly fierce. Thereafter, prices have steadied. Partly affected by the devaluation of the Indonesian *rupiah*, the constant (1990) export prices for A-grade meranti mouldings have come down from US\$ 750 per m³ in September 1997 to US\$ 553 in September 1999 (a 27% decline).

Further processed products from Malaysia were less affected by the increased competition during 1997-1998, but mouldings suffered a 21% price erosion. It can be concluded that the further processing industries in Asia weathered the stormy markets during 1997-1998 much better than the primary processed products, even though there were some weaker companies that became casualties of the market decline, e.g. in Thailand. For many countries, the Asian crisis served as an eye-opener to the lasting benefits of further processing. The performance of the industries is evidence that the strategies to support them have been appropriately chosen.

Based on the questionnaires received, the price for mouldings (wall panelling 12.5 x 934 mm) was around US\$ 580 per m³ on the Malaysian market, and US\$ 860 for exports. For merbau 20 x 90 mm parquet, the domestic market fetched US\$ 630-660 per m³, while the export price was US\$ 1,050-1,100.

Industry structure and location

Overview

Throughout the Asia-Pacific producer countries, the value-added sectors are dominated by small and medium-sized enterprises (SMEs), particularly in the wooden furniture sector. Medium and large enterprises form the bulk of mouldings, doors and builders' joinery producers. This structural difference can be attributed to the fact that furniture manufacturing is a craft-based, product-oriented industry, while the others are process-oriented. The numbers of companies per product category, as shown in table 8, are collected from various sources and may include some double counting of integrated producers.

The high levels of employment in the value-added processing sectors of the major exporting countries (Malaysia, Indonesia, Thailand and the Philippines) provide further evidence that the manufacturing units are indeed SMEs. With such a structure, it may also be assumed that most of the manufacturing units in these countries are not highly automated or capital-intensive. The capital outlay of the furniture sector in the major exporting countries amounts to only US\$ 500 million, further underlining its low capital intensity. Industrial sources (*Asian Timber*, 1999) suggest that only about 20% of the 6,000+ furniture manufacturing operations in these countries can be categorized as large-scale manufacturers.

Table 8 Number of registered companies engaged in further processing in major ITTO producers in the Asia-Pacific region

Countries	Wooden furniture	Builders' joinery	Mouldings
Malaysia	3,215 (MTIB* data)	21 doors 27 parquet	349
Indonesia	1,020 (517 belong to ASMINDO, Indonesian Furniture & Handicraft Association)	66 doors 223 flooring 139 windows	221
Thailand	2,000	n.a.	170
Philippines	515	n.a.	19
India	3,500	n.a.	400
Myanmar	5	n.a.	6

Sources: Ratnasingam, trade press.

* Malaysian Timber Industry Board.

Production costs have always been relatively low in these countries, and with the currency devaluation that followed the 1997 economic crisis making their products even more competitive in international markets, their exports of value-added products have been on the increase.

In terms of processing capacities, again there has been an increase in the Asia-Pacific region, particularly in the major exporting countries. With exports of primary products declining, value-added processing is poised to grow in the years to come. Industrial sources estimate that total processing capacity for value-added products in the major exporting countries is around 5 million m³ (*Asian Timber*, 1999). The fastest growth in processing capacity was reported in Malaysia, followed by Indonesia, where sufficient quantities of raw materials and labour are available.

Country notes

In the **Philippines**, the two largest furniture manufacturing centres are in Cebu and in Manila. There may be as many as 15,000 furniture factories and workshops in the country, employing in all about 300,000 workers. Manufacturers around Cebu are responsible for 65% of total furniture exports and their main market is the United States.

The Indonesian Sawmillers' and Woodworking Manufacturers' Association (ISA) provided the following information on the structure of the further processing industries in **Indonesia** (table 9). Although SMEs outnumber large units in all the product categories, the few large units that do exist actually account for most of the output and consume most of the wood raw material. The windows category is the only exception to this rule, where medium-sized firms play the key role.

Table 9 **Indonesia: structure of mouldings and joinery industry**

Product	Total annual output			Wood consumption		
	US\$ million/ year	No. of firms	Share of output (%)	m ³ /year	No. of firms	Share of output (%)
Mouldings	Small 0.5	180	18	Small < 500	170	23
	Medium 0.5–2	31	35	Medium 500–2,000	38	26
	Large > 2.0	10	47	Large > 2,000	13	51
Flooring	Small < 0.5	158	15	Small < 500	151	13
	Medium 0.5–2	46	28	Medium 500–2,000	47	21
	Large > 2.0	19	57	Large > 2,000	25	66
Doors	Small < 0.5	35	6	Small < 500	34	9
	Medium 0.5–2	18	25	Medium 500–2,000	22	26
	Large > 2.0	13	69	Large > 2,000	10	65
Windows	Small < 0.5	119	34	Small < 500	111	25
	Medium 0.5–2	17	47	Medium 500–2,000	22	44
	Large > 2.0	3	19	Large > 2,000	6	31

Source: ISA.

The Indonesian furniture industry displays a great diversity in both company size and structure. Large-scale manufacturers of up-market products are often merged with mouldings, joinery mills and other woodworking operations. These companies therefore have the muscle to supply branded furniture to the contract market, with customers such as local hotels, restaurants and office complexes, where the full range of interior decoration products can be installed. Below this top-performing sector of the industry comes an array of medium to large manufacturers who produce according to buyers'

specifications. Small-scale producers are often hand carving workshops specializing in distinctive styles (Jepara, Balinese and classic). Outside this official structure, there are freelance furniture makers employed by firms on a quota basis. Foreign investors have also been attracted by favourable production factors in the country. In 1998, there were 34 foreign furniture projects approved in Indonesia. One recent example of this trend is the plan to develop a furniture and woodworking industry on Batam Island, located strategically close to Singapore.

In **India**, the furniture industry consists mainly of small carpenters' workshops producing unbranded items. Around 85% of all the furniture sold in India is made in small workshops and is not distinguishable by brand names. The domestic urban markets in major cities like Mumbai, Calcutta and New Delhi contain at least 40 million middle- and higher-income consumers. The size and location of the metropolitan consumer centres is a key factor in determining the location of the manufacturers. Distances from the raw materials, however, tend to be very long.

In **Malaysia**, the majority of furniture companies are concentrated on the west coast of peninsular Malaysia (Selangor, Johor, and Kuala Lumpur). The three leading exporters of mouldings, each exporting 10,000-14,000 m³ per year in 1998, are located in Kedah. Of the total number of moulding mills (349), around 150 are situated in peninsular Malaysia.

In **Thailand**, the industry is made up of small and medium-sized firms, of which 90% are domestically owned and the remaining 10% are foreign investments. There were 1,400 furniture manufacturers in 1996, but the Asian economic crisis had cut their numbers back to around 1,000 units by 1998. Approximately 26% are also exporters. Bangkok, with its large expanse of surrounding industrial areas, used to be the centre of furniture manufacturing, but escalating costs have forced relocation to other provinces. A sizeable proportion of the industry, for example, has been attracted to the north of the country by the close proximity there of rubberwood plantations.

In **Myanmar**, which is a leading producer of natural teak, the processing capacity mainly rests in the hands of the state-owned Myanmar Timber Enterprise. It operates three furniture factories (two old-style and one modern), a finger-jointing factory, two new moulding plants and a flooring factory. There are also some privately owned downstream processors scattered around the country, but few of them are capable of exporting. Since the State authorities liberalized the trade in teak in 1999, private-sector involvement in teak processing has increased. A new trading environment is said to have emerged, taking teak out of its exclusive niche markets and more into the mainstream utility markets (*hardwoodmarkets.com*, 2000).

Labour issues

Overview

The value-added or further processing sectors in the Asia-Pacific region are definitely labour-intensive. This is amply demonstrated by the fact that in Malaysia, Thailand, Indonesia and the Philippines more than 950,000 workers are employed in these sectors. Further specific data by product sub-sectors is given in table 10. The workforce in the entire woodworking industry is even larger, with substantial numbers also employed indirectly. In Malaysia, for example, according to data received from the Malaysian Timber Industry Board (MTIB), the wood processing sector provides work for 191,635 people. In the Philippines, the direct workforce of the furniture industry is 300,000.

With such a large workforce, the value-added sector is a major socio-economic factor in these countries. Nevertheless, despite the sector's significant contribution to the countries' economies, in any full assessment of the industry's efficiency and competitiveness, the issue of labour productivity must also be considered.

Table 10 Number of workers employed in further processing in major ITTO producers in the Asia-Pacific region

Countries	Wooden furniture and parts	Builders' joinery	Mouldings
Malaysia	47,000	5,000 (doors)	27,000
Indonesia	215,000	n.a.	70,000
Thailand	400,000	n.a.	30,000
Philippines	300,000	n.a.	2,500
India	500,000	n.a.	200,000
Myanmar	189,000 (all wood-working industries)		

Sources: Ratnasingam, trade press.

In table 11, labour productivity is expressed in terms of the value addition per employee per annum, in United States dollars. When compared to their counterparts in Italy, the largest exporter of wooden furniture in the world, the labour productivity in the wooden furniture industries of the major ITTO tropical producer countries appears to be rather low. The highest is the Malaysian productivity level, which is only 35% of the Italian rate, indicating much room for improvement. The low productivity rates in Indonesia and Thailand are somewhat debatable, but the figures can be partly explained by the high number of workers and the comparatively low value-added element in the furniture produced. It should be remembered that value addition per employee is only an indicator, not an exact measure. In fact, according to Ratnasingam, one of the specialist consultants working on this report, several other parameters need also to be considered in order to arrive at fully meaningful labour productivity figures.

Table 11 Comparative labour productivity in furniture industries in the Asia-Pacific region

Country	Labour productivity (US\$/employee/year)
Malaysia	31,000
Indonesia	28,000
Thailand	27,000
Philippines	23,000
Italy	89,000

Source: Asian Timber (1999).

Table 12 shows the comparative wage rates of workers in the value-added wood processing industries of the major exporting countries. Rates in equivalent industries in consumer countries are very much higher. The comparison serves to emphasise that it is the combination of a consistent supply of wood resources and availability of a cheap workforce that has been the driving force behind the rapid growth of the value-added processing sectors.

Social charges in the South-East Asian region stand on average at around 15%, and it is current practice to pay workers on a daily rather than a monthly basis. When compared with the Italian industry wage rate of US\$ 65 per day, the figures for South-East Asia seem extremely competitive. However, the value addition per employee in the Italian industry is significantly higher.

Table 12 Comparative wage rates in value-added processing in the Asia-Pacific region		
Country	Daily wage (US\$)	Monthly salary (25 days/month + 15% social charges)
Malaysia	6	173
Indonesia	1-2	29-58
Thailand	2-5	58-144
Philippines	2.5 (average) 7.0 for machine operator 18.0 for high-skilled carver	72 201 518
Italy	65	n.a.

Sources: Asian Timber (1999), FDM Asia (May/June 2000).

Country notes

In **Malaysia**, the low wages paid in the value-added processing industry have made the industry heavily dependent on foreign contract workers. Estimates are that 65-80% of workers in the Malaysian furniture factories are foreign, mainly from Indonesia and Bangladesh (*FDM Asia*, April 2000). It may be argued that the value-added processing sector is indeed a 'low-wage economy' that needs to keep production costs down in order to remain competitive. This belief is evidently widespread throughout the countries in the Asia-Pacific region exporting value-added products.

Furniture industries in the **Philippines** have adopted highly innovative designs and material combinations in order to gain higher revenues for their exports, thus relieving the pressure on their 'above-region-average' labour costs. This is significant because this industry is recognized for its ability to incorporate skilled handwork into the finishing of its furniture. Hand carving, painting, inlay work and gilding are all features that give furniture from the Philippines its distinctive, quality image. In other words, the handwork actually adds to the quality of the furniture rather than just being an integral part of its structure (*FDM Asia*, May/June 2000).

In **Thailand**, it is estimated that 400,000 people are employed in furniture manufacturing. Of this total, some 100,000 are thought to be skilled workers.

Competitiveness

Overview

The Asia-Pacific exporters of value-added products depend, for their competitiveness, mainly on the availability of lower-cost production factors. The availability of sufficient raw materials and a large pool of cheap labour have been principal driving forces behind the rapid growth of this sector in the region. Comparatively low transportation and energy costs have also

contributed. Respective governments have played an important role by implementing policies that have discouraged exports of the primary commodity and encouraged, with fiscal and other incentives, the manufacture of value-added products for export.

It is also important to note that the consumption of panel products, in particular medium density fibreboard (MDF) and particleboard, has been increasing in the Asia-Pacific region, especially in the major exporting countries. These products are finding a broader range of applications in the various furniture industries. Using the latest technologies, such as edge banding and laminating, these products are being combined with solid wood to produce value-added furniture. This trend is set to continue well into the future and is expected to contribute towards the further growth of the sector in these countries.

Country notes

Intra-regional competition between supplier countries is a feature of the Asia-Pacific region that stimulates producers. Countries like Malaysia and the Philippines have tried to move out of low-price furniture markets into medium- to high-quality markets, and have used quite different methods in their attempts to achieve this goal.

The furniture industry in **Malaysia** is moving away from so-called ‘contract manufacturing’ or OEM (original equipment manufacturing) into ODM (original design manufacturing) in order to add more value to exports and escape from the fiercely competitive low-cost furniture markets. The main protagonists in the low-cost sub-sector are countries like China, Indonesia and Vietnam, which, with their low wage levels, are likely to remain by far the most price-competitive. **Indonesia** devalued its currency over the 1997-1998 period, which made its exporters far more competitive on international markets. On the other hand, imported machinery and materials became more expensive, a factor that has held back re-investment.

The **Philippines** industry has concentrated on design innovation and flexible production in terms of raw materials and combinations of them, as well as delivery and transportation. It is by concentrating on exactly these areas that both the Philippines and the Malaysian furniture industries will give themselves the best opportunity to develop and grow, just as Italy and Taiwan Province (China) are showing. Otherwise their price-competitiveness – which, in the case of Malaysia, has been maintained mainly by the injection of extra capital expenditure to create economies of scale – will be eroded.

It is also important to note that, despite its ‘cluster’ exercises, even Malaysia has not been able to realize the full potential of dynamic networks consisting of SMEs and larger furniture companies, which tend to control exports. The large-scale part of the industry failed to take advantage of the manufacturing and design flexibility offered by SMEs (the Italian way). It rather preferred to contract them as suppliers of a limited range of bulky components at minimum cost (Ratnasingam, *Asian Timber*, 2000).

Measured by current levels of domestic interest rates, the large ITTO member producers in the Asia-Pacific region are much better equipped to invest in new technologies than their competitors in Latin America or Africa. Domestic lending rates in 1999 were, on average, 7% per annum in Malaysia, 9% in Thailand and 12% in the Philippines. These rates were roughly one-third of the level of the prevailing rates in the Latin American ITTO producer countries and around about half the level of those in Africa (as reported by International Monetary Fund [IMF], *International Financial Statistics*). This financial advantage, coupled with the more competitive size of companies in Asia,

suggests that when it comes to the adoption of new technologies and machinery upgrades, and ultimately to productivity, the strongest Asian producer countries are set to outperform their rivals in the other regions.

Indonesia has been the one exception among the leading countries in the region, with domestic lending rates above 27% p.a., although admittedly they were on their way down after peaking at 32% in 1998. In most of the countries, rates started going down in 1999, a trend that continued into 2000.

Research and training

The research and development (R&D) and industrial training infrastructures in the Asia-Pacific region are closely linked to the industrial base that exists in each of the respective countries. In 1998, there were reported to be more than 75 R&D, or training, centres in the five major producer countries in the region.

In the main countries exporting value-added products, both R&D and training have been developed to relatively good levels, in line with the rapid expansion of the sector. In other economies, however, industrial training is still very much in its infancy. Almost all the research and training centres are funded by government, which aims to enrich the industry sectors through R&D as well as human resource development. A case study on the development of SMEs and human resources in Malaysia is presented in appendix III.

One point of concern, nonetheless, is that there would appear to be great emphasis on basic research as opposed to applied research, which does not augur well for the objective of bringing about a closer link between the industries and research institutions. It is for this reason, also, that industry-sponsored research is so relatively small in these economies.

In the **Philippines**, the Forest Products Research and Development Institute (FPRDI) is in the process of launching a new R&D programme for furniture industries (*FDM Asia* May/June 2000). The following key services will be provided, mainly for small to medium-sized companies:

- New furniture training and testing facilities;
- Help in using more plantation species and non-traditional raw materials for furniture;
- Improving the existing factories;
- The enhancement of local design and creative skills; and
- Creation of common service facilities in woodworking techniques, tool grinding, kiln-drying and finishing.

Policy issues

The role of Asian governments in encouraging the value-added processing sectors in the major exporting countries has been significant. The gradual reduction in the export level of primary commodities, through the imposition of levies, taxes, and even a total ban, has been one of the main reasons for the spectacular development of the value-added processing sectors. And with fiscal and policy incentives for the value-added processing sectors, growth in these countries has been positive, notably in Malaysia, followed closely by Indonesia, Thailand and the Philippines.

In order to protect domestic producers, most of these countries impose tariffs on imports of value-added products (at 30-50% on average). However, the major markets for their exported products provide tariff relief to the producer countries, in particular those under the Generalized System of Preferences

(GSP). For instance, the European Union, Japan and the United States apply no import tariffs to value-added products from GSP countries. While the application of import tariffs by the producer countries may appear to be a protective measure for the domestic industrial base, the practice might also result in less than optimal volumes of their value-added products being imported by the consumer countries.

High tariffs appear to be a special obstacle to trade growth between developing countries, too. In this respect, both importers and exporters should reciprocally avoid tariff escalation as the value-added trade develops.

Latin America-Caribbean region

Resource situation

In Latin America, most countries have large areas of natural forests that are still intact, often representing some of the most important natural resources available within their borders. There is much unutilized potential in nearly all the countries, but political, environmental and infrastructure-related difficulties have restricted its development (table 13). Latin America as a whole, has a disproportionately small share of the global trade in wood-based products.

Table 13 Resource status in producing countries in the Latin America-Caribbean region

Country	Forest area (thousand ha, 1995)	Potential wood fibre supply 2010 compared to 1996 potential
Brazil	Natural: 546,000 Plantations: 4,964	Increase, but pine declining rapidly
Ecuador	Natural: 11,092 Plantations: 64	Static
Bolivia	Natural: 48,200 Plantations: 40	Increase
Honduras	Natural: 4,112 Plantations: 10	Decline
Venezuela	Natural: 43,742 Plantations: 464	Static
Colombia	Natural: 52,862 Plantations: 187	Static
Peru	Natural: 67,400 Plantations: 14	Increase
Suriname	Natural: 14,700 Plantations: 8	Slight increase
Guyana	Natural: 18,500 Plantations: 8	Slight increase
Panama	Natural: 2,794 Plantations: 6	Decline
Trinidad and Tobago	Natural: 148 Plantations: 13	n.a.

Sources: FAO: Global Fibre Supply Study 1998, SOFO 1999.

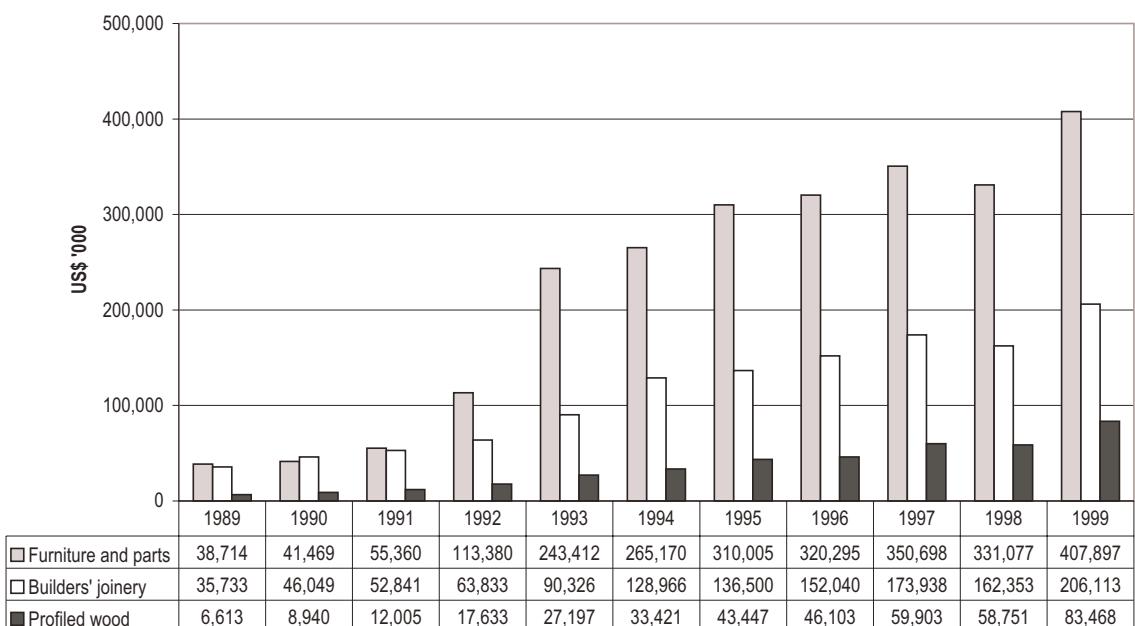
In Brazil, most of the industrially used wood comes from plantations. There has developed, in recent years, a shortage of suitable land for pine growing in the south of the country. Consequently, the rate of reforestation has lagged behind the rate of consumption growth of pine based products, and a deficit has accumulated. Serious shortages of pine are forecast for the next two decades. The further processing industry is preparing to use alternative sources, most notably eucalyptus, which is abundantly available in the south-east of the country. The internal transportation of primary processed tropical wood from the north to the south for further processing is increasing. Neighbouring Argentina offers an additional source of pine lumber at present because of local oversupply there, but this convenient solution may only be temporary.

Exports of further processed wood products

Overview

Exports of further processed wood products from ITTO producers in the Latin America-Caribbean region reached US\$ 552 million in 1998, in contrast to the modest start of just US\$ 81 million made in 1989. Export trends by main product categories are shown in figure 9 and in appendix II. Between 1989 and 1998, at 23.8% per annum, this was the region with the fastest average growth rate for exports of all the ITTO producer regions. Much of the growth took place in the early 1990s, when furniture exports multiplied almost sixfold in just four years (1989-1993). Exports from the region as a whole did not suffer in a major way from the Asian economic crisis, although the Brazilian economy and currency were somewhat affected by a few waves of instability in 1998. Again in 1999, exports shot up to US\$ 697 million (up 26% from 1998), spurred by Brazil's impressive growth in furniture exports.

Figure 9 Trends in the export structure of further processed wood products in the ITTO producer countries in the Latin America-Caribbean region, 1989-1999



Source: COMTRADE (UNSD).

Structure of exports

Around 60% of total value of exports in 1998 was in furniture and parts, while 29% was sold as builders' joinery and the remaining 11% as profiled wood. The composition of exports has undergone a considerable change over the past decade. Furniture has gained a larger share at the expense of builders' joinery (table 14). Exports of all three of these major product categories, however, have continued to grow throughout the period. Brazil largely dictates the region's product breakdown with its booming furniture export business (table 15). Among the other countries, Bolivia and Trinidad and Tobago have been more reliant on the joinery category, which has accounted for more than half their total exports throughout the decade. Honduras, on the other hand, is heavily dependent upon furniture exports to the United States (almost 90% of its total) while profiled wood accounts for the majority of Ecuador's exports (58% of total in 1998).

Table 14 Export structure of further processed products from the ITTO producer countries in the Latin America-Caribbean region

Category of products	1998		1989
	Total export value (US\$ million)	Share of total (%)	Share of total (%)
Wooden furniture and parts	331.1	60.0	47.8
Builders' joinery	162.4	29.4	44.1
Profiled wood (incl. mouldings)	58.8	10.6	8.2
TOTAL	552.2	100.0	100.0

Source: COMTRADE (UNSD).

Note: All figures rounded, and may not add up to totals.

Table 15 Export structure of further processed products by ITTO producers in the Latin America-Caribbean region, 1998

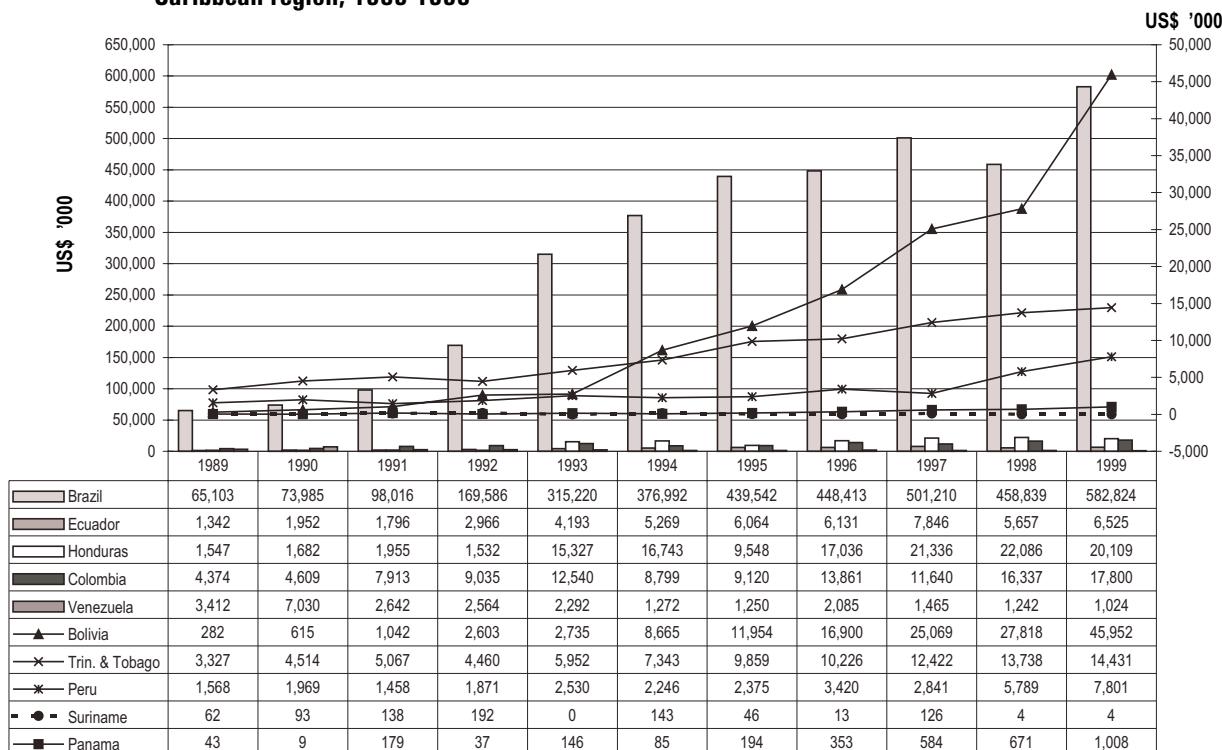
Countries	Total export value (US\$ million)	Wooden furniture (%)	Builders' joinery (%)	Profiled wood (incl. mouldings) (%)
Brazil	458.8	60.5	29.4	10.1
Bolivia	27.8	31.8	50.1	18.1
Honduras	22.1	88.9	6.3	4.7
Colombia	16.3	88.3	4.5	7.2
Trinidad and Tobago	13.7	26.7	72.9	0.4
Peru	5.8	66.6	3.8	29.6
Ecuador	5.7	25.2	16.4	58.4
Venezuela	1.2	82.5	8.1	9.4
Panama	0.7	76.2	23.8	0.0
Suriname (1997)	0.004	73.8	3.2	23.0
TOTAL	552.2	59.9	29.4	10.6

Source: COMTRADE (UNSD).

Exports by countries

Brazil's exports were valued at US\$ 459 million (83% of the region's total) in 1998 (figure 10). This left all the other countries with comparatively small shares, among which Bolivia (US\$ 27.8 million), Honduras (US\$ 22.1 million) and Colombia (US\$ 16.3 million) were the nearest (though distant) three regional competitors. Trinidad and Tobago had established a US\$ 13.7 million export trade by 1998, mostly in doors, and it is growing steadily.

Figure 10 Exports of further processed wood products by ITTO producer countries in the Latin America-Caribbean region, 1989-1998



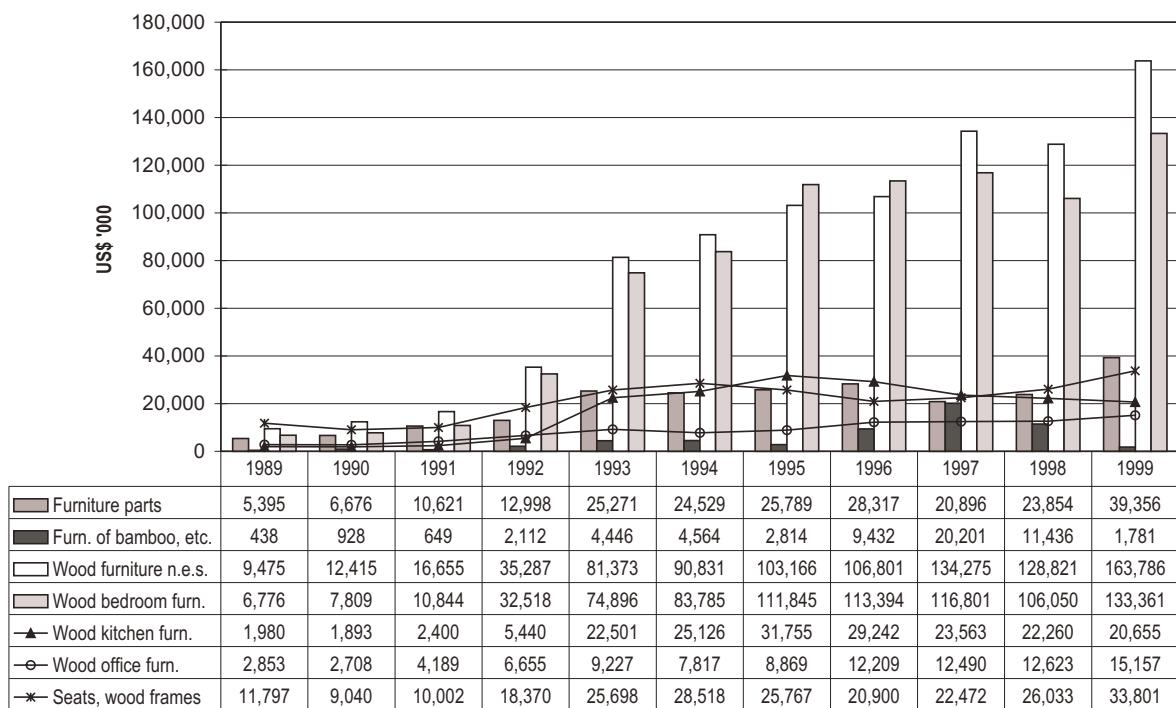
Source: COMTRADE (UNSD).

Export trends by individual products

Wooden bedroom furniture (32%) and unspecified 'other' wooden furniture (39%) were the two most important product categories in the region's exports. Both accounted for more than US\$ 100 million worth of export revenue (figure 11).

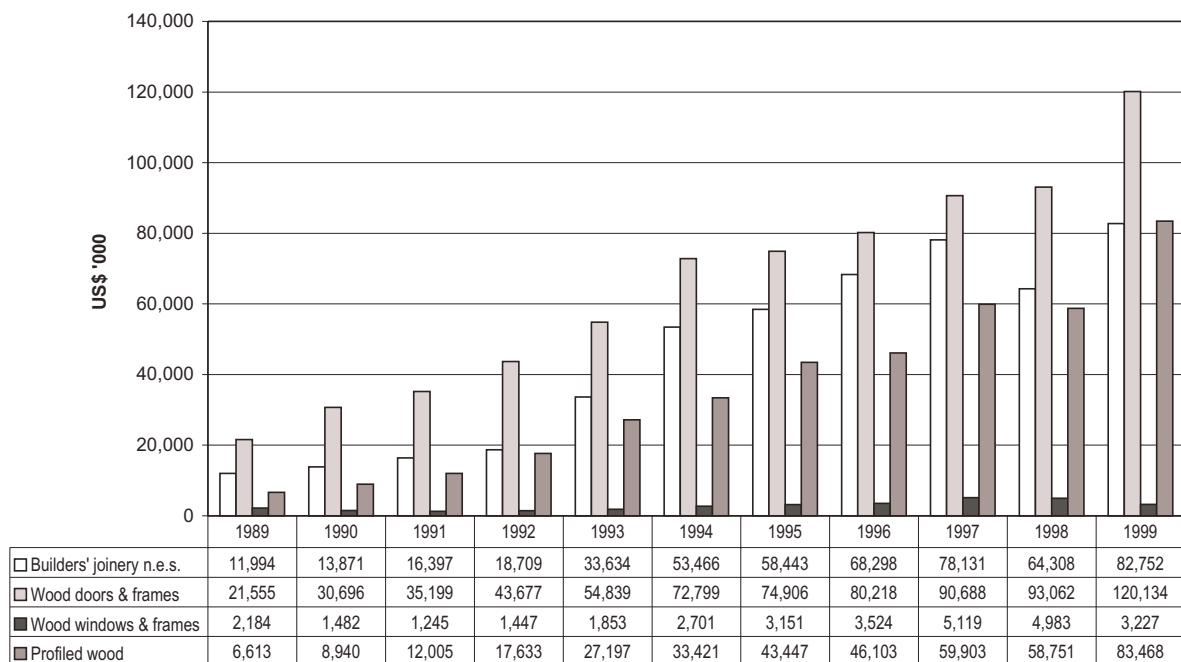
Within the joinery category, doors and frames accounted for the largest share of total exports (57%) (figure 12). Growth in the level of door exports has continued unabated over the past decade at least. As far as the remainder (some 40%) of the category, is concerned, the next largest product sector was 'other' builders' joinery (parquet panels, etc.) while windows and frames played a very minor role (3%). Profiled wood was the other important product type, with exports amounting to US\$ 59 million from the region. Unlike the Asia-Pacific region, Latin America has sold additional and significant quantities of softwood mouldings, which currently account for around 10% of total profiled wood exports. Softwood's share of exports used to be nearly 25% just a decade ago, but it has since declined because processing of the Paraná pine has been curtailed by a dwindling supply of logs.

Figure 11 Exports of wooden furniture by type from ITTO producer countries in the Latin America-Caribbean region, 1989-1998



Source: COMTRADE (UNSD).

Figure 12 Exports of profiled wood and builders' joinery by type from ITTO producer countries in the Latin America-Caribbean region, 1989-1999



Source: COMTRADE (UNSD).

Major markets

Export outlets

Looking at the destinations of the further processed wood products from the region's leading exporting countries (table 16), it is apparent that a few markets are dominant. The table summarizes the evolution from 1993 to 1998 of the main export outlets for four selected products from the key producer countries.

Table 16 Major export destinations of selected further processed products from top three ITTO exporters in the Latin America-Caribbean region, 1993-1998							
Exporting country	Destination	Share of total exports (%)		Exporting country	Destination	Share of total exports (%)	
Profiled hardwood		1993	1998	Doors		1993	1998
1. Brazil	United States	67.7	67.0	1. Brazil	United States	34.8	49.5
	Canada	–	9.8		United Kingdom	39.8	33.5
	Argentina	3.2	3.8		Argentina	1.9	2.1
	United Kingdom	10.6	2.4		Germany	9.1	1.9
2. Bolivia	Argentina	–	55.8	2. Bolivia	United States	49.2	64.5
	Italy	33.0	14.4		Argentina	30.7	26.5
	United States	–	10.5		Chile	6.6	4.4
	Germany	39.2	7.0		Spain	11.8	2.5
3. Colombia	Venezuela	80.5	97.7	3. Trinidad and Tobago	Barbados	24.9	31.9
	United States	9.4	0.9		Jamaica	19.5	26.9
	Mexico	–	0.4		Grenada	13.0	11.3
	Italy	7.6	–		Saint Lucia	15.7	6.7
Wood bedroom furniture		1993	1998	Furniture parts		1993	1998
1. Brazil	United Kingdom	8.2	22.8	1. Brazil	United States	47.5	67.0
	France	17.0	16.0		Argentina	–	8.5
	Netherlands	5.1	12.3		United Kingdom	19.9	7.2
	Germany	36.1	10.9		Germany	12.6	2.3
2. Honduras	United States	94.7	80.9	2. Colombia	United States	66.5	42.4
	Germany	–	10.4		Venezuela	22.6	32.9
	El Salvador	2.9	4.6		Ecuador	–	9.0
3. Colombia	United States	9.2	64.7	3. Honduras	United States	82.4	99.3
	Venezuela	80.1	19.3		El Salvador	14.4	–
	Ecuador	–	7.7		Guatemala	1.7	0.1

Source: COMTRADE (UNSD).

In **profiled hardwood** (including mouldings), the main export destinations are either North America or other countries in the Latin American region. In the case of Brazil's exports, the United States was by far the most important destination, absorbing two-thirds of the total export value in 1998. A general trend, which can be observed in exports of profiled hardwood between 1993 and 1998, has been the growing importance of the Americas as buyers, while the share of exports to Europe has been declining.

In exports of **doors**, the United States and the United Kingdom have remained major markets for Brazil, while imports by Germany have been in decline. In the case of Trinidad and Tobago, the third largest exporter in the Latin America-Caribbean region, the regional Caribbean market continues to absorb the bulk of their door exports.

There is strong demand in Europe for Brazil's **wooden bedroom furniture**, as the four European countries accounted for 62% of all exports in 1998 (table 16). Some changes between European countries have been seen, mainly with the United Kingdom and the Netherlands gaining ground, and Germany declining. For Honduras and Colombia, the United States market continues to be dominant, with Colombia experiencing a marked drop in exports to Venezuela between 1993 and 1998.

In **furniture parts**, export sales are clearly dominated by deliveries to the United States by all three leading Latin American exporters. Brazilian shipments to Europe (United Kingdom, Germany) have contracted in terms of market share, while a bigger slice of exports has gone to Argentina, probably stimulated by the adoption of the MERCOSUR (Southern Common Market) agreement.

Domestic and regional markets

The size of the affluent urban domestic market tends to be underestimated, despite the fact that it often plays a much more important role in the total trade of further processed products than in primary processed products. For example, in the case of Brazil, the age distribution of the population is pyramid-like, with a large proportion in the 15 to 25 age group. This part of the population is therefore just about to reach its consumption 'prime', and should be well within the sights of the further processing industries as a market for the products of their new investment projects.

Furthermore, the growth rate for numbers of urban dwellers tends to be higher than for the total population in Latin American countries overall. A part of the rural population is moving into the cities and demanding, perhaps for the first time, ready-made furniture. New house building calls for the increased use of wood for construction purposes and in the form of builders' joinery.

Within the existing urban population, cycles of renewal of household facilities – electrical appliances, furniture and interior decorations – tend to follow the same trend as the overall growth in wealth and purchasing power of the middle class. There are signs, in the case of Brazil, that a furniture and home decoration boom is about to develop – unless a sudden worsening of the economy gets in its way.

The Brazilian example highlights the wisdom of prudent investment planning, based on the trends observed in the domestic (and export) markets. Industrial-scale producers – starting from the SME level – should use this type of diagnostic approach before making major investment decisions.

Another example of a robust domestic (urban) market is that of **Venezuela**. The country is seldom mentioned in the context of the further processing of wood, and has exported only very small amounts of any of the products mentioned in this report. This is surprising given the country's apparently rich endowment of internal timber resources. Venezuela has sizeable forest resources in both native and planted exotic species (pine) and it has one of the highest levels of gross domestic product (GDP) per capita in Latin America. In reality, it is because the economy has been fuelled by oil and gas exports that other manufacturing sectors have not developed satisfactorily.

Consequently, Venezuela **imported** further processed products to the value of US\$ 46.6 million in 1998, and exported a mere US\$ 1.2 million. Its trade deficit was by far the largest among ITTO producers. The United States and Italy were the main sources of the imported furniture.

The export performance of **Trinidad and Tobago** in the Caribbean emphasizes how important the other countries within the region are to them,

as markets for their exports. Trinidad and Tobago have developed exports worth US\$ 13.7 million based mainly on wooden doors and windows. At least 91% of their window exports went to the local Caribbean market (Barbados, Jamaica, etc.) and 81% of total door exports worth nearly US\$ 8.9 million were sold to the five neighbouring island States.

Imports of further processed wood products

Imports of further processed products to the Latin America-Caribbean region are reasonably large in terms of actual values, amounting to US\$ 185 million in total in 1998 (table 17). They are mainly accounted for by furniture, of which Brazil and Venezuela each import more than US\$ 40 million worth. Altogether, 83% of the region's imports are of furniture.

Table 17 **Imports of further processed products by Latin America-Caribbean ITTO producers, 1998**
(in millions of United States dollars)

Countries	Wooden furniture and parts	Builders' joinery	Profiled wood (incl. mouldings)	TOTAL	Share (%)
Brazil	44.2	9.7	4.1	57.9	31.2
Bolivia	5.9	0.3	0	6.2	3.4
Honduras	5.8	0.6	0.06	6.4	3.4
Colombia	13.8	0.8	1.3	15.8	8.5
Trinidad and Tobago	3.9	0.9	2.6	7.4	4.0
Peru	15.8	0.6	0.2	16.5	8.9
Ecuador	7.0	0.8	0.4	8.2	4.4
Venezuela	40.6	4.3	1.7	46.6	25.2
Panama (partly 1997)	15.7	1.7	0.7	18.1	9.8
Suriname (partly 1997)	1.9	0.2	0	2.1	1.1
TOTAL	154.6	19.9	11.0	185.4	100.0
Share (%)	83.4	10.7	5.9	100.0	

Source: COMTRADE (UNSD).

Note: All figures rounded, and may not add up to totals.

Net trade

In terms of net trade, Venezuela, Panama and Peru are clearly net importers (table 18). Venezuela recorded a 1998 trade deficit in all three further processed products of about US\$ 45 million. The high demand for furniture by the better-off urban dwellers and the continuing underdeveloped state of the domestic manufacturing industry help to sustain these import levels. Wood office furniture and unspecified 'other' wooden furniture form the bulk of Venezuela's imports.

In spite of taking in US\$ 44 million worth of imports, Brazil's wood product exports were sufficient in 1998 to bring the region's total trade balance into a clear net surplus situation of some US\$ 400 million.

Table 18 Net trade on further processed products in Latin America-Caribbean ITTO producers, 1998
(in millions of United States dollars)

Countries	Wooden furniture and parts	Builders' joinery	Profiled wood (incl. mouldings)	TOTAL
	Net trade (exports minus imports)			
Brazil	233.5	125.2	42.2	400.9
Bolivia	2.9	13.6	5.0	21.6
Honduras	13.9	0.8	1.0	15.7
Colombia	0.6	-0.009	-0.09	0.5
Trinidad and Tobago	-0.2	9.1	-2.5	6.4
Peru	-11.9	-0.4	1.5	-10.8
Ecuador	-5.6	0.09	2.9	-2.6
Venezuela	-39.6	-4.2	-1.6	-45.4
Panama (partly 1997)	-15.2	-1.5	-0.7	-17.4
Suriname (partly 1997)	-1.8	-0.2	0.03	-2.0
TOTAL	176.6	142.5	47.9	367.0

Source: COMTRADE (UNSD).

Note: Minus denotes net imports, all figures rounded, and may not add up to totals.

Price information

To illustrate price developments over time for further processed wood products, some average prices of products exported by Brazil are presented in table 19. Softwood and hardwood mouldings have experienced notable declines in current United States dollar FOB prices over the period from 1996 to 2000, but this has to be seen against the background of the devaluation of the Brazilian *real* and the maturing process of the mouldings industry. During the year 2000, the average export price obtained for hardwood mouldings dropped below US\$ 1,000/ton for the first time.

Table 19 Brazil: comparison of average export prices of further processed wood products, 1996-2000

Product	Average export price (FOB US\$/ton)				
	1996	1997	1998	1999	2000/1-5
Softwood mouldings	793	880	643	557	570
Hardwood mouldings	1,713	1,770	1,533	1,156	961
Wooden windows and frames	1,746	1,720	1,665	1,548	993
Wooden doors and frames	1,324	1,322	1,258	1,234	1,174
Parquet panels	956	1,016	1,099	1,112	1,177

Source: SECEX/DECEX.

Price levels have been more successfully maintained for wooden door and parquet panel exports. Parquet panel prices have even been rising steadily over the years. Window prices apparently suffered a blow in the year 2000, but the five-month data on which this is based has to be treated as indicative only.

Bolivia is the first country in Latin America to have its own Forest Stewardship Council (FSC) standards. It has 660,000 hectares of certified forest and six companies supplying FSC timber. As a direct result, Bolivia has won new export markets and new customers (e.g. the large United Kingdom-based retail chain B&Q, which now sells Bolivian garden furniture). The timber industry in Bolivia is currently being restructured, and the government has moved from a system of charging a royalty on production volumes to one of a fixed annual rent. Consequently, more than half of the 128 logging companies have given up their concessions and the majority of those that remain have a long-term commitment to FSC aims. The total area of certified forest could rise to 5 million hectares (ha), or 10% of total forest resources in the country.

The prices obtained for Bolivian exports of FSC-certified products have shown a mixed pattern. In 1999, FSC-certified benches, chairs and sawnwood all obtained prices below the average for these product categories. The price differentials were -13%, -18% and -14% in the order of the products listed above. Above average prices were obtained for tables (+9%) and parquet (+45%). Differences may reflect unusual species compositions, with the lesser-used species perhaps being sold as certified products.

Industry structure and location

Overview

The wood industry in the Latin America-Caribbean region has reached a level somewhere between the rapidly expanding and technically innovative processing industries of Asia, and the under-developed wood industry sector of Africa. The furniture industry is the most important sub-sector, as almost all the ITTO producer countries are making efforts to produce furniture for exports, but in this region it is so far only Brazil that has achieved success. The main stumbling blocks for exports have been the lack of appropriate designs and product development and, to a lesser extent, the absence of industry-specific training programmes and institutions.

The majority of the furniture is still being produced by labour-intensive methods in small carpentry workshops, serving mainly the informal domestic markets.

Country notes

Brazil has without doubt the leading further processing base among Latin American ITTO producers. Its industry is mainly located in the central and southern regions of the country. There are about 13,500 furniture factories or workshops in the country distributed mainly between, and according to the size of, the 10 leading *polo moveleiros* (furniture centres) (table 20).

The total turnover of the furniture industry was estimated at US\$ 6.1 billion in 1998, of which wooden furniture accounted for around 80%. Chipboard, plywood and pine solid woods are the main raw materials for the furniture industry.

Around 10,000 of the existing furniture makers are very small workshops (micro-enterprises), employing between 10 and 20 workers. Around 3,000 are classified as small (20-150 workers) and only 500 as medium-sized companies (more than 150 workers). The majority of the furniture companies operate as separate units without any vertical integration with other processing facilities.

Table 20 Brazil: major furniture production centres, 1997

Furniture centre	State	No. of companies	Employees
Uba	Minas Gerais	153	3,150
Bom Despacho/Martinho Campos	Minas Gerais	117	2,000
Linhares/Colatina	Espirito Santo	130	3,000
Arapongas	Paraná	145	5,500
Votuporanga	São Paulo	350	7,000
Mirassol/Jaci/Balsamo/Neves Paulista	São Paulo	80	3,000
Tupa	São Paulo	54	700
São Bento do Sul/Rio Negrinho	Santa Catarina	210	8,500
Bento Concalves	Rio Grande do Sul	130	7,500
Lagoa Vermelha	Rio Grande do Sul	60	1,800

Source: BNDES Setorial, 1998.

The industry has been primarily located near the main cities, and secondarily near the plantations of uniform-quality pine, which used to be abundantly available until a decade ago. Now the pine resources are being exhausted and the industry will have to seek alternative species, among which eucalyptus has been the subject of intensive research. Attempts have also been made to expand further processing of tropical hardwoods in the Amazon region, but most tropical wood continues to be processed by factories in the south.

The **mouldings** industry in Brazil consists mainly of small companies exporting around 5 to 15 containers per month. There are very few larger units exporting more, but there exists at least one big producer exporting 60 containers per month. Producers are mainly located in the vicinity of forest plantations.

In wooden **flooring**, Brazil features a wide range of products and industries, but only about 20 companies form the backbone of this sub-sector. The production of solid wood flooring, comprising mosaic and stave parquet, as well as solid wood tongued and grooved plank flooring, is dominated by eight operators, which are located in the States of Paraná, Santa Catarina and São Paulo in the south. Laminated flooring production, which is based on MDF or chipboard, has grown from nothing to become the mainstay of the flooring business, and there are around 12 major entities. Among these are the big three MDF producers Eucatex, Duratex and Tafisa. Their entry into value-added processing is an example of a vertically integrated approach that has worked, but the approach has very rarely been successfully implemented elsewhere in the tropical wood industry.

In **Ecuador**, there are about 694 furniture factories and 922 other wood processing mills (mainly parquet, construction and joinery, pallets, and mouldings). During the fieldwork mission carried out in Ecuador, interviews were carried out with 14 enterprises among AIMA (*Asociación Ecuatoriana de Industriales de la Madera*) members, representing the larger-scale value-added manufacturers in the country. Based on information collected by AIMA on 59 member companies, a case study on the structure of the industry is presented, in the original questionnaire format, in appendix IV of this report.

In **Honduras**, there are an estimated 235 further processors of wood, and for 150 of these companies furniture is the main product. They are located mainly

in the central and Atlantic regions of the country (Francisco Morazan, Cortes) with the largest processing centre at San Pedro Sula. Most of the remaining hardwood forests are in the east of the country. The processing is divided clearly between the specialist work of mahogany hand-carved chairs and millwork on the one hand, and commodity pine furniture (seven pine species) on the other. Mahogany provides high-value niche markets for further processed products but, in the case of Honduras, a few foreign companies are the ones collecting the benefits from selling the products on into captive markets (e.g. Wellington-Hall, International Mahogany Millwork). European manufacturers of automotive interiors are showing a keen interest in establishing plants in Honduras. Mahogany is still in vogue for dashboards, consoles and door components, and it represents one of the highest-value wood products in international markets.

The main concentration of further processing in **Bolivia** is in the Department of Santa Cruz (the eastern part of the country). More than 46% of the forest production is on Santa Cruz, followed by Beni (21%), Cochabamba (15%) and Pando (8%).

In **Peru**, there are about 50 parquet factories and an undisclosed number of joinery and carpentry manufacturers. Around 40 of them are considered to have reached a technology level and size at which they can export competitively. Most of the factories of any size are located in and around Lima, the capital.

Labour issues

The **Brazilian** furniture industry directly employs 300,000 workers and as many as 1.2 million indirectly. Generally, there is a lack of qualified staff, but the situation is being improved by schemes introduced by central service organizations such as ABIMOVEL (*Associação Brasileira das Indústrias do Mobiliário*) for example, and by the regional furniture associations in key production centres.

In **Bolivia**, the forestry sector employs altogether around 50,000 workers, but only a minority of them (8,300) are directly employed in manufacturing. The majority of the workforce is in commerce and harvesting.

In **Honduras**, further processing of wood provides work for 10,000 people, primary processing employs 14,000 and artisanal workshops 30,000. Altogether, approximately 110,000 Hondurans work in the forestry sector – around 3-4% of the country's total workforce.

Research fieldwork carried out in Honduras indicated that the skill base is divided. In furniture making, all the companies that were interviewed reported a low skill level (less than 25% skilled or semi-skilled). In the manufacturing of doors and windows, the International Mahogany Millwork company reported that more than 50% of their employees were skilled or semi-skilled. The higher degree of automation in joinery requires skilled machine operators, unlike the manual carving and assembly of furniture.

Competitiveness

Indications of cost structures in **Ecuador's** further processing industries are given in table 21. They are based on individual company examples and should not necessarily be considered as being typical of the entire sector. In furniture industries in Ecuador, the average monthly salary is around US\$ 110. In the flooring industry, which runs more advanced production lines, wages play only a minor role in the full cost structure. The wood itself still constitutes the biggest cost factor of all.

Table 21**Ecuador: cost structures in further processing industries
(% of total)**

Product	Wood	Labour	Capital	Energy	Glue	Finishes	Transport
Doors	55	30	12	2	1	–	–
Flooring	57	10	14	4	–	10	5
Furniture	40	30	10	2	–	15	3

Source: Fieldwork.

When comparing sales by numbers of workers across the furniture companies in Ecuador, it was observed that the average annual output, or sales, per worker ranged from US\$ 5,000 to US\$ 17,500; huge variations between companies.

A distinct problem for the Latin American ITTO producers is the persistently high cost of investment capital. Domestic lending rates in the region in 1999 were among the highest of all the ITTO countries – Ecuador (64% per annum), Bolivia (35% p.a.), Venezuela (32% p.a.), Peru (31% p.a.) and Honduras and Colombia (30% p.a. each). In the leading economy, Brazil, the rates were only slightly lower at 26% per annum (IMF, *International Financial Statistics*, 2000).

In many countries, the cost of transportation makes it extremely difficult for the further processors to be competitive. The problems are caused not only by the poor quality of the transport infrastructures and outdated truck fleets, but also by the high cost of fuel. The effects are felt on both sides: in the transportation of incoming raw materials and semi-processed products and in the delivery of finished products. For example, in Peru, the in-land transportation of raw materials to the factories around Lima from the forest regions in the country accounts for 30-40% of the price at origin.

In Bolivia, the heavy tax on diesel means that fuel costs considerably more than, for example, fuel in Brazil, which directly affects the competitiveness between the two countries in the exporting of forest products. In fact, various government taxes account for more than 50% of the diesel price in Bolivia. The real comparative figures are the following:

- One litre of diesel costs US\$ 0.50 in Bolivia, compared with US\$ 0.32 in Brazil;
- Truck transportation of forest products in Bolivia costs US\$ 156 per ton per 2,000 kilometres, yet only US\$ 46 per ton for the same distance in Brazil;
- Hiring a 40-ton truck for a 2,000 km journey costs US\$ 6,420 in Bolivia and only US\$ 1,840 in Brazil.

Governments have often resorted to collecting remunerative taxes on fuels despite the unfavourable consequences for industries. Punishing environmental taxes, which are commonly collected in industrialized countries, have not yet finally arrived in tropical producer countries. The over-taxation of fuels and other imported inputs poses a real threat to competitiveness, and yet it may also be in total contradiction to other economic policies of a country's government. This calls for a consistent and balanced national economic policy as one of the preconditions for an industry's development.

Research and training

In **Brazil**, a fully integrated programme towards export development of furniture has been mobilized under the auspices of ABIMOVEL. This inter-agency programme is called PROMOVEL and it brings together the following government bodies:

- MDIC (*Ministério do Desenvolvimento, Indústria e Comércio Exterior*), responsible for government incentives and subsidies available under the programme.
- FINEP (*Financiadora de Estudos e Projetos*), information made available on lines of finance, necessary documentation and guarantees, etc.
- MRE (*Ministério das Relações Exteriores*), export logistics, fairs, export manuals, industry data banks, etc.
- CNPq (*Conselho Nacional de Pesquisa e Desenvolvimento*), guidance and training for technicians and students in furniture design.
- APEX (*Agencia de Promoção de Exportações*), responsible for financing and monitoring the execution of the PROMOVEL programme.

To date, over 500 exporting furniture manufacturers have taken part in the activities of the programme. PROMOVEL has identified 16 projects that will form the basis of the future work:

- ISO 9000
- ISO 14000
- Green Seal (environmental labelling)
- Technical norms for furniture manufacturing
- Quality and productivity
- Acquisition of foreign know-how
- Industry missions
- International market studies
- International marketing
- Formation of export consortiums
- International furniture exhibitions
- Development of furniture design
- Advanced business negotiation skills
- General capacity building
- Prospecting the United States furniture market
- Adaptation of factories

In a series of international market studies, the pilot report on the United States furniture markets has been prepared. The next will cover the United Kingdom markets.

In terms of the technical inspection and testing of various wood species, the work of IPT (*Instituto de Pesquisas Technológicas do Estado de São Paulo*) to ascertain their value-added potential is worthy of mention. It has a forest products division in São Paulo, which runs a laboratory on wood anatomy and identification of technical qualities.

In **Ecuador**, the following organizations are providing the further processing industries with technical and promotional support, and specific training programmes:

- CORPEI (*Corporación de Promoción de Exportaciones e Inversiones*);
- CORMADERA (*Corporación de Desarrollo Forestal y Maderero del Ecuador*);

- AIMA (*Asociación Ecuatoriana de Industriales de la Madera*);
- SECAP (*Servicio de la Cámara de Capacitación Profesional*);
- Escuela de la Madera;
- Sector Maderero de la Cámara de la Pequeña Industria;
- Universidad Técnica del Norte;
- Universidad Tecnológica Equinoccial.

Policy issues

The development policy of the **Bolivian** government recognizes forestry as a priority sector in the national economy. The new Forestry Law aims to achieve sustainable management of the natural forest (Amazonian Forest). No special action is being taken to promote manmade forests. And yet, no forest management plan is required for wood from plantations. While this exemption from regulated management plans could serve as an incentive, it may also have an adverse impact on the productivity of plantations.

Since becoming operational in 1996 a new Forestry Legislation Framework called Law N°1700 provides the necessary legal basis for facilitating the sustainable utilization of the forest production potential. The key points in the forestry legislation are:

- 40-year forest concessions to be renewed every five years and subject to external technical audits.
- Payment of forest fees for the total forest concession area on government lands (currently US\$ 1 per hectare per year).
- Payment of a maximum of 5% of payable forest fees in private forest, as a forest management incentive to forest owners.
- Establishment of biodiversity conservation and municipal reserves and incentives to facilitate the participation of local stakeholders in the management of these reserves.
- Wider participation by the civil society and greater transparency in the sector.
- Establishment of a forestry commission with no political orientation, independent from the Executive, and with its own separate budget.

In other Latin American countries too (for example, Ecuador, Honduras and Brazil) forest legislation is undergoing changes. The old Forestry Code Law of **Brazil** dates back to 1965 and is being revised. The new version of the law brings about clearer stipulations in the area of 'legal forest reserves'. In the Amazon region, for example, 80% of the land of rural properties containing forest or other natural vegetation must remain as forest reserves. Outside the Amazon region, 20% of this type of land must be reserved under similar conditions. This does not mean, however, that this land is permanently set aside from utilization. IBAMA (Brazilian Institute for Environment and Renewable Natural Resources) can approve forest management plans for the reserved areas and grant rights for their sustainable use for forestry.

Brazil is also adopting a new national forestry programme, whereby plantation forests are expanded, surveillance and planning in natural forests is improved, and forest-related education, science and technology agendas are upgraded. The modernization of the industries and the promotion of wood products will also receive attention.

In **Peru**, the new Forestry Law was signed on 15 July 2000 and the export ban on mahogany and cedar sawnwood was maintained. Manufactured products

and components may still be exported, and with this stipulation it is hoped to attract inward investment to the wood enterprises sector, perhaps in the form of equipment for value-added processing.

Africa

Resource situation

Overview

The nine African ITTO producing countries account for 15% of the world's tropical forest area and 86% of the total forest area of western and central Africa. They vary considerably in size. For example, the Democratic Republic of the Congo alone has as much forest as all the other African ITTO members put together, while Togo has only 0.5% of the total (table 22).

Despite the fact that the African forest (with a few exceptions such as Gabon) contains a wide variety of species, the development of forest activities has been, and still is, based on a limited number of 'commercial' species (sipo, sapele, African mahoganies, obeche, okoume, iroko and azobé, to name a few). This places serious restrictions on the volume harvested per hectare. It is conceivable, however, that the further processing manufacturers could use a wider range of species in the future, and thus ease the problem.

Table 22 Resource status in producing countries in Africa			
Country	Forest area (thousand ha)	Potential wood fibre supply 2010 compared to 1996 potential	
Côte d'Ivoire	Natural: 5,403 Plantations: 66	Slight decline	
Ghana	Natural: 8,969 Plantations: 14	Slight decline	
Cameroon	Natural: 19,582 Plantations: 23	Increase	
Dem. Rep. of the Congo	Natural: 109,203 Plantations: 42	Clear increase	
Congo	Natural: 19,500 Plantations: 37	Clear increase	
Togo	Natural: 1,245 Plantations: 6	Unclear	
Gabon	Natural: 17,838 Plantations: 21	Slight increase	
Central African Republic	Natural: 29,924 Plantations: 6	Slight increase	
Liberia	Natural: 4,500 Plantations: 6	Slight decline	

Sources: FAO: Global Fibre Supply Study 1998, SOFO 1999.

It is evident that the relatively small amount of production of logs by the Democratic Republic of the Congo is not in proportion to its present forest cover. It is also worth noting that African log production went through a period of stagnation from 1993-1997. However, the arrival of South-East Asian buyers for West African timber in 1998-1999 rapidly increased logging and exports (e.g. in Gabon). Four countries – Gabon, Cameroon, Côte d'Ivoire and Ghana – represent 80% of the total production of logs by the African ITTO producing countries.

Within the African ITTO community, there appears to be a geographical shift towards procuring primary products (logs, rough sawnwood) from the Congo basin (Central African Republic, Congo, Gabon and Democratic Republic of the Congo).

Compared with other continents, industrial wood plantations in Africa have been developed at a much slower pace, and still make only a minor contribution to total forest resources. Local legislation perhaps does not provide a strong enough guarantee to investors. The quality of the plantation management and the expected yields both appear to be low in many of the countries.

This slowness in creating and managing plantations is a major concern when looking at the future of African forest industries, which are now exploiting a diminishing natural forest base. All the wood processors interviewed during the fieldwork for this report expressed their concerns about the supply of logs in the medium and long term, even if they had already secured direct access to the forest through concession rights. Furthermore, the lack of performance of domestic markets for sawnwood and panels is holding back the establishment of self-supporting further processing units.

A wider acceptance of the lesser-used species (LUS) could help to at least delay the inevitable raw material supply crisis. Because of the wide variety of species found in most African forests and the impoverishment of the remaining mature forest, the lesser-used species are accounting every year for a greater percentage of the allowable harvest.

While the international tropical timber trade tends to concentrate on a limited number of well-known species, in the marketing of manufactured products there are other elements, such as technical specifications and aesthetic appearance, that come into play, and which are not necessarily species related. A well-known species may bring a 'plus' to a product, but it may not be a *sine qua non* for further processed products.

For Africa in particular, it has to be concluded that future expansion of the further processing and related trades cannot come from increased logging alone. It has to be derived from adding value to the gradually diminishing volumes harvested from natural forests, which are more and more coming under sustainable management. Further processing might create opportunities for new applications of the lesser-used species. However, for these to be fully exploited, there would need to be significant shifts in market acceptance and established trade flows, neither of which appears likely without a concerted effort by the industry.

Country notes

The potential for growth in production of forest resources varies among the ITTO African countries. **Côte d'Ivoire**, **Cameroon** and **Ghana** cannot expect any increases in their roundwood production, and the sustainability of the present harvest in these countries is at best doubtful. In Côte d'Ivoire, the coup d'état has resulted in a slowdown of reforestation efforts. Domestic supply of logs has been stagnant and imported wood is arriving from Liberia and Guinea.

In **Ghana**, the government has realized the problem and is focusing on stricter concession rules and plantation wood supply development. It has raised initial capital of US\$ 7.5 million to set up a Forest Plantation Development Fund. The fund has been stocked by export levies collected on air-dried lumber. It will provide financial assistance in the form of grants, subsidies and loans to growers who participate in approved schemes for commercial roundwood production. It is hoped that the fund will provide a fast-track lending system to growers (both national and foreign), releasing them from having to apply for less attractive bank loans.

Togo has embarked on developing a gradually expanding plantation base of teak. This could be a step towards establishing a market niche for further processing at a later stage. The current areas planted (6,000 ha) are far from sufficient to compensate for the alarming rate of deforestation (30,000 ha per year) in the country. It is also uncertain whether recently arrived investors from the United Arab Emirates, for example, could be persuaded to support processing capacities in Togo in preference to buying unprocessed logs when they mature.

As far as resources are concerned, **Liberia**, **Gabon**, the **Congo** and the **Democratic Republic of the Congo** have greater margins but, like every other African producing country, they have still to face the challenge of sustainability. Short-term concessions, often too small, add to the problem and threaten the biodiversity and the quality of forests. Political instability is another common cause of supply disruption and unpredictability.

Exports of further processed wood products

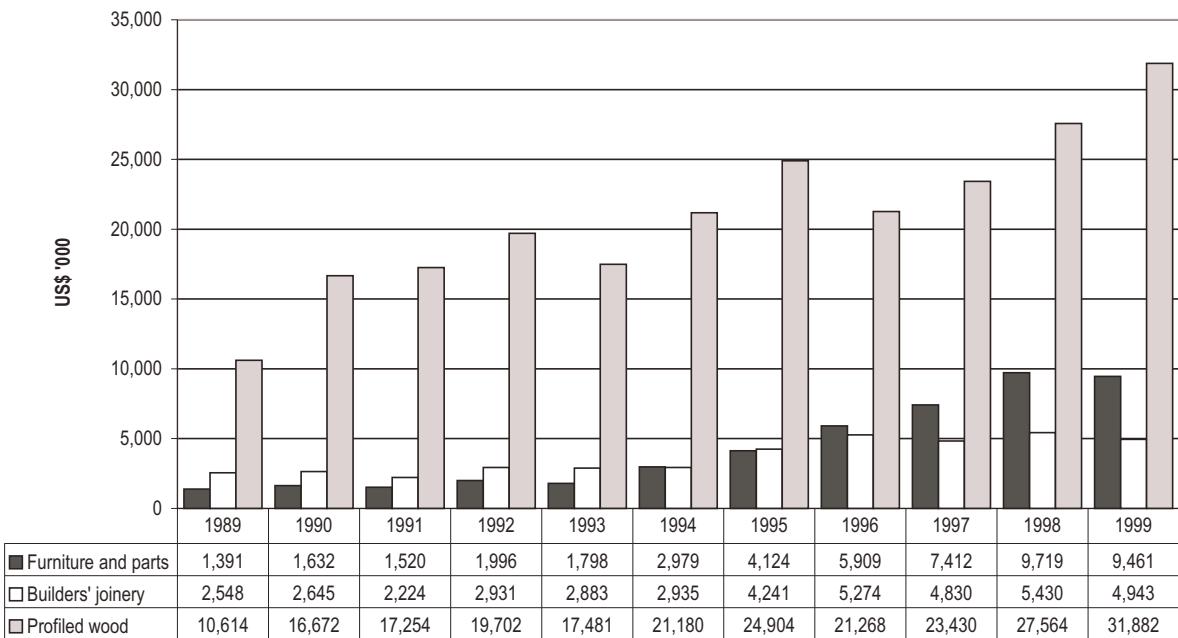
Overview

Altogether, the African ITTO producers exported US\$ 42.7 million of further processed products in 1998. Export trends by the main product categories over the period 1989-1998 are presented in figure 13 and appendix II. Exports almost tripled during this period, from US\$ 14.5 million in 1989. The average annual growth rate was 12.7% in the period 1989-1998. No export slowdown was experienced in 1997/98, but the growth trend was interrupted by fluctuations in exports of profiled wood, first in 1992/93 and again in 1995/96. In 1999, total exports showed a growth of 8% over 1998, reaching US\$ 46.3 million.

Structure of exports

Profiled wood is the main further processed product exported by the Africa region, accounting for 64% of the total (table 23). It is the first step in processing, and the first component of more elaborate goods. The heading 'profiled wood' covers a variety of products, ranging from sauna boards to furniture mouldings. Nearly all of them have to be kiln-dried, with the exception of garden and terrace materials. A point worth noting from table 23 is the emerging importance of exports of furniture during the decade 1989 to 1998. Furniture exports grew in both relative and absolute terms, from a modest 10% to a visible 23% share of all exports. The total value of furniture exports increased from US\$ 1.4 million in 1989 to US\$ 9.5 million in 1998. Most of this growth took place in the two years 1997 to 1998 and much of it is based on garden furniture aimed at the outdoor (teak) furniture market. The main species used is iroko and the main supplier is Ghana. Builders' joinery has lost ground in recent years in the overall African export picture.

Figure 13 Trends in the export structure of further processed wood products in the ITTO producer countries in Africa, 1989-1999



Sources: COMTRADE (UNSD), COMEXT (EU).

Table 23 Export structure of further processed products in the ITTO producer countries in Africa

Category of products	1998		1989
	Total export value (US\$ million)	Share of total (%)	Share of total (%)
Wooden furniture and parts	9.7	22.8	9.6
Builders' joinery	5.4	12.7	17.5
Profiled wood (incl. mouldings)	27.6	64.5	72.9
TOTAL	42.7	100.0	100.0

Sources: COMTRADE (UNSD), COMEXT (EU).

There are considerable variations between countries in the composition of their exports (table 24). Among the top four exporters, for example, Ghana stands out as more furniture-oriented than Côte d'Ivoire, Cameroon and the Democratic Republic of the Congo, whose exports are dominated by profiled wood.

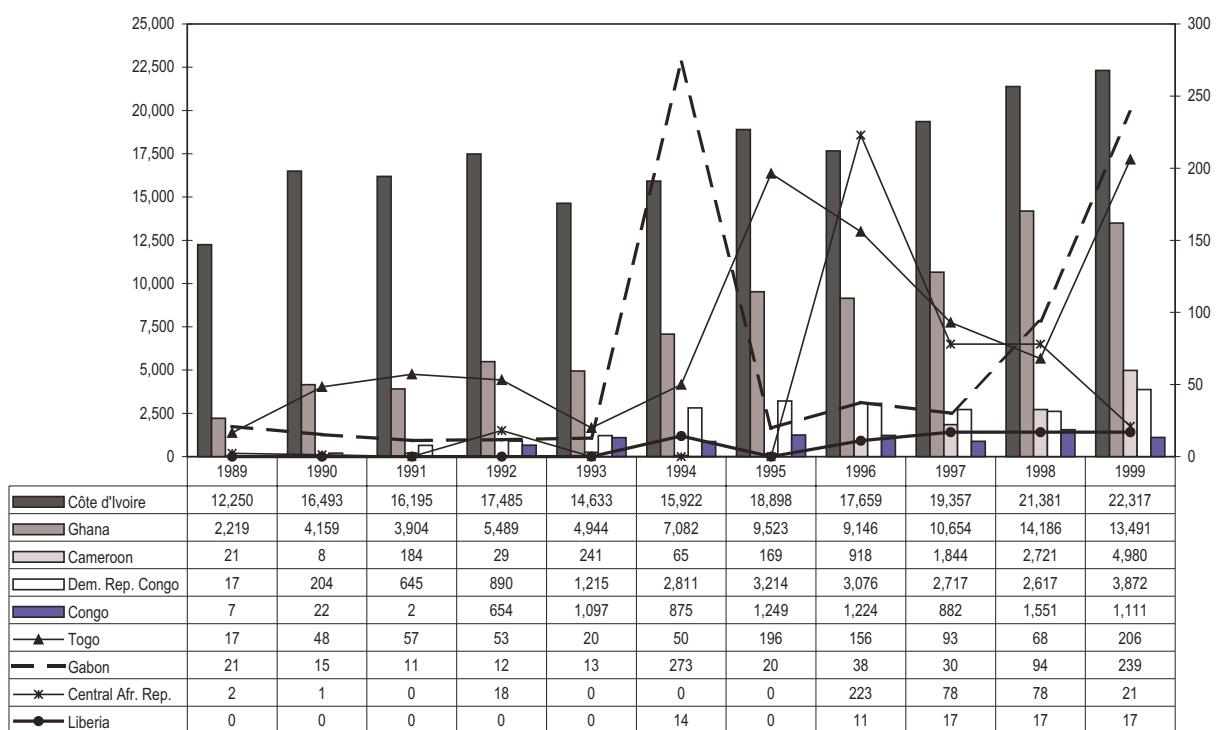
Table 24 Export structure of further processed products by ITTO producers in Africa, 1998

Countries	Total export value (US\$ million)	Wooden furniture and parts (%)	Builders' joinery (%)	Profiled wood (incl. mouldings) (%)
Côte d'Ivoire	21.4	3.1	17.7	79.2
Ghana	14.2	61.4	3.6	35.0
Cameroon	2.7	5.7	9.6	84.7
Dem. Rep. of the Congo	2.6	0.8	1.5	97.7
Congo	1.6	1.1	53.4	45.5
Togo	0.068	73.5	19.1	7.4
Gabon	0.094	28.7	1.1	70.2
Central African Republic	0.078	59.0	0.0	41.0
Liberia	0.017	100.0	0.0	0.0
TOTAL	42.7	22.8	12.7	64.5

Sources: COMTRADE (UNSD), COMEXT (EU).

Exports by countries

Two countries, Côte d'Ivoire and Ghana, because they were the earliest to start manufacturing and exporting further processed products, accounted for 83% of total African exports in 1998 (figure 14). Cameroon, with its log export ban recently having become effective, is set to expand its further processed product

Figure 14 Exports of further processed wood products by ITTO producer countries in Africa, 1989-1999 (in thousands of United States dollars)

Sources: COMTRADE (UNSD), COMEXT (EU).

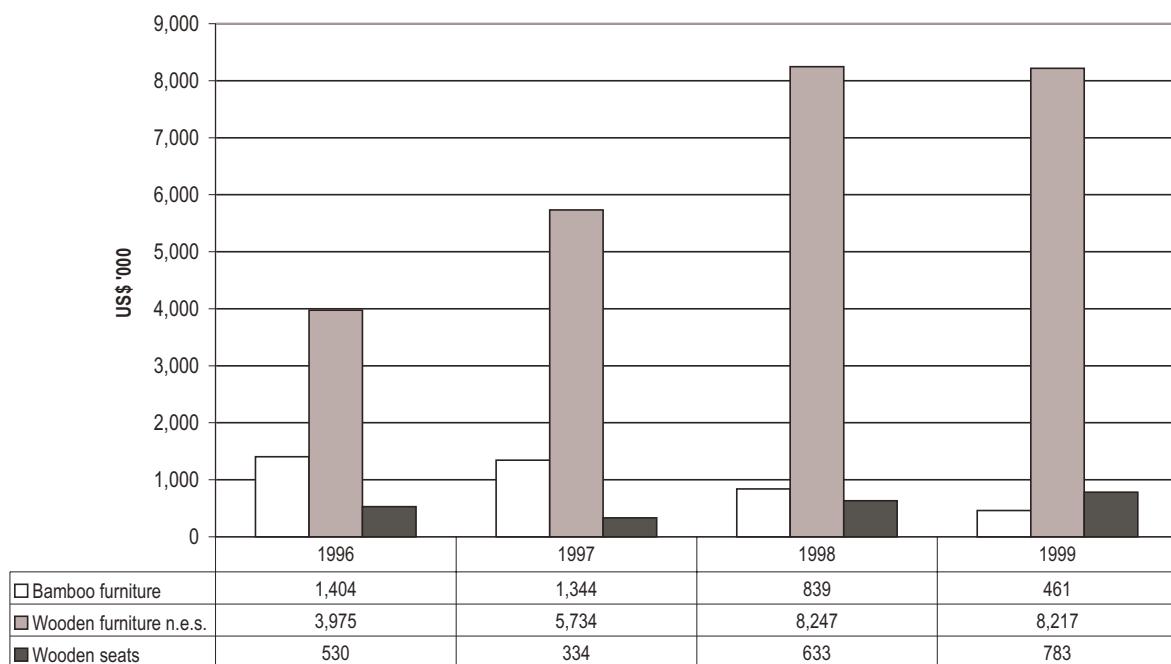
exports. The immediate impact of the ban has already been felt in Cameroon's growing exports of sawnwood to France, which rose by 33% between January 1999 and January 2000 (*Marchés Tropicaux*, May 2000).

Export trends by individual products

Product details were not available for builders' joinery, but it can probably be assumed that parquet and doors account for the bulk of the items. In furniture exports, the dominant product category was 'other' miscellaneous furniture, which includes garden and outdoor furniture. Seats and parts of seats and bamboo furniture were the other exported categories, but they represented a small share of the total (figure 15).

Finished interior furniture (kitchen, bedroom, office or similar) has not been reported in export statistics. It would appear, therefore, that this level of manufacturing sophistication remains with few exceptions beyond the reach of African furniture industries for the time being.

Figure 15 Exports of wooden furniture by type from ITTO producer countries in Africa, 1996-1999



Sources: COMTRADE (UNSD), COMEXT (EU).

Major markets

Export outlets

For western and central Africa, the main export market for tropical timber products traditionally has been Europe, and it remains so, although new outlets have been opened in the direction of Asia in the last few years. In 1998, Africa supplied 99% of the tropical logs and 53% of the tropical sawnwood

imported into Europe. In further processed products, African supplies are insignificant. Europe is, however, the only potentially viable market for further processed products from African producer countries in the future.

Italy and the United Kingdom absorbed most of the African ITTO producers' small amount of further processed products exported in 1998 (table 25). France was their biggest market for builders' joinery.

Table 25 **Exports of further processed products by destinations from African ITTO producers, 1998**
(in thousands of United States dollars)

Countries	Wooden furniture and parts	Builders' joinery	Profiled wood (incl. mouldings)	TOTAL	Share (%)
Italy	24	1,900	19,474	21,398	50.0
United Kingdom	7,700	251	1,061	9,012	21.1
France	142	2,108	491	2,741	6.4
Finland	–	56	1,707	1,763	4.1
Spain	78	34	1,385	1,497	3.5
Germany	216	227	970	1,413	3.3
Portugal	6	296	884	1,186	2.8
Others	1,567	611	1,608	3,786	8.8
TOTAL	9,733	5,483	27,580	42,796	100.0
Share (%)	22.8	12.8	64.4	100.0	

Sources: COMTRADE (UNSD), COMEXT (EU).

One point was clearly made by many of the interviewees in the research: mastering the distribution channels is essential to the success of any further processing project aimed at exports. In the particular field of further processed wood products, there is no direct, simple access to marketing facilities. Distribution channels vary according to the type of product, species and specifications. This means that a partnership with an experienced foreign company, which already has access to the distribution channels, is often required.

Domestic and regional markets

The domestic markets in African countries are somewhat unevenly spread. They are reasonably large in the west African capitals and other major urban centres, but almost negligible, for example, in Gabon.

Little analysis has been carried out on the quantity and quality of the domestic, mainly urban, markets for primary and further processed products. Lower-grade output is normally sold to the domestic or neighbouring markets at very low prices. Despite the low price levels, these markets are important to the sawmills because they compete with the 'informal' network of independent small suppliers. Integrated further processing could enhance the value of this material and produce higher margins in export currencies.

The domestic and regional markets are indispensable secondary outlets for the primary processing stage and may assume the same role for further processing in a second phase. Unfortunately, most domestic markets are not able to absorb further processed products made to international commercial standards, mainly for price reasons. Consequently, the domestic markets cannot provide the much-needed training ground for 'would be' further processors.

Imports of further processed wood products

Imports of builders' joinery and mouldings are insignificant in African ITTO producer countries (table 26). The situation for furniture is totally different, however, and all nine ITTO countries are net importers. The combined value of their imports in 1998 amounted to US\$ 16.5 million, compared to a value of US\$ 9.7 million for their exports. Primarily, it is demand for furniture by the wealthy urban elite that supports these imports.

Table 26 Imports of further processed products by African ITTO producers, 1998
(in thousands of United States dollars)

Countries	Wooden furniture and parts	Builders' joinery	Profiled wood (incl. mouldings)	TOTAL	Share (%)
Gabon	5,728	255	77	6,060	35.4
Côte d'Ivoire	4,928	119	39	5,086	29.7
Congo	3,012	–	–	3,012	17.5
Cameroon	2,806	59	–	2,865	16.7
Central African Republic	114	–	–	114	0.7
TOTAL	16,588	433	116	17,137	100.0
Share (%)	96.8	2.5	0.7	100.0	

Source: COMTRADE (UNSD).

Net trade

Only a partially effective analysis of net trade for Africa was accomplished for this report. The total figure presented in table 27 overestimates the positive trade balance, because recent import data were not available for Ghana, the Democratic Republic of the Congo, Togo and Liberia. Among these, Ghana is the biggest African exporter of furniture, with US\$ 14.2 million export sales in 1998, but the lack of its import figures distorts the net trade estimate for African producers.

Table 27 Net trade on further processed products in African ITTO producers, 1998
(in millions of United States dollars)

Countries	All further processed products
	Net trade (exports minus imports)
Côte d'Ivoire	16.3
Ghana*	14.2
Cameroon	-0.1
Dem. Republic of the Congo*	2.6
Congo	-1.5
Togo*	0.07
Gabon	-6.0
Central African Republic	-0.04
Liberia*	0.02
TOTAL	25.6

Sources: COMTRADE (UNSD), COMEXT (EU). *No recent import figures available.

Note: Minus denotes net imports, all figures rounded, and may not add up to totals.

Price information

The growing constraints of a diminishing resource, the potential for employment creation and the desire to develop local management expertise, combined with the prospect of adding value and revenue to exports, are all strong points in favour of further processing. The price differential between primary and further processed products is perhaps one of the most convincing arguments (table 28).

Table 28 Comparison of average export prices of Ghana's wood products, 2000

Product	Price (US\$/m ³)	Product	Price (US\$/m ³)
Lumber (domestic market, green)	102	Mouldings	429
Boules (air-dried)	239	Broomsticks	485
Boules (kiln-dried)	243	Dowels	522
Rotary veneer	275	Profile boards	628
Plywood	324	Poles	789
Lumber (export grade, air-dried)	340	Flooring	893
Lumber (export grade, kiln-dried)	352	Slice veneers	920
		Curls in block	1,231
		Lay-on	1,361
		Furniture parts	2,940

Source: Woodworking Sector Development Programme, Takoradi (2000).

See also the case study on the development of further processing in Ghana and Côte d'Ivoire in appendix V.

French-speaking African exporters who are pricing their products in CFA (and through the French franc are linked to the Euro), have recently benefited from the strong United States dollar. This has created a slight competitive edge against dollar-priced export products, for example, from Asia. However, as is often the case with currency fluctuations, the benefits may be short-lived.

To quote some specific price examples from July 2000, in Gabon, bilinga anti-slip profiles were priced at US\$ 553/m³ for export. Glue-laminated window stock of okoume fetched US\$ 857/m³. In Côte d'Ivoire, iroko parquet (10x30x600 mm) was sold at US\$ 5.3/m² ex-factory. Samba sauna boards were priced at US\$ 610-660/m³ for export.

Industry structure

Overview

Further processing currently represents a very minor share of the African industry, but its development is under way. While it is a logical approach to sustainable development and brings with it the solution to many problems, establishing further processing is not an easy task for under-capitalized companies without modern equipment or qualified staff. It requires a series of combined action, which is difficult to put together in western and central Africa.

Most industry contacts have indicated that outsourcing of substantial quantities of sawnwood on a regular basis to feed a remanufacturing plant does

not appear to be a realistic option for developing further processing in Africa. The structures of the domestic markets are very informal and do not offer a base on which a plant could rely. For various reasons, the sawmillers prefer to export as much as they can, rather than to sell locally. Sooner or later, the largest units will add a secondary processing line to their sawmills.

For both technical and economic reasons, the advantages of remanufacturing sawnwood are optimized only when carried out as an integral part of the production flow of the sawmill. This results in more flexibility, savings on transportation, and immediate interaction between the primary and secondary lines. In this context, it would be very risky today to start a separate, independent re-manufacturing plant in western Africa without the firm assurance of primary product supply.

Country notes

In contrast to the general picture, in **Côte d'Ivoire** most of the major companies engaged in further processing are integrated, or at least several items are produced in their mills (table 29). The most common and 'logical' forms of integration are those combining the production of flooring or moulding with sawmilling, because of the compatibility of the machinery that produces the flooring strip and the moulding or picture frame. Short dimension and finger-jointed items can effectively use sawmill off-cuts, thus improving total yield and profits. Ten firms in Côte d'Ivoire indicated that they each produce more than five different products.

Abidjan and San Pedro are the two central locations for wood processing enterprises in the country. The leading industries are grouped under the *Syndicat des Producteurs Industriels du Bois* (SPIB).

Many African sawmillers started out as foresters and have later built a sawmill to keep their logging rights. This first step was not an easy one and it is only several years later that they find the yield ratios slowly improving. For the majority, the next step towards further processing is kiln drying. Kiln-drying technology now seems to have been well mastered in the better mills, even if degrade ratios could be improved. As observed during the fieldwork, most African processors are adopting a step-by-step approach, whereby they begin to move downstream with the production of kiln-dried blanks, flooring strips or 'dimension', then later further progress with mouldings, finger-jointing and edge-gluing. This progressive approach requires not only a substantial amount of technical adjustment at the mills, but also, in Africa, considerable retraining of the commercial and administrative services to keep them up to date with the technical evolution.

There are, nevertheless, many successful examples of quicker entries into the further processing industry, but they are all based on the short-cut method of a huge importation of know-how – through expatriate staff – from foreign companies. They bring with them not only technical experience, but also their distribution channels for use by their African subsidiaries.

For example, in **Cameroon**, several of the leading further processors are in fact foreign subsidiaries. Some of the most notable wood processing companies in Cameroon are Pallisco, Patrice Bois, IBC, Equibat, SEFN, TIB, Wijma, Sefac and SFID. Most of them are located in the capital Douala, where the producers' association *Groupement de la Filière du Bois au Cameroun* (GFBC) is also based. Much of the new capacity in sawmilling has been established at a distance from the forests, contrary to what the government has proposed in its strategy towards vertical integration. Italian-owned mills, in particular, have sprung up around Douala, Yaounde and Ede.

Table 29 Côte d'Ivoire: list of major producers, by type of product			
Companies	Products	Companies	Products
AFRICAN INDUSTRIES	V, Pan	NSD	Sm,Pal
AFRICAN WOOD J. CI	Sm, M	NSM	Sm,Fl,Pal
ALPI CI	V	NSMD	Sm,Fl,C
AZUR	J,Fl,D,M,F	NSS	Sm,Fl,M,T,R,D,F,Pal,C
BATI WOOD	J,Fl,M,D,F	PGI	Sm,V,Fl
BTA	V, Pan	SBG	Sm,V,Pan,Pal
CIB	Sm,V,Pan,F,D,	SCAF	Sm,Pa,N,D
CSTBI	Sm,Gl,M,D,F,J	SC. DE BONDOKOU	Sm,Fl
DDCI	Sm,M,R	SDMB	Sm,Fl
ESDI	Sm,V,Pan,D,Pal	S.FR	Sm,Pal,C
Ets BARA SARL	Sm,Fl,T,F,C	S.21 B	Sm,Fl,C
FIBOIS	Sm,F,M,R,D,J	SIBD	Sm,Fl,M,R,Sm
GIB	Sm,V,M,T,R,F	SI DI NE	Sm
GIB N'DOUCI	Sm,V,Fl	SIF	Sm,V,Fl,Sm,Pan,Gl,J
GIBT	Sm,Fl,PaL,C	SIFCI	Sm,V,Fl
GSDI.	Sm,Fl,PaL,C	SIFPA	Sm,Pan,J,Gl,Fl
HBE	Sm,Fl	SIP - C SA	V,Pan
ICA	Sm	SITBAI	Sm,Fl,M,T,R,D,J
IDEC	Sm	SITBT	Sm
IFEX - CI	Sm,V,Pan,F	SMCI	Sm,Pan,J,Gl,Fl,M,T,R,F
IGD	Sm,Fl,M,T,R,D,F,J,Pal	SNG	Sm,M,R,Fl
IMPROBOIS	V,Pan,D	S.N.TRA	Sm,Fl
KRAFT INDUSTRIE	Sm,Fl,M	STBO	Sm,Fl,M
LBSP	Sm,V,Fl,M,Pal	TBA	Sm,M
MRL	Pan,M,R,D,F,J	TBI	Sm,Fl,M,R
NRCCI-SOFAMO	Sm,Pan,Fl,M,D,J	TBT	Sm,Fl,M
NSA	Sm,Fl	THANRY	Sm,Sl,Pal,C
NSB	Sm,Fl,C	TROPICAL BOIS	Sm,V,Fl
NSBF	Sm,Fl	WOOD IVOIRE	Sm,Pan,J,Fl,M,T,D,Pal

Source: Syndicat des Producteurs Industriels du Bois (SPIB).

Product key: Sm Sawmill, Fl Flooring, R Rods, J Joinery, Pal Pallets, Peel Peeling, V Veneer, M Mouldings, D Doors, Sl Slicing, Gl Glulam, Pan Panels, T Tools, F Furniture, C Charcoal

In **Ghana**, there are approximately 200 sawmills registered, of which 75% operate in very poor conditions. There are 50 companies regularly exporting (28 accounting for 80% of total exports). Around 20 medium-sized furniture manufacturers are operating, of which the leading exporter is Scanstyle, the largest producer of garden furniture in Africa with a turnover of US\$ 7.0 million. Ghana's major producers of further processed products are listed in table 30. Four of the leading flooring companies are in Kumasi, while the furniture and moulding producers are spread around the major cities (Accra, Takoradi, etc.). The relevant industry associations are the *Furniture and Wood Products Association of Ghana* (FAWAG) and *Ghana Timber Millers Organisation* (GTMO).

In the **Congo**, the government has given its support to adding more wood processing mills, but definite plans are lacking. Further processing facilities are mostly small-scale joinery factories or workshops. At least 60% of logs

harvested must be processed locally. Free trade zones have been established in the north of the country, and tax concessions are being granted to encourage wood processing.

From what was seen during the mission for this report, it appears that western and central African further processors are not yet capable of producing fully-finished interior furniture. Garden furniture is a logical intermediate step.

Table 30 Ghana: list of major producers by type of product

Products	Major companies
Flooring	Naja David Veneer & Plywood JCM STP Primawoods Ltd Logs and Lumber Ltd Fabi Timbers
Garden furniture	Scanstyle Furniture Primawoods Ltd Peewood Processing Ltd Dupaul Wood Treatment Ltd Furnart Ltd
Mouldings	Birim Wood Complex Naja David Veneer & Plywood JCM Ghana Primewood Ltd (GAP) Samartex Fabi Timbers Logs and Lumber Ltd Dupaul Wood Treatment Ltd Eduart Ltd ABTS

Labour issues

Definitive employment numbers for the further processing industries were not available during the fieldwork phase of this study. Estimating the exact workforce of the industry in Africa is difficult because of the high turnover of labour and the use of part-time or short-time workers and helpers. Furthermore, companies sometimes count and report all the people that are dependent on their firms, which probably means that the family members of their permanent workforce are included in the numbers as well.

In several cases reported, where a mill is managed by a small number of expatriates for either a foreign or a local owner, these few managers may account for the major portion of the company's payroll. The question of how useful it is to hire 'expensive' expatriates to run the operations, instead of training local managers, has not yet been properly addressed in any analysis of the development of further processing in Africa. In any event, the sustained operation of a further processing enterprise will probably, in the long term, greatly depend on having suitably qualified middle management.

In Côte d'Ivoire, for example, around three-quarters of the workforce in the wood products sector are Côte d'Ivoire nationals, with the remainder believed to consist mainly of white-collar expatriates and migrant workers from the neighbouring countries.

Competitiveness

Comparatively lower costs of raw materials and labour, as indicated in table 31, are not sufficient factors on their own to guarantee the competitiveness of African-made further processed wood products in export markets. These are just two of the parameters in what is, in practice, a complex equation. The low productivity of local manpower (often using five to eight times more labour), poor raw material recovery rates and high freight costs all play their part in cancelling out the initial advantages. Labour productivity is a key issue in trying to improve the competitiveness of African wood processing (table 32).

To put productivity levels further into perspective, on average, the output per worker in Ghana's wood processing sector is less than US\$ 4,000 per year. It is estimated that a level of US\$ 12,000 is necessary in order to be competitive in western Africa.

Table 31 Africa: comparative salary rates in value-added processing

Country	Monthly salary* (US\$)
Gabon	250
Côte d'Ivoire	160
Cameroon	75
Ghana	40

Source: Fieldwork, July 2000.

* Non-skilled worker, social charges included.

Table 32 Africa: comparative cost structures in furniture production

Cost factor	Company in a developed country		Company in African ITTO producer	
Labour	5 hours @ US\$ 6	30	20 hours @ US\$ 0.8	16
Raw material	14 board feet @ US\$ 1.5	21	18 board feet @ US\$ 0.9	16.2
Overheads	5 hours @ US\$ 6	30	20 hours @ US\$ 1.8	36
Total cost		81		68.2
Selling price		10 0		75
Profit		19		6.8

Modern machinery and the related know-how are essential for producing to international commercial and industrial standards. Exporting and further processing means accepting tighter, more complex specifications and quality control requirements set by the clients. This cannot be achieved without modern production lines. With the cost of the equipment and the added expense of shipping, installing and maintaining these production lines in remote places, often the only way to stay in business is to run the equipment at maximum capacity.

Commercial banks' interest rates remain too high for many SMEs to apply for domestic loans. Of the African ITTO producer countries, only Côte d'Ivoire and Togo have had low interest rates at around 5% per annum. Average

domestic lending rates for others in 1999 ranged from 17% per annum in Liberia to a fixed 22% in Cameroon, Gabon and the Congo, and 26% in Ghana (according to the IMF International Financial Statistics). Poor access to capital at reasonable cost is no doubt one major obstacle to upgrading the industries and technologies. Financing the necessary investments from cash flow is an alternative available to only a few of the most successful companies.

Other problems are often encountered in the distribution of imported supplies other than wood (most notably spares and tools, chemicals, finishes, and other consumables). Market failings are commonly found in many African ITTO producer countries. They may result from just a single supplier's behaviour, or excessive pricing, high import duties, inflated transportation costs, delayed delivery, etc. Overcoming these obstacles erodes the competitiveness of tropical further processors, who are in need of imported supplies to be able to produce competitive and marketable products of the required quality.

Managers of subsidiaries of European (Italian, French) companies interviewed during the mission explained that for them, the trimming of operations to make them more efficient means looking for that last small percentage of added productivity that might still be within reach. They are themselves, of course, already very advanced in further processing and therefore the production efficiencies of their companies differ considerably from those of the average western African company.

Investing in value-added production is costly, and it is hardly possible at all in conditions where even the primary processing sector is not yet capable of supplying the world markets at the strict quality requirements applied.

Research and training

Further processing support units

There is a need to create a support unit dedicated to assisting further processing companies or strengthening existing services in the departments of industry of each country, if such units do not already exist. The units should collate all the administrative, financial and fiscal information useful for starting up a further processing activity and coordinate the liaison between national and international institutions concerned with further wood processing and trade.

In the trade promotion area, the support unit could work together with international organizations, government agencies and local industry associations to prepare a kit of information for potential exporters. This could include:

- A 'Guide to Exporting', built on the common base of all the African producer countries and products. When necessary, the information and special guides could be tailored to a specific country and product/s. The guide would include references to trade practices and the main product standards and specifications.
- Updated lists of current developments in international trade on further processed products covering for example updated information on:
 - The main international trade fairs, by products;
 - The main importers, distributors or buyers, by products;
 - The main international institutions engaged in trade of further processed products;
 - The certification schemes and bodies;
 - A list of relevant standards;
 - Models of product promotion data sheets.

Training

There is a definite lack of wood industry training, and a shortage of expertise, at all levels ranging from middle management and foremen to skilled and semi-skilled operators.

Currently nearly all training is carried out at company level. Training centres require a substantial investment in buildings, equipment and qualified staff, all of which are difficult to gather together in Africa. The feasibility of creating training centres at regional level should be investigated. The regional centres could serve several countries; e.g. a school located in eastern Cameroon could also host students from the Central African Republic, Gabon and the Congo.

Several experts consulted during the fieldwork suggested that such centres should not be established in the main cities, but close to production sites and thus in an environment similar to the future employment site.

Policy issues

Wood energy

The combination of very low income, a slow rate of economic development and galloping population growth tends to result in an ever-increasing demand for charcoal. The production of charcoal is highly detrimental to the forest and, in many areas, can completely negate the effects of action undertaken to assure sustainability. There is a thriving business in charcoal within each of the ITTO countries, as well as between them and the hinterland, and the sub-Saharan countries. In fact, charcoal is the most widely traded wood-based product in most countries in the region.

A simple comparison of the production of wood-based products in the ECOWAS (Economic Community of West African States) region illustrates the huge disparity between the production volume and the desperate need for charcoal and wood-fuel in the region. The ECOWAS region produces 1% of the world's industrial wood but as much as 10% of the world's wood-fuel and charcoal. In Africa as a whole, wood-fuel's share of total energy use amounted to 35% in 1995 (FAO-WEIS, SOFO 2000).

Most of the production of charcoal is uncontrolled and its impact on the forest can only be described as disastrous. But there is currently no other source of energy so affordable and so widely available. As the majority of wood-fuel and charcoal is being extracted from natural forest, specialized energy wood plantations are being considered as a possible solution.

Inefficiency of forest departments

The lack of equipment and finance and the very low salaries undermine the efficiency of most forest departments in African ITTO producers. In such conditions, the law is rarely enforced and many official decisions are purely theoretical. Too often there is little or no effective control on logging or the trade in roundwood. A good indicator of this is the quantity of 'chainsaw' lumber being traded. This term refers to the informal flow of sawn goods, in the form of short boards or squares produced directly in the forest with a chainsaw, usually by illegal logging and with extremely low recovery rates (8-10%). In most of the ITTO countries in the African region, it is cut and sold in surprisingly high volumes.

The low level of efficiency of the forest departments has an impact on further processing in a number of ways, the most serious ones being the uncertainty about future supply and the persistence of corruption.

Export policy

Full or partial log export bans are now in force in several countries – namely, Ghana, Côte d'Ivoire and Cameroon – and underway in others – the Central African Republic, Gabon and the Congo. Banning log exports, or at least discouraging them through heavy taxes, is the first and vital step towards the development of primary and further processing.

Policies to help the development of further processing can be liberal or authoritarian – a campaign of dissuasion against roundwood, positive inducements and incentives for further processed products, or a combination of the two. Once primary processing is obligatory, the second move should be to limit, tax or ban exports of *boules* and green or air-dried sawnwood of the desired species. The limit can be based on a ratio between green and kiln-dried export volume for each producer, and it can apply to appropriately chosen species only. Some naturally durable species like iroko and azobé are exported for outdoor end-uses, for which kiln drying is not recommended.

Incentives for further processing could be established later. They can be positive – such as tax-exemption for further processed products, or negative – such as taxes on rough primary products. In Africa, perhaps more than anywhere else, taxes need to be simple to calculate and easy to collect.

Log exports may sometimes represent a feasible (but limited, time-wise) solution for a producer country where there is great diversity between national demand and supply situations, and a wide variety of timbers. This might be the case particularly if the country cannot meet the preconditions of long-term investors in the financing of industrial operations, or if log exports are necessary to compensate for market failures, or in order to achieve efficiency in harvesting and industrial processing. On the other hand, if a producer country cannot reach a high degree of efficiency in primary timber processing due to lack of skills, technology or for other reasons, such basic elements have to be put in place before viable export-oriented further processing industries can emerge.

Fiscal policy

African governments consider the forest industry as a source of different types of income, for which they have some pressing needs. On the other hand, investors would like to see more tax incentives for setting up new companies. Information gathered during the fieldwork seems to indicate that the existing tax systems, if applied more rigorously, would bring in substantially higher government income. This, in turn, would allow the granting of more attractive and effective incentives for further processing.

There are several incentives (if they are not already made available) that might be considered:

- Tax 'holidays' for new companies;
- Reduced or abolished customs duties on imported equipment and consumables, e.g. glue;
- Exemption from, or reduction of value-added tax (VAT) for suppliers of exported products;
- Free trade zones.

Chapter 4

Global demand outlook for further processed wood products

Global imports of further processed wood products

OECD import figures for the period 1992 to 1999 are used as a rudimentary yardstick of global demand for further processed wood products (table 33). These numbers are based on ITC's Technical Paper on Secondary Processed Wood Products (1998) and on the extraction of the latest COMTRADE (UNSD) figures for 1999.

The total value of imports of the selected further processed wood products into OECD markets has risen from US\$ 19 billion in 1992 to US\$ 29 billion in 1999. Wooden furniture accounted for 81.5% of the total, while joinery products made up 18.5%. Profiled wood was not covered in this data.

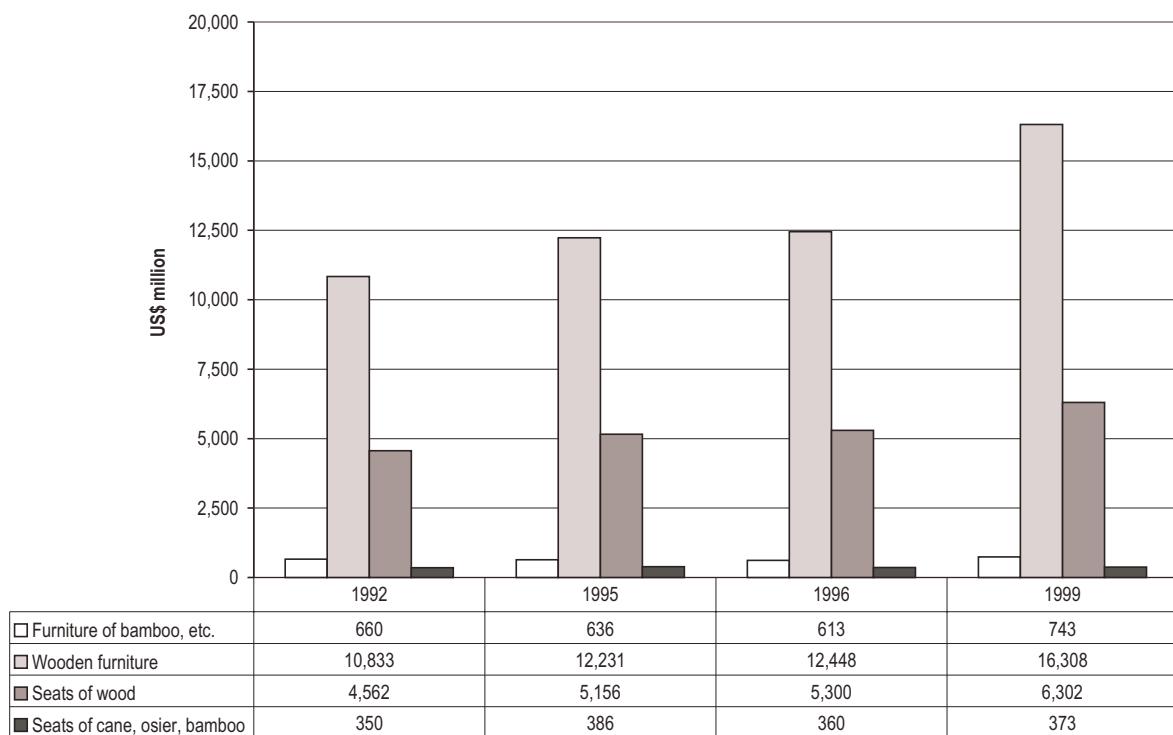
The increase of total imports was worth US\$ 9.8 billion, or 51%, over the seven-year period. This translates into a 6% average growth rate per year. (According to industry analysts, the global furniture trade is growing at the even faster pace of 9-10% per year [*World Furniture*, 2000]).

Most of the import growth came from the wooden furniture category (SITC 812.5), but imports of 'other' builders' joinery (including flooring) also grew significantly, doubling in value over the period. Wooden seats was the third major growth category, generating US\$ 1.7 billion more in 1999 than in 1992 (figure 16, figure 17).

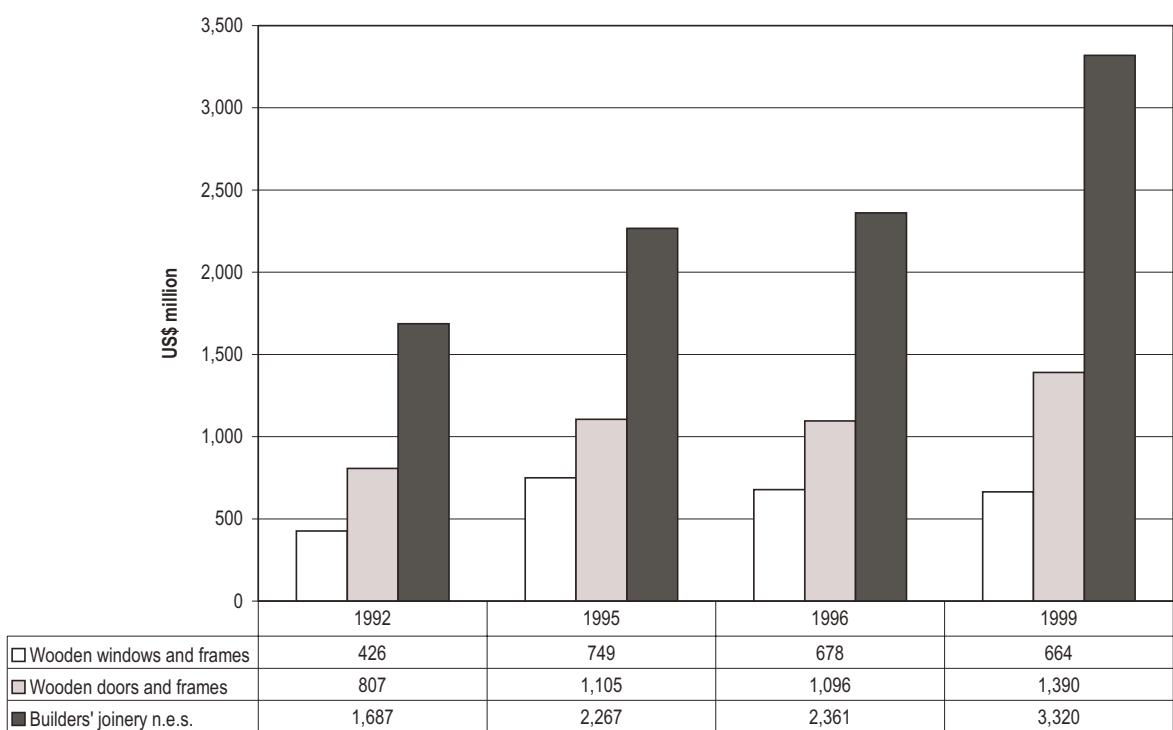
Table 33 **OECD imports of selected further processed wood products**
1992-1999
(in millions of United States dollars)

SITC	Product Description	1992	1996	1999
635.31	Windows and frames	426	678	664
635.32	Doors and frames	807	1,096	1,390
635.39	Other builders' joinery	1,687	2,361	3,320
Ex-635	Builders' joinery total	2,920	4,134	5,374
821.13	Seats of cane, bamboo, etc.	350	360	373
821.16	Seats, with wood frames	4,562	5,300	6,302
821.5	Furniture of wood n.e.s.	10,833	12,448	16,308
821.79	Of other material like bamboo	660	613	743
Ex-821	Wooden furniture total	16,405	18,722	23,726
	GRAND TOTAL	19,325	22,856	29,101

Source: COMTRADE (UNSD).

Figure 16 OECD: imports of wooden furniture, by products, 1992-1999

Source: COMTRADE (UNSD).

Figure 17 OECD: imports of builders' joinery, by products, 1992-1999

Source: COMTRADE (UNSD).

The windows category has performed worst among the further processed products covered here. The value of imports actually declined between 1996 and 1999. The use of competing materials such as aluminium, steel and PVC for windows has been increasing and timber has lost ground.

Key factors that determine the demand for value-added products include population growth and age structure, and changes in household formation and composition, as well as macroeconomic factors such as economic growth, disposable income, the unemployment rate, housing and institutional construction activity. It is apparent that market growth will be faster in developing countries than in the developed.

One peculiarity of demand for wood value-added products is that furniture is more of a fashion item, while builders' joinery and mouldings are more structural, or functional. This means that their demand dynamics are somewhat different. Demand for furniture is related directly to consumer factors, whereas demand for builders' joinery and mouldings is derived demand and driven largely by new construction and renovation activity.

The global demand for furniture is expected to remain strong, with growth in international trade in particular. There has been a significant opening up of trade in the furniture sector in particular, during the past decade, evidenced by the fact that the ratio of exports to production worldwide rose from 17% in 1993 to 24% in 1997. And it is expected to rise even further to some 28% in 2001-2002 (*World Furniture*, 2000).

World trade in furniture and other further processed wood products has continued to grow much faster than the overall GDP (which has averaged 4-5% per annum in recent years), or global production of wood products (3-4% per annum). The trade experienced dramatic growth in the 1990s. Developing countries have been able to expand their participation in international trade at the expense of industrialized nations. Their export growth has outperformed import growth in the major OECD markets, and this pattern should be the basis for a positive outlook for exports.

The long-term trend, however, has to be viewed against the fact that a slowdown in demand for furniture in the major markets has been predicted. Because the United States economy may slow during the year 2001, achievement of export growth targets may come under pressure, especially in the over-supplied, low- to medium-priced furniture range.

ITTO producer countries therefore need to stay on guard and prepare themselves for a faltering of consumer demand. They must seek new market niches, distribution systems and methods of promotion. Equally important will be the introduction of market-specific designs, as well as the launching of new furniture ranges at shorter intervals in order to create a more distinctive and professional supplier profile with which to face competitors in the local marketplace. Fostering the right competitive advantages should help the ITTO producers to maintain growth even in softening market conditions.

Outlook for ITTO producer countries

The contribution of further processing to the wood products industries and related trades will continue to increase in the ITTO producer countries. This is likely to happen at the expense of exports of primary processed products, which have shown a downward trend over the past decade.

ITC's previous report on the subject (1998) indicated that the OECD imports from the developing market economies (including ITTO producers) were rising much faster than imports from the developed market economies (including ITTO consumers). As an example, the developing market economies expanded their share of OECD imports from 19% to 30% in further processed wood products between 1990 and 1996 (ITC Technical Paper on Secondary Processed Wood Products, 1998).

It is expected that world trade in further processed wood products will continue to expand at a healthy rate of 9% to 10%, which it has been attaining, on average, for the past three years. Over the period 1989-1998 the average annual growth rates of exports of further processed wood products were 12.4% for the Asia-Pacific producer countries, 23.8% for the Latin America-Caribbean region and 12.7% for Africa (all in current United States dollars). A weighted average for all the ITTO producers was showing a 13.6% growth rate per annum. This supports the notion that the progressive ITTO exporters will maintain a higher export growth rate, estimated at around 15% per year, in the medium term. Taking the 1998 figure for ITTO producer exports (US\$ 3.47 billion) as a base, the above growth rate would result in US\$ 5.1 billion exports in 2001, and US\$ 6.6 billion by 2003. The 1999 export growth has already exceeded this estimate.

Many of the new exports will be aiming to gain market share in the leading OECD import markets and are thus likely to change considerably the traditional trade flows of value-added products. The driving forces include such factors as:

- The excellent quality of many tropical timbers, which lend themselves well to further processing, and a widening base of sustainably produced utility species from plantation forests;
- The wage cost differentials between wood processing industries in developing countries and those in developed countries;
- Improved technical and managerial skills;
- Transfer of more advanced processing and finishing technologies;
- Systematic market promotion efforts by leading exporters; and
- Supportive institutions and rational policies, resulting in an enabling environment for exporters.

There are vast differences between countries in their abilities to tap the potential benefits of value-added manufacturing and exports. The leading producers of tropical further processed products, such as Malaysia, Indonesia, Thailand and the Philippines, as well as Brazil, have already established their presence in the export markets. They also have reasonably well developed domestic markets and strong primary processing industries. These elements have proved important foundations for developing an export-oriented further processing industry.

Many African producer countries, and some of the smaller Latin American and Asian producers, are still in the process of trying to strengthen their ailing primary processing sectors, and are struggling to consolidate domestic markets for all wood products and to curb the unsustainable exports of unprocessed logs. This has not enabled them to engage in export trade of further processed products.

Already in the late 1990s, the former Eastern European countries were becoming a competitive challenge to the tropical countries, and this rivalry is likely to continue, especially in the European markets for further processed

wood products. Poland, Slovenia and Croatia are particular countries that compete directly with ITTO producer countries in certain product fields. And in another part of the world, Mexico stands out as a progressive force in furniture and other value-added products. Its success is largely attributable to the *maquiladora* system, which has created a lively duty-free exchange of raw materials, equipment, designs, capital, pre-finished components and final products across the border with the United States.

Market preferences on wood species

It is difficult to obtain statistical data on the species breakdown of further processed tropical hardwood products because the trade nomenclature does not identify species. Another way of approaching the preferences on species is to look at the major consumer countries and their selection of commercial species for various end-uses. The following listing has been produced to provide a broad picture of preferred species (source: ITC, 1998). The list is by no means comprehensive.

United States

- Bedroom furniture: oak, cherry, pine, mahogany, stained rubberwood
- Dining sets: oak, cherry, mahogany, stained rubberwood
- Flooring: softwoods (southern yellow pine, cedar), hardwoods (oak, beech, maple)
- Mouldings: red oak, alder, cherry, maple, poplar

Japan

- Legged furniture: oak, beech, elm, nyatoh, teak, tamo, birch, taun, Douglas fir, hemlock
- Other furniture: sugi, hinoki, pine paulownia, zelkova, mulberry, maple, walnut
- Interior joinery: white meranti, melapi, agathis, mersawa, spruce, Douglas fir, oak, alder
- Windows: temperate softwoods and hardwoods, ash/aluminium composites
- Doors: sugi, hinoki, spruce, oak, agathis, Douglas fir, mahogany, teak
- Floors for trucks: keruing
- Parquet: beech, oak
- Picture frames: jelutong
- Mouldings: domestic and imported softwoods, MDF

Germany

- Furniture: cherry, yew, beech, maple, alder, birch, pine
- Windows: meranti, white seraya, oak, pine, spruce, larch, hemlock, Douglas fir
- Doors: meranti, beech, maple, white oak, ash, birch
- Parquet: oak, beech, maple, ash, birch, rubberwood

France

- Furniture: oak, beech, ash, alder, walnut, cherry, mahogany, fruit woods
- Windows: oak, pine, African tropical hardwoods

- Doors: oak, koto, obeche, pine, tatajuba
- Stairs: oak, beech, chestnut, light tropical species
- Parquet: oak, beech, chestnut, various tropical woods, pine

United Kingdom

- Furniture: pine (very strong), oak, beech, rubberwood, mahogany, teak
- Windows: softwoods, Indonesian hardwoods (meranti)
- Doors: mahogany, teak, meranti, lauan, merbau
- Stairs: hemlock (but FSC-certified Scandinavian pine increasing)
- Parquet: beech, oak, maple, pine, merbau, nyatoh, eucalyptus, bamboo flooring

Fashion trends in terms of colour and grain

European tastes in hardwood interior materials changed towards light-colour species in the 1980s, and that trend has continued ever since. It coincided with the first effective boycotts on tropical timbers, which were mostly darker, reddish-brown species. Changes in fashion came as a blessing for temperate hardwoods, and particularly those originating from the United States. American hardwoods have been able to expand their market share in the EU during the past 15 years, and much of it has been gained from tropical timbers.

Light-colour timbers are usually preferred on emotional or visual grounds. They are perceived more suitable for modern designs and more freely combined with metal and glass. But their use may also bring some practical advantages, which are mostly related to the lighting of offices and commercial interiors. Light hardwoods reflect the natural or artificial light back from their surface, thus giving the impression of enlarging a room's dimensions and generally having a brightening up effect (*Asian Timber*, September 1998).

Another key feature is the distinctive grain of the wood, which is usually unique to each species. For instance, species such as ash, cherry, oak and elm have very pronounced grain patterns, allowing them to be finished to a bright lustre. On the other hand, they are difficult to combine with other species when surfaces are large. It is therefore essential to provide a whole range of products of the same species for architects and interior designers to work with. Darker timbers, or those stained with darker hues, are sometimes introduced to enrich the light colour palette. European consumers generally reject interlocking grain.

The majority of European households are conservative when it comes to the choice of wood for parquet, solid wood furniture, kitchen cabinets and other interior applications. Classic species, such as oak and beech, cannot be easily replaced with new 'look-alike' substitutes. Even lower prices may not attract accustomed temperate hardwood users to switch over to new species (Simula and Tissari, 1998).

Most commonly supplied species

On the supply side, there are some commonly traded species with specific end-use preferences.

The biggest Asian producer countries, Malaysia and Indonesia, are mainly supplying mouldings in red meranti, melantai, kapur, geronggang and ramin. For hard wearing applications the favoured species are punah for thresholds

and keruing for truck and container floors. Common Asian wood for decking and stairs is merbau. For Indonesia's furniture exports, the main species are teak, ramin, mahogany and sonokeling.

With supplies of these natural tropical woods diminishing, the planted timbers have come to the rescue. Rubberwood has found a substantial demand in ready-made furniture and parts, and pine, jelutong and nyatoh are commonly used in turned parts like table legs. Meranti is still the common stock in solid or laminated windows and their components.

Rubberwood has also entered the market for garden furniture, which was formerly dominated by teak. There are some reports that teak is losing ground to other species in its specialized applications, and is therefore expanding into other more utility-type uses. This development has been caused partly by the easing of restrictions on the sale and processing of teak logs in Myanmar, and partly because the emerging supply of plantation-grown teak is reportedly less suitable than natural teak for high end of the market uses, (hardwoodmarkets.com, 2000).

In Brazil, the tropical species most extensively produced for mouldings are cambara, tatajuba, tauari, cedro, marupa, ipê, jatoba, angelim, curupixa and imbuia. Among the tropical pines, it is mainly *Pinus taeda*, *elliottii*, *caribaea* and *oocarpa* that are used for mouldings. Parana pine (*Araucaria spp.*), however, which also has the properties needed for mouldings and joinery, does not provide sufficient quantities on a sustainable basis anymore.

In Bolivia, the major species exported for doors are cedro, mara and mara macho. Windows are mostly manufactured from cedro and palo maria. Roble is the first choice for exported general furniture, tables and bedroom furniture. Wooden chairs are produced mainly from lenga and roble.

The parquet exporters of Ghana are mostly using species like odum, papao, afromosia and tali. Wawa is the common moulding wood from Ghana. In Côte d'Ivoire, koto, tali, iroko, afromosia, doussié, limbali, African mahogany, aniégré, mutenyé, African teak and kotibé are used for parquet, samba for mouldings and iroko for furniture. In Gabon, okoumé and bilinga are processed into mouldings. Glue-laminated window stock is also made of okoumé. In general, Africa tends more towards using the lighter-density species, in comparison to the Latin America and Asia regions.

Chapter 5

Assessment of further processing technologies applied in producing countries

Introduction

The purpose of this assessment is simply to attempt to describe, define and categorize the different levels of technical sophistication currently existing across all the ITTO producing countries, not by individual countries. Furthermore, because of the paucity of statistical data on further processing in most of the producing countries, no attempt is made at quantifying the categories and the trends identified.

The further processing of planks and panels into products with more value added implies not only the use of an appropriate technology and adequate production facilities, but also correspondingly suitable management methods. The success of an industrial operation depends on technical and financial considerations, as well as on a fully qualified workforce at all levels, an appropriate institutional infrastructure and facilities for product development. And, of course, the existence of markets for the products is a condition *sine qua non*.

It is hoped that this approach will permit the planners as well as the individual manufacturers in the producing countries to assess their own situations with respect to competition, and plan measures to develop their industries.

For further reference, a case study is included as appendix VI, entitled Development of the processing of coconut stem wood. It describes the measures taken in the Philippines (also an ITTO producing country) to promote the use of coconut stem wood for low-cost housing in rural areas, and the difficulties encountered.

The system of classification of firms by their size that is normally used by ITC contains three categories: small, medium and large. However, because in many of the producing countries the 'craft' and 'mechanized craft' operations play such an important role in the production of wooden furniture and joinery, as well as upholstered and rattan furniture, a fourth size category has been added for the purposes of this chapter. This is called the 'micro' category, for firms employing less than 20 people. 'Small' is used to describe those firms that have 20-50 employees. Rattan furniture has been included because of the large share that it represents of the furniture exports of certain producing countries.

Levels of sophistication of production facilities in developing countries

In the light of the available data, it is impossible even to attempt to classify the producing countries according to the level of development of their further

processing industries. In each country and region, there is a multitude of production units each having different capacity, size, production methods, etc. and manufacturing similar products of varying levels of quality and price.

However, what is possible is to identify levels of sophistication into which each individual production facility can best fit. This classification of enterprises by the level of sophistication of their production facilities would seem to make more sense than using other parameters such as turnover, employment or whether the firms export or not. Based on this classification, firms can be graded, and the statistical distribution may be determined for a town, or even for a region.

The United Nations Industrial Development Organization (UNIDO) has developed a simple classification for using to survey this industrial sector. Craft operations that are of a purely manual nature have not been included. UNIDO has classified the units into five categories:

1. Facilities that use basic portable tools and universal woodworking machines;
2. Facilities that use basic woodworking machines (bandsaw, planer, thicknesser, spindle moulder, boring machine, etc.) to produce in small batches;
3. Facilities same as 2, but producing larger batches, using low cost mechanisation and jigs* suitable for serial production whenever possible;
4. Facilities that use special purpose machines (four-side moulders, copying lathes, edge-banders, CNC moulders, etc.);
5. Facilities with integrated machining lines (linked machines used for production of panel furniture, doors, surface finishing, robots used for painting, integrated lines).

* A jig is a self-constructed appliance that facilitates production, lowers labour costs and improves product quality. The use of jigs enables the production of interchangeable parts and avoids manual adaptations in the assembly of the final product. Machining and assembly jigs are commonly used in furniture and joinery factories.

Assessment of wooden furniture and joinery

The typical characteristics of each category are described in detail below. Furniture and joinery (mainly doors and windows, but also stairs, non-load-bearing partitions, etc.) have most production processes in common, so they are treated together.

Category 1: Basic portable tools and universal woodworking machines

These firms, which are usually employing less than ten persons, all fall into the micro-enterprise category. They can be divided into two very different groups: a small minority of skilled craftsmen producing high quality products that are well designed (often reproductions of antique furniture), and the vast majority (which can be called nascent industrialists) – producing low-cost products of far lower quality.

The former group consists of a small minority of very skilled craftsmen, who have earned enough to be able to afford some basic woodworking machines and to employ other skilled craftsmen. They exist in small numbers in the more

affluent urban areas of all the producing countries, and produce single items of high quality for an affluent clientele that exists in all countries. Occasionally they produce items for export – usually for expatriates and diplomats when they relocate at the end of their tour of duty, and sometimes also for interior decorators and architects in foreign countries who send them designs either directly or through their local purchasing agents. Over the years, they amass a collection of designs (originally supplied by and produced for clients) which they present as their own. Their production facilities (premises, machinery, etc.) are at similar levels to those of artisans' workshops in developed countries, though with a marked tendency for more manual labour. They may even have mobile dust extraction units incorporated into their machinery. The standard of their tool and machine maintenance is good. It is either carried out in situ, or subcontracted to specialized service centres.

They use high-grade timber that has attained the equilibrium point of moisture content, as well as other components of similar quality, and they devote a large proportion of their labour costs to sanding and surface finishing. The quality of their products is high, by any standards. Profit margins are high, so inaccurate costing is less of a problem. These firms have no real marketing system: their reputation is spread by word of mouth from client to client. Also, because of their relatively small number and ability to pay higher wages, they can recruit the highly qualified labour they need, and the owners provide any on-the-job additional training required. It is most unlikely that owners would employ several members of their extended families.

A certain amount of subcontracting exists between firms in this category. Tasks such as hand carving, marquetry, French polishing, gilding, lacquering and upholstery may be subcontracted to other small firms that specialize in these operations and produce only high quality work. Because of their exposure to an affluent clientele, the owner/managers have probably had more opportunity to educate themselves and therefore tend to make better business decisions, e.g. when investing in new equipment.

The above group is a small minority, and could be termed an exception to the rule. The vast majority of enterprises in this category fall into the latter group. They are on the borderline between craftsmen and 'nascent industrialists'. In developed countries they would be utility or low-grade (unskilled) workers. These enterprises have very few employees (rarely more than five), who are often members of the extended family. They have a universal woodworking machine, or a saw and a planer, and perhaps a boring machine as well, but the vast majority of the operations are manual. They make products across a very wide range (more or less anything the client wants), in very short series (often only one piece), catering only for the lower income classes, and selling on a price and not a quality basis. Designs are either copied from similar pieces, adapted from photos or sketched by the client.

They use a wide range of species, depending on what is available. They seldom use timber that has attained the equilibrium moisture content point. They opt instead for low-cost sawnwood and they have neither the facilities to kiln-dry it nor the working capital to be able to afford to wait until it is air-dried. Consequently, the quality of the product is, at best, mediocre, and very often downright poor. There is no effective plant layout; the few machines that these firms have are placed haphazardly, with carpenter's benches, work in progress and heaps of off-cuts around them. Surface finishing is done on an ad hoc basis, in the workshop, with dust and shavings further affecting the already low quality of the product.

Illumination in workshops is usually poor. Floors are often earth, with concrete slabs placed only under the machines. Electricity is often supplied to the machines by poorly insulated wires, so the risk of fire is great. This type of

operation does not have any dust extraction equipment, so machines can work only intermittently, having to stop to remove sawdust and planer chips, etc. The machines have a minimal number of tools, often produced by the owner from scraps of steel. Tool maintenance is carried out manually, with the corresponding poor quality also ultimately affecting the quality of the items produced.

There are no incentives to invest in machine and tool maintenance, since all components are always finished by hand, be it planing, sanding or fitting. Owners do their own purchasing, costing and selling. Costing is very rudimentary, but this type of firm is usually created by craftsmen at the end of their careers (by which time they have amassed some capital), so the owner has some experience of estimating labour and raw material costs. In any event, since they normally produce only individual items, the errors in costing affect no more than one piece. Labour is trained in situ and both owner and employees have only an empirical knowledge of the various jobs done, whether it be drying the wood or sharpening the tools, etc.

Neither group in this category is organized professionally into associations. The bodies that exist in the country to cater for the needs of the industry have great difficulty in liaising with the individual entrepreneurs. Most of the services they offer – training courses, ad hoc consultancy, information on export possibilities and regulations, etc. – are of little or no use to these enterprises. This is probably because the first group, for the most part, does not need them and the second can rarely afford them.

Finally, in any attempt at transferring technology to these firms, there would be two further problems to overcome: the low level of education of the owners, and the fact that, because they run ‘one man shows’, they cannot afford the time to attend any courses or to read technical documentation.

The expected long-term trend for this category of production facilities is that it will continue to thrive and will maintain its relative position because, for working in wood, it provides the entry point to the industry and the stepping stone from the craft level to the industrial level.

Category 2: Basic woodworking machines (bandsaw, planer, thicknesser, spindle moulder, boring machine etc.) for production in small batches

In this next category, or level of sophistication in terms of production facilities, the more successful entrepreneurs who have amassed enough funds have invested in additional machines to enable the enterprise to produce in short series or batches (of, say, up to 20 identical items). More operations are carried out using machine than by hand and the firm’s productivity is higher. Yet, if a craft operation is defined as one where the role of the machine is merely to serve the craftsman, this category is still a craft operation. Taking this logic a step further, an industrial operation is then one where productivity plays a more important role, and man (whether a craftsman or a semi-skilled machine operator) serves the machine. In terms of size, the majority of the firms may still be classified as ‘micro’ (up to 20 workers), although a significant proportion would qualify as ‘small’ (less than 50 workers).

The range of products may be as wide as in the first category, but there is a tendency for it to be restricted by the owner concentrating on bidding for larger, repeat orders, refusing to produce just single items when there are market opportunities to produce in small batches. Marketing is through direct contact with the end user, and the buyer normally supplies designs. Workers may be classified into two distinct groups: machine operators, who also do all the moving and arranging of the components, and carpenters, who do the hand finishing and assembly work. Although several woodworking operations can be

carried out on a universal woodworking machine, the productivity of these machines is recognized as being extremely low. Because they have only one motor, they can handle only one operation at a time.

The more successful small operators move from category 1 to category 2 but, in spite of having more machines, an analysis of their production methods would show that they are still really craft operations. The installation of additional machines may necessitate moving to larger premises, thus offering an opportunity to improve the layout of the plant. In this case, the need for intermediate storage of components has to be taken into account (because products are produced in small batches). When additional machines are added, however, any attempt at maintaining a well-ordered plant layout is usually lost, as the new machines get placed wherever there happens to be space.

Usually, no dust extraction process is installed. This is probably because the relatively high capital investment and power consumption costs make it seem like an unaffordable luxury. Surface finishing is given more importance. This is normally done in a separate room, with a simple fan extracting the surplus finishing material. The fan is often placed too high, and tends to extract more clean air than surplus material. Tool and machine maintenance also receives priority attention, but components are still not interchangeable and have to be finished by hand.

The automated or mechanical transportation of components within the plant is still non-existent. Components are moved from one machine to the next in baskets, or by hand, and are placed on the floor next to the machine, often in disorderly heaps and not even piles. They are picked up by the operator, machined and then literally thrown over the other side of the machine. All this (unnecessary) handling adds to the cost and reduces the quality of the machined components – but adds no value to the product. In some cases this is the only way to move components because of the unevenness or poor state of repair of the factory floor, or because the machines are so near to one another that they do not permit the passage of a pallet.

The typical management structure of this category of firm would be the owner, with perhaps a secretary/accountant, and the owner's son or a close family member as the owner's assistant. Such firms may be able to obtain relatively large contracts for supplying the local market with quite simple joinery items or furniture (such as school furniture), but they can rarely be competitive in export markets.

Category 3: Basic woodworking machines (bandsaw, planer, thicknesser, spindle moulder, boring machine etc.) for production of larger batches, using low cost mechanization and jigs suitable for serial production whenever possible

This is the first category to which the term industrial production really applies. Because of the use of jigs and higher quality machines, or where some form of low-cost mechanization is added on to reconditioned and well-maintained simpler machines, it is possible to produce interchangeable components. Production units at this level of sophistication are in a position to enter export markets. Products tend to be standardized, and series of up to 500 components may be put into production.

Compared to the previous category, this level of sophistication calls for a total rethink of the entire production system. That goes for the plant layout and the combination of different machines, to the degree of specialization in the range of products manufactured and, most important, the production planning,

operating and quality control systems. The management approach, too, is different from the previous categories in virtually all respects. Costing is far more precise, inventory control is introduced, and considerable time is spent on production planning and control. The advantages of producing in larger batches become quickly apparent, and management tries to take orders for industrial-scale production only. This is not always easy, because it forces the firm to develop its own designs and actively market them, instead of passively producing whatever designs their individual clients wanted. As part of the process, one of the aims is to minimise the number of different components produced, by standardizing, for example, the dimensions of drawer sides to perhaps just two lengths and two heights, to which different fronts may be added. Moreover, they will try to minimise their tooling requirements, again by standardizing, for example, the dowels used in construction and the shapes of mouldings produced.

This category of firms usually produces families of products, e.g. the same chair with or without armrests, and with different types of upholstery. Other products commonly made are bent plywood seats and backs, from different species and with different surface finishes. Also typical are desktops in two or three sizes, with drawers incorporated. Similarly, kitchen cabinets and wall elements are designed on a modular basis, to minimise the number of components and maximise the number of different versions for sale.

Once a firm has reached this level, the production facility is usually designed, *ab initio*, on the basis of the particular range of products in which it has decided to specialize, e.g. chairs, solid wood household furniture, knock-down panel furniture, doors, windows or similar items. Given the higher level of capital investment in equipment, management will want to make full use of the hardware installed. Longer production runs necessitate the installation of dust-extraction systems. Compressed air is probably needed for certain machines, so these circuits also have to be installed at the outset. Having decided to move up to this new level of production, firms must ensure that they devote sufficient time and effort to designing the layout of the factory before implementing it.

In designing the layout, particular consideration should be given to the areas that will be needed for intermediate storage of work in progress. Experience has shown that firms often allow, in their plans, insufficient space for this essential stage in the production process. And the other danger is that these areas get used for completely different, non-productive purposes, such as to house additional machines that are waiting to be installed at some later date. At this stage as well, management will probably realize that it would pay to invest in an internal transport system (e.g. pallets, with hydraulic lifts on rollers). The placement of machines in production line sequence, with clearly marked aisles alongside them, will ensure a logical flow of work.

Qualities that differentiate firms in this category from those in the previous one include:

- A different management attitude;
- Higher capital investment;
- Better thought and planning at the mill-layout design stage;
- A strong desire to produce in large quantities in spite of all the changes that this calls for in terms of product development;
- More efficient costing, production planning and inventory control systems; and
- The introduction of quality control procedures.

Serial production brings with it the need for preventive maintenance, better tool maintenance and, most importantly, the introduction of jigs, which speed up production, improve efficiency and subsequently improve the quality of the products. Well-designed, precision-made jigs can quickly deliver economies (reduced labour costs, lower incidence of rejected components, etc.) that more than justify the initial outlay on their design, production and materials.

At the same time as using jigs, many firms also incorporate low-cost pneumatic devices into their basic woodworking machines. These modifications increase productivity and reduce labour costs. Devices like this (feeding, clamping, turning, etc.) are usually already built in to the modern machines on the market today, but they can also easily be added to existing, older machines. Before the machines are modified, they are overhauled (bearings changed, safety checked, alignments and electrical installations adjusted, etc.) to improve their efficiency.

Firms in this category will sometimes subcontract certain operations, such as carving, out to smaller firms. There is some use of piecework, but more common is the use of bonus payments to particular sections (e.g. turning, sanding) based on increased productivity and/or a reduced incidence of rejects.

Typically, the majority of firms in this category will be medium-sized, with the balance consisting of a few large ones. The long-term trend in the producing countries is for the number of production facilities at this level of sophistication to increase, especially where the general standard of living and the purchasing power of the middle classes increase. In this case, it can be expected that consumers will prefer to choose from available models, even if they are mass-produced, as opposed to having items produced to their own designs and tastes, as is the current custom. This will result from the increased availability of mass-produced, medium-priced furniture with an attractive quality and price relationship.

Category 4: Special purpose machines (four-side planer moulders, copying lathes, edge banders, CNC moulders etc.)

This is not really a category in its own right, but rather an extension of the previous category. Firms are reluctant to invest in expensive specialist equipment unless it is to be used on a more or less continuous basis. Those that have invested, therefore, tend to be ones that have already drastically limited the range of products they manufacture and opted for serious specialization. Contrary to the common practice in some European countries (specifically Italy), firms in producing countries that have these specialist, high-productivity machines usually refuse to do work for their competitors. This type of attitude makes it even more difficult to justify the investment in these machines, and retards the technological development of the industry.

The lower cost of electronic circuits in general has made their incorporation in woodworking machines an economically more viable proposition. Until recently, electronic circuitry was limited to metal working machines, whose basic costs are far higher than woodworking machines doing similar jobs. The new equipment that is now replacing worn out or obsolete woodworking machines in existing mills is likely to have electronics incorporated in it. Similarly, as orders become larger and labour costs increase, investment in special-purpose machines is becoming economically more justifiable. This category of firms is therefore expected to grow, over time, in all exporting producing countries, as well as in non-exporting countries that have relatively affluent urban population segments.

Category 5: Integrated machining lines (linked machines used for production of panel furniture, doors, surface finishing, robots used for painting, integrated lines, etc.)

The existence of this type of installation is still very rare in the producing countries, because production runs are still relatively small. Producers in these countries are only now manufacturing panel furniture in larger series, because, up to now, the prices and value added that could be obtained for these types of items have been too low to make overseas exporting viable. Now that local markets are expanding, and as modern urban housing is starting to be sold with fitted kitchens, for example, demand will undoubtedly increase. The relatively low labour costs, however, will continue to make investment in export-level production facilities a comparatively unprofitable proposition, so development will be slow.

Assessment of other products

Upholstered furniture

It is unlikely that upholstered furniture will ever become a major export item on the scale of wooden or rattan furniture. In certain climatic conditions, upholstered furniture has some disadvantages, and it loses out to rattan furniture at the point of purchase. Furthermore, the production of upholstered furniture calls for skills and equipment that are quite different from those needed in the making of wooden furniture – the only common feature being the wooden frame. In fact, rather rough frames are usually produced, because the main requirement is for a rigid structure. Most upholstered furniture factories are in the micro- to small-sized units category, involving a considerable amount of manual work. Managerial problems are about the same as those in firms of a similar size producing wooden furniture in that particular country.

Rattan furniture

Rattan is a product of tropical forests that plays an important role in the economies of most producing countries in Asia, both as a source of employment and as an earner of foreign currency. The fact that a few years ago Indonesia, the major harvester of rattan, banned the export of poles, has led to the establishment of some large export-oriented industries producing rattan furniture. The ban has also affected the Philippines' rattan furniture industry, which previously relied on imports from Indonesia of the thicker poles that they could no longer find in their depleted stands. Among the rattan producing countries of Asia, the Philippines was the first to export high quality rattan furniture. The shortage of thick rattan poles has actually led the Philippine furniture designers to develop products that use bundles of thin poles, thus creating a new fashion and enhancing the international reputation of the Philippines as innovators in furniture design.

The production of rattan furniture is a labour-intensive operation, requiring a skilled workforce and relatively little investment in equipment. Rattan being a product found mainly in South-East Asia, the small, simple machines used in furniture making (mainly for crosscutting and sanding of the rough poles) are produced in the region, primarily in the Philippines and Taiwan Province (China). Economies of scale play a minor role, and the technology is relatively simple. In the smaller, craft operations, the rattan stems to be bent are usually

heated with a blowtorch; for larger production batches, the stems are steamed prior to bending. Simple cut-off saws are used for cutting stems to usable lengths, either on the perpendicular or at an angle and, as in cross-cutting sawnwood, cost savings can be achieved by combining the cutting requirements for several products into one operation, in order to minimise waste.

Between the production of individual items and serial production, two quite different techniques are used for bending the stems to the required shapes. For individual items, a wooden club (shaped like a baseball bat) is used, which has a notch at the thicker end, in which the rattan stem is placed and then bent. The shape obtained is compared with a drawing of the one required, traced on the floor or on a sheet of plywood. In serial production, jigs are produced and used to give the final required shape. A jig may simply be designed to take two components (say, both sides of an armchair). Alternatively, if a large number of pieces (say, 10-15) are to be bent in a single batch, the jig may consist of a set of one-inch galvanised pipes, embedded in a concrete block at the appropriate positions, with about half a metre of pipe protruding. Finishing processes, such as the lashing together of the stems and the sanding down of the assembled product, are always done manually.

As in most industries, rattan furniture factories come in all sizes. There are few differences, from a technological point of view and when comparing the equipment used, between the production methods of small, medium and large rattan furniture factories. The main variations are in the use of jigs and in the management controls used. Those operating at the craft level correspond to category 1 of the production facilities assessment groupings for wood furniture factories described earlier, the small units to category 2, and the large to category 3.

Mouldings and picture frames

Many of the producing countries in Asia are important exporters of mouldings. The exporters have established large, specialized production facilities, equipped with modern highly productive moulders, the majority of which are manufactured in Europe (mainly Germany) or Taiwan Province (China). The quality of the products is high; standards of both production planning and quality control are first-class. It should perhaps be mentioned here, however, that these planning and control functions are far easier to operate in such specialized plants than in, say, a furniture plant that produces, simultaneously, a wide range of designs, each with many different components.

Picture frames are simply high quality mouldings, with surface finishes corresponding to the quality of the moulding, cut at a bevel and assembled. Although some picture frames are completely assembled locally, it is more common for exports to be in the form of standard lengths of the corresponding mouldings, complete with surface finishes. The factories producing these are smaller than the moulding factories and are equipped with special machines that either wrap a foil on the moulding or surface-finish it automatically. This is, however, very much a small, speciality product sector within the further processing industry.

Finger-jointed and laminated solid wood panels

With the growth in the processing of rubberwood in certain Asian producing countries, finger-jointing and laminating has turned into a high-volume industry. Special lines to finger-joint and then laminate the strips into defect-free solid wood panels have become popular in furniture plants seeking an immaculate appearance for their wood surfaces. A wide range of different

equipment is in use, at various levels of sophistication and capacities. Equipment is generally large, and is never found in the smaller plants. The majority of production takes place either in Europe or in Taiwan Province (China). Factories exist that exclusively produce these types of panels either for export exactly as they are, or with solid wood moulded frames which might serve as table-tops. This type of panel is also sold to smaller furniture plants in the local market. With the growing usage of plantation wood and smaller diameter logs, it is expected that production of this type of panel will increase in the future. The quality of panels can vary depending on, *inter alia*, the homogeneity of the kiln-drying processes and the amount of care taken in matching the colour of the strips prior to assembling the panels. Production planning and control in such plants is relatively straightforward.

Parquet flooring

The production of wooden flooring is big business in some of the more advanced producing countries and large export-oriented industries have been established to cater for overseas market demand. There is only limited local use of parquet flooring within the producing countries in the tropics, but it is commonly found in some of the Latin American countries that have temperate-zone climates as well. The following are the main types of parquet being produced today:

- *Traditional strips*, up to 10 cm wide, in lengths of up to 1.5 metres, with or without tongue and groove (T&G) at the ends. Thickness varies from as much as 25 mm to as little as to 15 mm, probably averaging around 18 mm. These are produced on traditional planer moulders.
- *Traditional parquet*, similar, but only up to 7 cm wide (the majority 5 cm) and up to 50 cm long, with the same thickness range as the previous type. These are produced on special planer moulders to plane and groove the long sides, taking only smaller cross-sections, and special small double-end tenoners to produce the T&G on the ends. These machines are usually linked by conveyors and the strips are fed in from hoppers.
- *Mosaic parquet* (small finger-sized elements, machined by special equipment and then graded and assembled manually). Quality can vary, depending mainly on the colour matching of the fingers at the time of assembly.
- *Laminated parquet*, three (or sometimes only two) layers, with one thin (around 5 mm) layer of narrow strips of expensive hardwood face, of random lengths, glued onto an underlay of about the same thickness made of a cheaper species and/or a lower grade sawnwood. The panels thus produced are usually around 20 cm wide and up to 2 metres long. This type of parquet is produced on special machines, and usually sold with a sealed surface, ready to assemble.

In all the wood processing industries other than furniture and joinery, the maintenance of machines, and especially tools, plays an important role. The equipment in a production line is usually purchased from a limited number of suppliers, and special care is taken to ensure that the production capacities of the machines in the line are as equal to one another as possible. This is very seldom possible in furniture and joinery plants, with the exception of specialized door factories producing a limited range of models on an integrated line.

It is difficult to predict future trends in the development of the flooring industry. Not only do fashions change from lighter to darker coloured wood species, and back again, but, more importantly wood has to compete in overseas markets with other flooring materials such as wall-to-wall carpet,

ceramic tiles, marble and stone. It can be safely said, however, that there is a trend towards laminated parquet at the expense of the other types. This is because it is easier and less labour-intensive to install.

Structural elements

Timber houses used to be the accepted norm in the rural areas of many of the producing countries. Modernization has brought with it the desire to live in non-wooden dwellings, so that, just at the time when wood processing was moving from a craft into industrial production, demand for standardized, serial-production wooden structural elements (roof trusses, laminated I-beams and joists), ceased to exist.

Concurrently, tropical timber producing countries did not develop their own building codes for the use of timber in construction. For example, in pre-independence times, Ghana was using a version of London's building code and materials standards dating from around 1900. Timber engineering (i.e. the design of timber structures and their elements) was rarely taught in the producing countries. Using the design codes of the consuming countries did not help to promote tropical timbers, since the codes took no account of their particular strengths or advantages.

Modular wooden houses, produced in series using quite rudimentary equipment, were developed by the United Africa Company Ltd (UAC) in Nigeria in the late 1960s and, temporarily, met with some success. UAC also introduced them into Ghana, but without such a positive response. At around the same time, many thousands of pre-cut kits and machined bundles of sawnwood, each sufficient for constructing a two-classroom school unit, were produced and erected all over the Philippines. The Philippine Army's Corps of Engineers developed the design, along with a simple, extremely well written construction manual, and they produced the kits. These wooden schools were eventually replaced by buildings made out of metal, of a similar design but with three classrooms per unit – and that was the end of the wooden schools era in the Philippines.

Based on these two cases, efforts to promote wooden housing and the use of wood in housing in producing countries were made by certain United Nations bodies (mainly UNIDO, the United Nations Industrial Development Organization), but they met with limited success. As far back as 1975, attempts were made to develop the use of less acceptable species by designing for strength groups (any species with properties that fall within certain load-bearing and strength parameters) and not specifying one species in particular. For example, a modular system of school buildings was developed for the Lao People's Democratic Republic using some 45 local species, divided into three strength groups. It consisted of roof trusses with six different spans, ranging from 6 to 12 metres, and with modular wall elements, which permitted a number of variations in the final buildings. Together with the Food and Agriculture Organization of the United Nations (FAO), an attempt was made to promote the use of coconut stem wood in low-cost rural housing in the Philippines, again with little success.

Another UNIDO experience with the use of timber as a structural material relates to a system of low-cost modular prefabricated wooden bridges, for loads of up to 35 tons and spans of up to 24 metres. Each 3-metre module weighs some 150 kg and the bridges are launched using two towers made from wooden poles, one on each bank, with a steel cable between them to pull the elements across. This system, also designed for strength groups – based to a large extent on the Australian standard – and not individual species, was introduced in over 17 countries in the tropics, only a few of which, however, are ITTO members.

All the production facilities used to make the structural elements described above were equipped with very basic, but heavy duty, machinery and well designed, very rigid jigs.

Product development

Producers of furniture working at the craft, or mechanized craft, level usually do not develop any new products themselves: they copy items brought by their clients, or produce from customers' rough sketches or photos. As they make more products, they build up their own range of models, which they offer to their clients. The aesthetic value of these varies considerably from enterprise to enterprise, but what they do have in common is that they are poorly designed from an ergonomic point of view, especially when they have been based on a sketch or a photo. (Only craftsmen working for a higher-income clientele have better designs, which are often reproductions of antique furniture styles, and they give more consideration to proportions and construction methods.)

Furniture enterprises that produce in larger series usually make to product designs supplied by their client, be it a local enterprise such as a hotel, a bank, an insurance company or a school, or an overseas customer. The products are designed especially for industrial (serial) production, therefore factors such as the minimization of panel wastage and the commercial availability of sawnwood cross-sections are taken into account. These types of contracts are important capacity-builders for the producer, from both a technical and a managerial point of view. They allow firms to improve their capabilities in costing, production planning and quality control, while still producing shorter series for the 'safe' local market. In the next phase, the more successful firms, having fully mastered series production for the local markets, may take the crucial step of embarking on the export markets, requiring longer series and larger volumes.

The larger firms in the consuming countries often employ their own design departments and in-house designers. Even when these firms obtain designs from outsiders, their design teams do all the final drawings, as well as any modifications to the original designs in order to expand the range of products in the collection. They may also be capable, through a value analysis exercise, of adding a new lease of life to an existing design whose acceptance is waning on the market.

This approach enables these firms to minimise the total number of components required at any one time by, as far as possible, incorporating those that are already being produced in any new designs that they develop. Being permanent members of the company's staff the designers are better aware of its production potential and machine utilisation situation, and are able to design new products with this in mind.

Because the smaller furniture producers do not have their own designs, and have to rely on those provided by their clients, they sell almost entirely on a price basis. The owner of the design can estimate the costs of production, visit several potential suppliers and then agree a contract with the one offering the lowest price. This would not happen if these firms had their own designs to offer, at negotiable prices. These firms are too small to be able to each employ a designer full-time, therefore one possible solution did emerge: that of establishing design centres that could be commissioned by individual firms to design specific products for them. This system has its advantages; new ideas do emerge from the design centres, but, with time, the designers on their staff also tend to find it difficult to follow the latest fashion trends and their acceptance by the industry diminishes.

It is interesting to note that the countries that have led the world in furniture design, Italy and the Scandinavian countries, do not rely on either of the systems described above: they use freelance designers, paying them on a royalty basis. The furniture makers thus have access to a much wider range of talent. They can, if they so desire, select designers who have specialized in a particular type of furniture (e.g., children's furniture, office furniture, chairs), or who follow more closely the trends in tastes in a given market. Furthermore, in countries using this system, there is a buyer's market, i.e. there are more designs offered to the industry than it can absorb. On the demand side, part of the consumer market is always willing to pay a premium for an item created by a well-known designer. If successfully adopted, the freelance designer system would eventually benefit the tropical furniture producer countries and help them to cover their needs for furniture designs in the future.

Latent creative talent exists in all countries and all cultures; the problem is how to find it and to motivate the person concerned to design furniture as opposed to, or in addition to, other items (garments, leather goods, graphics, etc.). This 'hidden' creativity could be mobilized, perhaps, by organizing well promoted national furniture design competitions, endowed with prizes big enough to tempt people to participate. Getting an internationally known foreign designer to chair the jury can be an additional incentive. This celebrated designer and other designers on the jury might also give a series of lessons, or 'master classes' to all the participants. This would give them opportunities to discuss their entries and learn about some of the shortcomings of their designs, from both the aesthetic and the technical and production points of view.

Such competitions serve not only to build up interest in furniture design, but also, through the award of the prizes, to identify those with the greatest talent. The entries (or only the winning entries) could then be exhibited during a country's annual national furniture fair to generate interest among the public. A roster of national designers should be developed in conjunction with such design competitions.

Equipment selection

A major stumbling block for the smaller entrepreneurs, and one that hinders their expansion, relates to the selection of equipment. Craftsmen who want to expand and establish an industry have generally used very few or even no machines at all throughout their careers. They have very little knowledge of what is available and what is best for their needs, taking into account the little capital that they have. This problem is compounded by the fact that they have hitherto produced (manually) a very wide range of products. In fact, they feel that the equipment they are about to invest in should be just as polyvalent – and be capable of producing anything their clients may want.

This would necessitate purchasing an extremely wide range of machines and, since they obviously do not have the financial resources to do that, they tend to buy as many as possible. They end up by buying not only the cheapest available (e.g. the type sold in the developed countries to hobbyists), but also the minimum range of tools. Their intention is to save as much as possible on electrical installations; they consider dust extraction, for example, to be an unnecessary luxury. Ordinary 'Do-It-Yourself' machines (which are often what they buy) are just not designed for intensive (continuous) operations and are usually under-powered for the machining of hard, dense and abrasive tropical hardwoods.

Generally, these small entrepreneurs do not realize that an idle machine is an investment that is not earning anything, only costing interest. The real beneficiaries are the banks who advance the funds to purchase the machines.

The range and type of equipment installed in enterprises operating at the mechanized craft level is usually larger and better-suited to their needs, partly because those craftsmen who had made the most obvious mistakes would already have failed to move up to the next stage of development. This category of companies faces other problems, however: primarily those of ensuring that the equipment installed is at the same level of technological sophistication and productivity. They suffer, furthermore, from lack of space, resulting in poor factory layouts. Unless the equipment is of the same level of sophistication, unnecessary investment is made without a corresponding improvement in product quality or productivity. For example, there is no point in investing in a sophisticated surface finishing line without a corresponding improvement in the preparation of the surfaces through better and more thorough sanding. UNIDO has recently published a manual entitled *Woodworking Machinery: A Manual on Selection Options*, which classifies woodworking processes into 22 different categories. It describes the characteristics of machine options for each category, by degree of sophistication.

Unfortunately, most of the firms in this category are unaware of these matters. Competent consultants, visiting production facilities, have been known to be able to tell, purely from observation, that the firm that sold the surface finishing equipment had a better salesman than the one that provided the sanding equipment. Because these enterprises have still not reached the stage where they realize that it pays to specialize, it is extremely difficult for them to ensure equilibrium between machines or groups of machines on the production line. The result is under-utilization of capacity and a corresponding shortfall in profitability. One solution would be to use sub-contractors for certain work processes, but companies often resist this as it impinges on their independence, or it increases the profits of their competitors.

As firms expand and specialize, they devote more time to the selection of equipment, the factory layout and the auxiliary installations such as dust extraction, compressed air circuits, etc. More emphasis is also placed on tool and machine maintenance. Lines for the production of specific products, be it mouldings, parquet or similar products, are likely to be designed by specialists, often the equipment suppliers themselves. It is expected that, with time, the situation will improve: firms will be in a better position to select the equipment most appropriate to their needs. This will be partly through better education. They will also gain greater exposure to what is available through attending more specialized trade and industry fairs, and through the use of local specialist consultants (or consulting engineering firms) once they become available.

As they develop, the larger producing countries make the woodworking machines and tools that they need. Basically, these are simplified versions of hitherto imported machines. They are usually less precise, and they have fewer of the safety features that are mandatory in the advanced countries. Local producers take advantage of the less stringent legislation in the producing countries with respect to safety, the environment and working conditions (e.g. dust or noise), etc.

The range of machines produced locally increases every year, and Brazil and Malaysia already have national associations of woodworking machinery manufacturers. The Brazilian organization, which has already existed for a number of years, is something of a special case. It was established to cater for the factories that were using temperate-zone softwoods in the south of that vast country, where the Brazilian woodworking machine industry is located.

Management methods

The prospects for increasing further processing in the producing countries do not depend solely on the existence of production raw materials, facilities, finance and markets. Many other prior conditions have to be in place at the same time. Among the crucial prerequisites for adding value to wood products are:

- Availability of qualified workers;
- Availability of well designed products;
- A favourable investment climate;
- A well developed physical and institutional infrastructure; and
- Most importantly, the quality of management that will lead these firms.

Good management implies good leadership, but this is not enough. Successful craftsmen who aspire to create an industry often have the basic technical knowledge (acquired more by experience and intuition than through scientific studies), but are totally incapable of managing their finances, establishing controls, planning work, etc. They have no technology specific to their firm, and no specialization: all produce all types of wooden products, of more or less similar characteristics, quality and prices. They are always wary of the more ambitious among their workers opening a similar operation and becoming a competitor.

For this reason, and because they want to leave their enterprise to their eldest son, they are unwilling to delegate any authority, especially when the paternal influence is still very strong. This is often still the case in developing countries, where the family (and the extended family) still plays an important role in society. Also, they tend to lack the basic education to enable them to study these topics and improve their skills. Owners or managers of these very small operations have to be exceptionally skilled to succeed. As foremen, they are directing and guiding the work of the other craftsmen they employ. On top of this, they have to assume the duties of sales, purchasing and financial management, at the risk of becoming 'jacks of all trades' and 'masters of none'. This explains the rather low success rate of this type of firm.

The age and level of education of the owners plays an important role: the older the owner, the less he is willing to implement changes. He has been using the same methods throughout his career, and is unwilling to try other options, whereas younger people accept change much more readily. Older owners are also less willing to seek advice; hence it is more difficult to get them to attend training courses on management. This situation exists in all sectors of the industry, not only in the wood processing industries. But, unfortunately, the level of education of the owners of wood processing companies tends to be lower than that found in the enterprises of other industrial sectors, among equivalent sized firms.

Managers of larger and more sophisticated wood processing firms face another set of problems. These relate to estimating precisely the cost of products produced in long series, since any error will be multiplied in the number of pieces sold. Errors due to overpricing result in lost business, while under-pricing quickly eats up the firm's limited working capital. Cost control is also very important, as is inventory control. Even in the most advanced countries, the furniture industry still does not operate on a JIT (just-in-time) basis. The late or non-delivery of just one item can stop a whole container load from being exported on a given date. Similar problems arise with the introduction of production planning, production control and quality control.

These firms are large enough to employ specialists in the sales, finance and overall administration functions. These tasks are not specific to the wood processing industry, therefore such staff can be recruited with hands-on experience from other industrial sectors. In the case of a specialist coming to work on production planning or control, quality control, purchasing and inventory control, any experience in this field in another sector is naturally useful. These skills simply need to be adapted to suit the specifics of the wood processing industry. These are problems that countries going through the processes of industrialization and development all have to face. As the levels of education in a country rise and the industrial sector expands, the pool from which managers can be selected becomes larger.

The major hurdle to be negotiated is that of identifying the craftsmen with the entrepreneurial skills required to enable them to manage small and eventually larger industrial enterprises, to motivate them, and to provide the support that will enable them to grow. In time, these problems will diminish in importance.

Human resource development

In no country, whatever its level of development, have machines totally replaced man. The success of any industrial undertaking still depends to a large (and in some cases very large) extent not only on the ability of its managers, but just as importantly on that of its workforce.

For the further processing industries to develop, considerable and sustained efforts must be made in all the tropical producer countries. Given the typical, currently prevailing situations, an attempt is made in the paragraphs below to describe measures that have to be taken in order to develop the manpower, at all levels, that the industries are going to need.

The traditional training of craftsmen (be it through formal or informal apprenticeship schemes) is, by and large, adequate. More time and emphasis should be given to wood drying (how wood dries, how to overcome defects caused by shrinkage in solid wood construction, etc.). Other pertinent knowledge areas should include the merits of modern adhesives and surface finishes, and the correct use of hardware fittings in knock-down furniture.

Whenever relevant national or regional authorities have the opportunity, they should standardize and update the training curricula and materials used for the sector, so as to ensure that end-of-training certificates guarantee the same level of competence and are universally accepted. Training is usually provided at three levels of skill: **carpenter**, **joiner** and **cabinet-maker**. Carpenters do the rough work; joiners are trained to produce the quality required for doors and windows and low-cost furniture; cabinet-makers are further trained in the basics of carving and marquetry work (although additional specialization is needed to become skilled in these individual crafts).

One problem that arises is that woodworking may be perceived as an unglamorous sector, with poor working conditions, low promotion prospects, etc. For this reason, the trainees at the vocational schools in this sector tend to be those with a lower than average general knowledge, level of education, and even reading skills. Furthermore, they are usually literate only in the local languages, which means that even if teaching material for this level existed in another language it would have to be translated, which is always costly and time consuming. Special training material suited to the particular category of trainees is therefore required; this has hardly yet been developed.

Another crucial problem is the training of machine operators for factories that produce in long series. In the countries where industry is more developed, it is common for a fourth, and totally different, skill to be added to the three levels of skills mentioned earlier: that of **machine woodworker**. In these courses, much more emphasis is placed on machining wood (including diagnosing faults), safety in machining, machine setting, selection of tools, machine maintenance, design and use of jigs, etc. The practical work is also different: the students produce items in short series, and are thus trained in working on a repetitive basis. The emphasis is on training machine operators for the industry, who realize the importance of machine-setting to produce interchangeable components that do not need hand-finishing.

The other major problem that slows the industrialization of the further processing industry in the producing countries is the severe shortage of qualified middle management and technical specialists (supervisors, quality control specialists, time and motion specialists, etc.). Unfortunately, there are still very few technical colleges in the producing countries, or training courses available in their particular fields. Where such courses are available, they are aimed at some other industrial sector (for instance, time and motion studies in the garment industry), and any aspiring wood-processing industry graduates would have to be given additional specific training. Because most of the firms with staff in need of training in these fields are relatively small, they cannot justify even providing special courses at the workplace. Courses grouping together personnel from a number of different firms usually require releasing staff from their duties for long periods and sometimes involve travel and accommodation costs. Some training institutions and associations in producing countries may rely on bilateral donors and international organizations to provide expatriate expertise.

The training of ‘saw-doctors’ is a problem that the primary processing industry has to face, and to solve. The tensioning of saws, especially circular saws, is a craft that cannot be acquired overnight. But it is less of a problem for the industries that are further processing sawnwood, because the maintenance of TCT (tungsten carbide tipped) saw-blades, knives, cutter-heads, borer bits, etc. is very similar to that for metalwork cutting tools.

Timber engineers are civil engineers who are especially familiar with the properties of wood and its possibilities and limitations as a structural material, as well as the basic production processes of such structural elements as laminated beams, I-beams, etc. Although there are courses in this area of specialization in consuming countries, there are few producing countries where engineers can graduate in this field. The absence of native specialists hinders the promotion of the use of timber as a structural material.

In order for further processing to develop successfully, there is a need to train designers of furniture for industrial (serial) production. In most producing countries, furniture designers are interior decorators or architects with some taste, some understanding of proportions and a basic knowledge of ergonomics. But they rarely have any knowledge of the types of joints that can or cannot be made by modern woodworking machines (or are difficult to produce in series). They are also unaware of the relative advantages of modern joints, such as dowels, or of modern fittings for knock-down furniture. Schools for industrial designers do exist in many producing countries, but their graduates receive no special training in the design of furniture. Their main preoccupation is with other products.

The improved levels of education that come with higher standards of living are still not going to be enough for the wood processing industries to be able to assume that their human resource development problems will disappear, even over time. They will be competing in their own countries with other industrial

sectors that have a more glamorous image or offer better career prospects. They will have to offer not only better conditions, but also better education possibilities if they want to attract and keep the qualified personnel they need to ensure their development.

Institutional infrastructure

Lack of support structures

The fact that ITTO producing countries lack the institutional infrastructure of the consuming countries definitely affects the development of the industry. The services that industries in the consuming countries (especially smaller units) obtain from common, central facilities have greatly helped in their successful development. These services include key specialist support mechanisms such as tool maintenance centres, professional and trade associations, research and development institutes, specialized consulting firms and internationally recognized quality labels.

Associations

Associations, of one form or another, exist in practically all the producing countries, to represent either all the woodworking industry or specific parts of it (furniture manufacturers, sawmillers, rubberwood users, equipment manufacturers, exporters, etc.) In the more advanced producing countries, an umbrella organization groups all the associations together and represents them. Associations can play a number of extremely important roles, from representing their members in discussions and negotiations with the authorities and communicating their position, to organizing activities that benefit all the members and which individual firms could not do on their own. Some are nothing more than meeting places, where issues and problems of concern can be aired, but the more successful have a permanent staff, with comprehensive programmes of newsletters, promotion campaigns, the organizing of exhibitions and design competitions, etc. at the request of and to the benefit of their members.

Active associations are represented on technical bodies drafting standards, discussing legislation, and so on. They also have contact with similar bodies in other countries, whether they are producers or consumers, which enables them to secure the services of trainers in specific fields and to organize, in collaboration with local training institutions, courses for their members. They sometimes edit and publish technical documentation to complement the material in their newsletters.

It is difficult to forecast future development trends for associations and their activities, but in the countries where they play an important role, they have helped in the growth of the industry.

Design centres

Small firms cannot afford the luxury of employing full-time designers, and neither is it common for freelance designers to be used by the industry in many countries, be they producers or consumers. In efforts to compensate for this, many national authorities responsible for the promotion of exports have created design centres. These usually cover all manufactured products, as well as graphic design (packaging and logos). In countries that have an important wood processing industry, the design centres have often been the driving forces

behind the introduction of new ideas and concepts. They keep good, up-to-date documentation and archives, and can collaborate with national manufacturers' associations in organizing furniture design competitions or other events to motivate designers and attract their attention to the furniture sector.

Common service facilities

Some producing countries have created specialized industrial estates to which they have encouraged small firms that were operating in cramped facilities in urban areas, with no possibilities for expansion, to relocate. These 'furniture villages' offer sites with energy and water supplies, and perhaps vacant factory space at concessionary rates. In some, government authorities have established common service facilities, for instance renting out the use of specialist machines (e.g. lathes) by the hour to small entrepreneurs. The intention is to bring together, on the same site, specialized firms such as tool and machine maintenance centres, wood drying kilns, wood preservation cylinders, etc. that can offer their specialized services to other plants on the location.

Not all such attempts to relocate the industry have been successful. Among the reasons why they have, on occasion, failed to persuade small enterprises to relocate, are the following:

- Resistance of the key personnel to relocate to the relatively distant new factories;
- Poor commuting possibilities;
- Shortage of housing at reasonable cost;
- Lack of other facilities such as shops and churches;
- Power cuts due to insufficient grid or transmission capacity; or
- Difficulties with the continuation of long-standing subcontracting arrangements with clients.

Examples of other, less ambitious, common service facilities are tool maintenance centres that collect blunt tools from small enterprises for sharpening and returning within days, and wood-drying facilities where the client takes sawnwood to be dried. The provision of such leasing services can actually help production units at the mechanized craft level to upgrade to the level of industrial plants, by reducing their capital investment needs.

Research institutes

Very little research has hitherto been done in the producing countries to cover the needs of the further processing industry, and what has been published has come mainly from national forest research institutes. Research institutes specializing in the needs of the furniture industry exist in consuming countries only. These are usually financed by levies on the industry, supplemented by grants from the government. A few are private enterprise undertakings. Industry representatives sit on their boards (sometimes nominated by the professional associations concerned).

The specialist research institutes in Europe have even recently created their own umbrella association, the European Association of Furniture Technology Institutes (EURIFI). This offers a range of services: technical assistance at plant level, technical courses, periodicals and technical publications, a specialized documentation centre, market information, testing facilities, research on specific topics undertaken at the request of one or more firms or bodies, etc. In addition, the association offers an administration service for

quality labels, and it is represented on technical and standards committees. The fact that industries are willing to contribute to the operating costs of these institutes is an indication of their usefulness.

Research institutes have made a great contribution to the development of the furniture industry in consuming countries. It would certainly be in the best interest of the producing countries to emulate them and establish their own specialized facilities.

Only one such institute exists in a producing country (Brazil), located in the south of the country, where the furniture industry uses mainly temperate-zone species.

Quality labels

Unfortunately, none of the producing countries has so far established an internationally recognized quality label of its own. There is no doubt that quality labels have contributed to the success of countries' industries that have entered foreign markets. One good example is the Möbelfakta furniture label, originally developed some 30 years ago to help smaller Danish furniture manufacturers export their products (it also became their national standard for furniture). End-users in Scandinavia soon got into the habit of inquiring whether the product had the Möbelfakta label, so it was adopted as a national standard by the other Scandinavian countries, which used it for their products. Eventually it came to the point where discussions finally led to the establishment of European (CEN) and international (ISO) standards.

It would surely be in the producing countries' interests to seriously consider creating such a quality label, to act as a guarantee to new buyers of the quality of their locally designed and produced furniture, especially as the suppliers are usually not known to them. This would have the added advantage of reducing the need for buyers' representatives, who reside in some producing countries and supervise the production of items destined for their firms.

Kiln-dried wood does not always get the premium price over green lumber that it deserves, because of the low quality of drying. It could be useful to draft a regional kiln-drying standard, with the corresponding certification system, and publicize the KD quality mark in international timber trade circles.

Specialized consulting engineers

The work of freelance consulting engineers, or consulting engineering firms, has greatly helped smaller firms to develop and grow, through the introduction of more suitable technologies, improved plant layouts, etc. Catering exclusively for the needs of the furniture and joinery industry, consulting engineers have introduced better management planning and control systems, thus increasing productivity levels at their clients' mills.

Again, the majority of activity in this area so far has been in the consuming countries, with little being done in most of the producing countries. The relevant experience certainly exists in these countries, often with retired technical or production managers of the bigger and/or better-run factories, but is seldom put into practice professionally. The associations could perhaps help to establish them as senior consultants by keeping them on some sort of retainer basis as a service to their members, thus at least guaranteeing them a minimum annual income.

Standards and building codes

Standards play an important role in the development of any industry, and the more so if it is export oriented. They provide the basis for telling whether products exceed certain minimum requirements. To this effect, the larger producing countries have established national standards for sawnwood, wood-based panels and furniture (far fewer standards for joinery than for furniture), based on those of the countries they export to. Standards for rattan and rattan furniture have also been published by a few countries. However, in spite of the existence of national standards, customers often insist on the furniture they buy being produced to one of the more internationally recognized standards, such as the German DIN, the British BS or the Japanese JIS.

As mentioned earlier in this report, in the producing countries timber is not used as a construction material as much as it could be. Because of this traditional reluctance (it is a ‘poor man’s substitute’, it ‘burns and rots’), building codes do not permit timber to play the role that it could. Simply rewriting the codes to allow a broader use of timber would not suffice. Acceptance by the public and by the investors in construction must also be secured. Unless this is achieved, the new building code will find no users. Promotional campaigns and educational programmes are called for, not only for architects and contractors, but also for bankers and developers of large projects. These have to be complemented by campaigns to educate the public. Examples of typical units using wood could be constructed and exhibited in locations to which the public has easy and permanent access. These programmes should precede the adoption of revised building codes.

Chapter 6

Tariffs and non-tariff measures affecting trade in further processed products

Import tariffs

The long Uruguay Round negotiations under the auspices of the General Agreement on Tariffs and Trade (GATT)/the World Trade Organization (WTO) were concluded in 1994. The agreement brought about binding commitments to reduce tariff rates on wood products. Full implementation will take place only gradually over some years, particularly in the developing countries. Many tariff reductions will come into effect over a 10-15 year period following regional (North American Free Trade Agreement [NAFTA], ASEAN Free Trade Area [AFTA], and Asia-Pacific Economic Cooperation forum [APEC]) and bilateral negotiations on free trade. Another positive outcome is that a permanently fixed maximum rate will be set, giving countries less room to make excessive tariff increases in times of economic or political uncertainty (FAO, 1998).

Despite the fact that significant cuts have already been made to tariffs on **primary** processed wood products, tariffs on **further** processed products remain at a higher level. Among ITTO producer countries, tariffs vary according to the degree of processing of the product. In fact, the rates that are applied in the **producer** countries are on average considerably higher than those in the larger **consumer** countries, and seem likely to remain so (table 34). In some cases, countries are still setting their own new maximum rate limits at higher levels even than those agreed after the Uruguay round of talks, as some sort of reassurance to their domestic industry. Nevertheless, the time has now passed when individual countries could easily and arbitrarily use tariffs as a manipulative tool to suit their own domestic economic circumstances.

In order to protect their domestic producers, most Asian ITTO producer countries impose tariffs (on average at levels between 30% and 50%) on imports of value-added products. At the same time, however, countries that are major buyers of the value-added products exported by the producer countries provide tariff relief, especially those under the Generalized System of Preferences (GSP). For example, the United States, the European Union and Japan apply no import tariffs to value-added products from GSP countries. On the positive side, the United States, the EU and Japan have also agreed to eliminate completely, over the next 8-10 years, the tariffs on furniture (FAO, 1998).

Thus, the commitments to trade liberalization displayed by the different countries have so far produced very mixed results. This is indicative of the balancing acts performed by governments wishing to provide protection to their domestic industries and, at the same time, support the liberalization of trade in general. The strongest advocates of free trade are usually those with the greatest potential to benefit from it. While the producer countries may

appear to be protecting their domestic industrial base with higher import tariffs, consumer countries are responding by importing proportionately less of their value-added products. High tariffs seem also to be a major obstacle to trade growth between developing countries. In this respect, both importers and exporters would do well not to allow tariff levels to escalate at the same time as their trade in value-added products increases.

Table 34 Summary on import tariffs of further processed products in selected ITTO producer and consumer countries

Product	Producer countries					Consumer countries			
	India	Indo-nesia	Malaysia	Thailand	Brazil	EU	Japan	United States	China
1996/1997 Tariffs (% <i>ad valorem</i>)*									
Profiled wood 44.09	15.0	10.0	20.0	20.0	10.0	1.2	4.1–6.3	0–2.7	20.0
Builders' joinery 44.18	–	20.0	20.0	40.0	10.0	2.0–4.2	2.8–6.3	0–6.4	18.0
Wooden seats 94.01	30.3	50.0	40.0	80.0	25.4	2.2	0.0	0–4	22.0
Wooden furniture 94.03	35.0	50.0	40.0	80.0	32.5	2.2	0.0	0–7	22.0
Post-Uruguay Round bound tariff rates (% <i>ad valorem</i>)									
Profiled wood 44.09	n.a.	40.0	20.0	20.0	20.0	0.0	0–7.5	0.0	35.0
Builders' joinery 44.18	n.a.	40.0	20.0	20.0	20–60	0.3	0.5	0–4.8	40.0
Wooden furniture 94.03	n.a.	40.0	30.0	20.0	35.0	0.0	0.0	0.0	40.0

Source: FAO, 1998.

* MFN (most favoured nation) rates for all countries except China.

Non-tariff measures

The term ‘non-tariff measures’ (NTMs) refers to governments’ laws, regulations, policies and practices that either protect domestically produced goods from the full weight of foreign competition or artificially stimulate exports of certain products (APEC, 1999). In wood product markets they can take several forms and may be motivated by different considerations:

- Socially and politically motivated NTMs include:
 - Government actions to ban or set quotas for exports of unprocessed logs, or to stipulate minimum local processing quotas and differentiated export taxation according to the degree of processing (discussed under policy measures in this report). These are the NTMs most commonly adopted by the ITTO producer countries (ITTO, PPD 11/92).
 - Surcharges, import taxes and licensing, the use (e.g. in China) of designated trading enterprises (DTEs), and special free trade zones.
 - Import substitution schemes, foreign exchange regulations, procurement restrictions for public construction, etc.
 - Lack of national enforcement of GATT-required criteria to liberalize trade.
- Health and safety motivated NTMs include:
 - Restrictions on phytosanitary and pest control grounds.

- Prescriptive and culturally-varying building codes and standards (as in Japan).
- Favouring the use of non-decaying, non-wood building materials (steel, plastics, aluminium, etc.) in certain applications.
- Non-acceptance of foreign testing methods.
- Non-transparent approval system for the acceptance of new wood products.

□ Environmentally motivated NTMs include:

- Subsidies for afforestation or reforestation.
- Direct harvesting restrictions.
- Requirements for the certification and labelling of wood products.
- Mandated minimum recycled fibre contents, etc.

As well as the plethora of formal restrictions, there are other more informal impediments to trade. Among them are the bans and boycotts by local authorities and retailers of wood products, which have often been targeted at either all tropical wood or, more precisely, at the flow of uncertified tropical wood into the consumer marketplace. Since these actions are usually not a direct reflection of government policies it can not easily be proved that they are discriminatory under WTO trade rules. However, WTO membership obliges national governments to keep actions taken by sub-national bodies in line with the government's own commitments (FAO, 1998).

Timber certification and labelling of forest products

Trade in wood products vs. sustainable forest management

The tropical natural forests and the gradually expanding areas of man-made plantations in the developing world together provide a valuable and renewable resource of economic, social, ecological, and even climatic benefits. But it has proved difficult to find a sustainable balance between the various benefits that the forest areas can offer. Past and present methods of land use and resource exploitation, combined with increasing population pressure, have led to the depletion of forest cover in the developing countries – between 1990 and 1995 at an annual rate of 13.7 million hectares. Environmental concerns have therefore been mounting over the degradation of forest ecosystems and the loss of biodiversity.

It has become a fundamental requirement of any country wishing to develop an international export trade in wood products that its forestry is sustainable and biodiversity is protected. The lobbying activity of environmental groups and NGOs has been specifically directed at the timber trade and at the opinions of individual consumers of wood products. Man-made plantations are increasingly being seen as a sustainable alternative source of industrial roundwood, thus relieving the pressure on tropical natural forests.

It is generally accepted that negative trends can be reversed only if local populations will lend their knowledge to managing the forest resources in a sustainable manner, and as a result obtain a greater share of the benefits by participating in the trade in forest products. The role of trade in providing increased forest-derived revenues to help sustain the environment has been highlighted by, for example, the Intergovernmental Forum on Forests (IFF)

under the Commission on Sustainable Development (CSD). The subject of the potential benefits of voluntary timber certification has been raised specifically. Certification has been singled out as one of the most powerful soft policy instruments available in persuading wood industries to use sustainable forest management. The draft report of IFF on trade and environment (programme element II.b) concludes:

The impact that international trade in wood and non-wood forest products has on sustainable forest management can be both positive and negative. Trade liberalisation adds value to the resource and has the potential to promote economic development, contribute to poverty alleviation and reduce environmental degradation, provided it is accompanied by sound environmental and social policies.

And further:

IFF recognised the potential role of voluntary certification of forest management and labelling of forest products as among the potential tools in promoting sustainable forest management and differentiating forest products and services in the market. However, more practical experience is necessary to reach conclusions on the effectiveness of such programmes. Moreover, unsuitable design or non-transparent application of such schemes may in some cases lead to unjustified obstacles to market access. In particular, small and medium-sized forest owners and enterprises, including those of developing countries, may find it excessively costly to implement certification and/or labelling schemes.

The International Tropical Timber Council (ITTC) has already commissioned a series of projects for pursuing timber certification and related auditing systems with a view to eliminating obstacles to market access for tropical timber products. Particularly important in this respect are its Decisions 2(XXI), 2(XXIII), 9(XXVI), 10(XXVII) and 5(XXVIII).

The quality of forest management and the trade in forest products are interrelated in many ways. A sharp increase in the price of final wood products, or of roundwood, for example, can work in a number of different ways. It can escalate deforestation, give a boost to afforestation or speed up changes in technology. Governments need to use several forest and trade policy instruments at the same time in order to maintain balanced development. Certification is a useful tool for restricting the scope for negative forestry responses to positive market (demand) signals.

Current developments

There has been a proliferation of national certification schemes, as well as a rapid expansion in the amount of certified forest areas. The success of certification can be attributed to the end-use markets, which have differentiated in favour of 'environmentally sound' forest products. Action taken by trade intermediaries has, in fact, been a strong catalyst for the development of markets for certified products.

A great number of national, regional and international certification schemes have been developed throughout the forestry countries of the world, with their most obvious goal being to secure uninterrupted market access to the key markets. National certification schemes have recently been introduced, or are in development, in about 25 countries – with several million hectares already certified, for example, in Canada, the United States, Malaysia and Indonesia. In addition, forest-rich countries such as Brazil, Ghana, Finland, Sweden, Norway, Germany and the Netherlands (a major importer) have all progressed towards the creation of national schemes.

An important regional initiative in forest certification has been put forward by the African Timber Organization (ATO), together with the ITTO. At

an international level, the Forest Stewardship Council (FSC) and the International Organization for Standardization (ISO) have provided other prominent schemes. The FSC, which once pioneered performance-based forest certification, has around 20.67 million ha of forest covered by its certificates worldwide. The Pan-European Forest Certification (PEFC) provides another international framework for certification and labelling, and has even larger areas of forest in the process of coming under certification. PEFC is already the world's largest certification scheme in terms of forest area (32.37 million ha).

At the time of this report, there is no global consensus on the scope and viability of a single system of certification to be applied in all locations and all types of forests. Recognizing the eclectic nature of ecological zones and economic conditions in different parts of the world, it is unlikely that there will ever be one global system for all. It is therefore legitimate for individual countries and companies to pursue the development of their own national certification systems or to choose one of the existing systems. In order to avoid any discriminatory trade practices in regard to wood products coming from different certification schemes and ecological regions, an international system of mutual recognition between market-oriented, credible schemes will probably have to be developed.

The issue of mutual recognition between various schemes has remained largely unsolved despite some nascent international efforts having been made to this end. Nevertheless, it is crucial to providing the rules and procedures under which reciprocal agreements will be made between the various schemes. It is envisaged that credible forest certification schemes would recognize other equivalent schemes and be prepared to share the use of trademarks and labels. This would not only radically facilitate market access for the suppliers of certified products, but also consumers would have a smaller number of labels to contend with. The potential confusion created by a huge array of competing and possibly fraudulent labels in the marketplace could be avoided. PEFC has proposed the first model framework for mutual recognition between various certification schemes. CEPI (Confederation of European Paper Industries) has developed a comparative matrix of certification schemes.

It will be extremely important, furthermore, for the certification and labelling of wood products to be compatible with international trade rules. If they should lead to the unfair distortion of trade, it may be challenged inside WTO as a technical barrier to trade. In order to alleviate the fears that have been voiced by developing countries, FAO, ITTO and GTZ of Germany are jointly organizing a seminar to build confidence in certification among producers in the developing countries (hardwoodmarkets.com, 2001).

Prominence of certification in the marketplace

Timber certification and labelling (C&L) schemes calling for sustainable forest management (SFM) received an unprecedented (for the timber business) amount of media coverage in the 1990s. Originally raised by environmental non-governmental organizations (ENGOs), the voluntary timber certification and labelling schemes were initiated in order to make markets work for environmental conservation. The concept originally linked two objectives: (1) to improve the quality of forest management, and (2) to provide marketing advantage or improved access to markets. But, because roundwood accounts for only a small share of international trade (15-20% of total logging volume), the sustainability objective will not be reached by means of certification and labelling alone. Consequently, companies have used certification more as a marketing tool than anything else.

Today, timber certification and labelling is already past the point of no return. Schemes continue to be implemented in international markets, although the

full and final implications for the global forestry community remain to be seen. Firstly, some markets are clearly more environmentally sensitive (e.g. Western Europe) than others (China, India). Secondly, not all timber-producing countries are heavily dependent on exports, so some are hardly influenced at all by the strength of demand for certified wood. In fact, exactly how genuine the customer-driven demand for certified wood products is, remains another unanswered question, and is a marketing area that has been seriously under-researched.

In the whole process of putting timber certification into the market spotlight, the trade intermediaries in Western European markets have played the major role in sustaining the issue, despite the fact that certified products were in short supply in the early stages. Retailers and industrial purchasers of wood products established various buyers' groups in the early 1990s, with loose commitments to purchasing and retailing more certified wood products (e.g. WWF 95+ Group). The market move was initiated and supported by the World Wide Fund for Nature (WWF) and the FSC certification scheme, which at the time was the sole provider of such services to the wood industry.

Certification for softwoods has proved easier to achieve than for hardwoods. Softwood supply is much more concentrated in large forest product conglomerates, and there are fewer marketable species coming from the coniferous boreal or temperate forests. The main problem with hardwoods has been ensuring the uninterrupted availability of uniform-quality, commercial volumes of certified wood to the markets. This is mainly because sources are fragmented and ownership of natural hardwood forests is diverse. Plantation timbers such as rubberwood and eucalyptus have already made inroads, thus becoming the first certified hardwoods with sufficient volumes to occupy a proper market position. Their impact is clearly visible in the leading European DIY retail outlets and builders' stores, which showcase large quantities of certified eucalyptus shelving, glue-laminated boards, garden furniture, decking and similar products. Rubberwood is generally used in products with higher value-added content, such as household furniture, kitchen furniture, utensils and decorative items.

In the last few years, the supply base of certified wood products has widened and the larger retailers have begun to step up their promotion efforts. It is now common for mega-stores to feature the percentage of certified items in their product ranges, usually based on numbers of items sold. The box below is a compilation of some of the more prominent moves in this direction.

Declarations on purchasing policies made by retailers of wood products in favour of certified wood products

The world's third largest retailer of wood and building products, B&Q, was able to declare at the end of 1999 that it was on course to reach an ambitious target whereby 80% of all the wood products on offer in its outlets throughout the United Kingdom would be certified. Similar goals will be set in B&Q subsidiaries such as the Kingfisher group and Castorama at a later stage.

B&Q obtains the majority of its certified wood products from suppliers who have been certified under the FSC scheme. This applies best to products manufactured in solid wood. But among the approximately 14,700 items sold by B&Q, the majority are wallpaper, chipboard or MDF products, largely made of recycled wood. This has caused a fundamental problem for FSC certification, which does not work so easily with recycled products as with virgin fibre products. Rules based on the percentage content of recycled fibre have been developed by FSC to overcome this problem. At the same time, it has been criticized for setting artificial limits that bear no relation to the product or manufacturing process. B&Q has concluded by deciding to replace FSC certificates on controversial products with statements on the percentage recycled content. B&Q has also declared that it is accepting products certified under credible national systems, such as the Finnish Forestry Certification Scheme.



Another example comes from the United States, where **The Home Depot** (THD), the nation's largest home improvement chain, has indicated a similar move into the distribution of mainly certified wood products within the next three years. From August 1999, THD declared that it will phase out all wood products from environmentally sensitive areas unless they are certified. Several of its vendor partners in hardwood plywood, for example, have already been replaced. Others will follow unless they have supplied an FSC-certified product or unless they have shown a firm commitment to pursue certification in the near future. At this time, THD is working with FSC-certified products only, but it has not ruled out alternative certification schemes.

IKEA, the worldwide furniture and home accessory retailing chain, announced in its purchasing policy statement at the end of 1999 that 'By January 1st 2000, all high-value tropical tree species sold in IKEA stores worldwide must come from forests certified under FSC system or equivalent system. This plan includes tropical tree species such as teak, meranti, rosewood and mahogany.' What was left unsaid is equally important: lower-valued plantation wood or lesser-used species from the tropical regions were not mentioned, nor were products originating from boreal/temperate regions (70% of IKEA's imports). IKEA buys wood products from 56 countries, and distributes them in 28 countries through a chain of standard concept stores.

On the supply side, there are fewer certified furniture products and these are mainly mouldings, edge-glued panels, shelving, or joinery made of certified wood. For example, in Brazil the first furniture company received its FSC chain-of-custody certificate in November 1998. Its main product was garden furniture made of eucalyptus wood, and the accredited certifying body was SmartWood of the United States. The Brazilian producer still sells both certified and non-certified products. Certification is most prominent in the category of garden furniture and has become a necessary ingredient in marketing these products. Partly for this reason, the recent boom in garden and other outdoor furniture has benefited low-value plantation woods much more than teak (Revista da Abimovel, 1999).

In Bolivia, where a major certification effort is being made, the first enterprises to receive certification (in 1998-1999) were mainly producing sawnwood, components, posts, flooring, doors and garden furniture (Bolivia Forestal, 1999).

Certification of further processed products

The certification procedures for **further** processed products differ from those for **primary** products in the sense that the manufacturers of furniture and joinery seldom either own forest or carry out forestry activities themselves. They are normally adding value to the primary processed products (logs, sawnwood, panels) or components, which they buy from timber traders, upstream suppliers or contractors in their supplier network. Since further processing usually takes place at a different location from primary processing, the physical and economic link between further processing and forest management remains weak and rather indirect.

Decisions relating to the quality of forest management do not rest with further processors directly, although they can persuade their contractors to acquire forest management certification and to supply them with certified material through a verified 'chain of custody'. Chain of custody control ensures that the wood does genuinely come from the certified forest. This requires that it is physically marked and separated from other uncertified material throughout the logging, transportation and primary processing stages. If the further processor can show proof of certification (i.e. the certificates) for both the traceability of the incoming timber materials (chain-of-custody) and the quality of forest management, labelling of final products can proceed and the buyers in the marketplace can be informed. It is important to note that after the logs have left the forest there are no requirements relating to the quality of

the further processing itself. Processors may, nevertheless, find it useful to acquire an ISO 14001 certificate, or a similar environmental management system (EMS) certificate for their factories, in order to further strengthen the messages communicated to the markets about their environmental targets and achievements.

If the further processors obtain a price premium for their products made of certified wood, and if the number of certified suppliers of raw materials is limited, there is likely to be competition over the supply source. Makers of garden furniture, for example, who compete on the grounds of sustainability and eco-friendliness in the European markets, will often seek long-term contracts with their certified materials suppliers. In some extreme cases, the further processors may decide that it is in their interests to finance the process of certification of their preferred suppliers in order to ensure that they always have certified wood in stock.

From the further processors' point of view, the key challenge for manufacturing certified and labelled hardwood products is their long-term availability. In the case of softwoods this criteria has been more easily met because their supply is much more concentrated into large forest products conglomerates and in more uniform forests. But for smaller, scattered hardwood suppliers, and especially those of tropical origin with a range of species, the sustainability of certified timber flow remains critical.

It is anticipated that plantation timbers such as eucalyptus and rubberwood would benefit from certification, because it will contribute to their relative importance in the global hardwood trade. Their wider acceptance is also supported by the recent fashion trend in the European markets that favours light-coloured woods. For example, eucalyptus clearly has the potential to stand out as a new, secure and certifiable species for value-added solid wood products. After all, it covers much larger areas than its competitors such as rubberwood or radiata pine.

The influence of retail chains in Europe and in the United States and, to a lesser degree, pressure from consumers have been the driving forces behind the further processors' quest for certified supplies of wood. Although the question of whether market demand for certified products is genuine is somewhat in doubt and currently restricted to a few environmentally sensitive markets in Western Europe, there are signs of certification becoming a mainstream marketing argument and a new kind of product attribute. The supply of certified products made of solid wood has developed faster than that of reconstituted panels, mainly for the following reasons:

- ❑ It is easier with a solid piece of timber to trace it back to its origin and have it certified than it is with reconstituted panels, where complex percentage thresholds are applied to the certified material content and the segregation of raw materials.
- ❑ Panel-making factories are often large-scale operations with numerous log suppliers, who have differing capacities to deal with the forest certification issues.
- ❑ A locally operating sawmill may have a more concentrated log supply system and can rely on contractors that have acquired certification.
- ❑ Solid wood products are increasingly distributed through DIY outlets and retail centres where individual consumers may be more easily induced to choose products based on their environmental quality.
- ❑ At the point-of-purchase, self-service customers more readily notice certified solid wood products with their distinctive labels, while the selling environment for more bulky panels is less 'personal'.

There are very few analyses made on the market demand for and supply of certified further processed products, particularly in ITTO producer countries. This knowledge gap should be narrowed with the help of ITTO. Proposed action to support the certification of further processed wood products in ITTO producer countries is discussed under conclusions and recommendations of this report.

Launching the concept of green value-added products

Certification and labelling of wood products is a useful tool for convincing the markets on the environmental credentials of the wood products. But the scope of certification is so far restricted to the quality of forest management and traceability (chain-of-custody) of the materials, while issues like quality of further processing, recyclability or fairness of trade are not covered. It can be argued that in the case of furniture and joinery, where a mixture of components, materials and chemicals are used, other important considerations are not addressed by certification and labelling. There are already signs of a more sensitive demand for environmental protection at all the stages of manufacturing, sales, transportation and recycling or disposal.

It is worth remembering that the production of value-added wood products on an industrial scale may itself be putting pressure on the environment in several ways:

- Usage of wood, other fibres and non-renewable or synthetic materials;
- Consumption of energy in the processing and transporting activities;
- Emissions into the air and water;
- Toxic or hazardous wastes;
- Excessive use of packaging materials;
- Volatile organic compounds (VOCs) from finished products and materials;
- Transportation during distribution and the disposal of finished products; and
- Contamination caused by discarded materials and the growth in landfill (unless burned or properly recycled).

It is also important to note that by re-using the materials the industry can recover part of the energy, labour and capital consumed in the manufacture of the original products. Furthermore, extending the life of a wood product, through new uses or by remanufacturing, postpones the release of its carbon content into the atmosphere (e.g. by burning).

The broad concept of ‘green’, environmentally friendly furniture was launched in the United States and in European markets in the 1990s, but the subject has not yet received the full attention of ITTO producer countries. One reason perhaps is that in certain markets it could lead to competitive disadvantage. Nevertheless, as a market sector, it is growing. Furniture produced in the Philippines, for example, using ecologically friendly materials has recently met with a positive response from the marketplace, probably more because of its ‘green’ connotations than the originality of its design. The introduction of a national labelling and verification system would be a major step forward, and would enable consumers to differentiate between products on the basis of their overall environmental performance. The Brazilian PROMOVEL programme is preparing on three fronts for the ‘going green’ of the furniture sector: (1) helping companies to implement ISO 9000 standards; (2) making them more receptive to ISO 14000 standards; and (3) developing a national *selo verde*

environmental labelling system for furniture. All these elements will be incorporated in future export promotion campaigns for Brazilian furniture (www.abimovel.org.br).

The calls are getting louder for ‘eco-design’, life-cycle management and for the refurbishment of wooden and other furniture. New criteria are being set for the design and manufacture of furniture, whereby remanufacturing or refinishing should already be taken into account at the devopment stages of new collections. This holds especially true for office furniture, which tends to go out of fashion long before it stops performing from a simply functional point of view. In the United States, for example, the concept of office furniture recycling and refurbishing has been commercialized, with great success. From a grass-roots ‘cottage industry’ (garage sales of second-hand furniture) it has grown into a major organized business. Several hundred specialist companies already, with a combined annual turnover of some US\$ 1 billion, are developing a business that is growing at a rate of 20% annually – much faster than the new furniture market itself (*Asian Furniture News*, 1998).

The recycling of wood products is most viable for larger companies and in areas where the consumers are concentrated. In ITTO producer countries, several major cities exist where this activity would be feasible, especially in Asia. The recycling of household and industrial wastes in various forms is already well established in major cities, but there have been few concerted efforts by the wood industry to carry out research into environmentally preferred materials or methods of increasing their suitability for remanufacturing and recycling. Instead, the industry’s focus has been mainly on adapting production to raw material shortages through the use of plantation timbers, and the more efficient processing of wood (i.e. bending components rather than curve-sawing, edge-gluing or laminating them). In most cases, these developments have not been voluntary but forced by external circumstances.

Among the ITTO consumer countries, those in Europe are already imposing various laws, directives and agreements on furniture manufacturers, describing how to achieve environmentally friendly standards and to comply with the rising demand for recycling as well as the use of less harmful compounds. These requirements will also apply to foreign suppliers. In the retail trade, systems are already in place and pallets are in use for the full collection and recycling of packaging materials, but they have not yet been applied to wood furniture.

In Asia, both Japanese and Chinese consumers are being encouraged to recycle and exchange discarded items. In China, for example, windows, doors and interior fittings from demolished buildings are being collected and re-used in the making of traditional-style furniture. Contrary to popular belief, the Chinese market actually represents great potential for exporters of environmentally friendly wooden furniture that declares its ‘green’ properties. Demand is growing, especially among the younger and wealthier consumers, who are aware of, and concerned about, the current depletion of China’s own domestic natural forest cover. These are also quality-conscious buyers, whose requirements are ahead of the current design and manufacturing capabilities of Chinese furniture manufacturers. Convinced by the rising demand, several leading European furniture brands have already established themselves in the Chinese market.

Chapter 7

Conclusions

Asia-Pacific

There are signs of significant increases in the domestic consumption of wood resources in the Asia-Pacific region. This is probably because of population growth, economic growth and most importantly a greater emphasis on exporting value-added products. Exports of value-added products last expanded rapidly prior to 1997-1998. Latest reports suggest that exports from Malaysia, Thailand, Indonesia and the Philippines are rising again, probably owing to the competitive advantage gained from the devaluation of their currencies. These countries remain the largest exporters of value-added products in the region, among the ITTO member countries.

Capacities in the other five ITTO producer countries (India, Myanmar, Cambodia, Fiji and Papua New Guinea) have not yet expanded to the extent that they can be regarded as significant value-added product exporters. These countries are large producers of tropical logs and, for the majority, their exports of primary products such as logs and sawn timber have been the mainstay of their economies. Exceptions to this are India, a net importer of wood material needed to cater for its domestic demand, and Fiji, which is showing definite signs of reducing its exports. India is increasing its production capacity to meet the large domestic market, and this development has contributed to a small growth in the exports of value-added products. From a resource perspective, Myanmar, Cambodia and Papua New Guinea are resource-surplus economies, while Thailand, the Philippines and India are resource-deficit economies. Malaysia, Indonesia and Fiji can be categorized as resource-sufficient economies.

Available data suggest that value-added processing industries are growing in significance in countries such as Malaysia, Thailand, Indonesia and the Philippines. They appear to have well developed manufacturing bases already and sufficient supplies of competitive production resources, such as raw materials and labour. The shift towards the manufacture of value-added products in these countries has been largely the result of government efforts. The reduction in exports of primary commodities has forced factories to move up the value-chain towards the value-added manufacturing sector.

Compared, however, to Italy, the world's largest exporter of furniture, the industries in these countries appear to be a long way behind. Generally, most of the products they export are made-to-order, with little innovation or design input, which means that they do not fetch good prices in the global furniture marketplace. In fact, the main selling point for their exports is price competitiveness, which inevitably requires low-cost production parameters. There is a growing need to add more value to these products by the injection of technical and design know-how into the industries, something which the existing support services and infrastructures in these countries cannot provide.

With a greater emphasis in the future on further processing among ITTO producer countries, exports of value-added products from this region are poised to grow. How successful this sector becomes and how important a contribution it makes to the export earnings of these countries will depend on how effectively the shortcomings identified earlier are tackled. With growing exports of value-added products from resource-deficit countries such as Thailand and the Philippines, there will also need to be more imports of resources into these countries.

A brief SWOT analysis of the Malaysian wood processing industries is presented in the box below. It has been adapted from an article prepared by Dr J. Ratnasingam, who worked as a consultant for this study. It should be noted that all countries have their own individual sets of local factors and so a different scenario will result from each analysis. Even though the industries, for example, of Indonesia, Thailand and the Philippines are by and large influenced by the same **global** conditions (supply and demand trends, certification, distribution), the prevailing **local** conditions in areas such as raw material supply, labour markets, government incentives and institutional support would produce different results.

In the final analysis, it may be argued that the growth of the value-added products sector in the major exporting countries in the Asia-Pacific region has been driven primarily by the availability of low-cost production parameters. With costs escalating and the supply of tropical timbers diminishing, this scenario is expected to change in the future. There is a need for these countries to consolidate production capacities and at the same time ensure a shift towards the manufacture of products with higher value-added content. Consolidation may take the form of new selling schemes, strategic alliances or mergers, etc.

SWOT analysis of Malaysian wood processing sub-sectors				
Sub-sector	Strengths	Weaknesses	Opportunities	Threats
Sawmilling	<i>Quick cashflow; low capital but good returns; market demand</i>	<i>Reducing supply of logs; minimal value added</i>	<i>Vertical integration; going downstream</i>	<i>Timber certification; hardwood bans, commodity market; elastic supply</i>
Panels	<i>Greater value added; growing global demand</i>	<i>High capital outlay; availability of future supply of resources</i>	<i>Downstream activities; government incentives</i>	<i>Oversupply and competitive markets, commodity item</i>
Mouldings and joinery	<i>Higher value added; established market niche</i>	<i>Reliance on construction performance and on foreign labour; high capital outlay; integration with sawmills</i>	<i>Fast growth; ample government incentives</i>	<i>Becoming commodity market unless products differentiated</i>
Furniture	<i>Very fast growth trend; established manufacturing base; environmentally sound raw materials (rubberwood, fibres, bio-composites), united motivation and organized approach towards industrialization</i>	<i>Excess capacity, lack of product differentiation; lack of design skills; fragmented SME-industry; low capital and technology outlay; highly elastic supply; dependence on foreign labour, management skills</i>	<i>Priority status and incentives from government; higher value added would reduce competition; new materials; capture retail and move up on value chain</i>	<i>Commodity market; concerns over supply of labour and raw materials; growing competition from other emerging exporters</i>

Source: Adapted from Ratnasingam, *Asian Timber*, 1999.

The major factor affecting the global value-added products sector in the period under review was the economic crisis that began in Asia in mid-1997 and which had negative impacts on all major markets by late 1998. Trade in value-added products was not as severely affected as that in primary commodities. The figures shown in this report indicate only a marginal decline in 1998, with growth returning in 1999. The recovery in export levels was partly a result of currency devaluations in the region, which made products even more competitive. On this basis, export figures for the year 2000 are expected to show a further surge forward.

With the notable exceptions of Malaysia, Indonesia, Thailand and the Philippines, *further processing of tropical timbers in the producing countries of the Asian ITTO region has not yet reached a prominent status, and therefore the potential is far from being fully realized.* But signs of change are appearing. With exports of primary commodities gradually being reduced and with population levels growing, demand for value-added products will increase domestically. Current exporters would also benefit from an injection of technical and design know-how into their industries, to help them move into the manufacture of higher value-added products, and provide the extra competitiveness much-needed in the future. Further processing of tropical timbers in the Asia-Pacific producing countries of ITTO has great potential as an industry and certain areas can develop into significant players in the world market in years to come.

Latin America-Caribbean region

Seen from the perspective of resources, most of the Latin American producer countries are under-utilizing their true potential. The resource base of the Amazonian region is the largest of its kind in the tropical world and, contrary to the opinions of environmental extremists, is still largely intact. There are considerable potential amounts of lesser-used species, which have not been over-commercialized. At the same time, a few mainstream species such as mahogany have been the subject of some debate over their sustainable extraction and considered for inclusion in the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) listing.

In many countries in the region, the key constraints on the development of the processing industry come from the lack of effective forest and industrial policies, and poor governance and law enforcement in the forests. This easily leads to environmental controversies and infrastructure-related physical obstacles, which constantly interrupt progress. Hopefully, the newly revised forest policies in the Latin American producer countries will eventually help to alleviate these problems.

As the governments have not really been supportive of industrial development, enterprises have suffered from, among other things, a lack of investment capital at a reasonable cost. Normal bank loans come only with high interest rates, which puts companies under enormous unnecessary pressure just to finance their basic needs. Low levels of institutional support in areas such as product development, quality labelling, and design and technology upgrading, set additional hurdles in the way of development. Also, the absence of a dynamic domestic market for wood products has meant that companies have not been able to build up the necessary business and marketing skills, which would help their entry into the exporting trade.

Despite these disadvantages, however, the Latin American countries are, each in their own way, exploring how to increase their share of added value

wood products in export markets. To this end, Brazil has started the most impressive programme, namely the PROMOVEL programme implemented by ABIMOVEL. The results have been encouraging so far, with furniture exports in the first quarter of 2000 exceeding 1999 first quarter figures by 42.5%.

Bolivia is investing heavily in timber certification, with the aim of capturing specific environmentally sensitive markets that it has the ability to supply, which at present are the United Kingdom and the United States. Securing a steady, dependable supply of wood remains a key challenge in several countries of the region, despite the overall abundant availability of hardwood timbers in natural forests. In both Honduras and Ecuador, the industry's development is particularly challenged by wood supply constraints, as well as a lack of incentives and the high cost of investment capital.

The development of **further processing** is much more company-driven in Latin America than in Asia. But, as the example of Brazil's multi-faceted, inter-agency development programme shows, the adverse conditions placed in the way of sector export programmes by local governments may be gradually changing. Currently, imports of furniture and other further processed products constitute a trade deficit in six of the eleven countries in the region.

Africa

For most western and central countries in Africa, **further processing** still represents a very small, often negligible, proportion of the forest industry. In some countries, even **primary processing** remains a goal yet to be achieved. In nearly all countries, there are no government incentives for further processing. In the African context, the objective of 'value-added' or 'further processing' means little more than increasing the primary processing of logs.

African tropical timbers have long provided distinguished redwoods and whitewoods, mainly to the Western European markets. The most desired species have become established trademarks and play important roles in the wood flows of, for example, France and Italy. On average, African tropical timbers are lighter than many of the heavier, utility timbers from other tropical regions. This characteristic should be taken into account when developing demand-driven further processing in Africa. Another positive product attribute is that there is less colour variation between the species. It would therefore be comparatively easy to find substitutes for common species, but consumers and traders need educating in their uses, properties and names. Generally, exports of value-added products from the region would benefit from more promotion in the consumer markets of the advantages of African timbers.

It is doubtful, in many countries, whether the current harvesting levels of the most popular species can be sustained. The long-term balance between the capacity for primary production and the sustainable harvest level has not been reliably established. In most countries visited, there appears to be no realistic possibility of the much-needed future economic growth being built upon the foundation of forest industries by simply increasing harvesting levels.

Future development of the forest industries can come only from adding value to the existing – and often declining – resource, and to the products derived thereof. For some countries, this still translates into more **primary processing** – for them all to succeed, it will mean more **further processing**. Processing activity is at a standstill and investments are frozen in many countries, however, due to political, social or tribal unrest. Three countries in the region are currently in a state of war, or at least total insecurity: the Congo, the

Democratic Republic of the Congo and Liberia. Without a drastic improvement in the security of people and businesses in the further processing sector, no progress in these countries can be envisaged.

There are very few independent further processors in African ITTO producer countries, and no market for primary products (sawnwood) of any real quality exists. It would be very risky today to start an independent further processing or remanufacturing plant in western or central Africa without the firm assurance of primary product supply. In most countries visited, even the primary producers have concerns about the future supply of raw material.

Lower costs of raw material and labour are not sufficient on their own to guarantee the competitiveness of African further processed wood products. Modern machinery and know-how are needed as well. Whatever the size of the producer and the nature of the value-added product, a partnership with a company with proven expertise in overseas marketing and the distribution network is still the strongly recommended way to go in this region.

Too often, African companies do not realize the potential gains that better technical management of their plants could bring. Benchmarking programmes focusing on the main products (e.g. profiled boards, flooring strips), should be established to allow further processing companies to evaluate their own performance – and possible improvements – in comparison with similar companies in their own country.

Conclusions on processing technologies

Evolution of processing technologies

The further processing industries do not necessarily pass through all the steps of processing technologies identified in this chapter. Many companies die along the way; others change into a different structure through buy-outs, mergers or acquisitions. Companies may evolve through these steps but if investment funds are sufficiently available, production can be started straight from categories 3, 4 or 5.

Firms of all types and sizes are important locally as a source of employment and income, and there are some countries where every category exists. Experience shows that most enduring and successful companies have tended to evolve through all the development phases or categories. The key challenge for ITTO producer countries is how to accelerate the process.

Research and development or design

The ability of the further processor to devote time and effort to R&D or design varies according to the size of the enterprise. Craft or mechanized-craft level manufacturers seldom develop any products of their own: rather they copy items brought by their clients, or produce from rough sketches or photos.

Larger domestic market-oriented furniture makers produce in longer series and again usually obtain their designs from the client, such as a local hotel, bank, insurance company or school, or from their overseas customers. The more sophisticated of these firms take into account waste minimization of panels and commercially available cross-sections for their sawnwood. These types of contracts are important capacity-builders from both a technical and a managerial point of view (improving their costing, production planning and quality control systems).

In the next phase, the most successful firms, having gained experience in the local markets, may take the crucial step into exporting, with the larger volumes involved. Yet, in the fight for orders, they are often prone to giving way too easily on the price. This is because the owner of the original design is in a position to estimate the costs of production, visit several potential suppliers and award the contract on the lowest price basis. If they wish to avoid being in this situation, producers have the following options:

- Rely on the services of a design centre (usually not product specific) and preferably one set up by national authorities or trade promotion agencies;
- Set up own design departments and employ in-house designers; or
- Use freelance designers on a royalty basis, which is common practice in Italy and Scandinavia.

If adopted successfully, the freelance designer system could be of great benefit to the furniture industries of the tropical timber producer countries, by providing them with genuine, marketable furniture designs in the future. The use of foreign designers on an 'as needed' basis would help reduce the risk of failure when entering export markets. The usefulness of in-house designers tends to depend entirely on their levels of skill and general awareness.

The lack of specialist research institutes serving the further processing industries is a serious institutional shortcoming in nearly all the ITTO producing countries. There is a growing need to inject technical and design know-how into the furniture and joinery industries to fill this gap. International organizations such as ITTO, ITC and UNIDO could develop a more prominent joint strategy to supply technical assistance on this area. The aim of any assistance given would be to support and ultimately to establish, where necessary, national research institutes. Ideally, this should involve training of the local staff on an exchange basis in the research units of the more advanced countries.

Selection of appropriate equipment and maintenance

The majority of SMEs have not yet realized that it pays to specialize and to adjust the machinery selection accordingly. It is therefore extremely difficult for them to balance production capacity between machines, or groups of them, which results in idle capacity and lower profitability. It would be useful to introduce a systematic approach to equipment selection for SMEs, such as the one laid down by UNIDO's *Woodworking Machinery: A Manual on Selection Options*.

When firms decide to expand and specialize, they immediately find themselves having to devote more time to the selection of equipment, the factory layout and to auxiliary installations such as dust extraction and compressed air circuits. More emphasis is also placed on tool and machine maintenance. Attempts have been made to offer centralized maintenance services to small enterprises on a leasing basis, to alleviate the pressures on their scarce working capital. This is often most easily accomplished as a common service facility where a 'furniture village' or similar arrangement is established.

Since most of the non-wood operating supplies are not produced locally, the efficiency and timeliness with which they are delivered can create bottlenecks. Companies may also be penalized by the very high import duties that they have to pay on imported supplies, which again puts them at a disadvantage to their competitors in the developed countries. When countries' processing

industries scale up, the larger ones soon start to produce most of their woodworking machines and tools domestically. Examples of this can be seen in the big two ITTO producer countries, Malaysia and Brazil.

Human resources needs

The further processing industry will be competing in its domestic labour market with other industrial sectors. It will have to offer better conditions and more interesting possibilities for further education if it wants to attract and eventually recruit young students, and at the same time hold on to its existing qualified personnel.

The most pressing training needs are found to be in the following areas:

- The traditional training of craftsmen, through formal or informal apprenticeship schemes;
- Wood drying and saw doctoring (process control, defects, etc.);
- Modern adhesives and surface finishes, and the correct use of hardware fittings in knock-down furniture;
- Training of machine operators for factories that produce in long series (instead of machine woodworkers);
- Training of capable middle managers and technicians;
- Training of furniture designers specialized in the design of products for industrial (serial) production.

Quality labels

National furniture quality labels have definitely contributed to the successful entry into foreign markets of countries that have had them. So far, not one of the ITTO producer countries has an internationally recognized quality label of its own, even though the leading enterprises have reached the level of compliance with, for example, ISO standards (9000, 9001, 14000, 14001 series).

Caveat

A country may overcome all the potential above-mentioned problems and develop its further processing industry to the point where it is competitive and can enter any export market, but it can still fail – unless it concurrently takes the necessary measures to manage its forest resources on a sustained-yield basis. Furthermore it must succeed in informing and convincing the markets (buyers and environmental groups) in the consuming countries of its achievements in this respect.

As long as they are not convinced, consumer markets can block the producing countries by banning imports of their wood products. Environmentally wary state or municipal authorities may be persuaded to do the same. To succeed in the more advanced consumer markets of today, wood products need the support of consistent and long-term promotional and public relations campaigns based on verifiable environmental facts, which go hand in hand with the development of the further processing industry.

Chapter 8

Recommendations for future action

Structure of recommendations

Several possible lines of future action for pursuing the development of the further processing sector were identified during the fieldwork and through contacts with government agencies and industry associations. The contents of the chapters that follow draw upon the opinions collected from the field, which have then been streamlined and prioritized into more tangible action proposals.

At the request of the ITTO Secretariat, the recommended action thus compiled is that which would have a direct impact on the further processing industry. The conclusions made at the end represent the opinions of ITC as the leading agency in the further processed wood products sector. A preliminary screening of priority action proposals has been made by ITC and is presented for ITTO's consideration immediately following the list of recommendations. Careful planning and close collaboration between ITTO, ITC, and any other international organizations, should precede any future decisions to be made on programme focus or project priorities.

Recommendations for ITTO

Recommendations for ITTO on international level

Promote sustainably produced tropical timber and further processed products derived thereof, in the international markets

- Support the preparation of export promotion materials on the further processed products of tropical origin made from an environmentally benign raw material, which has a rich variation of valuable properties (health aspects, structural properties, appearance, insulation, recycling, carbon store, etc.) that cannot be offered by substitutes;
- Prepare and disseminate publicity material which highlights the potential of further processing to rationalize the use of forest resources, and to offer an internal incentive for sustainable forest management;
- Defend and train the tropical wood industries against falling victim to discriminatory trade practices and negative publicity in international fora;
- Disseminate information on suppliers of sustainably produced further processed tropical wood products from producer countries, to buyers in the international markets (preferably through online databases with free access).

Conclusions

Following its May 2000 session in Lima, Peru, ITTO established a new Communications and Outreach Programme. All the promotional activities required for tropical timber products should be addressed in a concerted manner under the chosen umbrella strategy.

A particular threat to tropical timber products has been the well organized lobbying campaign against timber organized by competitive materials industries, mainly plastics and steel, that are backed by strong multinational financial interests. This lobby has concentrated its attack on timber by putting the spotlight on the ecologically damaging practices of logging. Thus timber gets little or no credit for its natural properties, for having natural sustainability or for being the product of a growth process that benefits all life on earth. In the public relations arena, the fragmented timber industry has not been able to fight back in any collaborative manner against the exaggerated and unbalanced argumentation used by determined suppliers of non-renewable materials.

Ironically, the recent heated debate over climate change has brought into the plantation forestry business new players (e.g. oil multinationals) that are, in fact, also partly behind the strong lobby for plastics. In the follow-up process to the Kyoto Protocol, more scientific evidence has been accumulated for the beneficial role played by forests in alleviating the effects of global warming. ITTO may want to link its future outreach activities and environmental reporting even more closely to the scientific domain of climate change.

Other key arguments in favour of further processed tropical wood that could be used are:

- ❑ Its lower energy consumption when manufactured into building products (compared to steel, plastics, aluminium);
- ❑ Its high natural insulation properties;
- ❑ The fact that tropical wood is usually consumed in the form of products with long-lasting uses means that it has the ability to lock away almost permanently (for the life-cycle of the final product) the carbon stored in the wood during its growth period. At the end of their life, further processed wood products may be recycled or incinerated for energy.

Combining all these beneficial properties, the concept of 'green value-added wood products' should be launched as a generic promotional tool.

Improve market and product information, and export promotion

- ❑ Collect and disseminate to producers comparative information on product quality requirements (tests, tolerances, gluing, finishing), environmental standards and purchasing policies of the major distributors and retail chains, as found relevant to tropical timber and lesser-used species;
- ❑ Carry out in-depth surveys on the demand patterns and prices for further processed products in the major markets, including products of lesser-used species and certified wood;
- ❑ Keep producers abreast of the development of electronic commerce in the wood products sector by means of:
 - Analysing its opportunities and threats to tropical wood processors;
 - Revealing the current adoption rates and growing importance of e-commerce in trade;
 - Supporting the adoption of productive e-commerce practices and tools;

- Improving the cost-efficient access of ITTO producers to the electronic marketplace;
- Supporting the build-up of human skills base for e-commerce in producer countries.

□ Help organize international or regional conferences on the pertinent aspects of further processing (markets, technologies, certification, etc.) in ITTO producer countries.

Conclusions

This action proposal would require the expansion of the ITTO MIS: Tropical Timber Market Report, as well as ad hoc market studies or updates of reports such as the ITTO/ITC (1990) joint publication entitled *Wooden Household Furniture: a Study of Major Markets*. Significant changes in trade flows, distribution, tariffs, and furniture finishes and styles have emerged and should be brought to the attention of ITTO producers. A new edition of this study could also inform ITTO producer countries of current progress on key topics, such as certification and e-commerce in the field of further processed products.

E-commerce is deeply rooted in the mandate and current agenda of ITC. An ITTO-sponsored project could build capacities in the tropical producer countries to take advantage of the boost to efficiency and competitiveness that is offered by the adoption of digital economy tools in the sales and marketing of further processed wood products. It is important for ITTO producers to be informed of the very different levels at which e-commerce is becoming established in the business-to-consumer (B2C) sector compared to the business-to-business (B2B) sector.

ITTO and ITC could jointly plan and implement virtual exhibitions of further processed wood products in conjunction with major trade fairs on furniture and other wood products. Online trade promotion would shorten the distance gap between developing country producers and importers or wholesalers in the consumer markets – avoiding the necessity of having a physical products display and staff at the fair site.

Furthermore, either ITTO MIS, or a separate information circular co-produced with ITC could publish data on quality and environmental standards, purchasing policies of the major buyers and market-driven evolution of distribution systems. ITC's Wood Products homepage on its Internet website could become a focal point for information on these topics.

ITC is preparing to significantly improve the coverage of its technical paper 'Secondary Processed Wood Products – Overview of Major Markets' and to tie in its annual updates with a conference on value-added wood products planned to be held either in Geneva or in one of the producer countries. The core contents of the event should focus on supply and demand trends, international trade, market development, processing technologies, R&D and design. ITTO producer country delegations could find this a useful forum for engaging with several development organizations as well as major private-sector agents (importers, distributors, consumer groups, NGOs, designers, etc.).

Some cost-sharing and content options for the event are as follows:

□ Run the conference jointly with other interested agencies such as UNIDO, which could deliver its expertise in processing technologies.

□ Secure a firm commitment from ITTO to sponsor and utilize this new permanent forum for formulating and implementing ITTO's project pipeline on further processing.

- Arrange the conference in parallel with major national fairs on value-added wood processing in key tropical timber producer countries, with tailor-made agendas addressing the needs of producers in the Asia-Pacific, Latin America-Caribbean and Africa regions – according to the venue.
- Apply a regional approach because market and production conditions differ strongly; Africa should be granted priority status among regions owing to its greater need for direct support (the 2001 ATO/ITTO regional conference on further processing of African tropical timber made a good start in this direction).

Listed below are possible areas in which ITTO and ITC could jointly assist producer countries in the certification and labelling of further processed products:

- Assess the impacts of certification on further processed wood products and their manufacturers, most of whom do not own forest but procure their raw materials and components from subcontractors.
- Collect, exchange, analyse and disseminate information on timber certification and labelling standards, and the arrangements in different parts of the world, with special reference to further processing.
- Carry out in-depth market research on demand and supply of certified further processed wood products, and price structures.
- Organize the generic promotion of certified wood products exported by the developing countries, linking it to the promotion of sustainable forest management.
- Support pioneering further processing enterprises with tailor-made programmes to implement certification within their local situations.
- Coordinate capacity building and institutional strengthening in this field (e.g. standardization bodies, national institutions for accreditation).
- Support studies on non-conventional raw materials, imported consumables, and industry restructuring:
 - Commission detailed studies on product-specific applicability of lesser-used species (LUS), plantation timbers, products made of other fibrous plants, and the possibilities for introducing new combinations of materials.
 - Compile information on the achievements in R&D of non-conventional raw materials, and help provide the testing skills and facilities necessary to meet the challenge.
 - Carry out comparative studies on the availability, prices and distribution of production materials other than wood used in further processing industries (imported supplies such as machine spares, tools, lubricants, abrasives, chemicals, finishes, etc.). Their overpriced and limited supply often creates a bottleneck that impedes the development of further processing.

Conclusions

It is evident that in many of the ITTO producer countries there will be a greater utilization of LUS and plantation woods in the future. The growing scarcity of the commonly traded species has put the emphasis on bringing forward and promoting LUS. The maturing of the manmade forests planted in the 1970s and 1980s (with the support of governments and various development programmes)

will provide harvests of plantation timbers in the next 10-15 years. The potential importance of these plantations, from the viewpoint of further processing, has perhaps not yet received the appropriate amount of attention.

Industries have already started to make the technological adjustments needed to be able to utilize both of these new material sources, but market adaptation and the promotion of products are subjects that have not yet been proactively addressed. ITTO has already carried out a great deal of basic research on LUS, and the development projects should be built on this knowledge base. Case studies describing experiences of launching new species (e.g. product ranges using rubberwood, eucalyptus, tropical pines and gmelina) into markets are available for reference.

Both LUS and plantation species could benefit also from a promotional push for certification in the consumer markets, thus helping the producers to progress the incorporation of environmental advantages into their products. In most cases, the further processing industry is no longer directly involved in logging, but buys sawnwood, components or panels from primary producers. It is therefore a major challenge for further processors to see that market requirements for certified wood products are built into the operations of their suppliers.

One problem area that fell outside the original scope of this study was the malfunctioning of the distribution of imported supplies other than wood (notably spares and tools, chemicals, finishes, other consumables). Market imperfections are commonly found in many ITTO producer countries, and particularly in Africa. They may result from a single supplier's performance, excessive pricing, high import duties, inflated transportation costs, delayed deliveries, etc. Overcoming these types of obstacles erodes the competitiveness of tropical further processors, who need imported supplies to be able to produce competitive and marketable products of the required quality. This subject area is seldom surveyed, but a better understanding would contribute to the transparency of the supplies markets and to the competitiveness of ITTO producers. A comparative analysis of the supplies markets in selected countries would help the ITTO producers both to search for alternative supplies at more favourable costs and to overcome some of the market imperfections.

Support the international dimension of human resources development

- Prepare training materials and support regional or national training centres to improve the skills of local trainers for the further processing industries on subjects such as optimised sawing, wood drying and saw doctoring (process control, defects, etc.), which will eventually benefit the quality of parts and components;
- Help managers, technicians and furniture designers to participate in training courses abroad;
- Inject some design skills and know-how into the industries of ITTO producer countries by engaging companies with freelance designers from the main ITTO consumer countries.

Search for innovative approaches to technology transfer and financing

- Promote technology transfer, joint investment and the improvement of technical and design skills for the further processing industries through partnerships between ITTO producer countries and consumer countries;

- Identify the availability of green financing (ethical or fair trade foundations, climate funds, etc.) and other forms of non-conventional capital investment in sustainable tropical forestry and downstream further processing.

Recommendations for ITTO at a country level

The proposals are, of course, subject to endorsement by the respective governments and are dependent upon their priorities. The activities listed here could serve as the components, or modules, of ITTO's **blueprint** project on the development of further processing in producer countries, which is under consideration.

Strengthen the strategic orientation of SMEs and institutions involved in further processing

- Support the analysis of competitive advantages possessed by producer countries and the preparation of sector development strategies for further processing;
- Support the establishment of new trade and industry associations, help develop their agendas, and strengthen the services provided by existing national associations for the further processing industries;
- Formulate and implement product-specific marketing assistance programmes for SMEs, and provide information on niche markets (e.g. hand-carved furniture, car fittings), component trades, contract furniture markets and other emerging possibilities for exports.

Conclusions

At the national level, the feasibility of a **programme approach** to the support given to further processing should be considered; i.e. within the framework of existing industrial plans in producer countries. Suitable examples of such programmes (e.g. in Malaysia) are available for reference. A pilot programme could be developed in one producer country, then modified and implemented in others based on the lessons learned.

The following could make up the key elements of such a programme:

- Raw material analysis
- Cost analysis
- Infrastructure development
- Market analysis
- Clustering and SWOT analysis
- Upgrading and transfer of processing technologies
- Human resources development
- Implementation of forest certification
- Export promotion
- Investment promotion and joint ventures

Support targeted at the company level

- Support marketing missions and the production of innovative export promotion materials. Adopt e-commerce tools in pilot enterprises and disseminate the experience gained;
- Analyse the opportunities for and constraints to networking among further processing enterprises, and promote appropriate methods of increasing co-operation and improving supplier networks;

- Provide training and support to optimize the efficiencies of sawing techniques, kiln-drying, appropriate use of jigs, quality control and finishing methods;
- Support further processing companies in efforts to attain forest management and chain-of-custody certification, and in convincing their sub-contractors to follow suit;
- Improve knowledge of and access to appropriate technologies in further processing through the provision of technical data, contact with suppliers (fairs, magazines) and facilitation of bilateral or multilateral technology transfer projects.

Conclusions

In giving assistance at the company level, a **step-by-step approach** could be applied to project design, the first step being to carry out some supply and demand analysis. A larger number of enterprises would then benefit from the dissemination of the analysis across the sectors.

Once a broader picture of the industry and markets at this level has been ascertained, a group of companies would be selected for a programme of more practical assistance. This might, for example, comprise a study tour or trade fair visit, technical advice on restructuring and product development, and support and advice on marketing and export promotion. ITC's considerable experience in enterprise-level product and market development could play a pivotal role in establishing ITTO's approach in this area of activity.

Recommendations to governments in the ITTO producer countries

- Prepare and implement comprehensive and consistent development strategies for further processing industries including, as appropriate:
 - A consistent policy for supporting sustainable raw material procurement and further processing, as opposed to regulation by complex rules and ad hoc restrictions;
 - Tax concessions or similar fiscal incentives;
 - Appropriate export regulations;
 - Free trade (export) zones with a horizon corresponding to investors' planning cycles;
 - Rationalization of import tariffs on raw materials and equipment;
 - Improvements in transportation, communications and information infrastructures;
 - Strengthening of the institutional infrastructure that supports industries (associations, research institutes, export promotion offices, etc.).
- Support the development and implementation of national training programmes on further processing, with the emphasis on middle managers and technicians, and with the following training priorities:
 - Training of craftsmen, through formal or informal apprenticeship schemes and national training programmes;
 - Improving skills in the correct use of modern adhesives, surface finishes and hardware fittings in knock-down furniture;

- Support the training of machine operators for factories that produce in long series, e.g. by means of staff exchange programmes or a 'train-the-trainer' approach;
- Develop training course curricula and launch an education programme for furniture designers specializing in creating marketable designs of contemporary products for industrial (serial) production;
- Provide targeted (preferential rate) credit lines for the acquisition of further processing technology, working capital, factory construction and sustainable forestry.

Conclusions

In certain ITTO producer countries, many of the recommended actions, in various forms, have already been taken. Some items on the 'wish lists' of governments are not, however, compatible with the current economic policies of some other producer countries. In the leading producer countries of Asia, in particular, where the governments have been the driving force behind the building of value-added exports, several of these pre-conditions of expanded further processing have already been met. In Latin America and Africa, governments have taken few such measures so far, and development has been largely driven by individual enterprises.

Recommendations for industry and trade associations in the ITTO producer countries

- Bring the initiatives and aspirations of the industry more strongly to the attention of ITTO and other international organizations, and use the opportunities of various international fora to promote the interests of further processing industries;
- Collect and disseminate statistics, comparative information and studies on domestic further processing industries across competing countries;
- Carry out cost-efficient market and investment promotion, and publicity campaigns in a coordinated manner;
- Encourage the implementation of international quality standards and management system standards, as well as technical norms pertinent to further processing, and provide the necessary inspection services;
- Identify non-traditional sources of finance and new technologies and make them available to the further processing sector.

Proposed priority projects for ITTO

Based on the above recommendations, ITTO could consider the implementation of the following as priority projects:

A regional or prioritized country project to develop further processing of tropical wood in Africa

This follows up directly from the 2001 Libreville ATO/ITTO regional conference on further processing of African tropical timber. A viable project approach could serve as a model for other regions or sub-regions.

At the country level, the feasibility of a **programme approach** in supporting further processing in Africa should be considered, reflecting the experiences of

existing industrial master plans in other producer countries. A pilot programme could be developed in one producer country, and modified and implemented in others at a later stage, based on lessons learned.

The key elements of such programme could include:

- Raw material analysis
- Cost analysis
- Infrastructure development
- Market analysis
- Clustering and SWOT analysis
- Upgrading and transfer of processing technologies
- Human resources development
- Implementation of forest certification
- Export promotion
- Investment promotion and joint ventures

Carry out market research and disseminate reports on further processed wood products in the main consumer markets (the United States, European Union and Japan)

Several ITTO producer countries have stressed the need for more up-to-date market information. Irrespective of the region, producers feel that they are not adequately informed on their export markets. The international furniture markets, in particular, have undergone significant changes over the past decade, and the repercussions have not been understood or properly interpreted by many ITTO producers. In-depth market research on demand and supply of certified further processed wood products and their price structures in the major markets, and analysis on the implications of certification for manufacturers and for sustainable forest management, should form a part of the project work.

Regional conferences on the pertinent aspects of further processing in ITTO producer or consumer countries

Based on the experiences gained from the 2001 Libreville ATO/ITTO regional conference on further processing of African tropical timber, other regional conferences (Latin America-Caribbean and Asia-Pacific regions) could be organized.

Key topics would include supply and demand trends, international trade, R&D, design, export promotion, certification, e-commerce, and processing technologies. These conferences not only improve the skill and knowledge of industry managers, but they would also serve as catalysts for other projects in the region.

In the interests of both synergy and cost-savings, it would probably be best to arrange for the conferences to take place alongside existing major international fairs on value-added wood processing in key tropical producer countries. Agendas could be tailor-made to address the specific needs of producers in the regions. ITTO producers should find this a useful forum for engaging with several development organisations as well as major private sector agents (importers, distributors, consumer groups, NGOs, designers, etc.). The promotion of public-private partnerships could be added as a new ingredient of future ITTO-supported conferences on further processing.

Collaborative projects on (i) promotion of technology transfer and joint investments, and (ii) the injection of technical and design skills for further processing industries

Collaborative projects between ITTO producer and consumer countries could be implemented in the fields of technology transfer and investment promotion, on a partnership basis (South-North cooperation). The aim would be to facilitate access by producer country enterprises to the technology and environmentally motivated capital funds of the consumer countries, who promote the responsible use of renewable natural resources. The sustainability criteria set out by such funds would have to be strictly fulfilled, and the social dimensions of industrial development properly addressed. Executing agencies could be found among the regional financing institutions, industry associations, technical cooperation agencies and research institutions. Furthermore, South-South cooperation in similar fields could evolve, for example, around Malaysia and Brazil as regional powerhouses of further processing and related technologies.

ITTO could facilitate the process by preparing guidelines and codes of conduct for implementing joint projects, and by convening meetings between the potential participants from producer and consumer countries. This would also serve to deepen ITTO's own relationships and interaction with the private sector and with the non-conventional funding channels for sustainable forestry.

Technical and design skills could be upgraded by means of staff exchange or training courses in the testing laboratories and design institutes of the more advanced countries. This approach would help the producer countries to narrow the skills gap between them and their export markets. Ideally, this would bring the skills in quality control, technical testing and design up to an acceptable level from the consumer countries' point of view. Freelance designers from consumer countries could be involved.

A pilot project with one producer and one consumer country could be designed by ITTO in order to plan and test the methodologies for the new project concept described above.

Creation and implementation of national educational and training programmes on further processing, with emphasis on (i) machine operators for serial production, (ii) middle managers, and (iii) designers

The category of companies likely to be most receptive to technical support from ITTO is medium-sized processors that are already capable of serial production. They have probably just about reached a scale that could be described as 'industrial' and now want to embark on exporting. Training and retraining will therefore be required, in a number of different areas:

- Machine operators need to be trained to deal with the higher levels of production and stricter quality control requirements.
- Raising the scale of operations like this puts extraordinary pressure on middle managers. Their management skills need to be upgraded, new production planning methods must be applied and export procedures have to be learned.
- The training for furniture designers should focus on products for serial production, correspondingly. Here, designers from the export markets themselves could be brought in to undertake some of the training.

- ITTO itself might fund and organize a series of regional or national training courses **for the trainers** of machine operators, furniture industry managers and furniture designers from the producer countries – after a few initial pilot courses, perhaps. ITTO already has some experience of training courses in producer countries.

A pilot project to facilitate the adoption of e-commerce tools in the export promotion of further processed products of tropical origin

A project sponsored by ITTO, to show tropical timber producer countries how to use the tools of the new technology in the sales, marketing and export promotion of further processed wood products, could build capacities and boost their efficiency and competitiveness. (Note: it would be important in this respect to advise producers of the differences in levels of e-commerce uptake between the business-to-consumer sector and the business-to-business sector, the latter being much higher.)

Appendix I

Methodology

A multinational consultant team was assigned to carry out the work:

Table 1 ITC's consultant team

Name	Title	Nationality	Region/responsibilities
Jukka Tissari	ITC Market Development Officer	Finnish	Questionnaires, surveys (from ITC) Coordination of the consultants' work Fieldwork in Latin America-Caribbean Case studies on key Latin American producers Compiling the main reports Reporting to ITTO
Antoine Bassili	Senior Technical Consultant	Austrian	Desk research on processing technologies applied and their future development Case study on technology development
Pierre-Marie Desclos	Fieldwork Consultant for Africa	French	Fieldwork and report writing on Africa Case studies on key African producers
Ratnasingam Jegatheswaran	Fieldwork Consultant for Asia-Pacific	Malaysian	Fieldwork and report writing on Asia Case studies on key Asian producers

Additionally, a Senior Adviser (Markku Simula) was contracted by the ITTO Secretariat under a separate agreement to provide assistance in the planning of the work and in the analysis of results obtained.

Activities carried out by ITC

The ITC Market Development Officer implemented the following activities:

- Go-ahead: upon receipt of the ITTO contract, which was signed on 17 April 2000.
- Preparation of the workplan, which was circulated to Dr Markku Simula (Senior Adviser contracted by ITTO) and to the Secretariat during the ITTO Peru Sessions in late May 2000.
- In June 2000, consultants were recruited, questionnaires planned and verified, and contacts made with selected industries, relevant government offices (mainly ITTO correspondents) and industry associations. Contact information was gathered from industry and exporters' directories, websites, and magazines.

- In early June, a work planning and data collection trip was made to Finland to meet Markku Simula at Indufor Oy; to extract data from the Forest Research Institute, the Central Office for Statistics, the University of Helsinki, etc.; and to participate in the International Rubber Conference (IRC-2000) in Helsinki for the purpose of understanding rubber sector's future developments, which will have fundamental impact on availability of rubberwood in the producer countries.
- During the latter half of June, approx. 155 questionnaires sent by EMS, mail, fax or e-mail. Of this total, 35 to government offices, 30 to associations and the balance (90) to private enterprises. The same questionnaires were used for fieldwork interviews.
- In June-July, long-term (1989-1998) export/import data were extracted from COMTRADE (UNSD) and other statistical databases (COMEXT). Whenever possible, national trade data was used to fill gaps and complement latest available figures. These statistics were revised in October 2001 for the finalization of the report.
- In early July, statistical data sets were drawn from UNIDO's databanks on numbers of enterprises and employees, amounts of value-added produced, and wage rates, etc. within the industry sectors concerned. (Much of this data was out of date and could not be incorporated in the report.)
- The preliminary report was prepared and submitted to ITTO in September, bringing together consultants' inputs into a combined, seamless report.
- The main conclusions and recommendations to ITTO were presented at the ITTC 29th session in Yokohama on 1 November 2000.
- Based on comments received from ITTO and the Senior Adviser, the final report was prepared and submitted to ITTO.

Fieldwork activities

The fieldwork phase was considered crucially important for obtaining first-hand information for the project. The following tables summarize the type of data-collection missions made by the team of consultants.

Table 2 Fieldwork itinerary of ITC Market Development Officer			
Country	Dates	Organizations/persons visited	Activities/data collected
Honduras	2-5 July	MAFOR/PROCAFOR/René Romero COHDEFOR Departamento de Normas y Control/Milton Hernández ANETRAMA/Melitina Martínez Secretaría de Recursos Naturales y el Ambiente/Ernesto Bondy Reyes Centrex (Centre for Statistical Services) Banco Central de Honduras	Anuario Estadístico Forestal 1998 Foreign trade statistics 1997-1999 Company register

Table 2 (cont'd)

Country	Dates	Organizations/persons visited	Activities/data collected
Ecuador	5-7 July	AIMA/José Franco and Luis Játiva CORMADERA/José Zurita CORPEI/Valeria Escudero 14 enterprise interviews organized by AIMA	Report on development perspectives of wood sector in Ecuador AIMA/MADEXPO 99 report Indicadores Económicos del Sector Maderero AIMA membership directories and magazines Export development programme for wooden furniture
Bolivia	7-11 July	Cámara Forestal de Bolivia (Santa Cruz de la Sierra)/Arturo B. Olhagaray, Henry M. Sanjines	Directory of Cámara Forestal members Exports of wood products Exports of certified wood products Documentation of the ITTO-project Sistema Nacional de Información Forestal (SIFOR) Bolivia Forestal publications Guía para Inversión Forestal en Bolivia
Brazil	11-18 July	ABIMOVEL/Pedro Pamplona Laboratorio de Productos Florestais – LPF (IBAMA)/Varlone A. Martins APEX-SEBRAE/Helio M. Franca Agência Brasileira de Cooperação (ABC)/Flavai R. Ceron Galvani Instituto de Pesquisas Tecnológicas do Estado de São Paulo (IPT)/Erwin R. Perez Jara, Rubens Dias Humphreys STCP Engenharia/Ivan Tomaselli CAF Santa Barbara/Sergio Toninello Selectas/Ricardo Mueller Slaviero Trading/Vitor Pereira Junior	ABIMOVEL programme for furniture export promotion BNDES: Panorama do Setor Moveleiro no Brasil LPF: Relatorio de Atividades Guia da Indústria da Madeira & Mobiliário Reports and magazines on furniture and millwork industries in Brazil The most recent SECEX-foreign trade data Company visits

Table 3 Fieldwork itinerary of ITC consultant for Africa

Dates	Country	City
10 July	France	Paris
11 July	Gabon	Libreville
12 July	Gabon	Libreville
13 July	Gabon	Libreville
13 July	Cameroon	Douala
14 July	Cameroon	Yaoundé
15 July	Cameroon	Douala
16 July	Cameroon	Douala
17 July	Cameroon	Douala
18 July	Côte d'Ivoire	Abidjan
19 July	Côte d'Ivoire	Adzopé
20 July	Côte d'Ivoire	Abidjan
21 July	Ghana	Drive to Takoradi
22 July	Ghana	Drive back to Accra

Table 4 List of contacts during the fieldwork in Africa

Dates	Country	Place	Contact	Position	Department/company/association
23 June	Italy	Rome	H. Djombo	Minister	Department of Forestry, Congo
24 June	France	Lyons	J. Bechet	Consultant	ATIBT Expert
26 June	France	Paris	J.M. Libois	Consultant	WSDP, Ghana
27 June	France	Mahéru	G. de la Péchardière	Consultant	Associate consultant, CDI, EU
10 July	France	Paris	J.J. Landrot	Secretary General	ATIBT
11 July	Gabon	Libreville	A. Huber	General Manager	SHM
11 July		—	T. Gallotta	General Manager	SBE
11 July		—	L. Chabody	Secretary	SYN FO GA (Wood Industries Association)
12 July	Gabon	Libreville	D. Harwood	CEO	Brossette
12 July		—	H. Bosec	Manager	Rougier Gabon
13 July	Gabon	Libreville	J.B. Memvie	Secretary General	Department of Forestry, Gabon
13 July	Cameroon	Douala	M. Fochivé	Secretary General	Groupement Filière Bois Cameroun (Wood Ind. Ass.)
14 July	Cameroon	Yaoundé	R. Coron	Former CEO	RC Coron
14 July		—	P. Richard	Manager	TIB
14 July		—	T. Schoonenberg	Ass. Manager	SAB
15 July	Cameroon	Douala	M. Goulut	Manager	BDA
15 July		—	G. Rittaud	General Manager	Socarit-Socamati
15 July		—	J. Baudy	Manager	Baudy
17 July	Cameroon	Douala	M. Rougeron	Manager	R. Pallisco
17 July		—	L. Monthe	Admin Manager	SEPBC Timber Terminal
17 July		—	J.M. Mevellec	General Manager	SFID
18 July	Côte d'Ivoire	Abidjan	J. Servant	CEO	Inprobois
19 July	Côte d'Ivoire	Adzopé	M. Bruno	General Manager	FIP
19 July		—	M. Bruno	President	Fed. Nat. Industries et Services, Bois
19 July		—	J.C. Raynaud	Plant Manager	IPB
19 July		Abidjan	B. Duchier	Manager	GIB
19 July		—	J. Servant	Vice President	SPIB (Wood Industries Association)
20 July	Ghana	Accra	W.S. Vernon	Project Coordinator	Woodworking Sector Development Programme
21 July	Ghana	Takoradi	G. Bitar	General Manager	John Bitar & Co.
21 July		—	W. Wörle	General Manager	Ghana Primewood Products Ltd
21 July	Ghana	Takoradi	A. Bandel	Certifier	Quality control and testing
22 July	Côte d'Ivoire	Abidjan	R. Finifter	General Manager	SIFCI

Table 5 **Fieldwork itinerary of ITC consultant for the Asia-Pacific region**

Dates	Country	Organization
17 July	Thailand	Kasetsart University
18 July	Thailand	Thailand Furniture Manufacturers Association Royal Forestry Department
19-20 July	Indonesia	Forest Products Centre, Bogor Ministry of Forestry ASMINDO
21 July	Philippines	University of the Philippines, Laguna

In addition, widespread contacts were made in Malaysia. The Malaysian Timber Industry Board, Malaysian Timber Council and the Forest Department were among the contributing government agencies. The Furniture Associations, Moulding and Joinery Council, Timber Trade Federation and the Muar Furniture Association from the private sector were all consulted.

Appendix II

Statistical tables on exports

Table 6 Exports by ITTO producer countries in the Asia-Pacific region, 1989-1999 (in thousands of United States dollars)											
	1989	1990	1991	192	1993	1994	1995	1996	1997	1998	1999
Profiled wood of which	436,296	349,697	467,616	483,406	502,547	480,427	460,015	426,329	435,861	314,226	422,478
Indonesia	215,184	137,166	259,617	241,056	229,015	176,258	146,995	135,418	133,370	91,051	164,550
Malaysia	194,919	185,344	174,058	199,136	214,512	240,993	233,227	223,290	241,485	168,435	183,054
Philippines	0	0	3,455	4,070	8,344	3,491	3,465	2,083	3,873	4,538	3,817
Thailand	25,620	26,642	26,439	35,164	50,470	59,422	76,157	65,225	56,979	50,098	70,832
India	405	469	392	127	126	243	171	313	154	104	225
Myanmar	0	0	0	0	0	0	0	0	0	0	0
Fiji	168	76	3,655	3,853	80	20	0	0	0	0	0
Joinery of which	175,166	342,215	327,216	396,782	572,415	762,572	876,433	930,269	831,848	668,469	847,422
Indonesia	66,850	196,381	164,153	219,016	386,027	533,263	643,068	660,811	552,648	406,664	542,460
Malaysia	50,256	62,844	77,702	99,626	109,648	127,262	134,906	160,068	179,694	169,191	188,286
Philippines	38,626	66,067	69,164	62,905	53,632	73,726	67,578	84,822	70,686	59,662	75,787
Thailand	18,754	16,145	15,296	14,255	21,953	27,026	29,382	23,889	27,965	31,924	40,058
India	680	778	749	593	1,074	931	1,349	621	631	700	503
Myanmar	0	0	152	266	81	364	150	58	224	328	328
Fiji	0	0	0	0	0	0	0	0	0	0	0
Furniture of which	395,439	627,702	828,393	1,070,731	1,417,108	1,823,604	2,065,351	2,284,637	2,268,268	1,897,555	2,812,563
Indonesia	79,728	124,308	170,842	260,387	368,795	452,429	508,302	563,382	462,309	239,074	777,423
Malaysia	74,880	118,218	203,176	298,169	457,040	647,507	776,624	936,812	1,017,467	911,354	1,111,117
Philippines	52,447	144,270	140,562	145,812	161,844	187,437	205,819	221,534	243,483	257,903	279,789
Thailand	186,198	238,458	310,956	361,708	424,650	529,107	566,993	552,569	532,946	471,099	619,280
India	1,116	1,081	1,623	3,338	3,819	5,986	5,877	7,671	9,895	14,937	21,766
Myanmar	13	62	80	204	78	149	198	570	592	1,434	1,434
Fiji	1,057	1,305	1,154	1,113	882	989	1,538	2,099	1,576	1,754	1,754
GRAND TOTAL of which	1,006,901	1,319,614	1,623,225	1,950,798	2,492,070	3,066,633	3,401,799	3,641,235	3,535,977	2,880,250	4,082,463
Indonesia	361,762	457,855	594,612	720,459	983,837	1,161,950	1,298,365	1,359,611	1,148,327	736,789	1,484,433
Malaysia	320,055	366,406	454,936	596,931	781,200	1,015,762	1,144,757	1,320,170	1,438,646	1,248,980	1,482,457
Philippines	91,073	210,337	213,181	212,787	223,820	264,654	276,862	308,439	318,042	322,108	359,393
Thailand	230,572	281,245	352,691	411,127	497,073	615,555	672,532	641,683	617,890	553,121	730,170
India	2,201	2,328	2,764	4,058	5,019	7,190	7,397	8,605	10,680	15,741	22,494
Myanmar	13	62	232	470	159	513	348	628	816	1,762	1,762
Fiji	1,225	1,381	4,809	4,966	962	1,009	1,538	2,099	1,576	1,754	1,754

Table 7 **Exports by ITTO producer countries in Latin America and the Caribbean, 1989-1999**
(in thousands of United States dollars)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Profiled wood of which	6,613	8,940	12,005	17,633	27,197	33,421	43,447	46,103	59,903	58,751	83,468
Brazil	4,277	5,947	7,450	10,730	20,287	27,134	37,698	36,431	49,798	46,315	71,202
Ecuador	792	875	902	2,266	3,067	3,184	2,582	2,710	4,011	3,304	2,806
Honduras	525	921	780	808	728	708	263	1,984	590	1,042	1,762
Colombia	0	0	1,182	2,429	1,824	717	791	747	693	1,177	1,057
Venezuela	685	578	412	113	192	114	410	101	75	116	165
Bolivia	6	136	268	427	254	304	930	3,459	4,255	5,030	4,102
Trinidad and Tobago	99	155	256	189	122	131	146	127	47	55	178
Peru	229	316	755	671	723	1,057	601	505	340	1,712	2,196
Suriname	0	12	0	0	0	72	2	4	29	0	0
Panama	0	0	0	0	0	0	24	35	65	0	0
Joinery of which	35,733	46,049	52,841	63,833	90,326	128,966	136,500	152,040	173,938	162,353	206,113
Brazil	29,748	38,074	44,624	55,227	81,897	115,359	118,281	125,838	145,561	134,851	171,330
Ecuador	193	311	362	463	609	1,037	1,212	1,568	1,712	930	1,029
Honduras	1,022	761	1,175	724	800	904	1,077	831	197	1,400	2,044
Colombia	901	1,167	1,621	563	367	256	397	5,683	555	742	998
Venezuela	11	1,082	467	1,046	453	233	72	354	48	101	188
Bolivia	258	475	754	1,634	1,138	5,561	7,704	9,899	15,983	13,938	20,212
Trinidad and Tobago	2,467	3,293	3,516	3,400	4,500	5,341	7,558	7,492	9,407	10,011	9,696
Peru	1,133	886	322	776	562	218	150	226	190	220	201
Suriname	0	0	0	0	0	18	0	3	4	0	0
Panama	0	0	0	0	0	39	49	146	281	160	415
Furniture of which	38,714	41,469	55,360	113,380	243,412	265,170	310,005	320,295	350,698	331,077	407,897
Brazil	31,078	29,964	45,942	103,629	213,036	234,499	283,563	286,144	305,851	277,673	340,292
Ecuador	357	766	0,532	237	517	1,048	2,270	1,853	2,123	1,474	2,690
Honduras	0	0	0	0	13,799	15,131	8,208	14,221	20,549	19,644	16,303
Colombia	3,473	3,442	5,110	6,043	10,349	7,826	7,932	7,431	10,392	14,418	15,745
Venezuela	2,716	5,370	1,763	1,405	1,647	925	768	1,630	1,342	1,025	671
Bolivia	18	4	20	542	1,343	2,800	3,320	3,542	4,831	8,576	21,638
Trinidad and Tobago	761	1,066	1,295	871	1,330	1,871	2,155	2,607	2,968	3,672	4,557
Peru	206	767	381	424	1,245	971	1,624	2,689	2,311	3,857	5,404
Suriname	62	81	138	192	0	53	44	6	93	0	0
Panama	43	9	179	37	146	46	121	172	238	511	593
GRAND TOTAL of which	81,060	96,458	120,206	194,846	360,935	427,557	489,952	518,438	584,539	552,181	697,478
Brazil	65,103	73,985	98,016	169,586	315,220	376,992	439,542	448,413	501,210	458,839	582,824
Ecuador	1,342	1,952	1,796	2,966	4,193	5,269	6,064	6,131	7,846	5,657	6,525
Honduras	1,547	1,682	1,955	1,532	15,327	16,743	9,548	17,036	21,336	22,086	20,109
Colombia	4,374	4,609	7,913	9,035	12,540	8,799	9,120	13,861	11,640	16,337	17,800
Venezuela	3,412	7,030	2,642	2,564	2,292	1,272	1,250	2,085	1,465	1,242	1,024
Bolivia	282	615	1,042	2,603	2,735	8,665	11,954	16,900	25,069	27,818	45,952
Trinidad and Tobago	3,327	4,514	5,067	4,460	5,952	7,343	9,859	10,226	12,422	13,738	14,431
Peru	1,568	1,969	1,458	1,871	2,530	2,246	2,375	3,420	2,841	5,789	7,801
Suriname	62	93	138	192	0	143	46	13	126	40	40
Panama	43	9	179	37	146	85	194	343	584	671	1,008

Table 8
Exports by ITTO producer countries in Africa, 1989-1999
(in thousands of United States dollars)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Profiled wood of which	10,614	16,672	17,254	19,702	17,481	21,180	24,904	21,268	23,430	27,564	31,882
Côte d'Ivoire	9,693	13,840	14,121	15,358	13,144	13,928	15,676	13,829	15,257	16,931	17,493
Ghana	904	2,629	2,419	3,417	2,978	4,117	5,629	3,656	3,810	4,962	5,427
Cameroon	0	0	78	26	191	48	150	633	1,538	2,306	4,677
Dem. Rep. of the Congo	0	183	636	883	1,169	2,758	3,142	3,015	2,676	2,556	3,679
Congo	0	20	0	0	0	329	268	94	99	706	490
Togo	0	0	0	18	0	0	38	0	0	5	18
Gabon	17	0	0	0	0	0	0	0	18	66	66
Central African Republic	0	0	0	0	0	0	0	41	32	32	32
Liberia	0	0	0	0	0	0	0	0	0	0	0
Joinery of which	2,548	2,645	2,224	2,931	2,883	2,935	4,241	5,274	4,830	5,430	4,943
Côte d'Ivoire	2,532	2,523	2,026	2,037	1,434	1,739	2,781	2,674	3,373	3,781	3,469
Ghana	3	121	129	267	307	623	424	1,145	409	508	460
Cameroon	0	0	62	0	12	1	9	236	220	260	116
Dem. Rep. of the Congo	9	0	0	0	41	43	44	56	39	39	131
Congo	0	1	2	622	1,084	525	978	1,125	776	828	615
Togo	0	0	0	0	5	0	3	35	11	13	13
Gabon	1	0	5	4	0	4	1	3	2	1	139
Central African Republic	2	0	0	0	0	0	0	0	0	0	0
Liberia	0	0	0	0	0	0	0	0	0	0	0
Furniture of which	1,391	1,632	1,520	1,996	1,798	2,979	4,124	5,909	7,412	9,719	9,461
Côte d'Ivoire	24	130	48	89	55	256	441	1,156	727	669	1,355
Ghana	1,312	1,409	1,356	1,805	1,659	2,342	3,470	4,345	6,435	8,716	7,604
Cameroon	21	8	43	3	39	17	9	49	86	155	187
Dem. Rep. of the Congo	8	20	9	6	5	11	27	5	2	22	62
Congo	7	0	0	31	13	20	3	5	7	17	6
Togo	17	48	57	35	15	50	156	121	82	50	175
Gabon	3	15	6	8	13	270	18	35	10	27	34
Central African Republic	0	1	0	18	0	0	0	182	46	46	21
Liberia	0	0	0	0	0	14	0	11	17	17	17
GRAND TOTAL of which	14,553	20,950	20,998	24,629	22,162	27,093	33,269	32,451	35,672	42,713	46,254
Côte d'Ivoire	12,250	16,493	16,195	17,485	14,633	15,922	18,898	17,659	19,357	21,381	22,317
Ghana	2,219	4,159	3,904	5,489	4,944	7,082	9,523	9,146	10,654	14,186	13,491
Cameroon	21	8	184	29	241	65	169	918	1,844	2,721	4,980
Dem. Rep. of the Congo	17	204	645	890	1,215	2,811	3,214	3,076	2,717	2,617	3,872
Congo	7	22	2	654	1,097	875	1,249	1,224	882	1,551	1,111
Togo	17	48	57	53	20	50	196	156	93	68	206
Gabon	21	15	11	12	13	273	20	38	30	94	239
Central African Republic	2	1	0	18	0	0	0	223	78	78	21
Liberia	0	0	0	0	0	14	0	11	17	17	17

Appendix III

Case study on Malaysia: development of SMEs and human resources in the furniture industry

SMEs

The furniture manufacturing industry in Malaysia is dominated by small and medium-sized enterprises (SMEs), which account for more than 80% of the total number of units operating in the country. Furniture, being a fashion-related product, requires a high degree of manufacturing flexibility, in terms of both design and volume output. Recognizing these needs, the government has targeted the furniture industry as one of the priority growth sectors under its Industrial Master Plan (IMP). The first IMP applied to the period 1985 to 1995 and the second, from 1995 to 2005, is in effect currently. In both these plans, the growth of the furniture industry was encouraged through the provision of fiscal and policy incentives aimed at creating an export-oriented industry that is competitive in world markets. The government appears to have achieved its goal, with Malaysia now the largest exporter of furniture among all the ITTO producing countries in the Asia-Pacific region.

Being SMEs, the manufacturing units are usually starved of funds and do not possess the necessary know-how. Most units are managed by family members, a situation that tends to restrict the application of new management techniques. In recognition of the fundamental needs of SMEs, the government has formulated a comprehensive plan aimed at enhancing their performance in the furniture sector.

The Ministry of Entrepreneurial Development, the Ministry of International Trade and Industry and the Ministry of Primary Industries, in collaboration with several government agencies such as the Malaysian Timber Industry Board and the Malaysian Timber Council, have been playing pivotal roles in spearheading the industry's development. Grants and funds were made available for the smaller furniture manufacturers to improve their operations. Marketing assistance was provided to help them attend key international trade fairs. Consultants were appointed to help them with technical problems in the mills and factories. Most importantly, export credit refinancing and tax deductions, etc. were provided to help these enterprises succeed.

The establishment of furniture villages, whereby single areas are provided to accommodate all the manufacturers, sub-contractors, vendors and supporting industries in a particular locality, will improve the efficiency of the whole industry. In this context, the Muar furniture zone stands out as a major success, now accounting for more than 40% of all the furniture exported from the country. This is an important policy because, being a handicraft trade, the normal expectation would be for furniture manufacturers to be scattered over a large area. The logistical problems presented by this have in the past restricted the growth of the sector. Through the furniture village concept, production capacities and efficiencies can be optimized.

SMEs remain the powerhouse of the Malaysian furniture industry. Of the 176 manufacturers in the Muar area, only 23 are considered exporters, while the rest are component suppliers or sub-contractors. The primary function of the exporters, or main contractors as they are usually known, is to secure market orders. As far as the manufacturing cycle goes, they tend to concentrate on assembly and finishing processes. The sub-contractors, sometimes as many as 35 supplying a main contractor, provide the various components, usually finished in the form of white wood sanded parts. This vast array of suppliers provides the furniture manufacturing industry with its two greatest strengths – flexibility in the product mix and flexibility in terms of production volumes. Thanks to the extensive supply network, main contractors are able to supply a large product mix in small quantities for the export market. This special feature enables them to capture the market and expand it. From an operating viewpoint, the large sub-contracting network enables the overhead costs to be spread more thinly. This allows for a cheaper production base, which also benefits from the economies of scale required of the component manufacturers. Furthermore, these sub-contractors carry the necessary inventories of components and parts, which inevitably shortens the manufacturing cycle. In other words, the main contractors are able to fulfil orders in a much shorter time.

The fact that most of these sub-contractors used to be former employees of the main contractors also helps business relationships. Quality and other requirements are well understood, a major advantage in such a concept. Thus, SMEs have been the biggest reason for the rapid expansion in the production output of the Malaysian furniture industry. With further guidance and development, the sub-contract or vendor scheme will enable the Malaysian furniture industry to develop into a large manufacturer base of value-added furniture catering for the global market.

SMEs will continue to play a major role in the Malaysian furniture industry, just as they do in the furniture industries in Italy and Taiwan Province (China). Ensuring their success will inevitably contribute towards the success of the whole furniture manufacturing industry.

Human resources

There is a growing dependence by the Malaysian furniture industry on imported labour. Consequently, the workforce can be characterized by its high mobility and low skill retention. Labour productivity in the sector has therefore also been severely affected, which in turn has affected the profitability of the industry as a whole. In recognizing this problem, the government, through the Labour Ministry of Malaysia, has established the Human Resource Development Fund (HRDF). All employers within the manufacturing sectors contribute a nominal amount towards this fund, and when their employees attend a training course a portion of the fees is reimbursed by the fund. In this way, employers are encouraged to send their employees for skill enhancement. The success of this fund in improving skill levels has been most encouraging and is a key reason why Malaysia is now held up as an example of human resource development excellence within the Asian region. The availability of trained personnel within the furniture industry has enabled many companies to establish component manufacturing in other countries, where these personnel play important roles in the area of productivity.

In order to ensure that the training provided is industry-relevant, the government has established three centres, FURNITEC, WISDEC and TTITC. Each is located within a furniture village to ensure that it is fully utilized by the

factories located within the area. Most of the training courses and seminars are approved by the Human Resource Development Council (HRDC), enabling participants to claim reimbursement from the HDRF. The programmes have been well received by the industry. Below is a summary of the courses offered:

<i>Training courses offered</i>			
<i>Types of training courses</i>	<i>WISDEC</i>	<i>TTITC</i>	<i>FURNITEC</i>
<i>Technical oriented</i>	25%	25%	20%
<i>Management oriented</i>	10%	10%	15%
<i>Operator oriented</i>	60%	65%	55%
<i>Design oriented</i>	5%	–	10%

There are also several ‘smart’ partnerships between these training institutes and universities within the country, which accredit some of the training courses, thus allowing participants to apply for relevant further education in the universities. Although this plan is still very much in its infancy, there is evidence to suggest that, in time, apprenticeship and technical programme participants will have a better chance of furthering their education. When it is established, professional standards within the furniture industry will be improved. While the concept is not new (it has been one of the strengths of the education system in Germany, for example), the creation of such a scheme in Malaysia will serve the furniture industry well, not only by stabilizing the workforce but also by contributing towards higher productivity.

One of the programmes being most actively pursued by these centres is the training of technicians. It has been recognized that the industry needs well trained technicians to efficiently operate the machines and thus boost productivity. Equally, a lack of product development skills within the industry has hampered progress up to now in the value-added manufacturing sectors so these skills are now being taught to industry personnel at the training centres.

Despite the technical and product development courses being provided, design skills within the furniture industry remain at a low level. Furniture design is a complex art, involving the study and understanding of lifestyle, culture, ergonomics, etc., and the development of such skills is more prevalent in fashion-conscious communities. The government annually holds the Malaysian International Furniture Fair, which, as well as being a fair for the trade, is also aimed at exposing both Malaysian furniture manufacturers and consumers to the prevailing design trends. Furthermore, the Malaysian Furniture Design Centre was established to develop new designs and products for the furniture manufacturing industry. These efforts by the government clearly demonstrate that initiatives are taking place aimed at propelling the furniture industry to greater heights in the years to come, especially in the manufacture of value-added furniture.

The issue of human resource development is also important to the future of the furniture industry in Malaysia. There must be less mobility among the workforce and greater skill retention if the industry is to remain competitive in the global market. With the creation of the Human Resource Development Council (HRDC), the government is playing an increasingly important role in ensuring that the workforce within the country is sufficiently trained and skilled enough to provide the furniture manufacturing sector with all the human resources that it needs for its future development.

Appendix IV

Case study of 59 further processing enterprises in Ecuador

INTERNATIONAL TRADE CENTRE (ITC) PROJECT INT 33/05	INTERNATIONAL TROPICAL TIMBER ORGANIZATION (ITTO) 25/99 (i)
Project Title: REVIEW OF THE STATUS OF FURTHER PROCESSING OF TROPICAL TIMBER IN PRODUCING COUNTRIES	Country: ECUADOR
	Name of respondent: JOSE FRANCO MONCAYO Title: EXECUTIVE DIRECTOR
	Name of association: ASOCIACIÓN ECUATORIANA DE INDUSTRIALES DE LA MADERA (AIMA)
	Official address: Avs. Amazonas y República, Edif. las Camaras, 7mo. Piso
B. Questionnaire for national manufacturers'/industry associations	Tel: 260980 / 923798 / 923799 Fax: (593 - 2) 439560)
	Email: aima@hoy.net
	Names of official publications used: El Maderero; Estadísticas de Comercio Exterior-Banco Central del Ecuador; Proyecto de Competitividad INCAE-CORPEI

B.1.1 BASIC SECTORAL AND INDUSTRY DATA				
Product specifications and producers by type of product				
Product groups	Predominant raw material used	No. of firms	Share of group output (%)	Major wood species used (list per products)
Wooden furniture: 47 firms	- Solid wood	40	85	Solid wood furniture: Colorado; Fernán Sánchez; Laurel; Cedro and Aliso
	- Wood-based panels	7	15	
	- Other (specify)			
Mouldings: 6 firms	- Non-coniferous (hardwood)	5	83	Hardwood mouldings: Virola; Laurel and Colorado
	- Coniferous (softw.)	2	33	
	- MDF or other	3	50	
Wooden flooring: 2 firms	- Assembled parquet panels	2	100	Parquet flooring: Chanul; Mascarey; Eucalyptus; Capirona and Colorado
	- Strips/friezes for parquet flooring, not assembled	2	100	
	- Laminated flooring			
	- Other (specify)			
Wooden doors: 4 firms	- Solid wood (surface and core)	4	100	Solid wood doors: Seique, Cedro and Laurel
	- Panel surfaced doors			

Furniture producers by type of product		
Wooden furniture manufacturers by product type	No. of firms	Share of furniture output (%)
Wooden seats	11	23
Office furniture	17	36
Kitchen furniture	7	15
Bedroom furniture	45	98
Other than wood, metal or plastic furniture (e.g. rattan, bamboo)		

B.1.2 BASIC SECTORAL AND INDUSTRY DATA, continued				Size distribution of the further processing industry					
Product groups	Total annual output			Number of employees per unit			Wood consumption per year		
	US\$ million/year	No. of firms	Share of output (%)	Permanent employees	No. of firms	Share of output (%)	m ³ /year	No. of firms	Share of output (%)
Solid wood furniture	Small < 0.5	8	20	Small < 50	10	25	Small < 500	38	95
	Medium 0.5–2.0	30	75	Medium 50–200	29	73	Med. 500–2,000	2	5
	Large > 2.0	2	5	Large > 200	1	2	Large > 2,000		
Wood-based panel furniture	Small < 0.5	1	14	Small < 50	1	14	Small < 100	4	57
	Medium 0.5–2.0	4	57	Medium 50–200	5	71	Med. 100–500	2	29
	Large > 2.0	2	29	Large > 200	1	14	Large > 500	1	14
Upholstered furniture	Small < 1.0			Small < 50			Small < 500		
	Medium 1.0–2.5			Medium 50–200			Med. 500–2,000		
	Large > 2.5			Large > 200			Large > 2,000		
Mouldings	Small < 0.5	1	17	Small < 20	2	33	Small < 500	5	83
	Medium 0.5–2.0	5	83	Medium 20–50	4	67	Med. 500–2,000	1	17
	Large > 2.0			Large > 50			Large > 2,000		
Wooden flooring	Small < 0.5			Small < 20			Small < 500	2	100
	Medium 0.5–2.0	2	100	Medium 20–50	2	100	Med. 500–2,000		
	Large > 2.0			Large > 50			Large > 2,000		
Doors	Small < 0.5	1	25	Small < 50	4	100	Small < 500	1	25
	Medium 0.5–2.0	3	75	Medium 50–200			Med. 500–2,000	3	75
	Large > 2.0			Large > 200			Large > 2,000		

B.1.3 BASIC SECTORAL AND INDUSTRY DATA, continued				Structure and location of the further processing industry					
Product groups	Ownership of industries			Level of integration			Distribution by major region/state		
	Type	No. of firms	Share of output (%)	Type of integration	No. of firms	Share of output (%)	Region/state	No. of firms	Share of output (%)
Wooden furniture	Private	47	100	Fully integrated with sawmill	1	2	1. Pichincha	24	50
	State			Fully integrated with panel plant			2. Azuay	18	45
	Cooperative/ community			Fully integrated with joinery mill	47	100	3. Guayas	3	5
	Foreign joint venture			Other form of integration					
	Other (specify)			Non-integrated					
Mouldings	Private	6	100	Fully integrated with sawmill			1. Pichincha	6	100
	State			Fully integrated with furniture					
	Foreign joint venture			Other form of integration	1	16			
	Other (specify)			Non-integrated	5	84			

B.1.3 BASIC SECTORAL AND INDUSTRY DATA, continued				Structure and location of the further processing industry					
Product groups	Ownership of industries			Level of integration			Distribution by major region/state		
	Type	No. of firms	Share of output (%)	Type of integration	No. of firms	Share of output (%)	Region/state	No. of firms	Share of output (%)
Wooden flooring	Private	2	100	Fully integrated with sawmill	2	100	1. Pichincha	2	100
	State			Fully integrated with furniture					
	Foreign joint venture			Other form of integration					
	Other (specify)			Non-integrated					
Doors	Private	4	100	Fully integrated with sawmill	4	100	1. Pichincha	3	75
	State			Fully integrated with furniture			2. Guayas	1	25
	Foreign joint venture			Other form of integration					
	Other (specify)			Non-integrated					

B.1.4 BASIC SECTORAL AND INDUSTRY DATA, continued			Specialization, automation and labour skills in the further processing industry			
	Level of product specialization:		Level of automation		Level of skill intensity	
Definitions:	Number of different products manufactured		Percentage of work done by CNC and automated machines		Percentage of skilled and semi-skilled workers of total workforce	
Product groups	Classification		No./% of firms		Classification	
Wooden furniture	Only one product		No automated processing		40/85	Less than 25% skilled/semi
	2-5 products		Automation less than 50%		7/15	25-50% skilled/semi
	More than 5 products		47/100	Automation more than 50%		More than 50% skilled/semi
Mouldings	Only one product		No automated processing			Less than 25% skilled/semi
	2-5 products		Automation less than 50%		4/67	25-50% skilled/semi
	More than 5 products		6/100	Automation more than 50%	2/33	More than 50% skilled/semi
Wooden flooring	Only one product		No automated processing			Less than 25% skilled/semi
	2-5 products	2/100	Automation less than 50%		1/50	25-50% skilled/semi
	More than 5 products		Automation more than 50%		1/50	More than 50% skilled/semi
Doors	Only one product		No automated processing		1/50	Less than 25% skilled/semi
	2-5 products	4/100	Automation less than 50%		1/50	25-50% skilled/semi
	More than 5 products		Automation more than 50%			More than 50% skilled/semi

B.1.5 PRODUCTION AND MARKET DATA

	Indicators	Unit	1985	1990	1995	2000 E	Major export destinations	Major import sources
Wooden furniture	Volume of exports	Tons			479		Colombia, United States, Peru	Colombia, United States, Italy
	Value of exports	US\$ FOB ('000)			2.105	3.000	Martinique	Germany
	Export share of output	%					Panama	Spain
	Volume of imports	Tons			1.409		Central America	Taiwan Province (China)
	Value of imports	US\$ CIF ('000)			4.967	2.500	-	Denmark

1.5.1 What are the leading producers/industrial groups in:

Solid wood furniture: GRUPO COLINEAL; BRITANY; FADEL; CARRUSEL; LA GALERIA

Wood-based panel furniture: ATU; HOGAR 2000; REMODULARSA; RAMBAL

Mouldings	Indicators	Unit	1985	1990	1995	2000 E	Major export destinations	Major import sources
	Volume of exports	Tons			5.149		United States, Canada, Japan	–
	Value of exports	US\$ FOB ('000)			2.878		Chile	–
	Export share of output	%			70		Cuba	
	Volume of imports	Tons			0		Rep. of Korea	–
	Value of imports	US\$ CIF ('000)			0		Colombia	–

1.5.2 What are the leading producers/industrial groups in mouldings:

TYMBER; MOLDEC; MAPRESA; MATROP

Wooden flooring	Indicators	Unit	1985	1990	1995	2000 E	Major export destinations	Major import sources
	Volume of exports	Tons			39	-	Italy, Spain, Morocco	Belgium-Luxembourg
	Value of exports	US\$ FOB ('000)			36	38	Germany	United States
	Export share of output	%			3	5	Colombia	Brazil
	Volume of imports	Tons			78			Germany
	Value of imports	US\$ CIF ('000)			196	206		

1.5.3 What are the leading producers/industrial groups in:

Parquet flooring: INDUSTRIA MADERERA ROBALINO; EDIMCA; EXPOMADEL (for the two types of products)

Laminated flooring:

Doors	Indicators	Unit	1985	1990	1995	2000 E	Major export destinations	Major import sources
	Volume of exports	Tons			591		Colombia Martinique	United States
	Value of exports	US\$ FOB ('000)			942	1130	Canada Chile	Colombia
	Export share of output	%			65	70	Cuba	Canada
	Volume of imports	Tons			50		United States	
	Value of imports	US\$ CIF ('000)			124	130	Venezuela	

1.5.4 What are the leading producers/industrial groups in doors:

IROKO; JACCOMETTI; EDIMCA; INDUSTRIA MADERERA ROBALINO

1.5.5 What are the leading producers/industrial groups in windows:

1.5.6 What are the typical distribution channels and intermediaries involved in the trade of further processed wood products?

On domestic markets?	Typical distribution channels:				Names of the biggest retail outlets/DIY chains:
Wooden furniture	Factory/own warehouse	/Distributors	/	/Customer	
Mouldings	Factory/own warehouse	/	/Distributors	/	/Customer
Wooden flooring	Factory/own warehouse	/	/Distributors	/	/Customer
Doors	Factory/own warehouse	/	/Distributors	/	/Customer
Windows	Factory/	/	/	/	/Customer
In exports?	Typical distribution channels:				Most common types of export intermediaries used:
Wooden furniture	Factory/importer	/	/Customer	/	
Mouldings	Factory/importer	/	/Customer	/	
Wooden flooring	Factory/importer	/	/Customer	/	
Doors	Factory/importer	/	/Customer	/	
Windows	Factory /	/	/	/	/Customer

B.1.6 INDICATIVE PRODUCT PRICES			
Specify product examples:	Indicative price levels (specify unit)		
	Prices FOB ex-factory	Price level on domestic markets	Price level in exports
Wooden furniture (style and material/wood species used): Office table: Melamine board Bookcase: Melamine board Dining set: Native wood (Laurel) Wooden chair: Native wood (Laurel) Kitchen cupboard: MDF Bedroom furniture: Native wood (Laurel)	– – – – US\$32	US\$ 493 US\$ 300 US\$2,000 US\$ 150 US\$ 35.2 US\$ 900	– – – – US\$ 28.16
Mouldings (specify dimension and profile): Of hardwood: Of softwood: 20 x 90 x 2.300 mm or other	– US\$ 1.30	– US\$ 1.21	– US\$ 1.73
Wooden flooring (specify strip dimensions and species): Parquet: 9 x 40 x 200 mm or other Laminated flooring: staves of 18 x 120 x 240 mm	US\$ 5.40 US\$ 9.60	US\$ 7.20 US\$ 12.80	– –
Doors: Solid wood exterior door: Seique Solid wood interior door: Seique Panel surfaced door:	– – –	– US\$ 58 (for the two types of doors) –	– US\$ 66 (for the two types of doors) –

B.1.7 COMPETITIVENESS DATA:

1.7.1 What has been the development in the total workforce employed by the further processing sector?						Average number of workers per producer	Share (%) of skilled/semi-skilled workers of total
Products	1985	1990	1995	2000 E	2000 E		
For the entire wood processing sector:		200,000 (1989)					
Wooden furniture:			25,000 (1994)			35	50
Mouldings:						25	70
Wooden flooring:						30	65
Doors:						25	70

1.7.2 What are the average costs of key manufacturing inputs in further processing (sector/industry basis)?

Sector/industry coverage	Wood	Labour	Capital	Energy (factory load)	Glue	Finishes	Transport (expenses/sales)
Unit:							
For the entire wood processing sector:							
Wooden furniture:	20%	35%		15%		20%	10%
Mouldings:							
Wooden flooring:							
Doors:	55%	30%	12%	2%	1%		
Windows:							

B.1.8 FURTHER QUESTIONS

1.8.1 What direct and indirect government measures have been applied for supporting the development of further processing industries (specify)?

- Policy-level instruments: log export bans, processing quotas, other legal instruments, etc:
Prohibition of log export exists for the species on the way to extinction.
- Financial incentives: tax incentives, investment financing, creation of industrial parks, etc:
At present, there is a study on the new Law of Sustainable Forest Development, that establishes economic incentives to the MFS and the reforestation (up to 75% reimbursement on the investment).

1.8.2 What are the institutions involved in product development, technical testing, promotion and training in the further processing of wood products?

Asociación Ecuatoriana de Industriales de la Madera (AIMA)
Corporación de Desarrollo Forestal y Maderero del Ecuador (CORMADERA)
Universidad Técnica del Norte
Universidad Tecnológica Equinoccial

1.8.3 What promotional/export development programmes are currently being run or planned for the near future?

The Corporación de Promoción de Exportaciones e Inversiones (CORPEI) and the Asociación Ecuatoriana de Industriales de la Madera (AIMA) implemented an export promotion programme for furniture and other added value products, with the intention of increasing exports of these products to US\$ 15 million in the next 5 years.

1.8.4 What are the perceived comparative advantages/disadvantages of the further processing industries in your country?

Advantages:

- Availability of raw material
- Presence of valuable and semi-valuable timber
- Fast growth rates
- Twelve daily hours of light
- Presence of altitude and tropical species
- Availability of labour force and inexpensive land

Disadvantages:

- High rates of deforestation
- Extreme waste
- Lack of technological knowledge (logging, drying)
- Lack of knowledge about the international market
- Illicit trade of timber to neighbouring countries

B.1.9 RECOMMENDED FUTURE ACTIONS:

1.9.1 What actions or programmes are being considered in your association/other institutions to support the further processing of wood products?

- Use of appropriate technologies (closes tape, connect to the motosierra)
- Training in grave techniques, cut and processing (dried)
- Agreements with indigenous communities, forest owners, for the application of low impact extraction techniques and less waste sawing

1.9.2 What should be done by ITTO as a commodity organization to promote further processing of tropical timber in producing countries?

- Market information for such products
- Technical assistance on the improvement of technology
- Support major value added products

1.9.3 What actions should be taken by industry and trade to develop the further processing of wood products?

- Trade liberalization of the tropical timber industry
- Incorporate appropriate technique/technology
- Define quality standards for both national and international levels
- Support MFS of the tropical forest and reduce waste of forest resources

Appendix V

Case study on the development of further processing in Ghana and Côte d'Ivoire

Ghana: WSDP, an example of the promotion of further processed wood products and support for secondary processing

The terms of reference of the **Woodworking Sector Development Programme (WSDP)** are briefly as follows: *To raise the growth rate of the Ghanaian economy by stabilising and increasing exports of value-added products in the woodworking industry by improving the technical, marketing and managerial skills of selected firms in the sector either directly to individual firms or indirectly through various forms of support training institutes in the wood sector...*

and,

the project also aims at supporting the restructuring of the resource base of the industry by providing financial incentives to encourage the use of lesser-used species (LUS) and thus take the pressure off overused species.

The programme, lasting over three years, is based in Takoradi, Ghana. It is funded (4.76 million Euro) by the Centre for Development of Industry (CDI) in Brussels. CDI is an instrument of the Treaty of Lomé charged with assisting the industrialization of the African, Caribbean and Pacific countries (ACP). The Ghanaian partners are the Forest Products Inspection Bureau (FPIB) and the Timber Export Development Board (TEDB).

To benefit from the programme, companies are requested to produce a business. The main components of the programme are management, marketing and productivity, kiln-drying, moulding and gluing. Assistance is provided through direct advice to the factories from local consultants and foreign specialists on short-term missions. All projects are tailored to the particular needs of the Ghanaian industry. Once a problem surfaces within a sub-sector of the industry, the coordinator identifies an expert to visit the companies, separately or in a group.

The foreign consultants are assisted by local trainers who later disseminate the information. Specific courses are also organized, e.g. a one-week course for kiln operators, accommodating 12 participants, with examinations held at end of course.

WSDP provides assistance for, and courses on, secondary processing in the following areas:

- Technical:* sawmilling, saw-doctoring, kiln-drying, wood machining, moulding, turning, gluing, machine maintenance, benchmarking (self-assessment of productivity).

- *Commercial, design and management:* business planning, marketing, product development, furniture design, promotion of lesser-used species (LUS) – mainly bombax, celtis, chenchen, denya, essia, gmelina, wawabimba.
- *Education and training:* distribution of technical books to schools, upgrading the level of training in polytechnic schools. The WSDP cooperates with the Ghanaian training centres, i.e. Wood Industry Training Sector (WITC) and the polytechnic schools.
- *Financial:* WSDP gives subsidies (export incentive subsidy) and grants to promote the use of LUS (10% of the FOB value of value-added LUS exported) and the acquisition of kiln-drying equipment.

While most technical actions do not raise questions, some decisions related to the sustainability of forestry are more complex. The project managers themselves identify some difficulties. For example, promoting LUS should not induce logging companies to revisit compartments logged a few years ago, thus causing serious damage to a forest that should be recovering.

This kind of programme seems very well adapted to the needs of western and central Africa. Qualified technicians provide direct and precise answers to the multiplicity of questions raised by a young industry. The WSDP publishes a newsletter, the *Wood Working Newsletter*, reporting its activities and future actions.

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Côte d'Ivoire: FIP, the largest western and central African secondary processed wood products plant

The **Fabrique Ivoirienne de Parquet (FIP)** is located in Adzopé, Côte d'Ivoire.

The Bruno family created the company in 1977 as a flooring plant. Specialists in flooring since 1929, four generations of this well-known family have built the business into an international group. Today the Adzopé plant is one of four in the group – the others being located in Italy, France and Indonesia. The two basic strengths of their system are a very high level of expertise and a good international distribution network including logistical, after-sales and marketing services.

FIP is the largest flooring plant in Africa and employs 1,050 people, of whom 24 are expatriates. The plant is fully integrated with a sawmill processing 8,000 m³ of logs per month. The 1999 turnover was US\$ 15 million. The equipment is modern and impressive: 46 kiln cells with a total capacity of 3,500 m³, 10 moulders and a state-of-the-art quality control laboratory. The company is healthy and still growing. More investments are underway: new kilns and a finishing line are being installed, at a total cost of US\$ 1 million.

Appendix VI

Case study on the development of the processing of coconut stem wood

Introduction

Coconut palms (*Cocos nucifera L.*) are found in most of the ITTO producer countries. Their stems have been used traditionally as posts and poles in housing construction, while the crowns served as roofing material. There have always been other non-structural uses but these were minor.

In this day and age, when ecological considerations play a much more important role than in the past, the fact that coconut is what might be called 'a plantation wood' is an asset in the marketing of the sawnwood. The use, where possible, of the stems of senile coconut palms relieves the pressure on natural tropical hardwood forests, especially in countries like India, the Philippines and Thailand. Here, drastic measures are being taken to protect the remaining forest coverage and even to bring it back to its former levels. While coconut sawnwood is unlikely to feature in world trade in large volumes, it could become an important low-cost utility hardwood for use locally in the construction of housing in rural areas, as well as for lower-cost items such as joinery, or for school and domestic furniture.

Raw material availability

The figures below serve to illustrate the potential importance of coconut stems as a raw material for the processing industries of many ITTO Asian member countries.

- Total area of coconut harvested in all ITTO producer countries: 9,042,681 ha.
- Total area of coconut harvested in countries other than ITTO members: 1,447,705 ha.
- Total area of coconut harvested in all countries of the world: 10,490,386 ha.

Over 86% of the total area planted with coconut is in the ITTO producer countries.

ITTO Asian member countries represent 78.8% of the world's total.

Plantation density is highly influenced by the flatness of the terrain and the prevailing climatic conditions. As many as 120 trees per hectare are planted in the relatively flat and typhoon-free areas of Mindanao in the southern Philippines and in Indonesia. As few as 80 trees per hectare are planted in the mountainous areas of eastern Luzon in the Philippines and in southern India. A density of 100 trees per hectare may be taken as the world average. The

usable stem volume can be as high as 0.9 m³ and as low as 0.4 m³, depending upon the coconut species, soil conditions and environmental and climatic conditions prevailing in the plantation. A volume of 0.65 m³ per tree is deemed average. Thus, the total standing volume in ITTO Asian member countries is of the order of 500 million m³.

The common practice among coconut farmers in Asia is for them to consider a coconut tree to be senile and in need of replanting either when it yields less than five nuts every 40 to 60 days, or when the tree is so tall that ripe fruits break when they fall to the ground. Trees struck by lightning, blown over by typhoons or attacked by insects have to be replaced immediately. Senility starts to set in at 40 years. However, 50-60 years may be taken as the average age for replacement. After all the senile trees have been replaced it is estimated that the annual replacement rate is little more than two stems per hectare, or approximately 18.5 million stems in ITTO Asian member countries. Data from the production of coconut sawnwood for the two demonstration houses in the Philippines from 1983-1984 in the UNIDO and FAO projects, indicated an average volume of 0.9 m³ per stem, yielding about 0.45 m³ of sawnwood in the three grades (hard, medium and soft). This gives a potential volume for Asia of more than 5 million m³ of sawnwood per annum.

Past, traditional and potential uses

Coconut stems are used in rural housing construction, for electric power and communication poles, for fence posts, foot-bridges, posts in small piers and for the production of shingles and crowns as low cost, non-durable roofing material. Once the trees have been sawn and treated, the denser sawnwood obtained (so-called hard grade, with a density of more than 600 kg/m³ for the dry wood) can be used for structural components such as beams in housing, flooring, staircases, and shingles, etc. The less dense wood (medium grade, with a density between 400 and 600 kg/m³ for the dry wood) can be used for non-structural applications, such as room dividers, etc.

The soft grade (density below 400 kg/m³) is unfit for use in structurally loaded housing components. However, the two demonstration houses erected in the Philippines have shown that roofing shingles made from adequately treated soft grade coconut wood have a service life of more than eight years – comparable, cost-wise, to traditional roofing materials. Hard and medium grades have also been used in furniture, tool handles, etc., and coconut wood's unique grain and colours have made it popular for decorative boxes, bowls and trays.

Research done on processing

Research on processing of coconut stems started in the Philippines in 1970. The Philippine Coconut Authority (PCA) created a Coconut Wood Research Center in Zamboanga City to develop its use. At a later stage both FAO (from 1974) and UNIDO (from 1981) provided assistance, the latter in sawing, grading and promotion, including the construction of two low-cost houses and a comparative cost study with traditional construction methods.

The coconut palm, a monocotyledon, has a stem with a density on the surface (dermal) that is far higher than at the stem's core. Similarly, the density at the base decreases towards the crown. On average, using adequate sawmilling

facilities and the log breakdown pattern developed at the PCA centre in Zamboanga, the sawnwood yield from each coconut stem may attain 70% hard, 17% medium and 13% soft.

This causes serious problems in grading the sawnwood produced. Because green stems have very nearly the same density in both the dense and the non-dense wood, grading by density cannot be used. Grading by measuring the sag of planks supported at a given distance is the method used. (Investment in a mechanical stress-grading machine is uneconomical for the small mills sawing coconut stems.) Visual grading by assessing the number of fibrovascular bundles at the ends is another possibility. The sawn timber is very susceptible to decay: the softer specimens have a life of as low as four months, while the denser ones attain 2.5 years. Sawn timber must therefore be preserved, but this is not a problem. Drying also poses no problems: coconut stem wood's drying rates approach those of hardwoods classified as moderately easy to dry. The use of stellite or carbide tipped blades is essential. Finishing is important, especially for household articles.

Promotional work done

The Philippines is the country that has done most work in this respect. It has established testing and training facilities devoted exclusively to coconuts and coconut stem wood. A large specialised bibliography has been compiled, the main groups of authors being researchers at the Forest Products and Coconut research facilities and the experts provided under projects financed by UNDP and executed by FAO and UNIDO. Work has also been done in Australia, Fiji, Indonesia, New Zealand and Papua New Guinea. Even the German bilateral aid agency GTZ has published a very useful manual. Grading rules have been published. Seminars to disseminate the technical information were held in Tonga in 1976, in the Philippines in 1979, in Solomon Islands in 1982 and again in the Philippines (Lucena City in February, Davao City in April 1985 and at the Product Development and Design Center in Manila in July 1989). These seminars were all aimed at developing and promoting the use of coconut wood as a substitute for traditional wood species in the construction and building industries.

However, there remained major problems to overcome. One was the acceptance of coconut wood as a species for which a building loan could be obtained. It is difficult to classify the species into one of the strength groups because the very wide variation in density of the sawnwood obtained from the same stem calls for very strict grading, and it is difficult to assess the strength of the sawnwood visually.

The other problem was that of finding uses for the relatively large volume of low-density sawnwood produced. Unless this wood is disposed of, even at a marginal cost, sawing large volumes of coconut stems and placing the sawnwood on the local market as a utility hardwood for structural purposes is likely to be uneconomical. For example, while relatively good charcoal can be obtained from the 'dense' wood, this is not the case with the 'soft' wood.

Development and promotion of the use of coconut wood on the desired 'industrial' scale requires that the problem of the widely dispersed coconut farm ownership be effectively addressed. More than 75% of the area under coconuts is owned and farmed by smallholders who are not capable, either financially or technically, of carrying out a replanting programme that could ensure a reliable and continuous supply of coconut stems. This would be a prerequisite for securing the desired growth of the stem processing industry.

The situation has also hindered the efforts of governments in the coconut producing countries to promote the use of coconut wood as a substitute for traditional wood species in the building and construction industries.

Conclusions

The ban on felling in the natural forests, combined with an insistence on utilizing only wood from forests (and plantations) that are managed on a sustained yield basis, may help to promote the use of coconut wood in ITTO producing countries. The modification of building regulations and the training of graders would be prerequisites of the successful introduction of these measures. Any other problems that remain are specific to the smallholders, preventing them from producing a reliable and continuous supply of coconut stems.

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