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Investment Opportunities in the Australian Forest Products Industry

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PREFACE

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TABLE OF CONTENTS

GLOSSARY **IX**

DEFINITIONS AND CONVERSIONS **X**

EXECUTIVE SUMMARY **XI**

1. INTRODUCTION **1**

2. RESOURCE **2**

2.1 Description 2
2.2 Regional Opportunities 6
2.2.1 Tasmania 6
2.2.2 Green Triangle 8
2.2.3 Western Australia 10
2.2.4 Central Victoria 11
2.2.5 East Gippsland / Bombala 12
2.2.6 South East Queensland 13
2.2.7 North Queensland 14
2.2.8 Other Opportunities 15

3. ASIA-PACIFIC MARKET: SOLID WOOD AND WOOD BASED PANEL PRODUCTS **16**

3.1 Sawn Softwood 16
3.1.1 Development and Outlook 16
3.1.2 Major Consuming Markets 17
3.1.3 Costs 24
3.1.4 Opportunities for Australia 26
3.2 Sawn Hardwood 28
3.2.1 Development and Outlook 28
3.2.2 Major Consuming Markets 28
3.2.3 Opportunities for Australia 36
3.3 Plywood 37
3.3.1 Development and Outlook 37
3.3.2 Major Consuming Markets 38
3.3.3 Opportunities for Australia 44
3.4 Particleboard 47
3.4.1 Development and Outlook 47
3.4.2 Major Consuming Markets 48

3.4.3 Costs 52
3.4.4 Opportunities for Australia 54
3.5 Medium Density Fibreboard 54
3.5.1 Development and Outlook 54
3.5.2 Major Consuming Markets 55
3.5.3 Costs 60
3.5.4 Opportunities for Australia 61
3.6 Laminated Veneer Lumber and Glue-laminated Lumber 62
3.6.1 Development and Outlook 62
3.6.2 Major Consuming Markets 63
3.6.3 Costs 66
3.6.4 Opportunities for Australia 67

4. ASIA-PACIFIC MARKET: WOODCHIPS 70

4.1 Major Consuming Markets 70
4.2 Grades 75
4.3 Market Trends 76

5. ASIA-PACIFIC MARKET: PULP AND PAPER 79

5.1 Papermaking Fibres Overview 79
5.1.1 Development and Outlook 79
5.2 Bleached Hardwood Kraft Pulp (BHKP) and Bleached Softwood Kraft Pulp (BSKP) 81
5.2.1 Development and Outlook 81
5.2.2 Major Consuming Markets 82
5.2.3 Opportunities for Australia 84
5.3 Mechanical Pulp 91
5.3.1 Development and Outlook 91
5.3.2 Major Consuming Markets 92
5.3.3 Opportunities for Australia 93
5.4 Recycled Fibre 95
5.4.1 Development And Outlook 95
5.4.2 Major Consuming Markets 96
5.4.3 Opportunities for Australia 98
5.5 Newsprint 100
5.5.1 Development and Outlook 100
5.5.2 Major Importing Markets 104
5.5.3 Opportunities for Australia 106
5.6 Printing and Writing Paper 109
5.6.1 Development and Outlook 109
5.6.2 Major Consuming Markets 112
5.6.3 Opportunities for Australia 114

5.7 Cartonboard 119
5.7.1 Development and Outlook 119
5.7.2 Major Consuming Markets 122
5.7.3 Opportunities for Australia 123
5.8 Corrugating Materials 125
5.8.1 Development and Outlook 125
5.8.2 Major Consuming Markets 128
5.8.3 Opportunities for Australia 131

6. INVESTOR REQUIREMENTS 134

6.1 Greenfield 134
6.2 Brownfield 136

Tables

Table 2-1: Estimated total pulpwood yields - Tasmania 8
Table 2-2: Estimated total pulpwood yields – Green Triangle 9
Table 2-3: Estimated available pulpwood yields – Western Australia 10
Table 2-4: Estimated available sawlog yields – Western Australia 11
Table 2-5: Estimated available pulpwood yields – Central Victoria 11
Table 2-6: Estimated available pulpwood yields – East Gippsland / Bombala 13
Table 2-7: Estimated available sawlog yields – East Gippsland / Bombala 13
Table 2-8: Estimated available pulpwood yields – South East Queensland 14
Table 2-9: Estimated available sawlog yields – North Queensland 14
Table 3-1: Standard sawn radiata pine sizes used for packaging grades in Japan 19
Table 3-2: Japanese Softwood Import Tariffs 20
Table 3-3: Approximate Overall Softwood Sawmill Production 26
Table 3-4: Japanese Hardwood Import Tariffs 35
Table 3-5: Japanese Plywood Import Tariffs 41
Table 3-6: Japanese Particleboard Import Tariffs 51
Table 3-7: Japanese MDF Import Tariffs 59
Table 3-8: Japanese LVL and Glue-laminated Lumber Import Tariffs 64
Table 4-1: Hardwood woodchip grades currently being exported to Japan and Indonesia from Australia 75

Figures

Figure 2-1: Map of NPI plantation regions 4
Figure 2-2: Plantation establishment in Australia 5
Figure 2-3: Total estimated potential sawlog yields - Australia....5
Figure 2-4: Total estimated potential pulpwood yields - Australia....6
Figure 3-1: Sawn Softwood Consumption in Asia-Pacific, including Australia/New Zealand 16
Figure 3-2: Japan Sawn Softwood Production and Trade....17
Figure 3-3: Indicative End-uses for Sawn Softwood in Japan 18
Figure 3-4: China Sawnwood Production and Trade (including Hardwood)....21
Figure 3-5: Indicative End-uses for Sawn Softwood in China....22
Figure 3-6: Korea Sawn Softwood Production and Trade 23
Figure 3-7: Indicative End-uses for Sawn Softwood in Korea....24
Figure 3-8: Softwood Timber Cost Chart for the Asia-Pacific 25
Figure 3-9: Sawn Softwood Direct Costs by Country....25
Figure 3-10: Volumes of Imported Softwood since 1996/97....26
Figure 3-11: Sawn Hardwood Consumption in Asia-Pacific, including Australia/New Zealand 28
Figure 3-12: Indicative End-uses for Sawn Hardwood in China 29
Figure 3-13: Indonesia Sawn Hardwood Production and Trade....30
Figure 3-14: Indicative End-uses for Sawn Hardwood in Indonesia 31
Figure 3-15: Malaysia Sawn Hardwood Production and Trade....32
Figure 3-16: Indicative End-uses for Sawn Hardwood in Malaysia 33
Figure 3-17: Japan Sawn Hardwood Production and Trade 34
Figure 3-18: Indicative End-uses for Sawn Hardwood in Japan....35
Figure 3-19: Plywood Consumption in Asia-Pacific, including Australia/New Zealand 37
Figure 3-20: China Plywood Production and Trade 38
Figure 3-21: Indicative End-uses for Plywood in China....39
Figure 3-22: Japan Plywood Production and Import 39
Figure 3-23: Indicative End-uses for Hardwood Plywood in Japan 40
Figure 3-24: Indicative End-uses for Softwood Plywood in Japan....40
Figure 3-25: Korea Plywood Production and Trade 42
Figure 3-26: Indicative End-uses for Plywood in Korea 42
Figure 3-27: Indonesia Plywood Production and Trade 43
Figure 3-28: Indicative End-uses for Plywood in Indonesia....44
Figure 3-29: Hardwood Plywood Cost Chart....45
Figure 3-30: Hardwood Plywood Production Cost by Country....46

Figure 3-31: Particleboard Consumption in Asia-Pacific, including Australia/New Zealand 47
Figure 3-32: China Particleboard Production and Trade 48
Figure 3-33: Indicative End-uses for Particleboard in China....49
Figure 3-34: Japan Particleboard Production and Trade....50
Figure 3-35: Indicative End-uses for Particleboard in Japan 50
Figure 3-36: Korea Particleboard Production and Trade, 1988-2000....51
Figure 3-37: Indicative End-uses for Particleboard in Korea 52
Figure 3-38: Particleboard Cost Chart 53
Figure 3-39: Particleboard Production Cost by Country....53
Figure 3-40: MDF Consumption in Asia-Pacific, including Australia/New Zealand 55
Figure 3-41: China MDF Production and Trade....56
Figure 3-42: Indicative End-uses for MDF in China 57
Figure 3-43: Japan MDF Production and Trade 57
Figure 3-44: Indicative End-uses for MDF in Japan....58
Figure 3-45: Korea MDF Production and Trade....59
Figure 3-46: Indicative End-uses for MDF in Korea....60
Figure 3-47: Softwood Medium Density Fibreboard Cost Chart....60
Figure 3-48: Medium Density Fibreboard Cost by Country....61
Figure 3-49: Glue-laminated Lumber Supply in Japan....63
Figure 3-50: LVL Supply in Japan....64
Figure 3-51: LVL Supply in Australia....65
Figure 3-52: Indicative End-uses for LVL in Australia....66
Figure 3-53: Softwood Laminated Veneer Lumber Cost Chart....66
Figure 3-54: Laminated Veneer Lumber Production Cost by Country....67
Figure 3-55: Softwood Glue-laminated Lumber Cost Chart....69
Figure 3-56: Softwood Glue-laminated Lumber Production Cost by Country....69
Figure 4-1: Major Asia-Pacific Hardwood Woodchip Importers, 2000....70
Figure 4-2: Hardwood Woodchip Sales to Japan (m^3) 71
Figure 4-3: Percentage Share of Japanese Hardwood Woodchip Market....72
Figure 4-4: Japanese Softwood Woodchip Imports, 1990-2000....73
Figure 4-5: Area of Japanese Overseas Hardwood Plantations Planted for the Japanese Pulp Industry, December 2000 ('000 ha) 76
Figure 4-6: Comparison of Landed Costs for Japanese Imported Hardwood Woodchips based on 2000 FOB prices....77
Figure 5-1: Consumption of Papermaking Fibres in Asia-Pacific by Grades 2000 80
Figure 5-2: Consumption of Papermaking Fibres in Asia-Pacific by Country 2000 81

Figure 5-3: Consumption of Market Bleached Softwood Kraft Pulp in Asia-Pacific 2000 83
Figure 5-4: Consumption of Market Bleached Hardwood Kraft Pulp in Asia-Pacific 2000....84
Figure 5-5: Net Trade Balance of Bleached Softwood Kraft Pulp in Asia-Pacific 2005-2015....85
Figure 5-6: Demand and Supply of BSKP in Asia-Pacific 1980-2010....86
Figure 5-7: Typical Cost Structure of BSKP Production....87
Figure 5-8: Softwood Cost 2001....88
Figure 5-9: Net Trade Balance of Bleached Hardwood Kraft Pulp in Asia-Pacific 2005-2015....89
Figure 5-10: Demand and Supply of Market BHKP in Asia-Pacific 1980-2010....89
Figure 5-11: Typical Cost Structure of BHKP Production....90
Figure 5-12: Hardwood Pulpwood Cost at Pulp Mill Gate 2001....91
Figure 5-13: Demand for Mechanical Pulp in Asia-Pacific 2000....92
Figure 5-14: Net Trade Balance of Mechanical Pulp in Asia-Pacific 2005-2015....93
Figure 5-15: Demand and Supply of Mechanical Pulp in Asia-Pacific 1980-2010....94
Figure 5-16: Typical Cost Structure of Mechanical Pulp Production....95
Figure 5-17: Demand for Recovered Paper in Asia-Pacific 2000....96
Figure 5-18: Exporters of Recovered Paper and Recovery Rate 2000....97
Figure 5-19: Recovered Paper Sources for Major Importers 2000....98
Figure 5-20: Recovered Paper (OCC) Cost 2001....99
Figure 5-21: Recovered Paper (ONP) Cost 2001....99
Figure 5-22: Demand for Newsprint in Asia-Pacific 2000....100
Figure 5-23: Supply of Newsprint in Asia-Pacific 2000....101
Figure 5-24: Consumption of Newsprint in 2010....101
Figure 5-25: Consumption Growth by Countries 2000-2010 (% growth/a)....102
Figure 5-26: Demand for Improved Newsprint in Asia-Pacific 2000....103
Figure 5-27: Demand for Coloured Newsprint in Asia-Pacific 2000....104
Figure 5-28: Major Newsprint Importers in Asia-Pacific 2000....105
Figure 5-29: Major Newsprint Exporters in Asia-Pacific 2000....106
Figure 5-30: Demand/Supply Balance of Newsprint in Asia-Pacific 1980-2010....107
Figure 5-31: Typical Cost Structure of Newsprint (DIP) Production....108
Figure 5-32: Recovered Paper (ONP) Cost 2001....109
Figure 5-33: Production and Consumption of Printing and Writing Paper in Asia-Pacific by Grades 2000....110
Figure 5-34: Consumption of Printing and Writing Paper in Asia-Pacific by Grades 2000....111

Figure 5-35: Major Importers of Printing and Writing Paper by Grades 2000 111
Figure 5-36: Major Sources of Printing and Writing Paper Imports 2000 112
Figure 5-37: Consumption of Printing and Writing Paper to 2010 113
Figure 5-38: Consumption Growth by Grades 2000-2010 114
Figure 5-39: Demand and Supply of UWF in Asia-Pacific 1980-2010 115
Figure 5-40: Demand and Supply of CWF in Asia-Pacific 1980-2010 115
Figure 5-41: Demand and Supply of Mechanical Papers in Asia-Pacific 1980-2010 116
Figure 5-42: Typical Cost Structure of UCWF Production 116
Figure 5-43: Typical Cost Structure of CWF Production 117
Figure 5-44: Hardwood Fibre Cost 2001 117
Figure 5-45: Typical Cost Structure of LWC Production 118
Figure 5-46: Softwood Fibre Cost 2001 118
Figure 5-47: Coating Pigment Cost 2001 119
Figure 5-48: Consumption of Cartonboard in Asia-Pacific by Countries 2000 120
Figure 5-49: Consumption of Cartonboard in Asia-Pacific by Grades 2000 121
Figure 5-50: Consumption of WLC in Asia-Pacific 2000 121
Figure 5-51: Major Exporters of Cartonboard to Asia-Pacific 2000 122
Figure 5-52: Consumption Growth of Cartonboard in Asia-Pacific to 2010 123
Figure 5-53: Demand and Supply of Cartonboard in Asia-Pacific 1980-2010 124
Figure 5-54: Typical Cost Structure of FBB Production 125
Figure 5-55: Demand for Corrugating Materials in Asia-Pacific 2000 126
Figure 5-56: Supply of Corrugating Materials in Asia-Pacific 2000 127
Figure 5-57: Top Producers of Corrugating Materials in Asia-Pacific 2000 127
Figure 5-58: Major Corrugating Materials Importers in Asia-Pacific 2000 128
Figure 5-59: Major Corrugating Materials Exporters in Asia-Pacific 2000 129
Figure 5-60: Consumption of Corrugating Materials in Asia-Pacific 1980-2010 130
Figure 5-61: Consumption Growth by Countries to 2010 (% growth/a) 130
Figure 5-62: Demand/Supply Balance of Corrugating Materials in Asia-Pacific 1980-2010 131
Figure 5-63: Typical Cost Structure of Kraftliner Production 133
Figure 5-64: Softwood Fibre Cost 2001 133

Appendices

Appendix 1: Major Newspapers in the Asia-Pacific Region
Appendix 2: Customer Structure for Newsprint
Appendix 3: Customer Structure for Printing and Writing Paper
Appendix 4: Customer Structure for Cartonboard
Appendix 5: Customer Structure for Corrugating Materials
Appendix 6: Cost Comparisons
Appendix 7: Summary of Australian Pulp and Paper Companies and their Australian Mills
Appendix 8: Top 3 Importing Countries by Pulp and Paper Grades and Estimated Consumption Growth to 2010
Appendix 9: Fibre Mix Summary

GLOSSARY

%	percent
a	annum
ACACA	Australia China Agriculture Cooperation Agreement
ADt	air dry tonnes
BCMP	bleached chemi-mechanical pulp
BDt	bone dry tonne
BHKP	bleached hardwood kraft pulp (or bleached hardwood market pulp)
BSKP	bleached softwood kraft pulp
cm	centimetres
CWC	coated wood containing
CWF	coated woodfree paper
FBB	folding box board
g	gram
ha	hectare (1 ha = 10,000 m^2 or 2.47 acres)
km	kilometres (1 km = 1,000 m or 0.621 miles)
LPB	liquid packaging board
LVL	laminated veneer lumber
m	metres (1 m = 1.094 yards or 3.281 feet or 39.370 inches)
m^2	square metres
m^3	cubic metres (1 m^3 = 35,3147 cubic feet)
m^3 sub	solid cubic metre measured under bark
m^3/ha/a	cubic metres per hectare per annum
MDF	medium density fibreboard
NFI	National Forest Inventory
NPI	National Plantation Inventory
OCC	old container cuttings
ONP	old newsprint
OSB	oriented strand board
SBB	solid bleached board
t	tonne
t/a	tonnes per annum

UWC	uncoated wood containing
UWF	uncoated wood-free paper
WLC	white-lined chipboard
WTO	World Trade Organisation

DEFINITIONS AND CONVERSIONS

basic density	mass of oven dry wood divided by volume of green wood
green density	mass of freshly felled wood divided by volume of green wood
air dry density	mass of wood in the air dry condition divided by volume of wood in the air dry condition
wood paying capacity	the highest price a wood industry can afford to pay for the raw material and still break even

EXECUTIVE SUMMARY

Investment opportunities in the Australian forest industry can be found throughout the country and at varying scale. The majority of investment opportunities identified in this report would utilise the increasing availability of softwood from plantations over the coming years. By 2010, additional opportunities for processing the expanding hardwood plantation resource should arise. The traditionally important native forest resource is expected to continue to provide sustainable volumes, but sawlog yields are currently committed for utilisation by existing industry.

Resources

The Australian forest industry is an important contributor to the national economy with a total annual turnover of some 12 billion dollars. In the year 1999-00, total harvest removals were around 10.7 million m^3 from native forest hardwoods, 12.3 million m^3 of mostly exotic plantation softwoods and over 0.8 million m^3 of plantation hardwoods (ABARE, 2001).

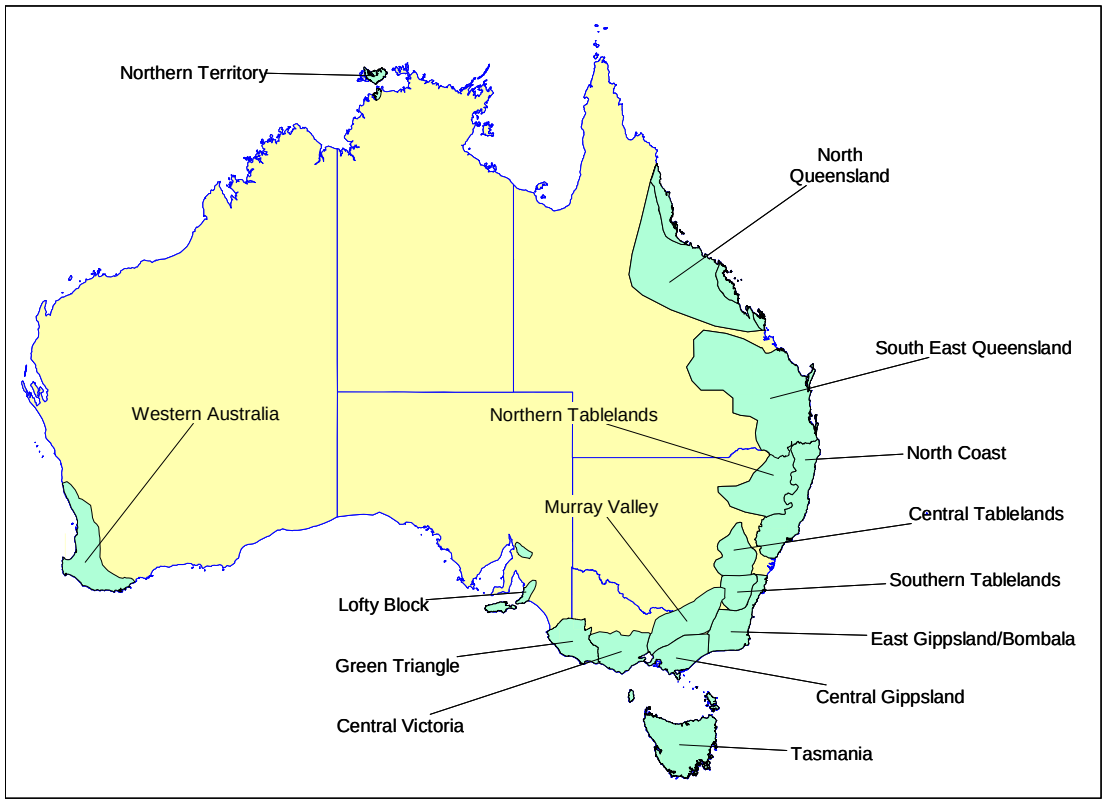
Australia's 1 million hectares of softwood plantations are producing sawlogs and pulp logs which are processed into a number of key products such as:

- Structural grade timbers
- Appearance grade timbers
- Industrial grade timbers
- Treated products
- Wood-based panels, such as plywood, particleboard, MDF and LVL
- Pulp and paper.

Australia's 0.5 million hectares of hardwood plantations are mainly planted for the production of pulpwood, however, higher grade logs are produced in a few locations and used in the solid wood industry. Many of the hardwood plantations are still relatively young and hence, significant volumes of fibre will not be available until the later part of this decade.

The plantation resource in Australia is spread out along the southern and eastern coasts, with additional resources in Tasmania and Western Australia.

Figure S1:
Map of NPI plantation regions

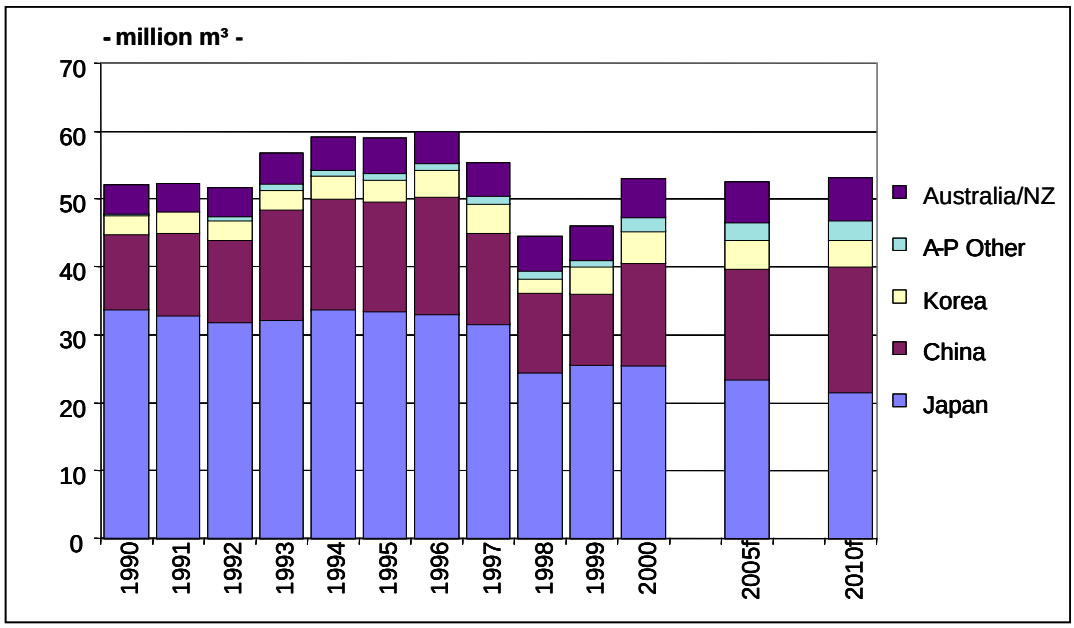


Markets

Sawnwood

Softwood consumption within the Asia-Pacific region is expected to remain relatively static through 2010 as the important Japanese market continues to decline, and China's growth remains limited by its building traditions (see Figure S2).

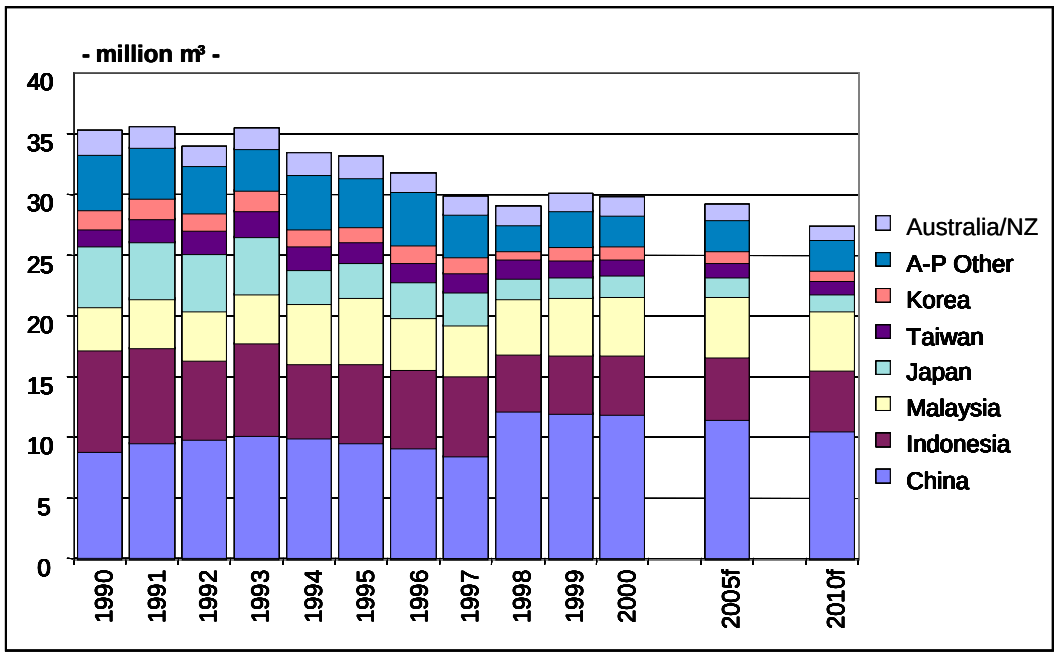
Figure S2:
Sawn Softwood Consumption in Asia Pacific, including Australia/New Zealand



However, the considerable changes occurring in both the domestic Australian market and the various export markets will provide real opportunities for future investments in this industry. Within the domestic market, substitution of imported material will continue to provide room for further growth. Opportunities also exist in supplying the Chinese market with a range of products even though Chinese per capita consumption is among the lowest in the world, with just 0.01 m³/capita in 2000, compared to 0.18 in Australia or 0.20 in Japan. The Japanese market is changing considerably and the use of engineered wood products in house construction is increasing rapidly. In addition, hardwood availability throughout Asia is declining and should present further opportunities for sawn softwood from Australia.

Hardwood consumption in the Asia Pacific region has been declining, primarily as a result of declining availability and rising costs of tropical sawn hardwood. This decline is expected to continue over time (see Figure S3).

Figure S3:
Sawn Hardwood Consumption in Asia-Pacific, including Australia/New Zealand

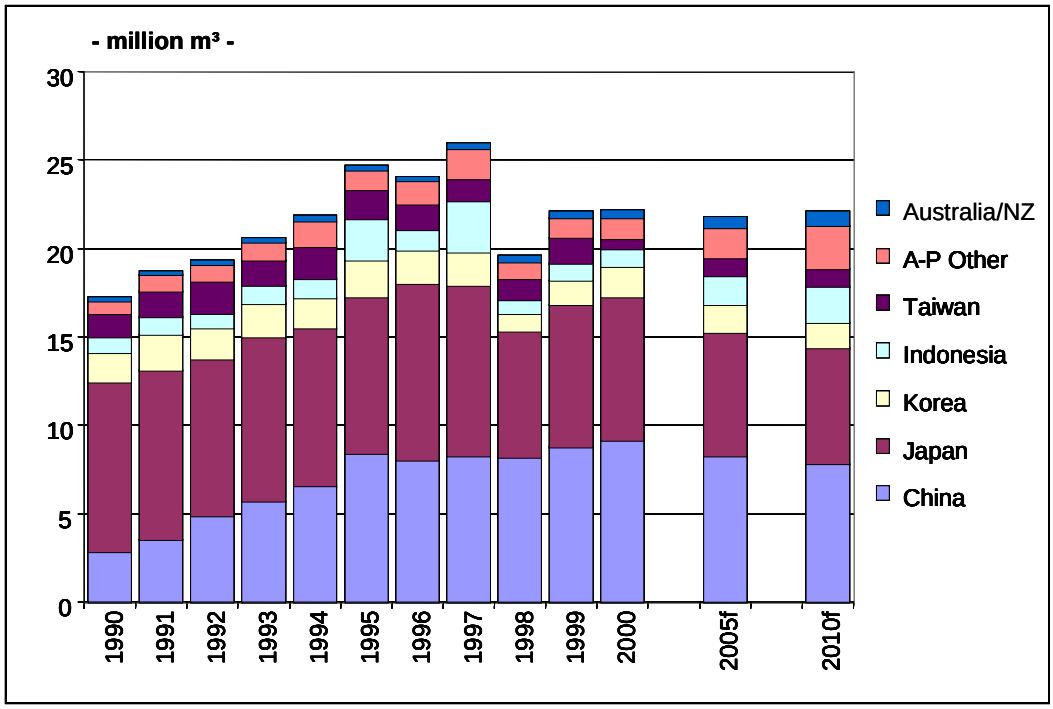


The decline in availability, particularly of high quality hardwood does present real opportunities for Australia. China is by far the biggest market for sawn hardwood followed by Malaysia and Indonesia. China has increased its imports dramatically over the past years and will continue to import large volumes. However, per capita consumption of hardwood is close to that observed in other countries, i.e. China at 0.01 m³/capita in 2000, compared to 0.08 m³/capita in Australia and 0.02 m³/capita in Japan. Initially, these opportunities will be available to the established native hardwood industry, however, sawlogs should become available from plantations as well.

Plywood

Plywood is the primary wood-based panel product within Asia-Pacific. Production facilities are found throughout the region and the industry supplies markets globally. However, production of plywood has traditionally been based on tropical hardwood and its availability has been in decline. Consumption of plywood is strongly concentrated in China and Japan who together account for more that 80% of the Asia-Pacific market. While consumption has declined since 1993, future consumption is not expected to increase dramatically as the supply of finished products is driven by the availability of resources.

Figure S4:
Plywood Consumption in Asia-Pacific, including Australia/New Zealand

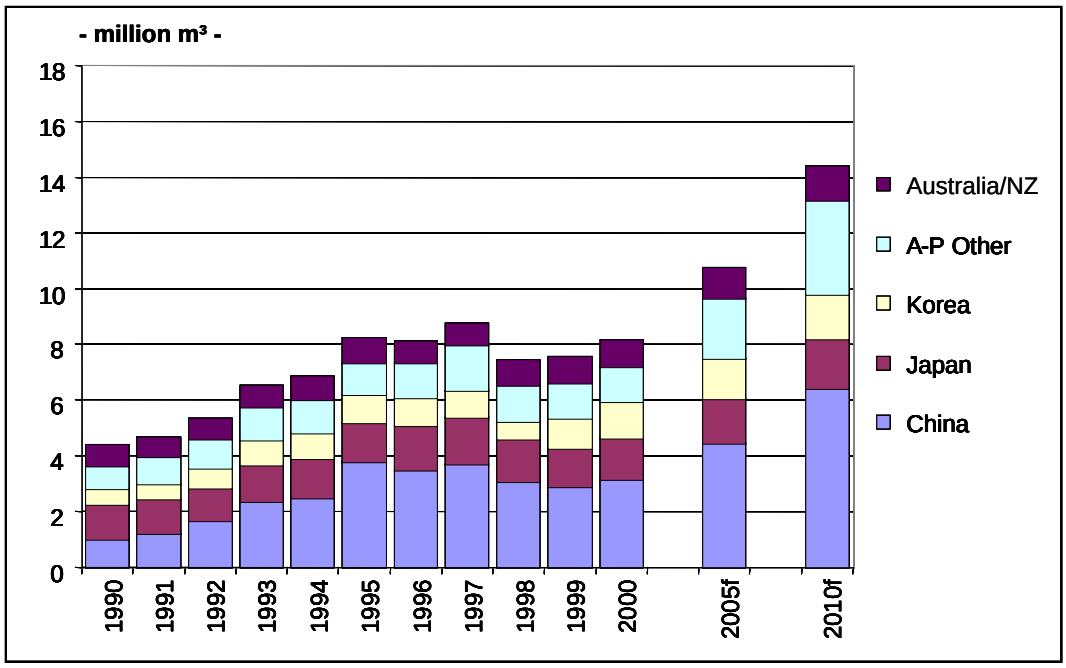


China has become the largest plywood market in Asia-Pacific. The majority of plywood is used is for decorative purposes but temporary construction uses, such as concrete formwork, are increasing. The Japanese market uses plywood more in construction and structural type end-uses and has become very used to combi and softwood based plywood. Raw material for plywood production will become increasingly scarce resulting in opportunities for the supply of plywood to the Asian market from Australia.

Particleboard

Particleboard is well established in the traditional markets of Europe and North America but is still relatively new throughout the Asia-Pacific region. The consumption of particleboard is expected to grow considerably, driven by the Chinese and other Asian markets (see Figure S5).

Figure S5:
Particleboard Consumption in Asia-Pacific, including Australia/New Zealand



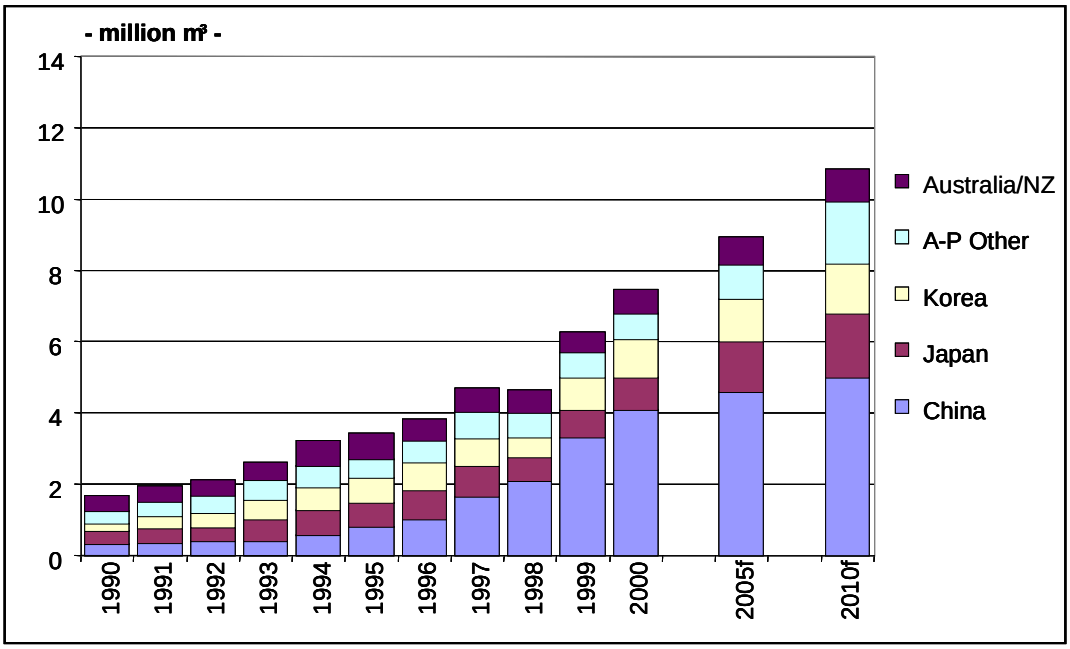
Particleboard is a relatively low cost panel and is not typically transported over great distances in raw form. However, value-added processes such as overlays or natural veneer, melamine or others allow particleboard to be cost effectively transported – these value-added particleboard products are the main opportunities for Australia.

Medium Density Fibreboard

Medium Density Fibreboard (MDF) has grown rapidly in Asia-Pacific. MDF is produced throughout the region, with significant capacity installed in Australia/New Zealand, Malaysia and China. Australia/New Zealand has been a major supplier of MDF to the Asian market and has developed a strong reputation for quality based on the utilisation of radiata pine fibre.

The strong consumption growth for MDF is forecast to continue as the panel will continue to find new end-uses and substitute for more traditional products (see Figure S6).

Figure S6:
MDF Consumption in Asia-Pacific, including Australia/New Zealand



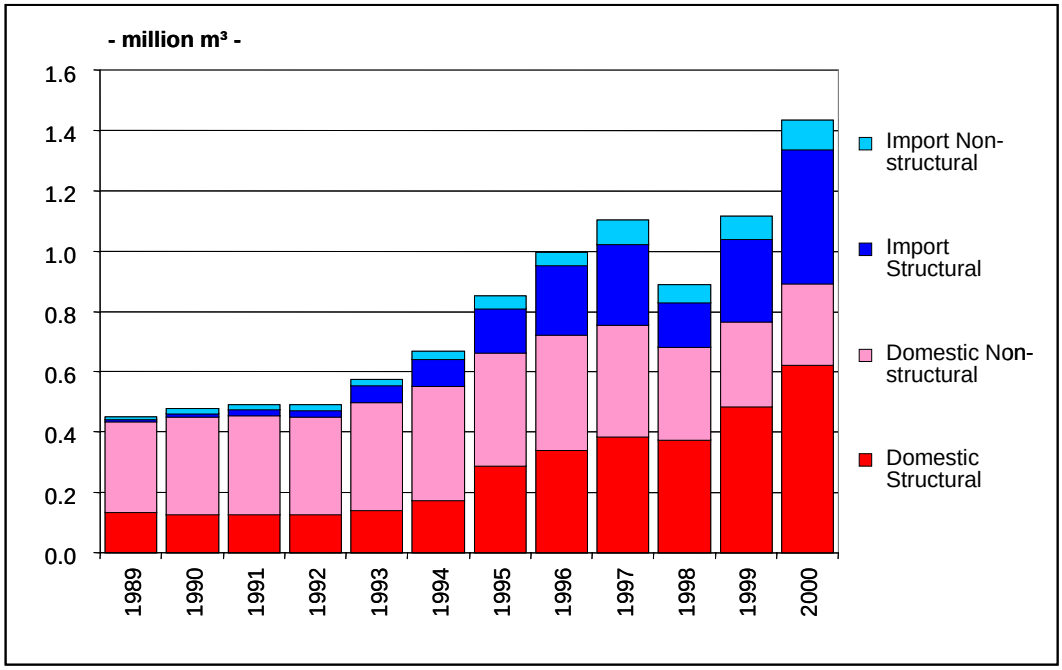
Major MDF markets within the region include China, Japan, Korea and Australia/New Zealand. All markets are expected to see continued growth in consumption and total consumption is forecast to reach some 11 million m³ by 2010.

The continued growth in demand will present future opportunities for Australia in the existing industry and for greenfield mills. It can be expected that softwood, hardwood as well as a mixture of fibres will be used in future MDF production, which will provide an increasing range of products for future markets.

Laminated Veneer Lumber

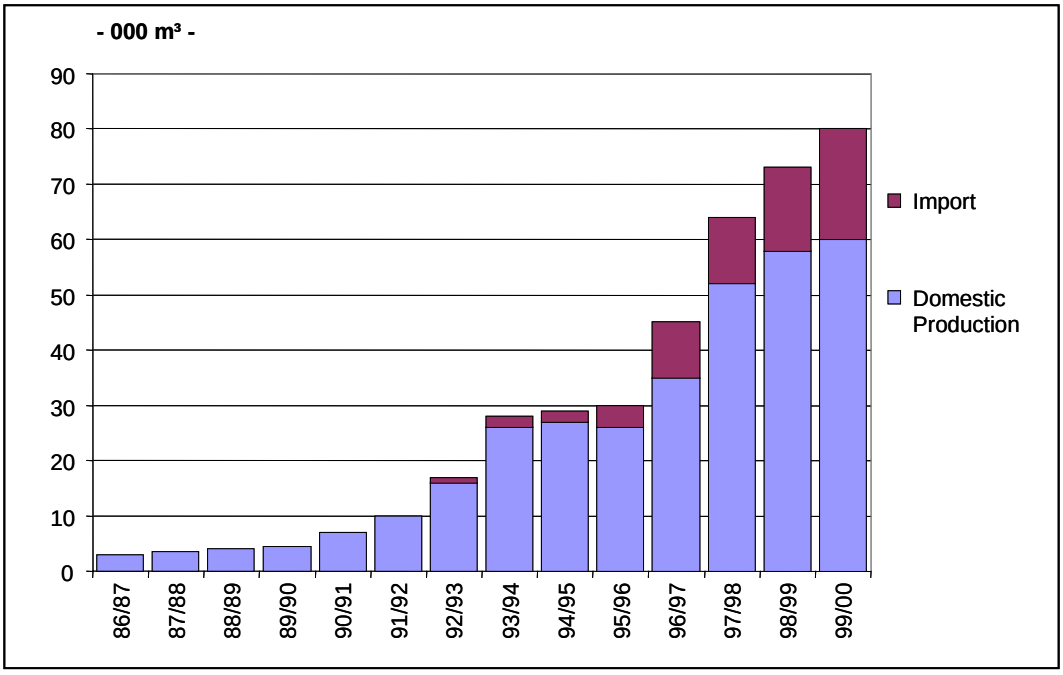
Within the Asia-Pacific region only two distinct markets for LVL exist to date. The main market is the Japanese market where both structural and non-structural LVL is used. Total consumption in Japan reached some 450,000 m³ in 2000 (see Figure S7).

Figure S7:
LVL Supply in Japan



The Australian market for LVL has developed strongly, and this market is primarily a structural LVL market. In addition to domestic supplies, LVL has been imported into this market from North America. Total consumption of LVL is estimated to have reached some 80,000 m³ in 1999/00 (see Figure S8).

Figure S8:
LVL Supply in Australia



No other significant markets have yet developed for LVL, however, it is expected that New Zealand's consumption of LVL will increase as LVL will be made available through domestic processing. In addition, various non-structural markets for LVL are expected to develop throughout Asia.

Opportunities exist for further expansion of the LVL industry in Australia. This would serve the increasing Australian market as well as exports markets.

Glue-Laminated Lumber

The only Asian market for glue-laminated lumber is in Japan where its use in house construction is growing rapidly. New Zealand has developed a small position in this market; facilities based in Australia could also present real opportunities.

The domestic and export market opportunities and Australia's cost competitiveness for solid wood products are illustrated in Table S1.

Table S1:
Solid Wood Opportunities

Summary	Supply Deficit in		Cost Competitiveness
	Asia	Australia	
Softwood sawn	●	●	●
Hardwood sawn	●	◖	●
Particleboard	●	◖	◖
MDF	●	○	●
LVL	◖	●	●
Glue-laminated lumber	●	◖	●

● Positive ◖ Neutral ○ Negative

Woodchips

Hardwood and softwood woodchips are traded within the Asia-Pacific region, and Australia is supplying both. The main market for woodchips is Japan (87%), but Korea and Taiwan are also importing significant volumes. Australia is in a strong position to increase its market share in the main woodchip markets as well as develop new markets for woodchips in Indonesia and other countries facing increasing resource scarcity.

The increasing supply of hardwood woodchips as a result of the rapid expansion of prospectus driven plantations provides opportunities for increased woodchip exports (and/or domestic processing). Most of the plantings are *Eucalyptus globulus*, regarded as one of the best fibres for BHKP production. Australia's

cost competitiveness will ensure markets can be found in Japan but some exports may be partly at the expense of native forest woodchips beyond 2010.

Opportunities for softwood woodchip export are not as strong due to competition from New Zealand and North America.

Table S2:
Woodchip Export Opportunities

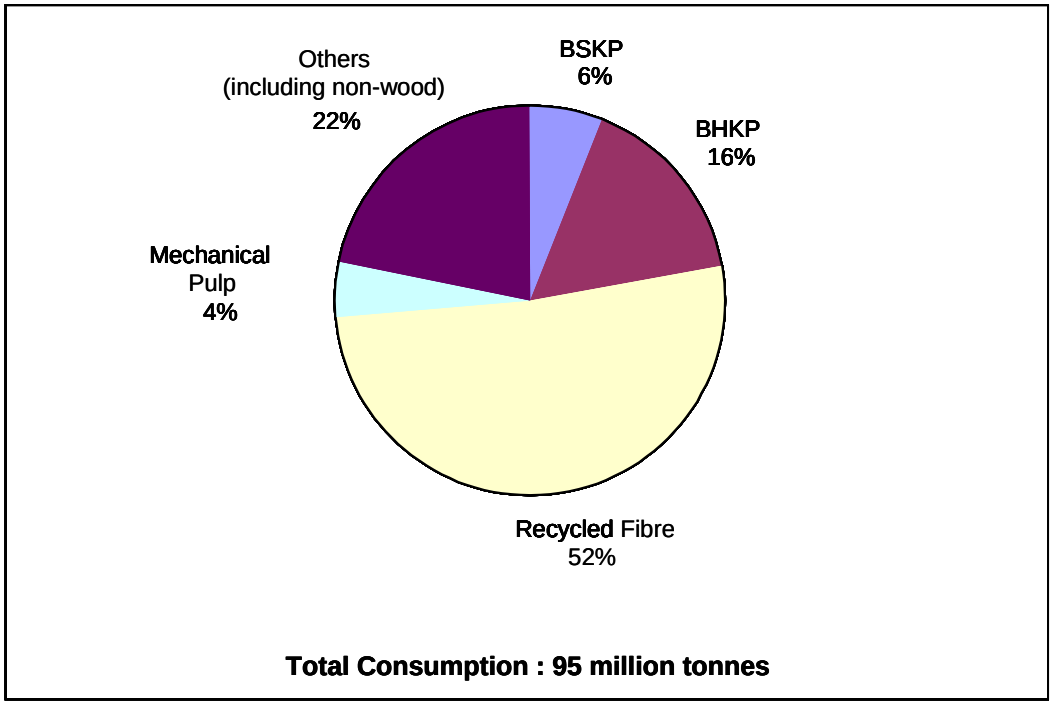
Summary	Supply Deficit in		Cost Competitiveness	Quality Advantage
	Asia	Australia		
Softwood	●	○	◖	◖
Native hardwood	●	○	●	◖
Plantation hardwood	●	○	●	●

● Positive ◖ Neutral ○ Negative

Papermaking Fibres

Papermaking fibre consumption within the Asia-Pacific region amounted to 95 million tonnes in 2000, including both market and integrated pulp. Recycled fibre accounts for 52% of all fibre used (Figure S9). Recycled fibre and bleached hardwood kraft pulp are increasingly replacing non-wood pulp, especially in China.

Figure S9:
Consumption of Papermaking Fibres in Asia-Pacific by Grades 2000



Consumption of market pulp in the region is summarised in Table S3.

Table S3:
Consumption of Market Pulp in Asia-Pacific 2000-2010 (million tonnes)

	Consumption 2000	Consumption 2010	Growth 2000-2010 (%/a)
BSKP	4.0	5.5	3.2
BHKP	5.9	11.0	6.4
Mechanical pulp	1.1	1.4	2.4

For market pulp, the total consumption of bleached softwood kraft pulp (BSKP) reached some 4 million tonnes in 2000 and is expected to increase to some 5.5 million tonnes by 2010. The Asia-Pacific region will remain a significant net importer of this grade.

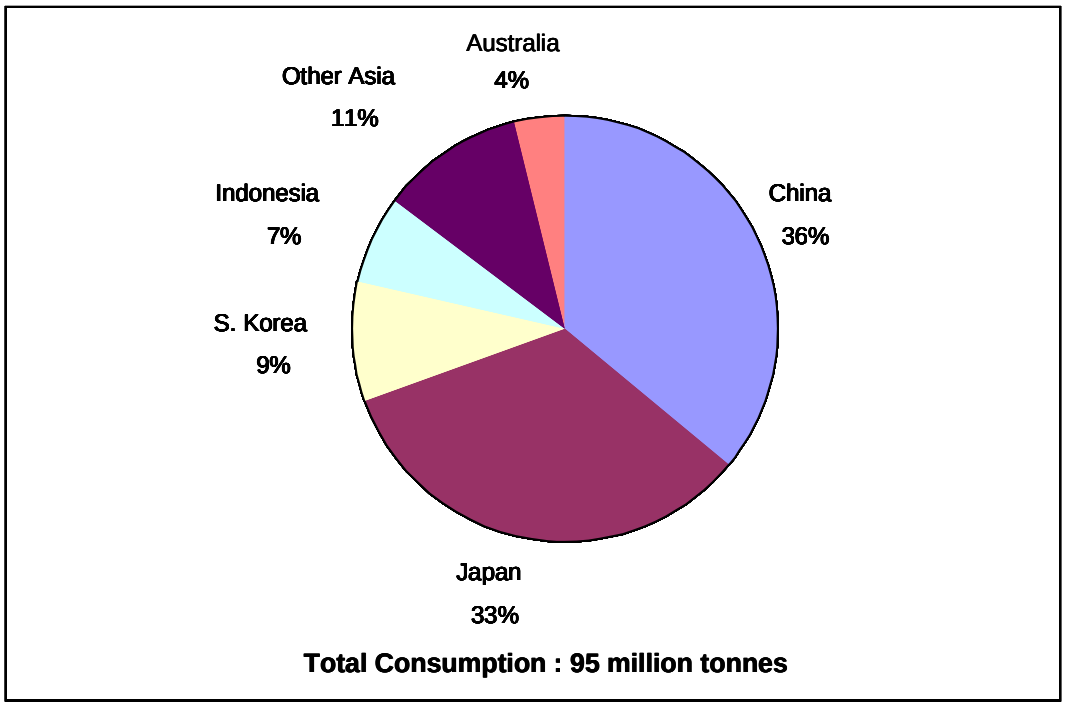
For bleached hardwood kraft pulp (BHKP), market pulp consumption reached some 6 million tonnes in 2000 and is expected to increase to some 11 million tonnes by 2010. The region has significant capacity expansion plans, and is expected to become a net exporter.

Mechanical pulp is a relatively small and specialised market pulp product; the total market for this pulp grade is only some 1.1 million tonnes in the region. Market demand for this pulp is expected to increase to some 1.4 million tonnes by 2010 but much of this will be supplied from mills presently planned in China.

Recycled fibre recovery in Australia could increase from the present 48% to some 50-60% typically achieved in other developed countries in the region. This would allow for an increase in use of this fibre within Australia and/or increases of exports of this fibre. Increasing use of recycled fibre may also result in an increase in pulpwood availability.

China and Japan account for one-third each of total papermaking fibre consumption (Figure S10). The Japanese fibre market is largely supplied by domestic recycled fibre and chemical pulp produced from imported woodchips.

Figure S10:
Consumption of Papermaking Fibres in Asia-Pacific by Country 2000



Opportunities exist for Australia to increase production of hardwood and softwood kraft pulp, mechanical pulp and the proportion of recycled fibre collected. This would present opportunities to supply domestic and export markets, particularly with BSKP, as the region will remain a significant net importer of this pulp grade.

An indication of how these opportunities fit with regional supply deficits and the potential cost competitiveness of Australian production is shown in Table S4.

Table S4:
Papermaking Fibre Opportunities

Summary	Supply Deficit in		Cost Competitiveness
	Asia	Australia	
BSKP	●	●	●
BHKP	◖	●	◖
Mechanical pulp	●	●	●
Recycled fibre	●	●	●

● Positive ◖ Neutral ○ Negative

Paper and Board

Table S5:
Consumption of Selected Paper and Paperboard in Asia-Pacific 2000-2010

	Consumption 2000 (metric tonnes)	Consumption 2010 (metric tonnes)	Growth 2000-2010 (%/a)
Newsprint	9.5	12.5	2.8
Printing and writing	27	38	3.5
Cartonboard	10	16	4.8
Corrugating material	28.6	40	3.4

Newsprint consumption in Asia-Pacific reached some 9.5 million tonnes in 2000 and is expected to increase to 12.5 million tonnes by 2010, with growth being concentrated in the developing countries such as China, Indonesia and Thailand. While Australia is a net importer of newsprint, the majority of the newsprint consumed (80%) is supplied by a single company.

Printing and writing paper consumption in the Asia-Pacific region reached some 27 million tonnes in 2000 and is expected to increase to 38 million tonnes by 2010. Australia is a major importer of various printing and writing grades (650,000 t/a) and opportunities exist to develop new production facilities for certain grades, integrated into a pulp production facility such as BHKP or mechanical pulp.

Cartonboard consumption within the Asia-Pacific region reached some 10 million tonnes in 2000 and is expected to increase to 16 million tonnes by 2010. The Asia-Pacific region as a whole is a small net importer. Australia imports volumes from New Zealand and the USA, but opportunities for expansion of cartonboard production within Australia are limited.

Corrugated materials consumption reached some 28.6 million tonnes in 2000 and is expected to increase to some 40 million tonnes by 2010. China and Japan are the key consumption centres accounting for 65% of the total market. Australia is a net exporter of corrugating materials and will remain a strong supplier of this product into the region.

An indication of the market opportunities and cost competitiveness of Australian production of the various grades is shown in Table S6.

Table S6:
Paper and Paperboard Opportunities

Summary	Supply Deficit in		Cost Competitiveness
	Asia	Australia	
Newsprint	◖	●	●
Wood-free	○	●	○
Wood containing	●	●	●
Cartonboard	●	●	●
Corrugating Materials	◖	○	●

● Positive ◖ Neutral ○ Negative

Investment Opportunities

Future opportunities to utilise the wood resources may be located in:

- Tasmania, with significant volumes of hardwood and native forest material potentially available, which would allow for investment in world scale chemical pulping operations.
- Green Triangle, with significant volumes of softwood pulpwood and softwood residues as well as hardwood plantation pulpwood available towards the end of this decade. As with the Tasmanian opportunity, volumes would be sufficient for world scale chemical pulping operations.
- Western Australia, with significant hardwood pulpwood availability, as well as smaller volumes of softwood sawlogs. Pulpwood availability would be suitable for chemical pulping options, while softwood sawlogs would be sufficient for additional capacity in sawmilling, or alternative processes such as LVL.
- Central Victoria, with volumes of softwood pulpwood available, suitable for various solid wood and reconstituted panels options.
- East Gippsland/Bombala, with good availability of softwood pulpwood and suitable for various reconstituted panel options as well as sawlog availability, which would support sawmilling or peeling operations and produce residues for panel manufacture.
- North Queensland sawlog availability suitable for supplying sawmilling operations.

There are a number of additional opportunities to expand the current industry capacity or develop more niche type activities throughout Australia. The significant increases in hardwood plantations are likely to result in developments of technology to allow utilisation of some of this resource by the solid wood industry.

The following graphs present 9 expansion and a minimum of 9 greenfield opportunities based on existing and developing regional wood resources.

Figure S11:
Pulpwood Roundwood and Residue Opportunities for Pulp and Paper Manufacture

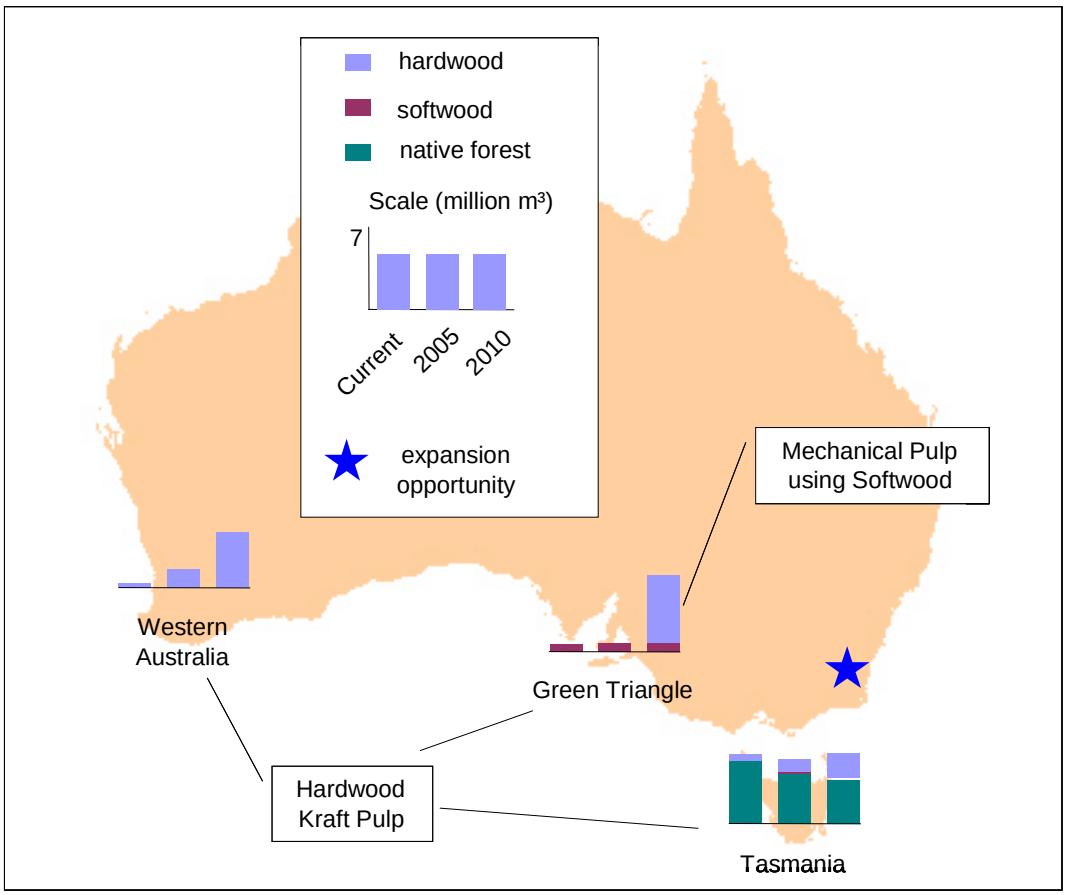


Figure S12:
Pulpwood Roundwood and Residue Opportunities for Panel Manufacture

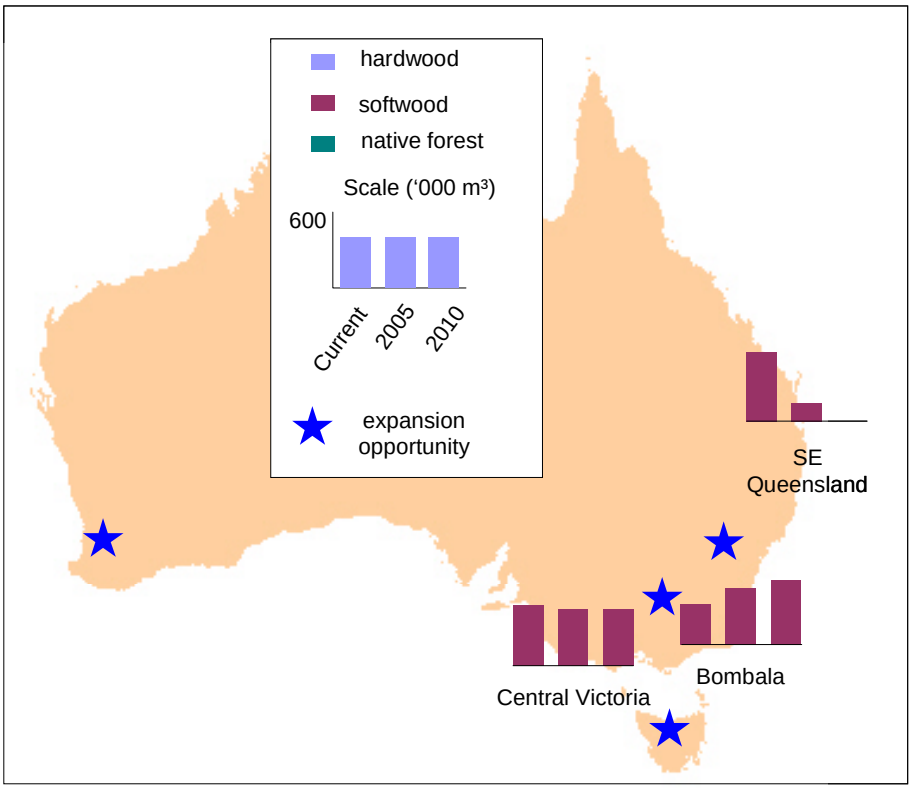
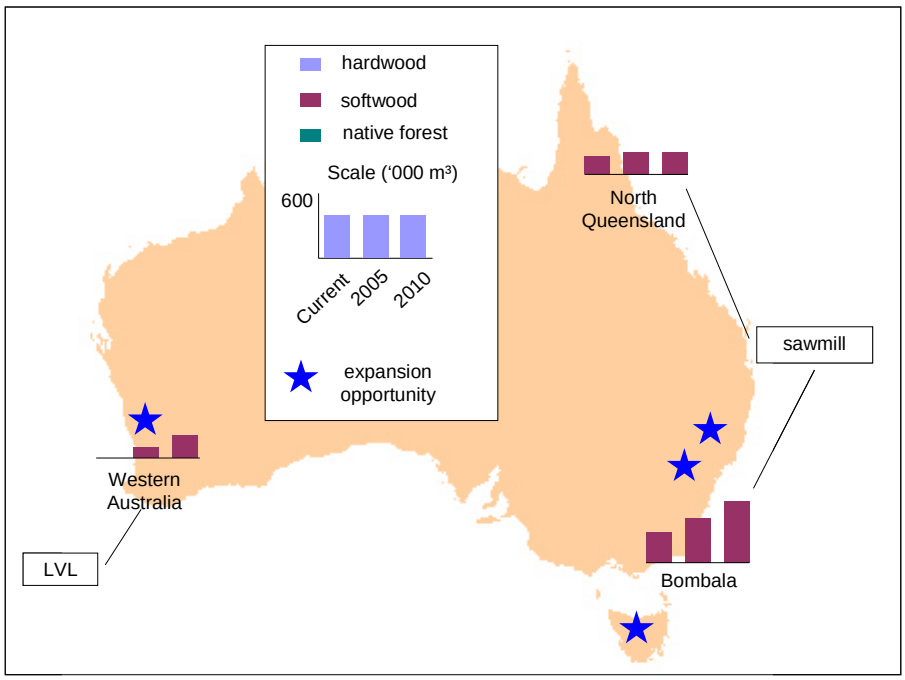


Figure S13:
Sawlog Opportunities for Sawntimber or LVL Manufacture



Investor Requirements

While Australia has the resource base to support a number of greenfield and brownfield investments in timber processing, there are three key elements that potential investors consider.

1. Sufficient high quality, cost competitive resources.

2. Infrastructure (transport, communication, energy, water) and a trained workforce.

3. Sovereign risk and political uncertainty, particularly the approval process and potential changes in legislation.

1. INTRODUCTION

The Department of Agriculture, Fisheries and Forestry appointed Jaakko Pöyry Consulting to develop a report outlining the investment opportunities that exist now or in the future within the Australian forest industry. This assignment has taken into account the current and future available forest resource. Native forest, plantation softwood and hardwood resources have been assessed as to their current supply and their potential supply in 5 and 10 years' time by region.

Throughout Australia there are increasing opportunities for not only new processing plants to supply the domestic market, but there are increasing opportunities to export to the various markets within the Asia-Pacific region.

The various options identified are limited by the resource availability in the regions. It has been assumed that all existing industry will remain, and expand their intake as resource becomes available. However, it has also been assumed that current exported raw materials may be available for a domestic processor.

Opportunities have been identified, by an analysis of the market potential and the resource capability in each region. This has provided a number of suggested options for investors to review.

2. RESOURCE

2.1 Description

The Australian forest products industry is a significant contributor to the economy of Australia with an annual turnover of around 12 billion dollars (ABARE, 2001). Harvest removals in 1999-00 were around 10.7 million m³ of native forest hardwoods, 12.3 million m³ of mostly exotic plantation softwoods and over 0.8 million m³ of plantation hardwoods[1].

The security of supply from native forests has been improved through the enactment of Regional Forest Agreements (RFA). These agreements are intended to provide certainty in forest management and land use for periods of twenty years. The core principle of the RFA is to ensure that a comprehensive, adequate and representative reserve system is in place in native forests while allowing for a sustainable production of timber.

The majority of Australia's 39 million hectares of open canopy (50% to 80% canopy cover) native forests[1] are publicly owned and are made up primarily of eucalypts and some conifer species. These forests vary greatly in their wood production capabilities with about 50 important commercial hardwood species. Most of these species differ markedly in their durability, strength and appearance characteristics.

Australia's 1 million ha of softwood plantations are managed on a multi-thinning regime with final harvest generally at 25-35 years. *Pinus radiata* (radiata pine) is the dominant plantation species in Australia. *P. radiata* has many useful characteristics for structural wood production including superior machining, painting, and staining properties. It is commonly used for:

- Structural grade timbers (e.g. wall framing and roof trusses).
- Appearance grade timbers (e.g. furniture components, panelling, flooring, mouldings, skirting and architraves).
- Green rough sawn (e.g. pallets and packing cases).
- Treated products (e.g. exposed beams, decking, landscape materials and fencing).

A range of reconstituted wood panels are also manufactured from *P. radiata* including structural plywood, laminated veneer lumber (LVL), particleboard and premium quality, light coloured medium density fibreboard (MDF). MDF manufactured from *P. radiata* attracts a price premium.

P. radiata produces a high quality long-fibred pulp commonly used in the manufacture of newsprint, tissue and cardboard. It can be combined with short

[1] ABARE, 2001. Australian Forest Products Statistics, December quarter 2000, ABARE, Canberra.

fibred hardwood pulp to produce a wide range of paper grades. There is also a well developed international trade in *P. radiata* sawlogs, peeler logs, pulp logs and woodchips.

Other exotic species like *P. caribaea* (caribbean pine) and *P. elliottii* (slash pine) are found in the warmer climates of Queensland, the north coast of New South Wales with *P. caribaea* also planted on Melville Island, NT. These softwoods are used to produce structural grade sawntimber, plywood panel products and export woodchips. The exotic species *P. pinaster* is planted mainly in Western Australia on sandy soils in preference to *P. radiata* and is used to produce structural grade sawntimber, MDF and particleboard. *Araucaria cunninghamii* is the only native plantation species and is managed to produce saw and veneer logs.

Hardwood eucalypt plantations occupy around 500,000 ha in Australia. The most common species is *Eucalyptus globulus* (blue gum) followed by *E. nitens* (shining gum) and *E. grandis* (flooded gum). *Eucalyptus globulus* has been principally grown for pulpwood production because of its rapid growth rate, excellent pulping qualities and coppicing ability. *Eucalyptus grandis* has been successfully grown on the NSW north coast for 40 years and yields high quality veneer logs. While achieving very rapid growth, *E. grandis* is not considered to be as valuable a pulp species as *E. globulus.*

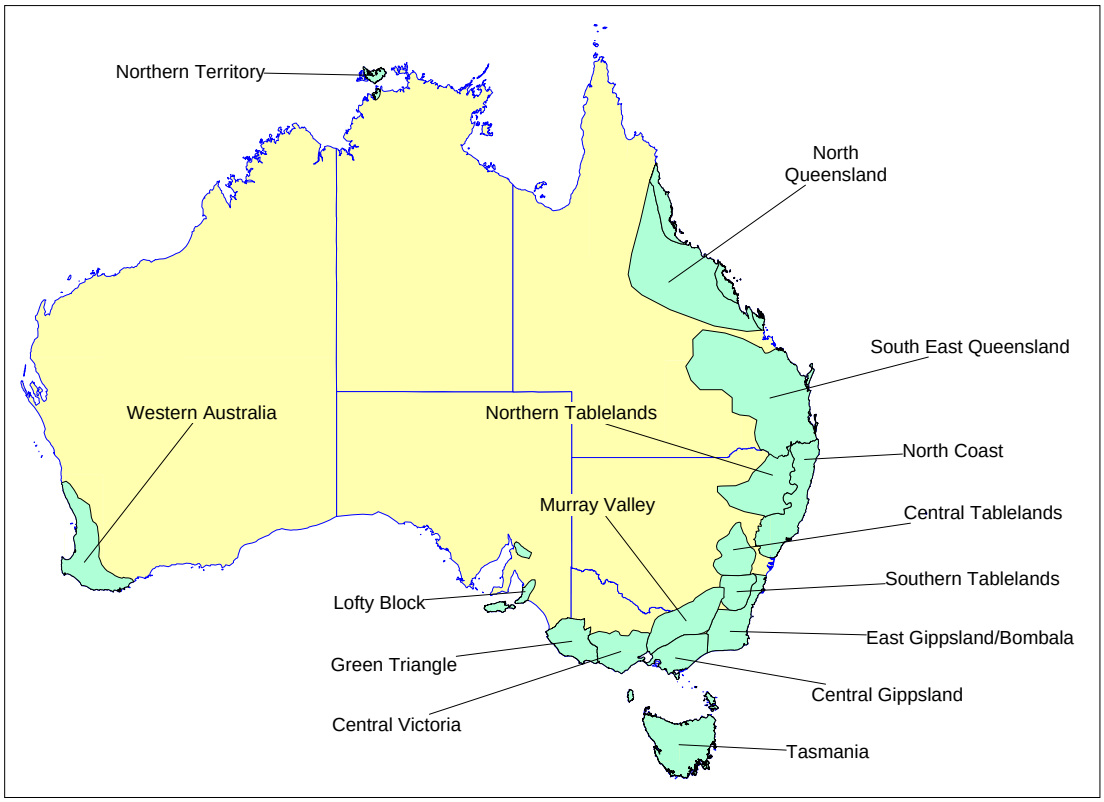
Plantations of *Eucalyptus nitens* have generally been established in the colder parts of Tasmania and Victoria where *E. globulus* is affected by frost. The lower basic density of *E. nitens* results in lower pulp yields than *E. globulus*, although *E. nitens* produces a very light coloured veneer, does not experience end-splitting and no problems are encountered in either peeling or drying the veneer. *E. nitens* also has superior sawing properties to *E. globulus*.

Hardwood pulpwood plantations are generally managed on 10-15 year rotations. Hardwood sawlog plantations have been established in New South Wales (mostly *E. pilularis* and *E. grandis*) with thinnings as early as age 8 and rotations of up to 30 years. Some companies are also beginning to establish hardwood sawlog plantations in Queensland and Tasmania.

The National Plantation Inventory (NPI), a component of the National Forest Inventory (NFI), produces periodic updates of Australia's plantation estate. In 1997 the NPI provided a report estimating regional plantation yields based on the areas planted and age class distribution of the resources. An update is due in 2001. The NPI's plantation regions have been used as a basis for presenting expected wood flows. All plantation area estimates quoted in this report are largely based on the intermediate NFI report, National Forest Inventory (2000), National Plantation Inventory Tabular Report – March 2000 (Bureau of Resource Sciences). Native forest yields are estimated for those areas immediately surrounding the plantation resources.

In Figure 2-1 the National Plantation Inventory (NPI) regions have been modified to include adjacent native forest supply regions.

Figure 2-1:
Map of NPI plantation regions

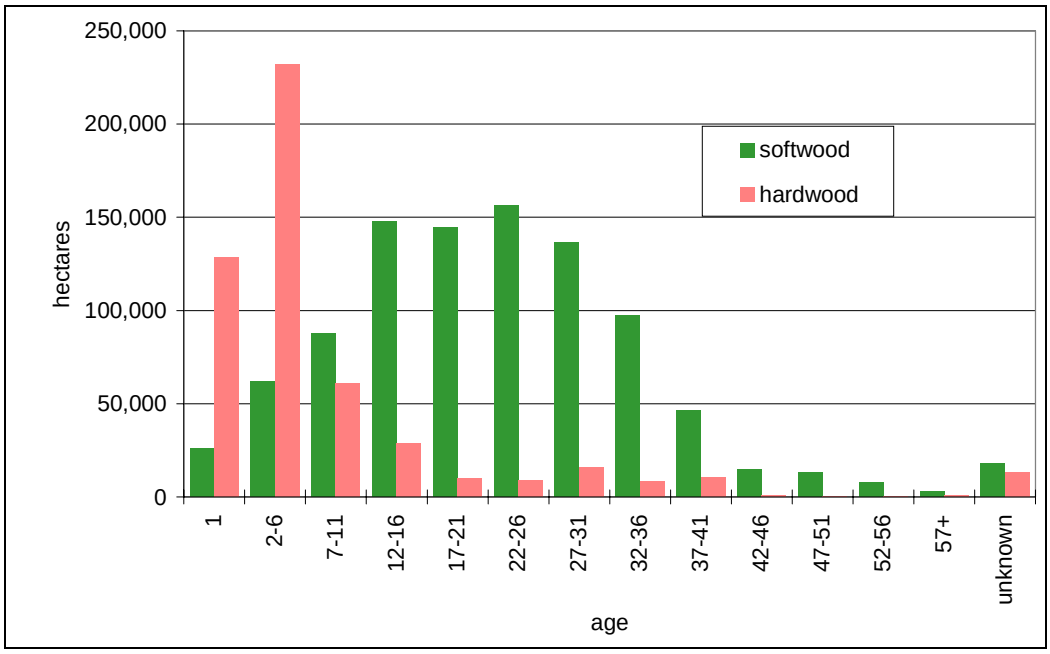


Other plantation and native forest areas in Australia will produce smaller yields not applicable for identifying large processing opportunities.

Australian softwood sawlog production is increasing due to the large number of plantations established in the 1970's-80's. As these resources come on stream, there will be an opportunity for existing and potential processors to expand.

The expansion of hardwood pulpwood plantations in Australia has accelerated dramatically since 1995 through investment in the retail prospectus plantation industry. Small private investors have been attracted to plantations by a favourable investment climate and a strong demand for *E. globulus* pulpwood on the export market. This expansion in plantation area will result in significant increases in yields from 2005. Figure 2-4 shows plantation areas by current age.

Figure 2-2:
Plantation establishment in Australia



Note: Age 1 is estimated area established in 2000.

The estimation of yields is challenging due to variations in productivity, climatic variation and varying performance by growers. Productivity generally coincides with high rainfall but quality varies between and within regions. Estimates of sawlog and pulpwood total yields are provided in Figure 2-2 and Figure 2-3, respectively.

Figure 2-3:
Total estimated potential sawlog yields - Australia

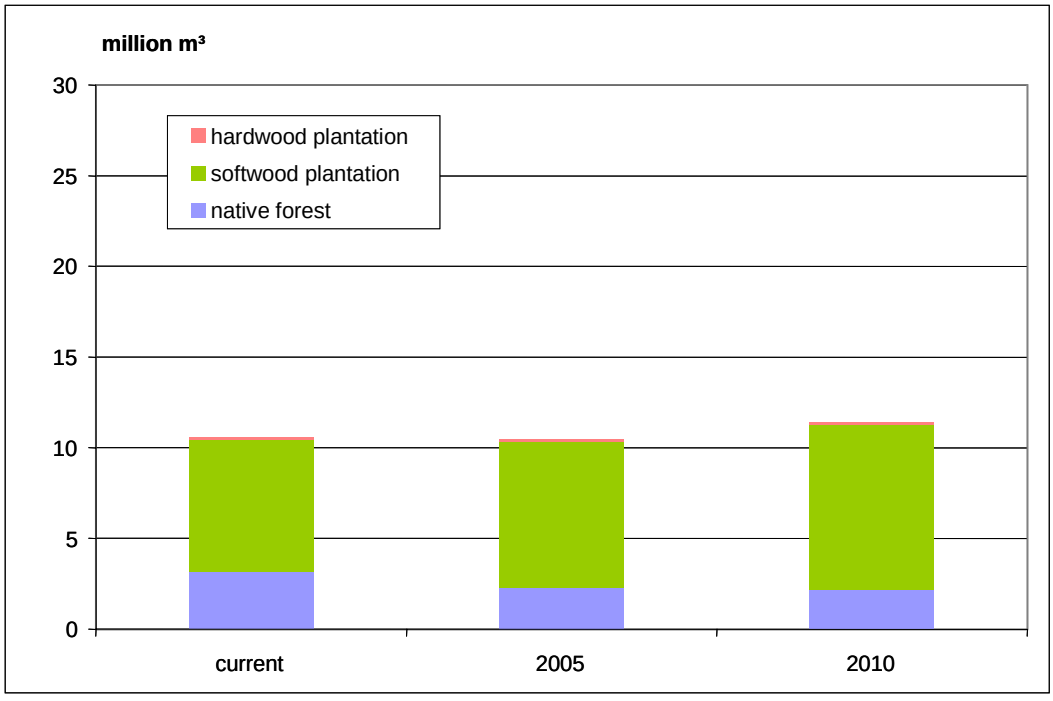
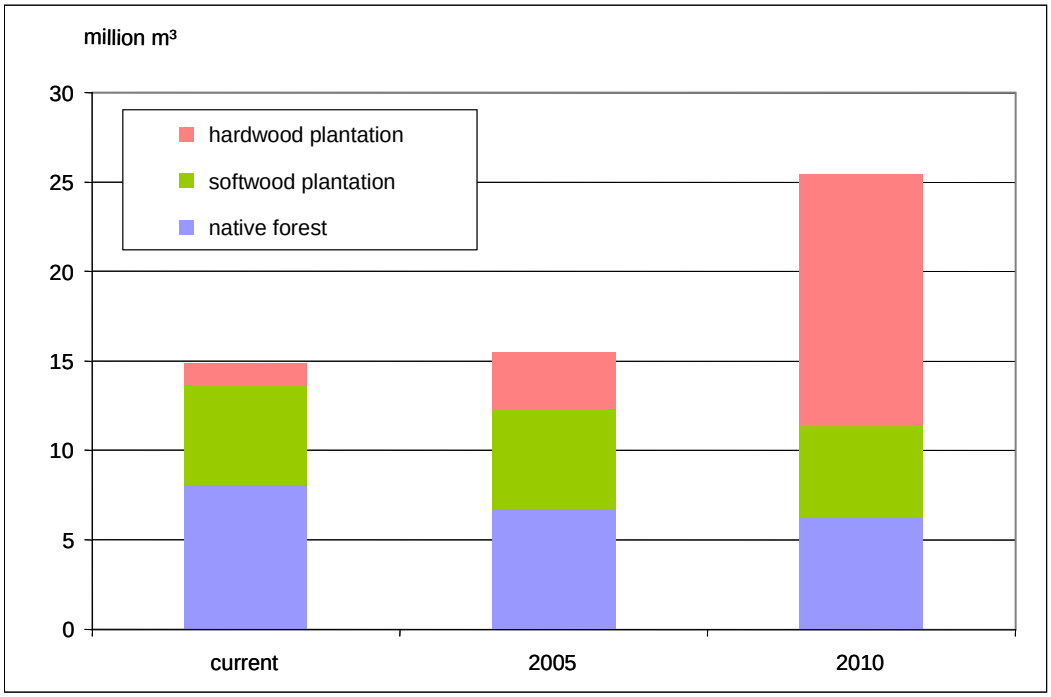


Figure 2-4:
Total estimated potential pulpwood yields - Australia



These yields are what might be produced based on data from growers and previous investigations by Jaakko Pöyry Consulting. The estimates assume current rotation lengths, regimes, product specifications and expected growth rates. The term "availability" in this report means those volumes that could not be utilised by domestic processors based on estimates of their current and expected future capacity.

Importantly, log and woodchip exporters are not included as domestic processors as they do not produce finished products such as sawntimber, panels or pulp and paper. In many cases, the resources are committed under supply and sales agreements. However, the domestic processing industry may be able to offer higher prices than an exporter of raw wood resources although resources located close to port will be highly sought after by raw material exporters and producers targeting export markets. Estimated production of residues for pulp or panel production are dependent on utilisation of sawlog by existing or new processors.

2.2 Regional Opportunities

2.2.1 Tasmania

Tasmania has a long history of forestry activity. A significant proportion of the State's population are either employed directly or indirectly by the forest industry, which includes woodchip export, sawmilling and manufacturers of MDF, pulp and paper, particleboard, plywood/veneer and post/poles. The region has some of

the most productive forests in Australia and supplies 66% of the native pulpwood and woodchip for export markets.

Production native forests cover around 1.5 million hectares of the State and include many species of hardwood eucalypts and acacias with half of the resource under public ownership. The most commercially significant of these is the ash or the Tasmanian oak group: *E. regnans* (mountain ash), *E. delegatensis* (alpine ash) and *E. obliqua* (messmate stringybark). *Acacia dealbata* (silver wattle) and *A. melanoxylon* (blackwood) also produce quality saw and veneer logs. High quality pulpwood is produced from *E. regnans* and *E. delegatensis* with lower quality pulpwood sourced from native forests in the south and north-west, and also derived from the less preferred pulpwood species such as the *E. amygdalina* (black peppermint) along the east coast.

Around 98,000 ha of plantations have been established in the State. *Eucalyptus nitens* and *E. globulus* are the main plantation hardwoods grown and there are 71,000 ha of softwood plantations entirely made up of *P. radiata* with one-quarter of the plantation estate being publicly owned.

Tasmania has three deep water ports used for pulpwood woodchip export situated on the north and southeastern coastline. The state has an excellent road network with a number of major trucking routes recently being approved to allow larger volumes of logs and woodchips to be transported. Forestry Tasmania, manager of State-owned forests and plantations, is currently improving infrastructure for the southern forests around the Southwood site, Electrona Wharf and Huon Valley where the new investment in processing will concentrate on bio-energy and solid wood product output.

Expected opportunities in Tasmania are based on native forest and hardwood plantation pulpwood yields and possibly from softwood pulpwood and sawmill residues (Table 2-1).

Table 2-1:
Estimated total pulpwood yields - Tasmania

	'000 m³/a			
	HW pulpwood native forest	**Availability**	**HW pulpwood plantations**	**Availability**
current	5,500	Less than 5% used for domestic processing; most exported as woodchip.	450	Most plantations privately owned by woodchip export company.
5 years	4,700 - 5,200		800 - 1000	
10 years	3,500 - 4,500		1,700 - 2,000	

	'000 m³/a		**Availability**
	SW pulpwood plantations	**SW sawlog residues**	
current	550	200	Most pulpwood and residues are used in local processing around 100,000 m³ is exported annually.
5 years	600 - 700	250 - 300	Local processing should absorb increases, however, some may be available along with current exports.
10 years	600 - 700	300 - 350	

Ninety-five percent of hardwood pulpwood is exported as woodchips. A decline in harvests from private property is expected due to a lack of management for long-term native sawlog production or the conversion of native forest to eucalypt plantation. By 2010, 80% of the softwood plantation pulpwood and sawlog residues should be taken up by local processing, although as much as 200,000 m³ may be available for export or additional domestic processing.

Native forest sawmills are already competing vigorously for decreasing sawlog yields that in turn will produce decreasing sawmill residues. Trials have been undertaken which show that regrowth eucalypts in Tasmania are suitable for rotary veneer production. This is used in structural plywood manufacture and a log export market has been developed for this application. Domestic processing of veneers could commence once the product gains better market acceptance in Asia. Other solid wood uses for regrowth logs may be developed resulting in an increase in the availability of sawlogs.

The softwood sawmilling industry does not currently have the capacity to absorb new sawlog yields, however, processors will likely expand their capacity; sawmill residues are expected to be used locally with small amounts exported.

2.2.2 Green Triangle

The "Green Triangle" region refers to approximately 34,000 sq km of southeastern South Australia and southwestern Victoria. This region could be

called the birthplace of Australian softwood plantation forestry and has one of the nation's largest plantation estates.

If establishment continues at 25,000 ha/a, the Green Triangle's hardwood plantation area could equal the softwood plantation area of 155,000 ha after 2003. The majority of hardwood plantations have been established through the retail prospectus industry. Approximately 40% of the region's softwood plantations are publicly owned.

The Green Triangle softwood industry is located around the processing centre of Mt Gambier, 160 km from the Victorian port of Portland. Processors include sawmillers and manufacturers of particleboard, LVL, plywood/veneer, pulp/paper and posts/poles. There is a well maintained road network in the region.

Expected opportunities in the Green Triangle are based on the utilisation of pulpwood and sawmill residue yields (Table 2-2).

Table 2-2:
Estimated total pulpwood yields – Green Triangle

	'000 m³/a			
	HW pulpwood plantations	**Availability**	**SW pulpwood plantations**	**Availability**
current	50	Most to be used in local processing.	1,000	Only around 600,000 m³ used domestically for pulp and paper and posts and poles.
5 years	50 - 100		900 -1,100	
10 years	5,000 - 6,000	Currently planned for woodchip export.	900 -1,100	

	'000 m³/a	
	SW sawmill residues	**Availability**
current	500	Currently only 75% of residues utilised.
5 years	600 - 700	
10 years	700 - 800	

Approximately half of the softwood pulpwood and sawmill residues produced are exported as woodchip through Portland. The small amount of hardwood plantation pulpwood produced is used locally. Current plans are to export most of the hardwood pulpwood harvested as woodchips.

The existing softwood sawlog industry should take up increases in sawlog yields.

2.2.3 Western Australia

The boom in hardwood plantation establishment in Western Australia has been driven by the popularity of the retail prospectus industry and competitive export pulpwood woodchip prices. Plantation pulpwood is expected to exceed and offset the reduced harvesting of native forests. New infrastructure is being developed to handle increases in hardwood plantation yields and woodchip exports.

Since 1988, and particularly in the last 5 years, *E. globulus* has been the principal hardwood species planted on land located in the higher rainfall zones able to support the more productive plantations. Areas receiving less than 600 mm annual rainfall are affected by high transpiration rates and water stress resulting in decreased plantation productivity. Although land prices have increased significantly with the prospectus industry's demand, it is expected that around 15,000 ha/a will continue to be established over the coming 2 to 4 years.

The principal softwood species planted are *P. radiata* and *P. pinaster* (maritime pine), the latter primarily on the drier, sandy sites. Over 100,000 ha of softwood plantation has been established in the south-west of the State and are used in the manufacture of sawntimber, MDF, particleboard and posts/poles.

Estimated availability of pulpwood is shown in Table 2-3 with sawlog availability in Table 2-4.

Table 2-3:
Estimated available pulpwood yields – Western Australia

	'000 m³/a			
	HW pulpwood plantations	**Availability**	**SW pulpwood plantations**	**Availability**
Current	400	Current yields exported; no hardwood pulpwood domestic processing.	450	All processed domestically.
5 years	900 - 1,400		450 - 550	Availability depends on proportion of sawmill residues used domestically.
10 years	3,500 - 4,500		450 - 550	

Table 2-4:
Estimated available sawlog yields – Western Australia

	'000 m³/a	Availability
	SW sawlog plantations	
current	350	Used domestically.
5 years	450 - 550	Current industry could expand to utilise increased yields.
10 years	500 - 600	

The native forest sawlog industry will be reduced to half its current output in the next few years with an expectation that less than 200,000 m³ of logs will be available for processing annually. The current softwood sawlog industry may take up the increase in softwood sawlog yield for sawmilling, however, plans for a new LVL plant are also being considered.

2.2.4 Central Victoria

This region has some of Australia's highest rainfall (1200 mm/a) and therefore highest growth rates (as high as 30-35 m³/ha/a). The northern part of Central Victoria is flat to rolling hills with low rainfall (as low as 500 mm). Most plantations are located in the southern Otway Ranges and around Ballarat.

The softwood estate is around 30,000 ha and is privately owned. Local industry includes sawmilling and manufacture of posts/poles.

Estimated availability of pulpwood is shown in Table 2-6.

Table 2-5:
Estimated available pulpwood yields – Central Victoria

	'000 m³/a		Availability
	SW pulpwood plantations	SW sawmill residues	
current	300	150	All yields exported as woodchips.
5 years	250 - 300	150 - 200	
10 years	250 - 300	150 - 200	

Softwood pulpwood and residues are currently exported as woodchip through the port of Geelong.

Softwood sawlog supply increases should be taken up by local processing expansion although any oversupply is currently exported as sawlogs.

2.2.5 East Gippsland / Bombala

This region is divided into two distinct sub-regions: East Gippsland in eastern Victoria, which is predominantly mixed eucalypt species for hardwood sawmilling. Bombala, in south-east New South Wales, still supports some hardwood operations but is increasingly converting to *P. radiata*. There are also hardwood woodchip exports based on the native forest in the region. A trial softwood woodchip export operation has recently commenced from Eden.

Within East Gippsland all available high quality hardwood sawlogs are allocated to the existing sawmilling industry although there are opportunities to utilise low quality pulpwood from mixed species native forest. Possibly as much as 1 million m^3/a of pulpwood could be available.

The Bombala region is located due west of the export port of Eden and has a long history and culture associated with the timber industry. Initially the region developed an extensive hardwood sawmilling and export pulpwood woodchip industry, which was followed by significant development of softwood plantations. The early softwood plantations were developed prior to World War II. However, major plantings did not commence until the late 1960's and early 1970's.

The softwood plantation estate of *P. radiata* now covers around 45,000 ha and form an arc to the south and east of the town of Bombala following the higher rainfall zones. The average transport distance to Bombala would be around 25 to 45 km. This resource is largely unutilised except for the minor amounts of sawntimber and posts/poles produced. Around 75% of the plantations are publicly owned.

The major road network in New South Wales and Victoria is well developed with the Princes Highway running through the region and key highways and main roads linking in to this network. In particular, the sealed forest highway south of Bombala, which runs from the Monaro Highway east to the Princes Highway, was constructed to service the export pulpwood market. The public forests also have an excellent internal road network and the new general-purpose wharf being constructed in Twofold Bay adjacent to Harris Daishowa's woodchip export loader provides additional attractive infrastructure.

In Victoria the broad gauge line operating from Sale, connects East Gippsland to Melbourne and Geelong ports and is now being used extensively for pulp log transport.

Table 2-6:
Estimated available pulpwood yields – East Gippsland / Bombala

	'000 m³/a		Availability
	SW pulpwood plantations	SW sawmill residues (possible)	
current	150 - 200	100 - 125	Only minor post/pole domestic processing. A new general purpose wharf is being constructed at Eden.
5 years	250 - 300	130 - 170	
10 years	250 - 300	175 - 225	

Importantly, sawmill residues are based on available sawlog yields.

Table 2-7:
Estimated available sawlog yields – East Gippsland / Bombala

	'000 m³/a	Availability
	SW sawlog plantations	
current	250 - 300	Only around 10-15% processed domestically; no log exports.
5 years	350 - 400	
10 years	450 - 550	

Current softwood sawmill capacity in the region is small (less than 100,000 m³/a) making the majority of sawlog supply available. A memorandum of understanding has been in place for over a year with a potential developer of a greenfield softwood sawmill at Bombala with an associated export woodchip terminal at Twofold Bay, NSW. The development memorandum has specific timelines for establishment and commissioning of the two facilities. Significant investment is yet to occur.

2.2.6 South East Queensland

Harvesting of native forests is to reduce over the next 25 years, however new hardwood plantations are being established including plantations for sawlog production. The primary hardwood plantation species is *E. grandis*.

There is a large exotic pine plantation resource comprised of *P. elliottii* and *P. caribaea*, and more recently, F1 hybrids; *P. radiata* is not suited to South East Queensland's higher humidity, temperatures and summer rainfall. Plantations of *Araucaria cunninghamii* (hoop pine) are also scattered throughout the region. The estate is almost entirely publicly owned. Processors include sawmillers and manufacturers of MDF, particleboard, plywood/veneer and posts/poles.

Port facilities near Brisbane and Gladstone process softwood woodchips for export. These ports are within 150 km of most plantations; most of the Gladstone

pulpwood is transported by rail from south of Maryborough. The rail system has small sidings along its entire length that require minor upgrading to facilitate the handling of bulk wood products.

Table 2-8:
Estimated available pulpwood yields – South East Queensland

	'000 m³/a		Availability
	SW pulpwood plantations	SW sawmill residues	
current	650	500	Roundwood supply is decreasing, however, domestic processing capacity is around 75% of current pulpwood/residue supply
5 years	400 - 550	400 - 500	
10 years	200 - 300	500 - 600	

New hardwood plantations could produce minor opportunities to use pulpwood from thinnings. Increases in sawlog volume will be taken up by existing processors.

2.2.7 North Queensland

The only regional market in the area is Cairns (pop. 130,000). However, if wood export facilities were developed the shipping distance to Asian markets (around 10 days to Japan) would be shorter than from most Australian ports.

Around 21,000 ha of softwood plantations have been established. The primary exotic species planted in this tropical region is *P. caribaea* or hybrids along with a minor amount of *A. cunninghamii*. Most of the softwood estate is publicly owned.

Opportunities exist for utilising the *P. caribaea* sawlog produced in the region (Table 2-9).

Table 2-9:
Estimated available sawlog yields – North Queensland

	'000 m³/a	Availability
	SW sawlog plantations	
current	150	Current capacity around 25% of supply.
5 years	175 - 225	
10 years	175 - 225	

2.2.8 Other Opportunities

- Currently three regions in Australia are using hardwood sawlogs from plantations for sawntimber manufacturing although current production is less than 200,000 m^3/a. Production will increase slowly and only minor opportunities will exist until 2010. Some possibilities for utilising *E. globulus* plantations for sawlog production or veneer and plywood may exist although its wood properties for these products currently seem to be less attractive than for pulp and paper manufacture.
- The overall production of softwood sawlog is increasing in Australia and by 2010 supply should exceed demand. In many regions, the increases are expected to be utilised by existing industries through increases in processing capacity or improved use of the existing capacity. Minor greenfield opportunities may arise where this local industry is unable to capture the increasing yields.
- Almost one quarter of open canopy native forests are privately owned. Many of these forests are located on Australian farms. Production estimates from these farm forests is very limited, however, it is known that sales from these forests include sawntimber, sleepers and firewood. The available yield from farm forests is believed to be above what is currently harvested. (Parsons, 1999).
- A new product that may influence demand in many regions is wood as an energy source under the Renewable Energy (Electricity) Act (2000). The Act introduces a mandatory target for the production of renewable energy in power supplies in order to contribute towards the reduction of Australia's greenhouse gas emissions. This provides a potential market for wood waste, which includes sawmill residues and thinnings as renewable energy source and may create opportunities for revegetation programs in areas where conventional timber production is not viable. Opportunities may be created in several areas in Australia where softwood plantations have been established but are lacking in traditional processing markets.
- Although the future of plantations as carbon sinks is currently uncertain Jaakko Pöyry Consulting estimated in a report for the Australian Greenhouse Office (Jaakko Pöyry Consulting, 2000) that 24% of Australia's plantations (as of 1999) could be classified as "Kyoto forests." These plantations have the potential to sequester carbon that could be used to offset greenhouse gas emissions. Under existing carbon accounting rules, carbon sequestered may be used to offset emissions but when these forests are cut down they generate an emission equal to the amount sequestered. This means that carbon sequestration is a tool that can assist with a temporary reduction of greenhouse gases as distinct from emission reductions that tend to be "permanent".

3. ASIA-PACIFIC MARKET: SOLID WOOD AND WOOD BASED PANEL PRODUCTS

3.1 Sawn Softwood

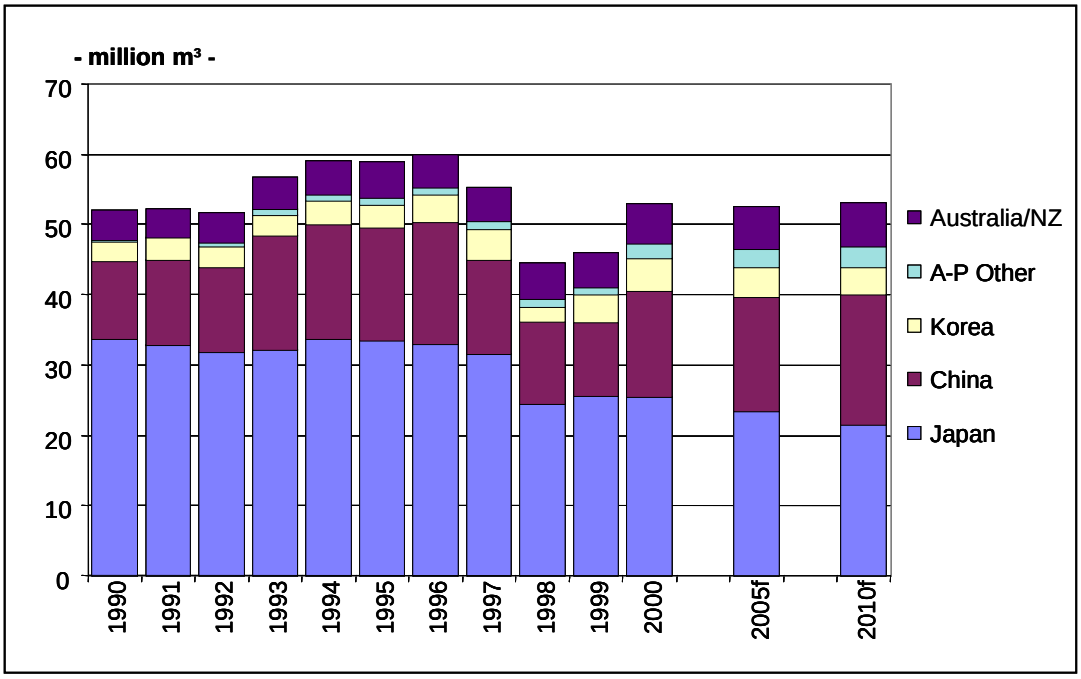
3.1.1 Development and Outlook

In 2000, global consumption of sawn softwood was some 336 million m³, of which the Asia-Pacific, including Australia/New Zealand, consumed approximately 53 million m³ (16% of the world's total). Consumption in the Asia-Pacific has been in a range of 50 to 60 million m³/a in the 1990s, with the only apparent exception being evident during the Asian financial crisis (Figure 3-1). Japan is the largest consumer in the Asia-Pacific region at present, followed by China and Korea.

The region's future demand is forecast to be relatively steady over the next decade despite a negative trend in Japan, as overall substitution from traditional tropical hardwood to alternative fast-grown softwood is underway in most of the Asian countries.

China's demand is forecasted to grow strongly, with slower demand growth in Korea and the other Asia-Pacific countries (A-P Other) up to 2010.

Figure 3-1:
Sawn Softwood Consumption in Asia-Pacific, including Australia/New Zealand



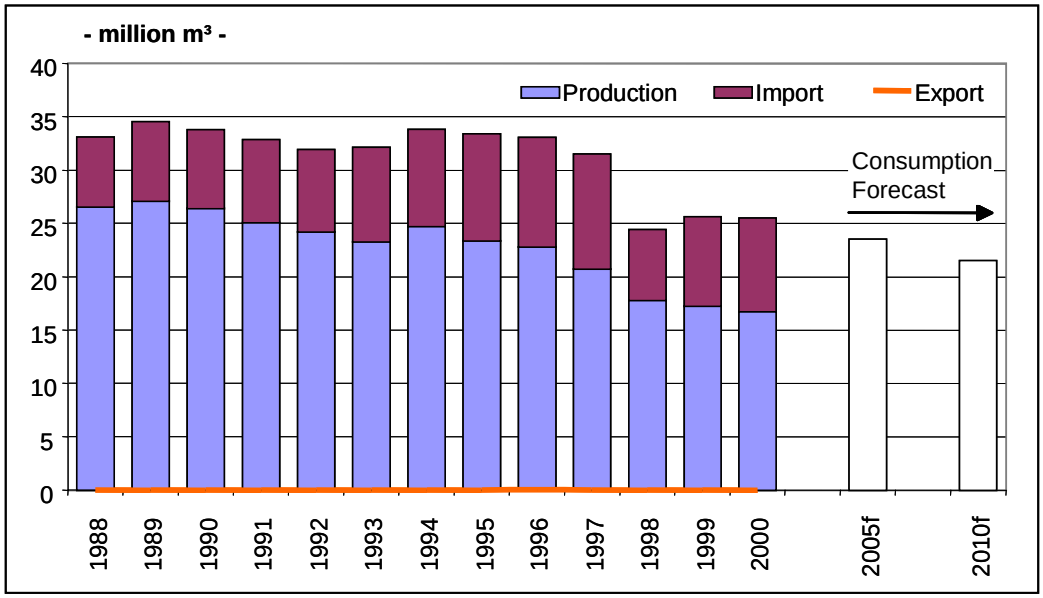
3.1.2 Major Consuming Markets

Japan

Since its peak in 1978, Japan's production of sawn softwood has significantly declined and continues to be replaced by imports. The substitution is underway due primarily to the cost competitiveness of imports compared to domestic manufacturers. Major softwood log exporters into the country have been Russia, USA and New Zealand, although domestic production remains quite strong.

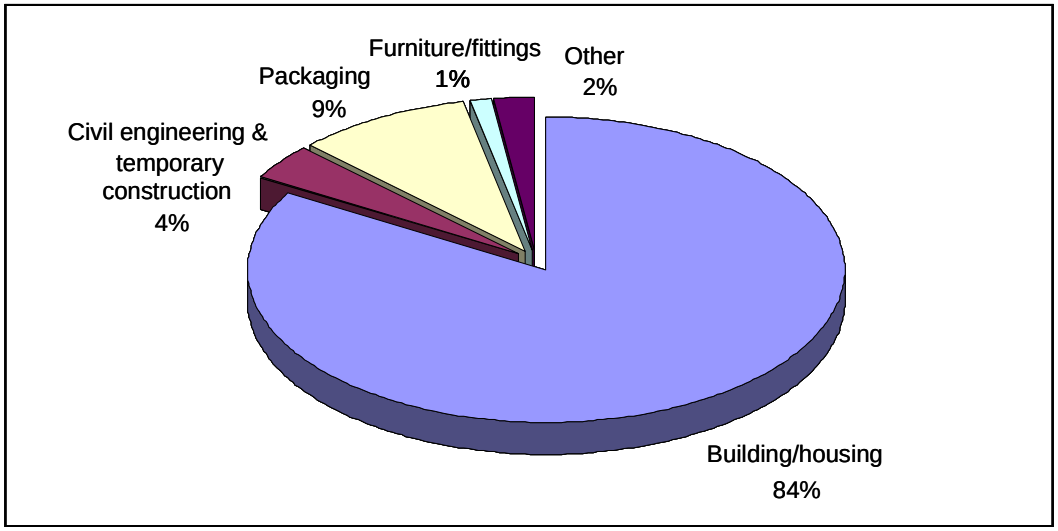
Total consumption of sawn softwood in Japan ranged between 32 to 35 million m³/a until the economic crisis of 1998. Consumption now remains at approximately 25 million m³/a (Figure 3-2). While the consumption level is expected to fall slightly over the next decade, declining domestic production may fall in line with the trend evident since 1994.

Figure 3-2:
Japan Sawn Softwood Production and Trade



It is estimated that 84% of sawn softwood consumption in Japan is used for building/housing. The second largest end-use is packaging, accounting for 9% as identified in Figure 3-3.

Figure 3-3:
Indicative End-uses for Sawn Softwood in Japan



In the wooden housing segment, there are three types of construction methods, namely "post-and-beam" (80.3% share in 2000), "2 x 4" (14.2%) and "Prefab" (5.5%). The component sizes in the post-and-beam sector are very standardised in their traditional way; *hashira/dodai* 105 x 105 mm, *hirakaku* 105 x 270 mm, *mabashira* 105 x 27 mm, *neda* 105 x 45 mm, *sujikai* 90 x 45 mm, *taruki* 40 x 30 mm to name just a few. The 2 x 4 sector consumes North American 2 x 4-12 sizes that are different from Australia's and New Zealand's in actual measurements. The prefab sector is less standardised although the components' dimensions are similar to the 2 x 4's. Radiata pine timber physical properties are presently not acceptable for use in pre-fab or traditional post-and-beam housing in Japan.

Sawn radiata pine is primarily used in the packaging sector and is supplied as either flitch for resawing in Japan or as ready-to-use board. The standard sizes (off-saw) are shown in Table 3-1. For flitch, the invoiced size is 10 or 12 mm less than the off-saw size.

Table 3-1:
Standard sawn radiata pine sizes used for packaging grades in Japan

Flitch (mm	Board	
	Thickness (mm)	Width (mm)
160 x 110	12	70
160 x 130		80
160 x 160		85
185 x 185		150
212 x 212		180
262 x 212		200
242 x 242		210
262 x 262	15	70
272 x 272		80
312 x 312		150
332 x 332		180
		200
		210

These packaging products can be manufactured from low density and knotty wood. This, combined with the low level of value-adding, will require Australian manufacturers targeting these markets to be low cost producers. This can be achieved by low wood cost, low transport costs to port and large scale processing.

The Japanese Agricultural Standards (JAS), issued by the Ministry of Agriculture, Forestry and Fisheries (MAFF), widely apply to solid wood products. Their primary role is to control the quality of structural components made from natural materials. In addition, the Building Standards Law defines which types of building can be carried out and, hence, restricts the materials used in structures and finishing. While JAS broadly applies to solid wood products, the Japanese Industrial Standards (JIS) standardise the manufactured products such as furniture and pallets. To successfully compete within Japan, suppliers will need to produce to JAS standards, and obtain JAS accreditation.

The following tariffs (Table 3-2) apply to sawn softwood imports (Harmonised System Code 4407.10) to Japan.

Table 3-2:
Japanese Softwood Import Tariffs

HS code	Description	Tariff general	Tariff WTO
4407.10.110	*Pinus* spp., *Abies* spp., or *Picea* spp.; planed or sanded; T<160 mm	8.0%	4.8%
4407.10.121	*Pinus* spp.; Not planed or sanded	4.8%	4.8%
4407.10.129	*Abies* spp., or *Picea* spp.; not planed or sanded	6.0%	4.8%
4407.10.210	Genus Larix; planed or sanded; T<160 mm	8.0%	6.0%
4407.10.290	Genus *Larix*; not planed or sanded	10.0%	6.0%
4407.10.other	Other	Free	Free

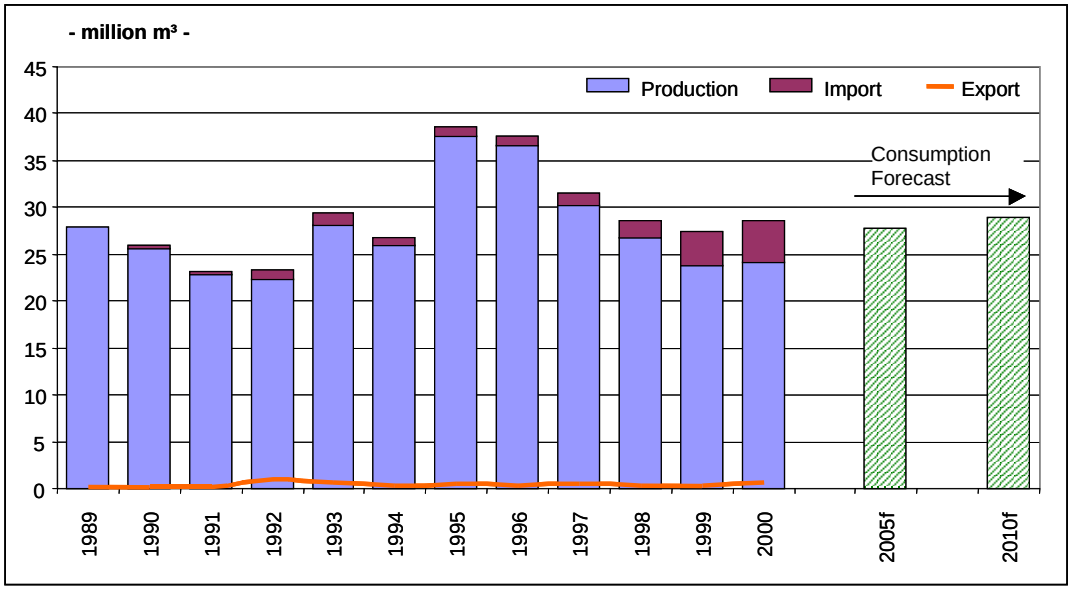
KEY TRENDS

The main trends within the Japanese market can be described as a move towards importation of further value-added products, away from primary raw materials and the move towards use of engineered wood products in house construction. This trend will present increasing opportunities for supplies of timber, as well as engineered wood products. It is expected that in time, certification will become important to the Japanese market, and hence the ability to supply certified material will assist the exporters.

China

Sawnwood consumption, including both hardwood and softwood, in China reached approximately 27 million m^3 in 2000 (Figure 3-4) and China now ranks third in the world behind Japan and the USA, although still quite low on a per capita basis.

Figure 3-4:
China Sawnwood Production and Trade (including Hardwood)

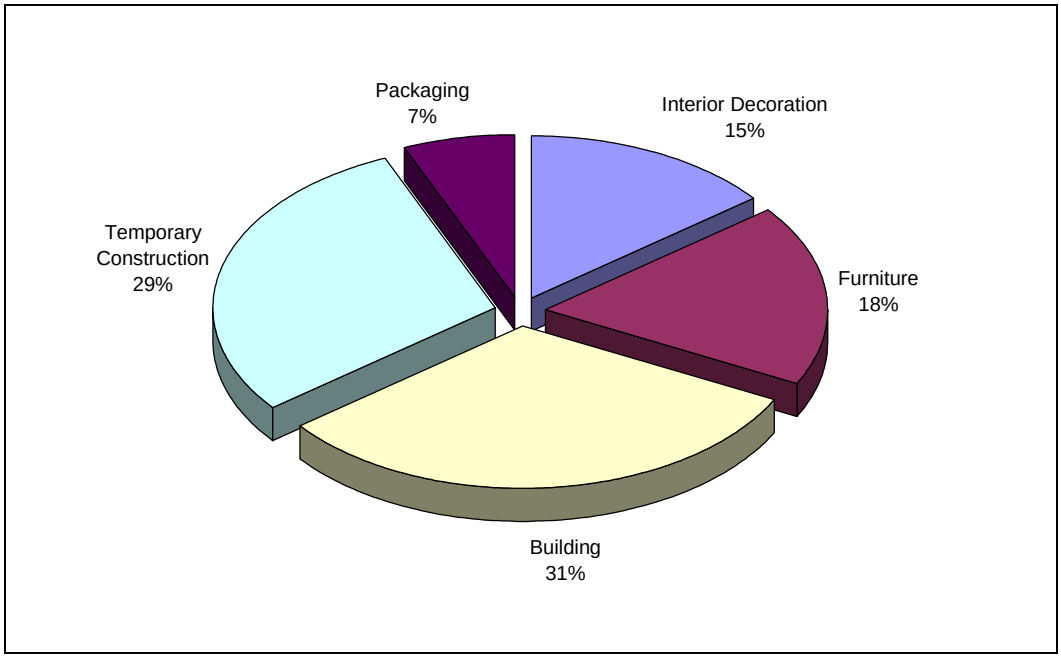


In 2000, China consumed some 15 million m³ of sawn softwood; of that approximately 600,000 m³ was imported. Major sources of sawn softwood imports have been USA, Canada, Russia and New Zealand.

Although timber consumption in construction is declining (primarily being substituted by concrete and steel even though the use of timber is more efficient), China is still a major consumer of wood-based products. Figure 3-5 shows a breakdown of sawn softwood consumption by end-use. Increasing volumes of wood are being used in interior flooring, decorative and maintenance applications. Hence, during the next decade the increase in construction activity is expected to increase wood demand substantially.

The Chinese furniture industry is another major consumer of wood products. The industry has been growing at a rate of up to 12%/a over the last five years and is expected to continue to grow at this pace during the next decade.

Figure 3-5:
Indicative End-uses for Sawn Softwood in China



Sawn sizes in China vary to a great extent and are yet to be standardised. However, the dimensions commonly observed are:

- Thin board: 12/15/18/22 mm x 50-240 mm (10 mm increments)
- Medium board: 25/30 mm x 50-260 mm (10 mm increments)
- Thick board: 40/50/60 mm x 60-300 mm (10 mm increments).

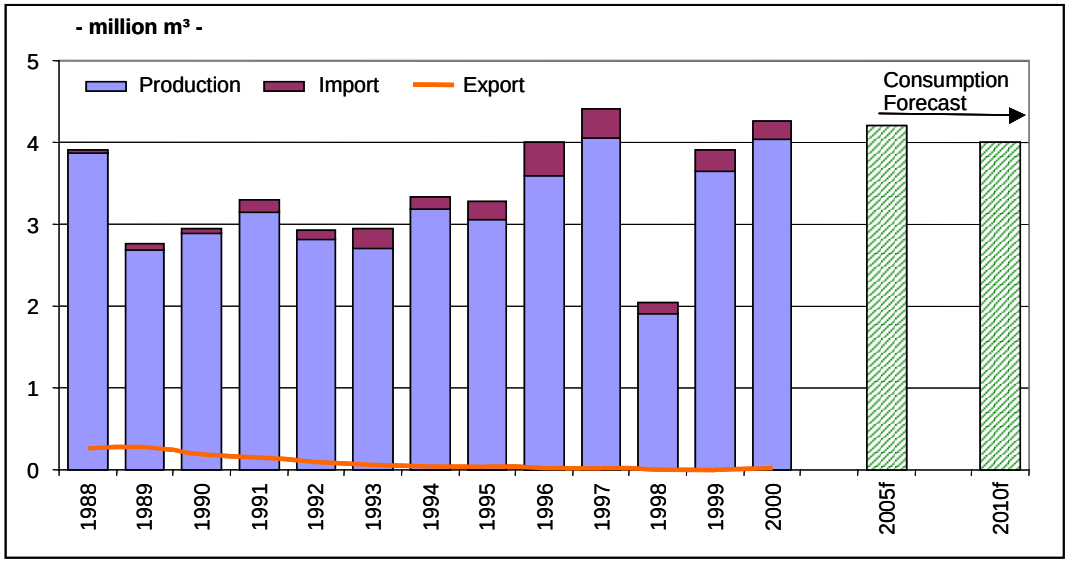
Import tariffs on sawnwood were eliminated in 1999, resulting in a significant increase in the imported volume in the last two years.

KEY TRENDS
The significant increase of timber and log imports indicating the domestic shortage of raw material will drive much of the future imports. The major trend observed within China is the acceptance of softwood for various interior and furniture applications. Education about timber properties is essential for expanding market opportunities in China.

Korea

Sawn softwood consumption in Korea has returned to pre-Asian crisis levels. Consumption was estimated at 4.7 million m^3 in 2000 (Figure 3-6).

Figure 3-6:
Korea Sawn Softwood Production and Trade

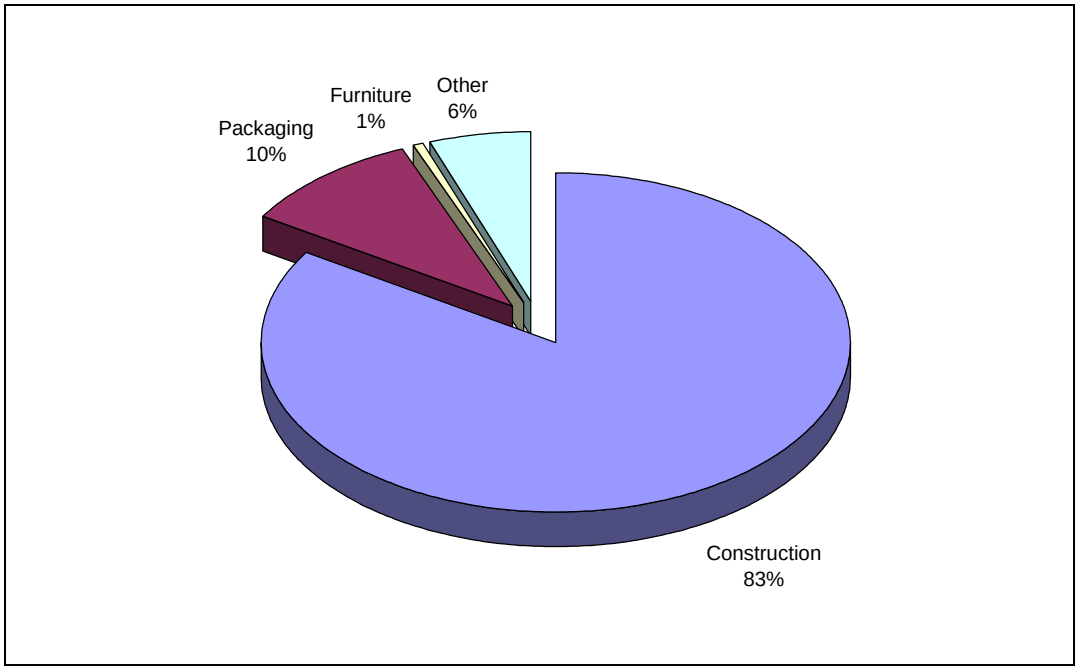


Domestic sawmillers depend heavily upon imported logs. The primary softwood log sources have been New Zealand and Russia, followed by Australia, USA and Chile. The industry consists of a large number of small sawmills, although the number of mills is declining and productivity is improving. Most employ 10 to 20 people and produce 10,000 to 15,000 m³ of output per annum.

Sawn softwood imports represent only a small portion of total supply, but it has steadily increased over the last decade. The major suppliers are Chile, New Zealand and Canada.

Construction is by far the largest consumer of sawn softwood in Korea, followed by packaging (Figure 3-7). These two industries are estimated to consume 93% of the total supply. Usage of sawn softwood in the furniture/interior segment has been increasing but hardwood use still dominates those markets.

Figure 3-7:
Indicative End-uses for Sawn Softwood in Korea



Compared to Japan where importing cut-to-size products is increasing, Korea still tends to prefer sourcing square "mini-flitches" (e.g. 85 x 85 mm) that are domestically sawn into a variety of ordered dimensions.

A tariff of 5.0% applies to sawnwood imports (Harmonised System Code 4407) to Korea. No other special requirement/import-barrier is observed.

3.1.3 Costs

Figure 3-8 shows the weighted average (by volume) cost elements for producing a cubic meter of sawn softwood timber in the Asia Pacific region. It highlights the importance of wood (log) cost in the unit cost of production.

Figure 3-8:
Softwood Timber Cost Chart for the Asia-Pacific

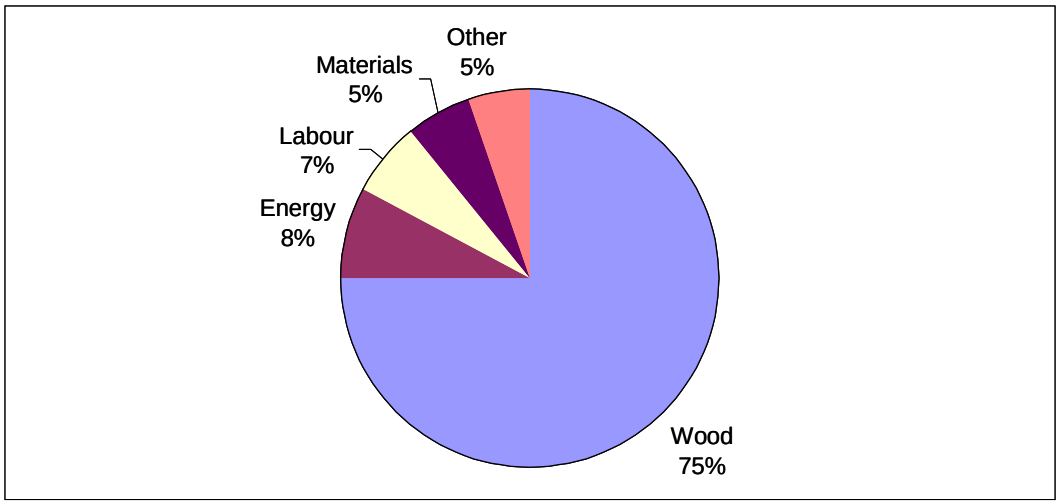
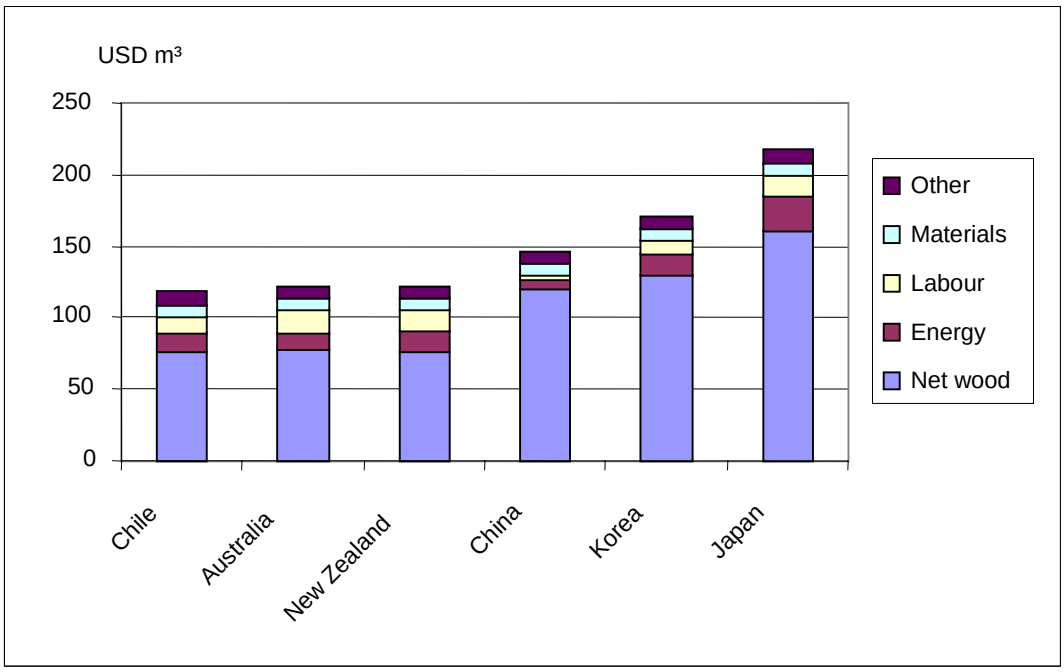


Figure 3-9 illustrates the comparative cost of producing softwood timber in a number of Pacific Rim countries and highlights how competitive the Australian softwood sawmilling industry has now become.

Figure 3-9:
Sawn Softwood Direct Costs by Country



3.1.4 Opportunities for Australia

Over the past five years the competitive position of the Australian softwood sawmilling industry has significantly improved. Through acquisition, many processors have developed scale efficiencies and generally improved their operational efficiencies.

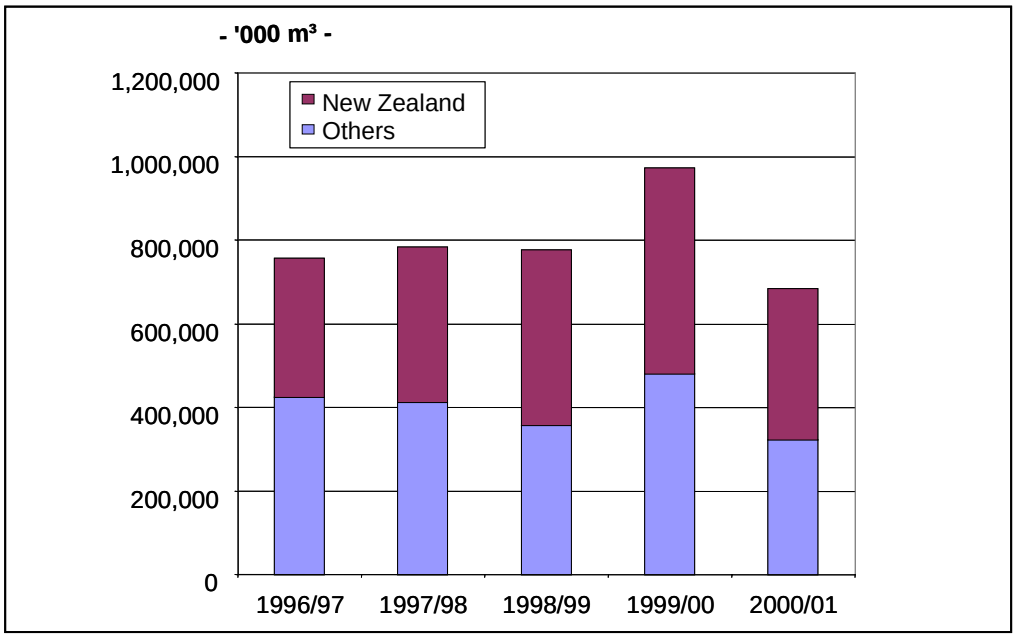
The major Australian softwood sawmills are now efficient producers of structural sized timber. Approximate overall production from the major softwood sawmills is shown in Table 3-3.

Table 3-3:
Approximate Overall Softwood Sawmill Production

Product	Estimated production (%)	Common sizes (mm)
Structural	70	70 & 90 x 35 70 & 90 x 45
Appearance	10	90, 140, 190 & 240 x 19
Industrial	10	Various
Other (treated landscape timbers)	10	Various

Figure 3-10 illustrates the volumes of softwood timber imported into Australia over the past 4 years and an estimate as to the import level expected in 2001. The Australian softwood industry is continuing its drive towards achieving import substitution. This represents approximately 15% of the market however there will be difficulties in completely eliminating imports given the reputation of North American sawntimber and the likely competitive pricing of New Zealand produced radiata pine framing.

Figure 3-10:
Volumes of Imported Softwood since 1996/97



Softwood Exports

Australia is not expected to become a significant softwood log exporting country. With the majority of the country's softwood resource located inland and significant transport costs, log exports are not likely to be competitive.

Australian plantation grown softwoods with limited clears, small knots and higher density (compared to New Zealand and Chile) allow the industry to target a small number of key end-use export markets, such as cut to length packaging and low temperature kiln dried products for use in furniture and mouldings. In addition, opportunities are expected to develop for laminated structural products for the Japanese housing market. However, most of the larger structural softwood mills would experience difficulties in producing the range of sizes required by those export markets unless they were dedicated to a particular export market. The timber lengths and sizes in a number of the export timber markets are different to those commonly used in Australia. (Refer to Table 3-1 and Table 3-3 for the timber size differences between domestic and export.)

Where there have been large areas of softwood plantations established away from the export shipping ports, it is expected that the processors of those resources will concentrate on improving their mill operational efficiencies and continue to target import substitution in the domestic structural market. The processors of timber from smaller scale softwood plantations established closer to ports have the opportunity to develop smaller scale processing operations and target niche markets, either for export or domestic consumption.

There is also an opportunity to promote radiata pine structural sizes into Asia as a replacement for the hardwood timbers currently used in the construction industry. While the change over to using softwood structural sizes in Australia took a number of years, it has been successfully achieved. In the past, when the Asian structural timber markets were investigated, the prices available were not attractive compared to domestic markets and there was difficulty overcoming the mindset that construction timber needed to be of dark colour. Successfully overcoming this will require gaining both official (e.g. building codes and standards) recognition and user acceptance. Successfully promoting structural softwood timber in Asia will require a co-operative effort rather than an individual company approach.

Opportunities for new mill investments can be found primarily in Bombala and North Queensland, where opportunities exist for either brown field expansions or the development of more niche type operations. Targeting of export markets would be the recommended approach for most new sawmills.

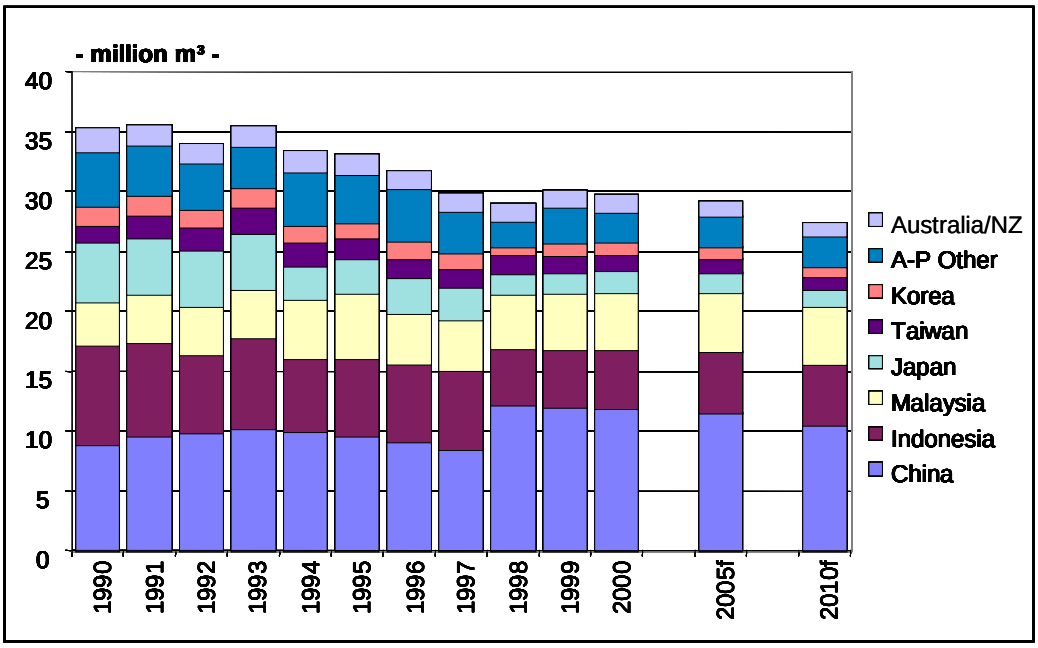
3.2 Sawn Hardwood

3.2.1 Development and Outlook

In 2000, global consumption of sawn hardwood was some 121 million m³, of which Asia-Pacific, including Australia/New Zealand, consumed around 30 million m³ representing 25% of the world's total. The region's share is significantly higher than its 16% representation in global sawn softwood consumption. The region's major supply has come from the tropical hardwood resources of South East Asia.

The long-term trend, however, is a shift from traditional tropical hardwood resources to fast grown softwood resources. Consequently, the region's consumption of sawn hardwood in the next decade is forecast to decline as illustrated in Figure 3-11. This reduction is supply rather than demand driven.

Figure 3-11:
Sawn Hardwood Consumption in Asia-Pacific, including Australia/New Zealand



3.2.2 Major Consuming Markets

China

China is the biggest sawn hardwood consumer in Asia-Pacific, accounting for approximately 40% of the total in the region. In 2000, China produced around 9.6 million m³ and exported only 485,000 m³ of sawn hardwood, which represented 45% of total sawnwood consumption for China.

In 2000, China imported about 2.7 million m³ of sawn hardwood. Malaysia and Indonesia currently account for nearly 50% of imports, although sawn hardwood imports from Europe and USA are growing rapidly due to the State policy of encouraging sawnwood imports and the fast pace of economic development in China.

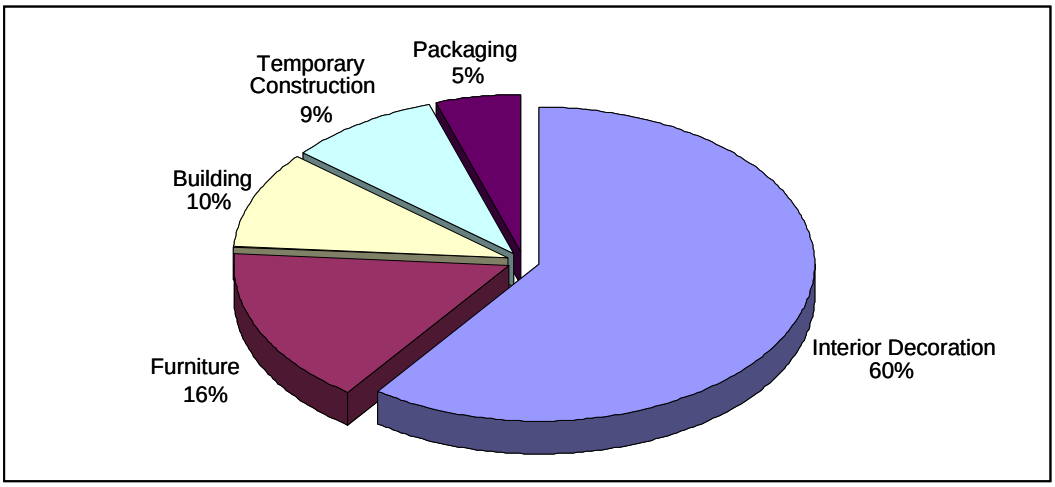
In addition, demand for a variety of high-grade sawn hardwood products has been positive due primarily to the Chinese improved lifestyle and increased incomes. A shift towards wooden houses and floors in urban areas is expected to continue and further increase demand for sawn hardwood in the next decade.

Main applications for sawn hardwood in China are interior decoration and furniture (Figure 3-12). Approximately 60% of sawn hardwood is used in interior decoration applications such as wooden floors, moulding and doors. It is the furniture segment, however, that anticipates more rapid growth in the country's manufacturing and export activities. Other end-uses for sawn hardwood include building, temporary construction and packaging.

There is little standardisation in sizes and common sawn sizes are:

- Thin board: 12/15/18/22 mm x 50-240 mm (10 mm increments)
- Medium board: 25/30 mm x 50-260 mm (10 mm increments)
- Thick board: 40/50/60 mm x 60-300 mm (10 mm increments).

Figure 3-12:
Indicative End-uses for Sawn Hardwood in China

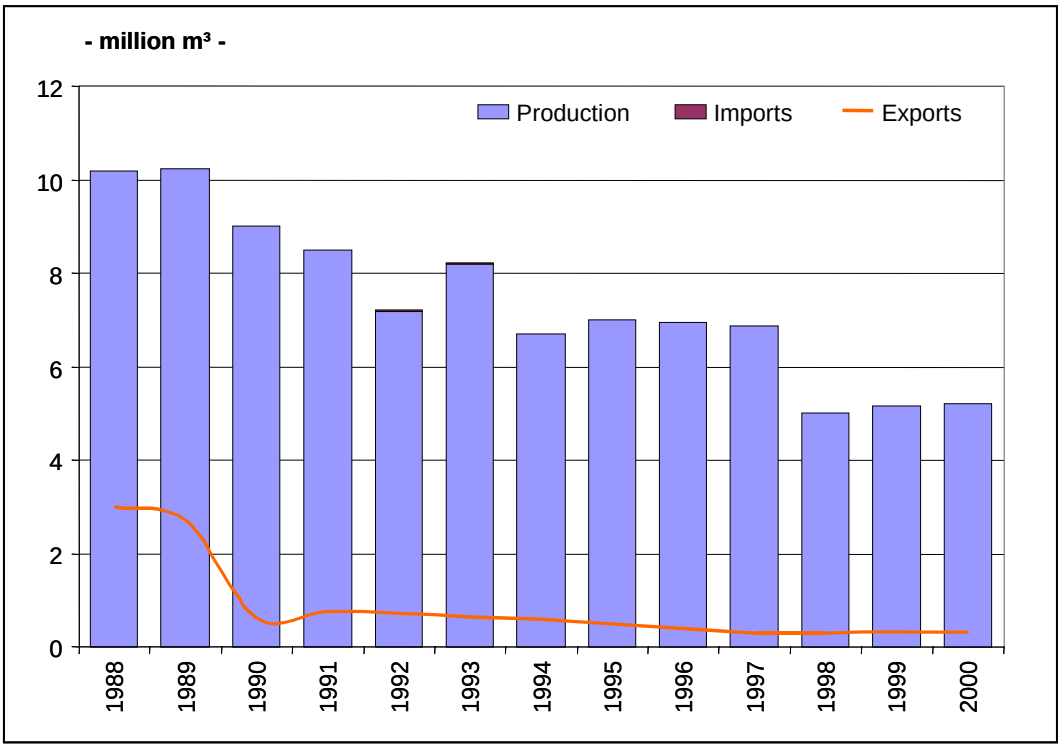


Future demand for sawn hardwood in China is expected to remain strong. However, as the industry matures, increasing substitution between solid hardwood and alternative products will occur. This would primarily be through the replacement of solid wood with wood-based panels, such as particleboard and MDF, overlaid with natural veneers or artificial overlays.

Indonesia

In 2000, Indonesia produced about 5.2 million m³ and exported 0.3 million m³ of sawn hardwood (Figure 3-13). With insignificant imports, the country's consumption in the year was around 4.9 million m³.

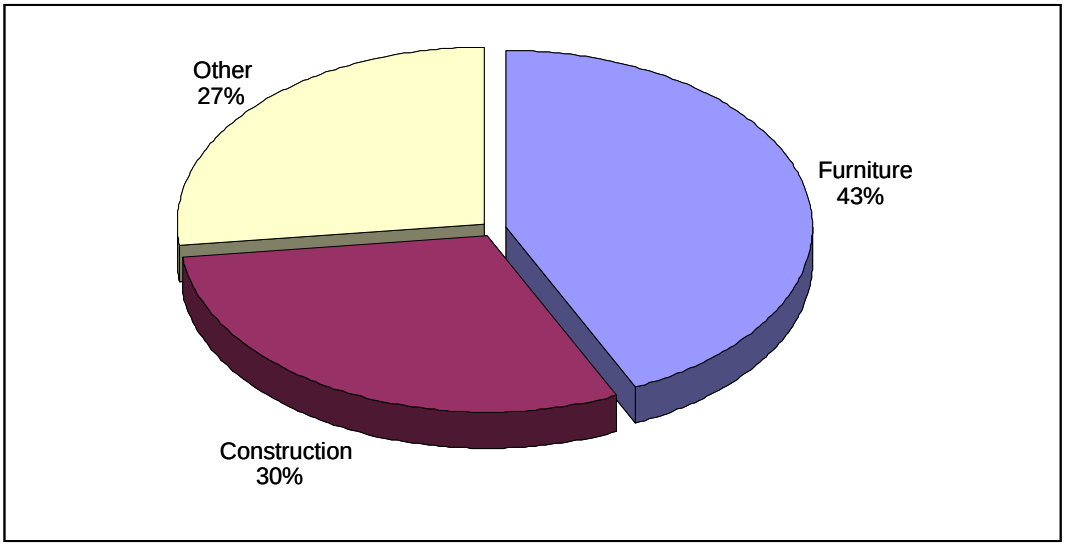
Figure 3-13:
Indonesia Sawn Hardwood Production and Trade



Indonesia is faced with a tight log supply situation. Logs are also being sourced from increasingly remote areas with inadequate infrastructure for transporting the logs to market. Uncertain government regulations, and a precarious security and political situation are also hampering the forestry industry.

The main sawn hardwood end-user in Indonesia is the furniture industry (43%) (Figure 3-14) with estimated usage in the construction segment at 30%. Domestic demand for furniture is driven by growth in the construction business, particularly hotels, commercial real estate, growing demand from Indonesia's own developing population and the export market. Presently, the furniture industry in Indonesia is experiencing significant growth, as Indonesia is proving to be a highly competitive location for export furniture manufacturing. Japan, United States and the United Kingdom are the most important markets for Indonesian wooden furniture.

Figure 3-14:
Indicative End-uses for Sawn Hardwood in Indonesia

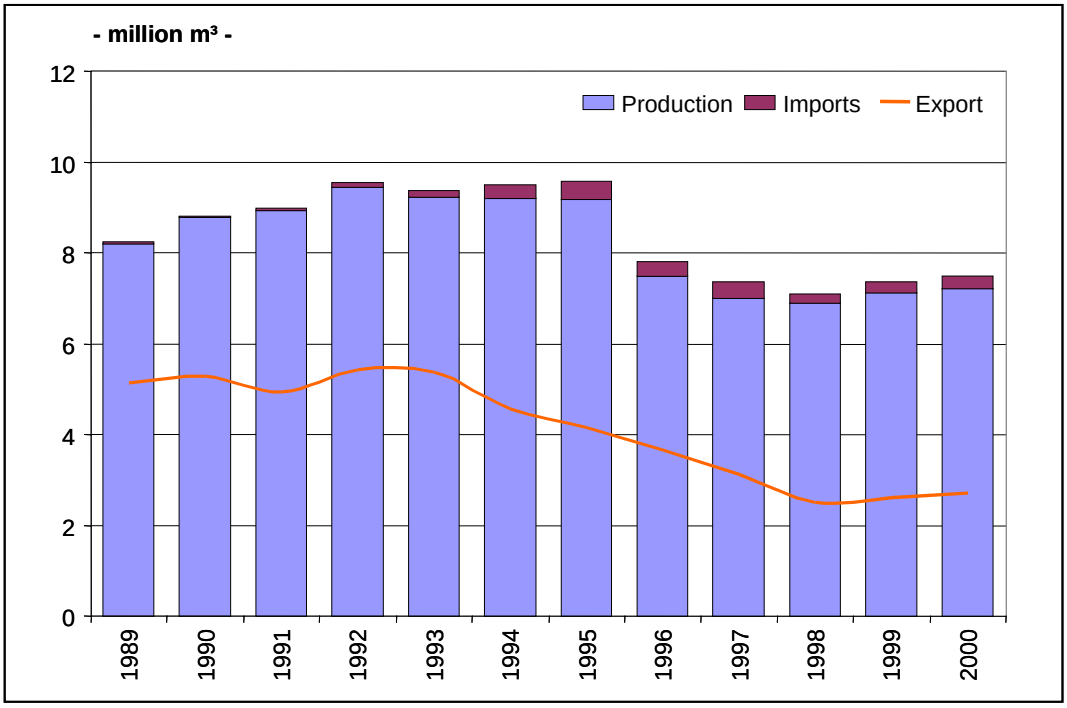


While the future demand for sawn hardwood timber in Indonesia will be primarily supplied from Indonesia's own resources, the furniture industry's increasing focus on supplying international markets will lead to various decorative hardwoods needing to be imported.

Malaysia

In 2000, Malaysia produced about 7.2 million m^3 and exported 2.7 million m^3 of sawn hardwood (Figure 3-15). With insignificant imports, the country's consumption in the year was around 4.8 million m^3.

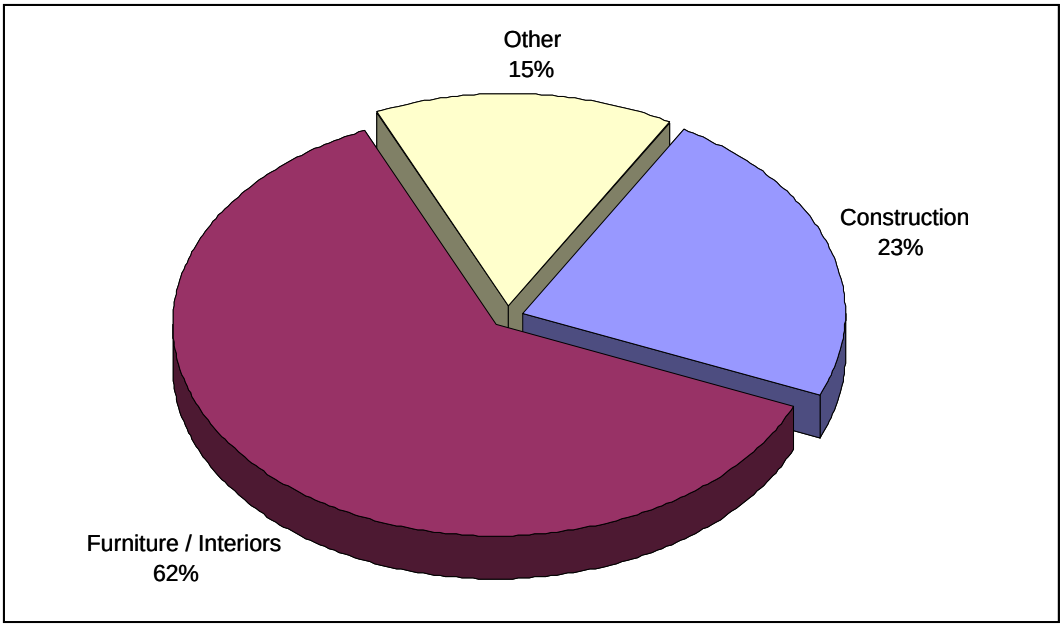
Figure 3-15:
Malaysia Sawn Hardwood Production and Trade



In recent years, the forestry industry in Malaysia has been rapidly moving away from the manufacture of low value primary products. This is in line with the national objectives and priorities where the development of secondary and tertiary wood processing industries are being actively promoted, with a view towards achieving greater utilisation of the resource base and generating higher value-added products. Exports of sawntimber have declined as saw millers are encouraged to add increasing value to their products. Malaysia's main timber export markets have been Thailand, Singapore, Korea and Taiwan.

The Malaysian furniture/interiors sector is the major driver for wood demand, constituting 62% of timber usage (Figure 3-16). Recent developments in commercial real estate have led to an increased demand for furniture as well as creative interior designs. The construction sector constitutes 28% of timber usage. Wood use in construction will remain small, as wooden houses are generally regarded as low quality housing.

Figure 3-16:
Indicative End-uses for Sawn Hardwood in Malaysia

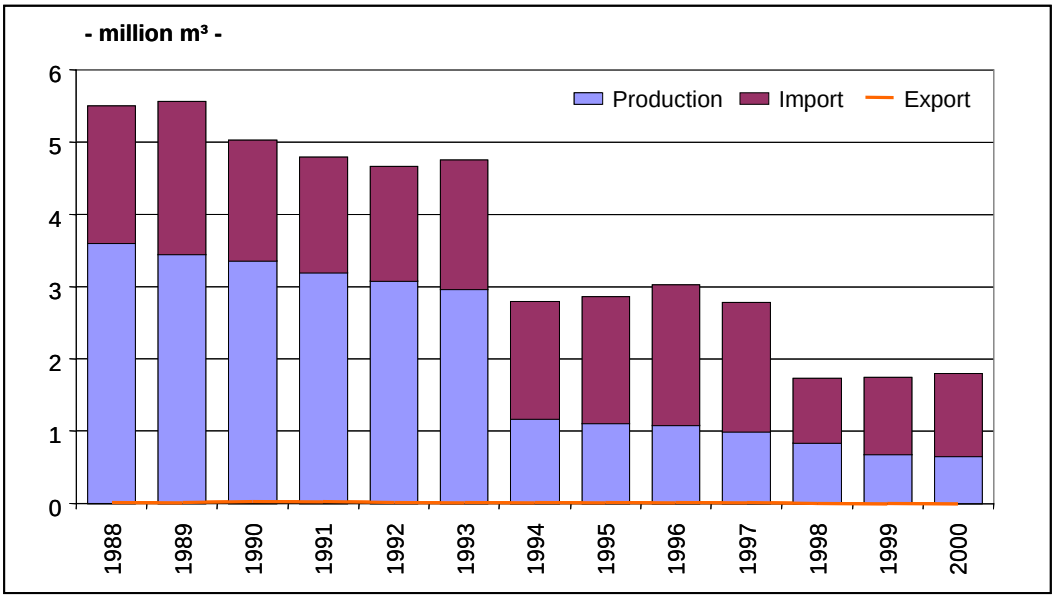


Malaysian supply of hardwood timber continues to be provided from indigenous resources, as well as plantation resources such as rubberwood. However, increasing volumes of high value decorative hardwoods will be imported by the furniture industry to meet the growing demand for finished products in the global markets. To date North America has been the main supplier of these resources, but opportunities exist for other suppliers of decorative hardwoods to gain a proportion of this market.

Japan

Japan's sawn hardwood consumption has declined significantly over the last decade (Figure 3-17). Domestic production has fallen to an even greater extent. In 1973, Japan produced 12 million m^3 and imported 0.5 million m^3 of sawn hardwood, compared to 0.7 million m^3 and 1.1 million m^3 respectively in 2000.

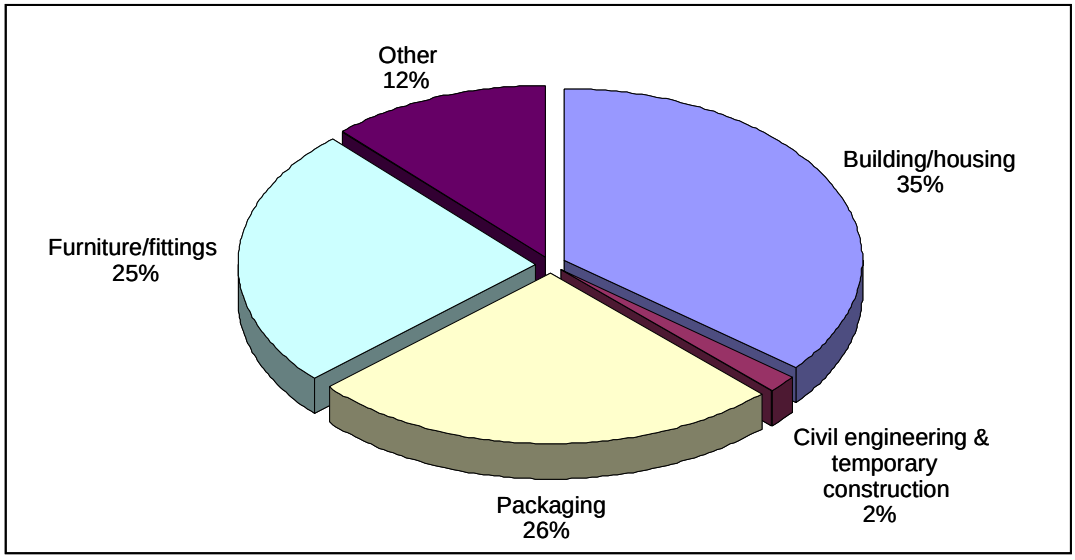
Figure 3-17:
Japan Sawn Hardwood Production and Trade



The considerable drop has been largely driven by a shortage of tropical hardwood log availability. This has offered softwood products substantial room to penetrate the market, given their cost competitiveness over hardwood. No rebound from traditional sawn hardwood suppliers is anticipated.

Compared to sawn softwood, which is predominantly used in the building/housing segment, packaging and furniture/fittings are equally important for sawn hardwood (Figure 3-18). The Japanese have traditionally preferred hardwood furniture/fittings although softwood is becoming more popular. In packaging, the primary end-use for sawn hardwood is for pool-pallets, where durability of hardwood products is required.

Figure 3-18:
Indicative End-uses for Sawn Hardwood in Japan



Common dimensions in the building/housing and packaging areas are fundamentally equivalent to what is described earlier for sawn softwood. However, sawn hardwood has been preferably used in the furniture/fittings applications where sizes vary.

The tariffs that apply to sawn hardwood imports (Harmonised System Code 4407.24-99) to Japan are given in Table 3-4.

Table 3-4:
Japanese Hardwood Import Tariffs

HS code	Description	Tariff general	Tariff WTO
4407.24	Virola, Mahogany, Imbuia, Balsa	Free	Free
4407.25-26-29	Meranti, Lauan etc	10.0%	6.0%
4407.91	Oak	Free	Free
4407.92	Beech	Free	Free
4407.99.310-390	Other; Dipterocarpaceae	10.0%	6.0%
4408.99.other	Other; other	Free	Free

The Japanese market has moved away from utilisation of hardwood, and this trend is not expected to be reversed. However, potential availability of plantation grown hardwood for certain end uses could see the use of hardwoods in some decorative applications increase. Key areas where plantation grown hardwood could provide a good alternative to the presently used materials are in packaging and the housing sector.

3.2.3 Opportunities for Australia

In keeping with Australia's falling supply of sawlogs from native forests, significant and successful efforts have been made by the industry in recent years to value-add the production from those forests. Ongoing export markets have been developed for flooring, furniture components and sliced veneer. Further expansion of the NSW, Victorian and Tasmanian native forest processors' exporting efforts will likely be dependent on some of the smaller sawmillers collaborating to provide sawntimber to modern value-adding downstream processing facilities, thus ensuring that their product is well dried, accurately machined and professionally marketed. Individually, the export volumes from smaller mills' are unlikely to be of sufficient scale to justify the necessary capital expenditure or marketing effort.

The ability to grow and process plantation grown hardwood sawlogs consistently is yet to be proven. Severe end checking is a major problem with *E. globulus*, though not so with *E. grandis***.** However, the residue from *E. globulus* is preferred by the pulp and paper industry and approximately 40% (AFFA database) of each sawlog is recovered as residues. While trials are currently underway it could be some years before the final answer is known however, results in Spain provide good indications of what can be done with *E. globulus* for furniture.

On the assumption that it will be possible to grow and process plantation hardwood sawlogs, a considerable research and marketing effort will be required to ensure that the species grown are likely to be sought after for value-added products (furniture, panelling and slice cut veneers). Processing of plantation grown hardwood logs into sizes suitable for house construction and pallets is unlikely, as the prices for those sizes and grades of timber are not expected to meet the costs of growing the plantations.

A combined and co-ordinated effort is required between researchers, investors, processors and marketers to successfully develop hardwood sawlog plantations. Governmental involvement would be vital to ensure a strong and successful development of suitable, high quality hardwood sawlog plantations.

Plantations have been established in Central Gippsland and North Coast NSW for production of hardwood sawlogs. Regrowth native forest sawlogs in Tasmania and NSW will also present opportunities for sawn hardwood processing. Greenfield processing operations may also be possible within the major plantation hardwood growing regions of Western Australia, Tasmania and South Australia (Green Triangle). However, significant industrial investment based on this resource is required within the next decade.

3.3 Plywood

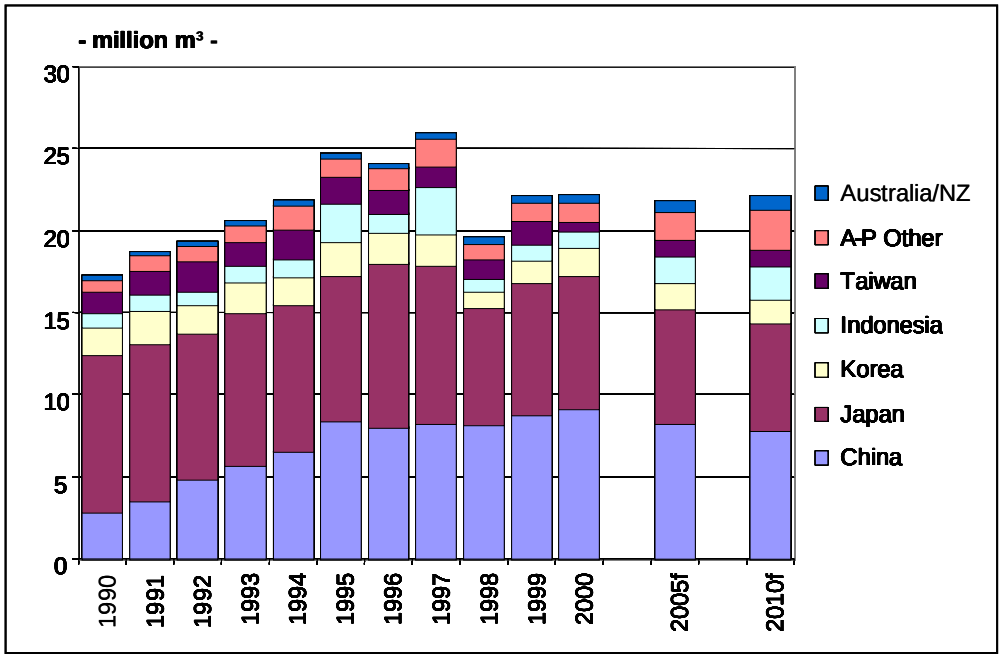
3.3.1 Development and Outlook

Within Asia, tropical hardwood plywood has been widely available and is the key panel for a wide range of applications. However, during the past decade the use of other panel products such as softwood plywood and reconstituted panels have expanded in all markets and in many instances now compete directly with the traditional hardwood plywood product.

Softwood plywood is a relatively new product within the Asia-Pacific region (Australia and New Zealand being the exception). Softwood plywood, in its traditional form, has been a structural panel used in the construction of wood frame type housing. Within Asia, the only significant wooden housing construction takes place in Japan, where hardwood plywood has been used in preference to softwood plywood. However, over the past few years softwood has entered the Asian plywood industry initially as core veneer, but increasingly as 100% softwood plywood. This development has been predominantly in Japan, but is slowly spreading to other countries throughout the Asia-Pacific.

The total plywood market size in the Asia-Pacific in 2000, including Australia/New Zealand, is estimated to be 22 million m³ (Figure 3-19). In 2010, the total demand is forecast to be almost unchanged. This will primarily be the result of a lack of availability of hardwood plywood, and increasing availability of alternative products. Softwood and combi plywood will account for an increasing share of volume, while composite products will represent a sound substitute for plywood.

Figure 3-19:
Plywood Consumption in Asia-Pacific, including Australia/New Zealand



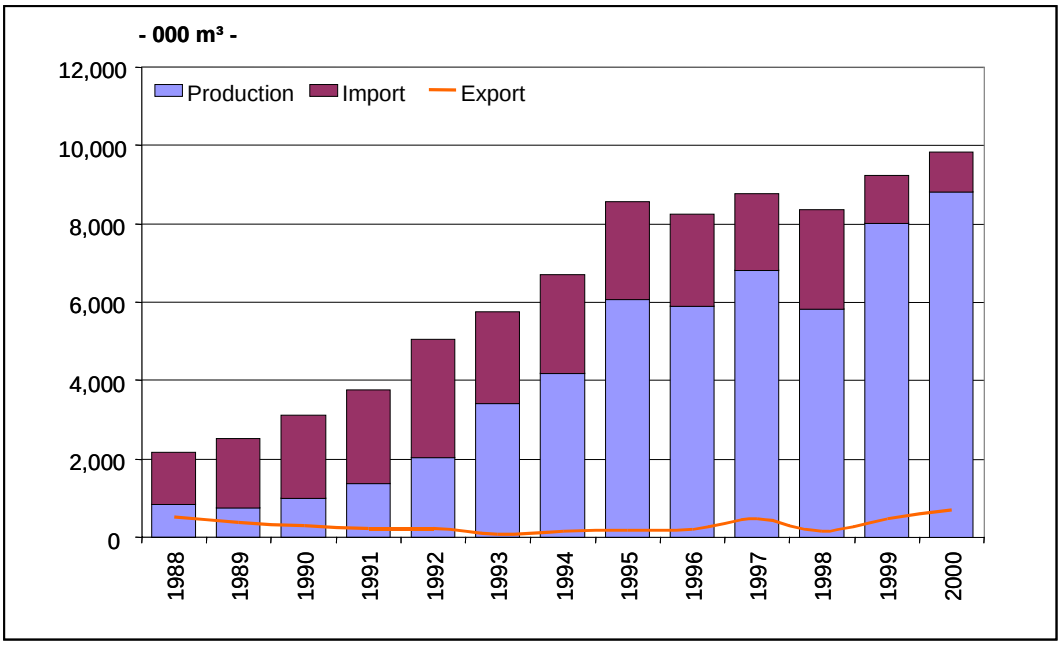
3.3.2 Major Consuming Markets

China

During the last decade, China has become the largest consumer and the second largest producer of plywood in Asia-Pacific. The majority of plywood consumed in China is hardwood; generally with a tropical hardwood face veneer and imported or local hardwood core layers. However, other types of plywood such as combi plywood and bamboo plywood are commonly used.

Total consumption of plywood is estimated to have exceeded 9 million m³ in 2000 (Figure 3-20). At present, important end-uses for plywood in China include furniture and interior decoration and construction. More than 50% of the plywood used in China is less than 6 mm thick and the majority is interior grade for use in joinery applications and furniture production (Figure 3-21). In such applications, plywood is beginning to come under pressure from reconstituted panels.

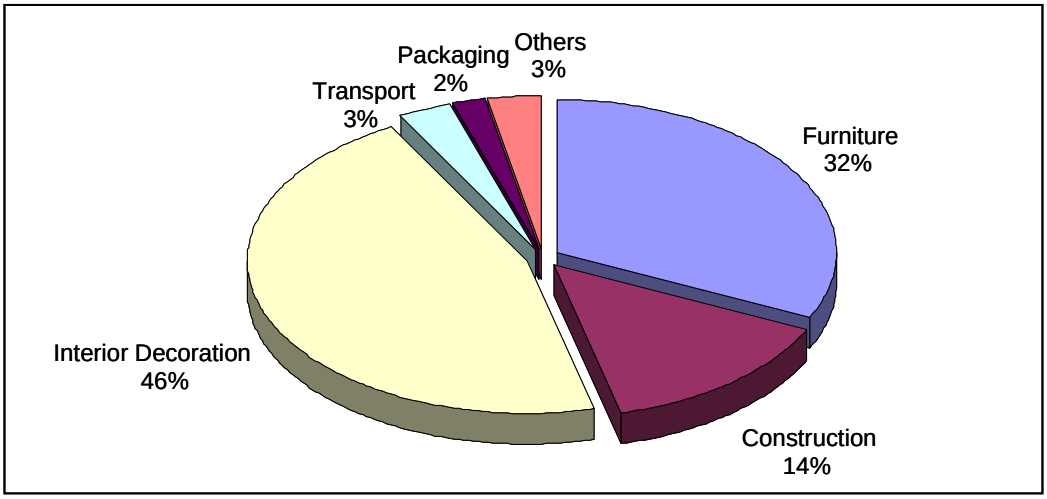
Figure 3-20:
China Plywood Production and Trade



Plywood applications in the construction sector, such as for concrete formwork, have increased in recent years due to the development of the construction industry and some infrastructure projects. These factors have meant that the demand for thick softwood plywood has grown.

Common plywood sizes consumed in China are 900 mm x 2100 mm and 1200 mm x 2400 mm. A tariff of 15% currently applies to Chinese plywood imports.

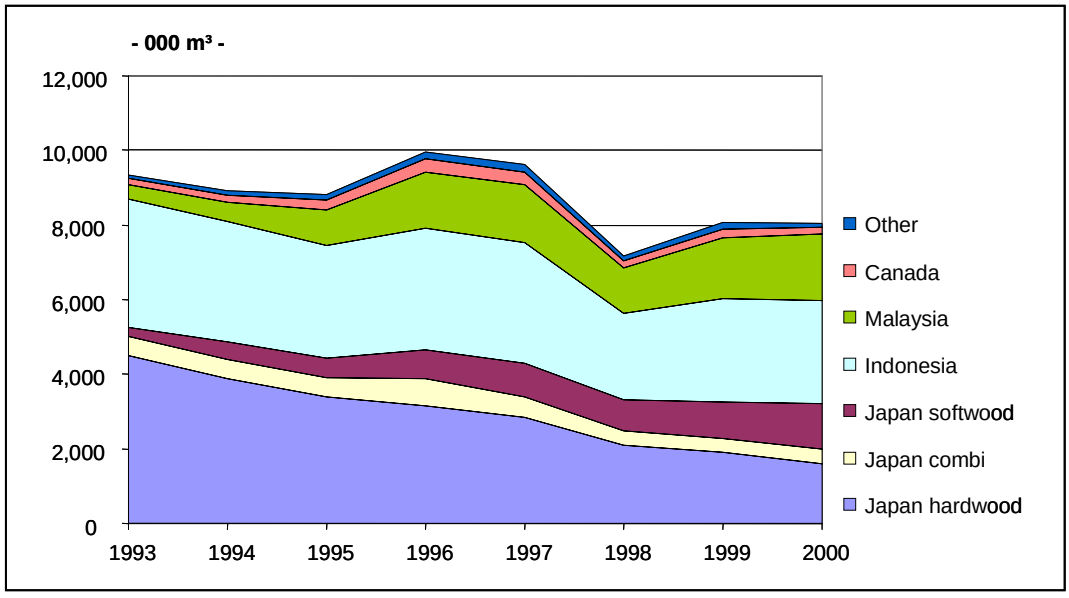
Figure 3-21:
Indicative End-uses for Plywood in China



Japan

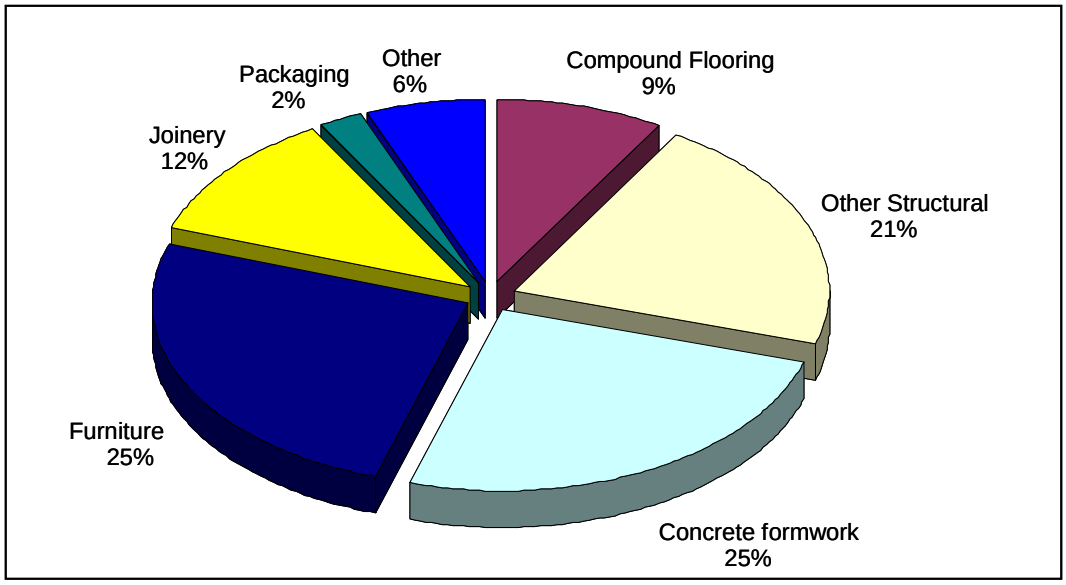
Japan produced 3.2 million m³ and imported 4.9 million m³ of plywood in 2000 (Figure 3-22). With minimal exports, the total consumption was about 8.1 million m³. At present, the Japanese plywood industry remains an important supplier of plywood to the domestic market. To remain competitive, the industry increasingly produces combi plywood, which is made up of hardwood face veneers and softwood core veneers, or 100% softwood plywood.

Figure 3-22:
Japan Plywood Production and Import



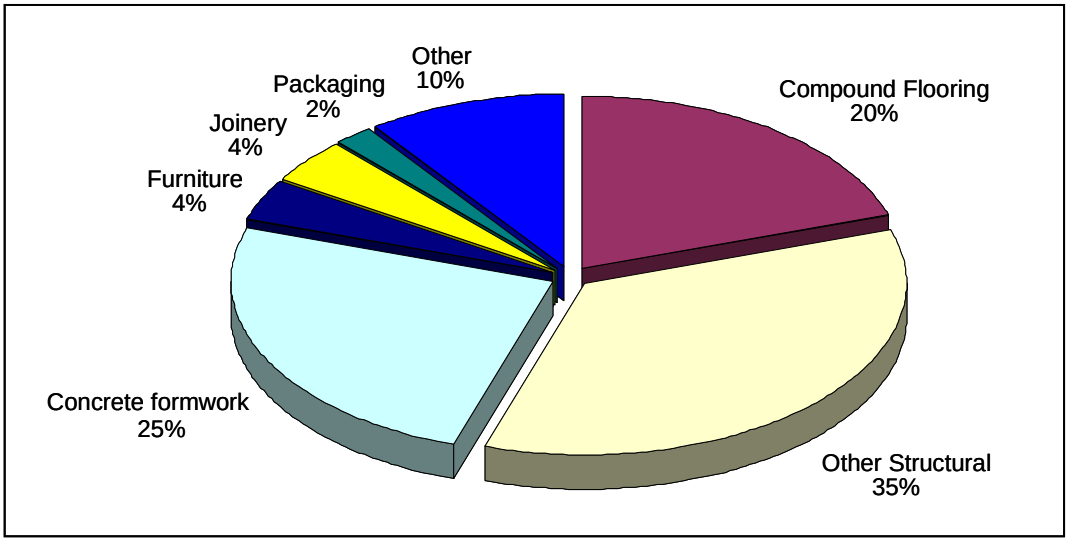
Hardwood plywood is extensively used in construction, flooring, wall linings and floor underlay as well as in concrete formwork (Figure 3-23). In addition to the wide range of structural end-uses, hardwood plywood is also used in furniture and joinery manufacture. In the past, new end-uses were actively developed by the domestic plywood industry, which produced high quality hardwood plywood from imported logs.

Figure 3-23:
Indicative End-uses for Hardwood Plywood in Japan



Over the past decade, Japan has consistently increased its use of softwood plywood. Although usage was initially concentrated on lower value applications, softwood plywood has gradually been accepted and today has penetrated a wide range of end-uses (Figure 3-24). This development has been greatly assisted by the marketing of softwood plywood by domestic Japanese plywood mills.

Figure 3-24:
Indicative End-uses for Softwood Plywood in Japan



The predominant size of plywoods consumed in Japan has traditionally been 900 mm x 1800 mm however, 1200 mm x 2400 mm in the structural softwood panel sector is becoming common; for example, imports from Canada are mostly of 1200 mm x 2400 mm. The key sheet size will continue to be 900 mm x 1800 mm if Australia exports veneers to Japan, but exports of 1200 mm x 2400 mm finished plywood will be possible.

The tariffs that apply to Japanese imports of plywood (Harmonised System Code 4412) are given in Table 3-5. Japan has a differential tariff for countries within the World Trade Organisation (WTO) and countries that are not members of this organisation.

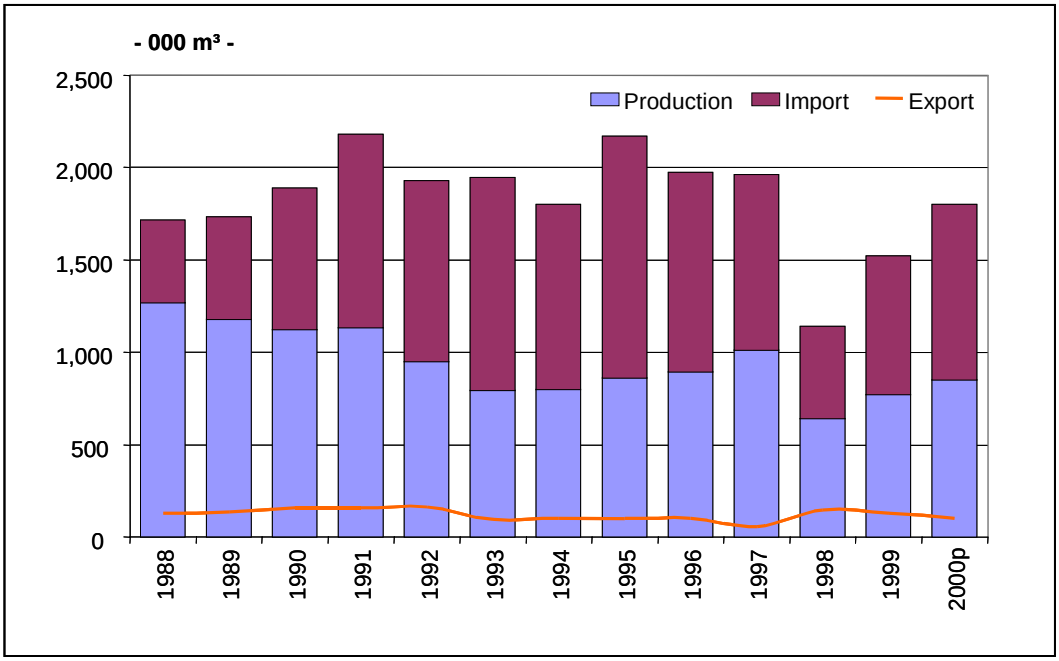
Table 3-5:
Japanese Plywood Import Tariffs

HS code	Description	Tariff general	Tariff WTO
4412.14.011	Hardwood plywood; Tongue and groove	10.0%	6.0%
4412.14.019	Hardwood plywood; Other	15.0%	6.0%
4412.19.011	Softwood plywood; Tongue and groove	10.0%	6.0%
4412.19.019	Softwood plywood; Other	15.0%	6.0%
4412.22.010	Laminated timber; with at least 1 ply of tropical wood	15.0%	6.0%
4412.23.010	Laminated timber; with at least 1 ply of particleboard	15.0%	6.0%
4412.29.010	Laminated timber; Other	15.0%	6.0%

Korea

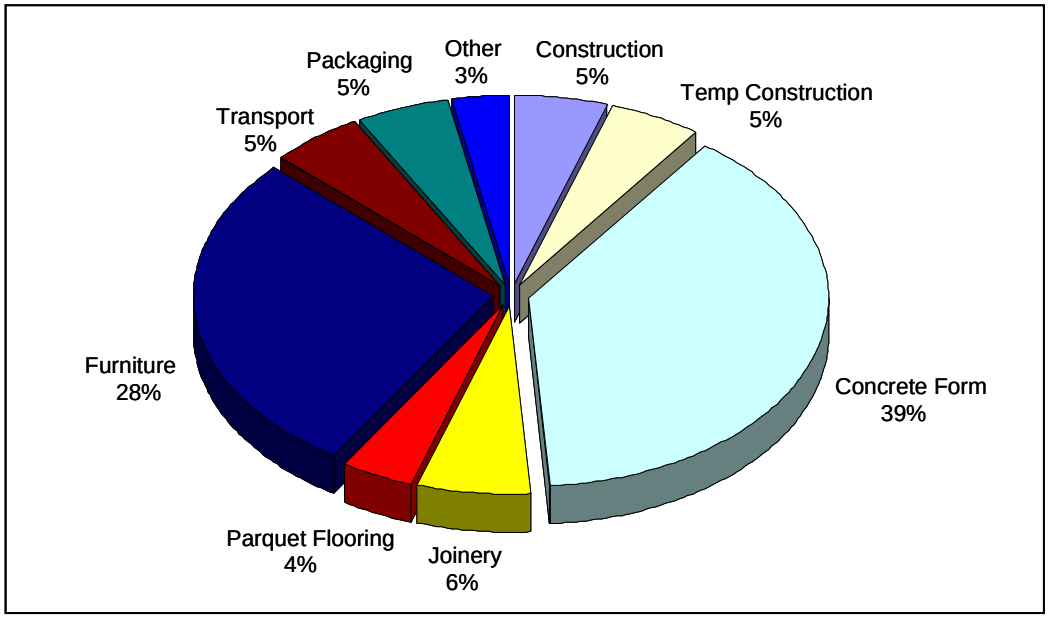
In the 1990's up until the Asian crisis, Korea consistently consumed an average of 1.9 million m^3 per annum of plywood. Although the crisis almost halved the consumption in 1998, it is now recovering to the previous level (Figure 3-25).

Figure 3-25:
Korea Plywood Production and Trade



End-uses for plywood in Korea are relatively diversified. However, concrete-form and furniture are most significant, accounting for 39% and 28% respectively (Figure 3-26).

Figure 3-26:
Indicative End-uses for Plywood in Korea



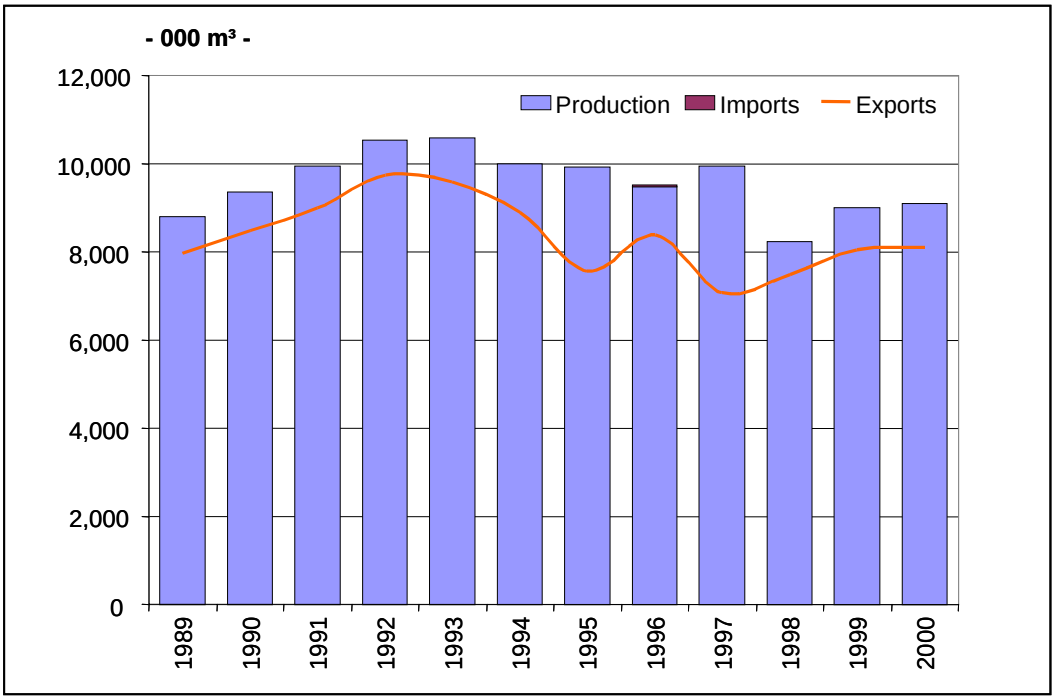
More than 90% of the domestically manufactured ordinary plywood in Korea is 12 mm or thicker. The share of combi plywood has been growing, in response to declining availability of tropical hardwood from SE Asian countries. In contrast, 2.7 mm hardwood plywood still remains dominant for furniture. Common sheet sizes in the Korean market are 1200 mm x 2600 mm and 900 mm x 1800 mm.

A tariff of 8% applies to plywood imports (Harmonised System Code 4412) to Korea. No other special requirement/import barrier is observed.

Indonesia

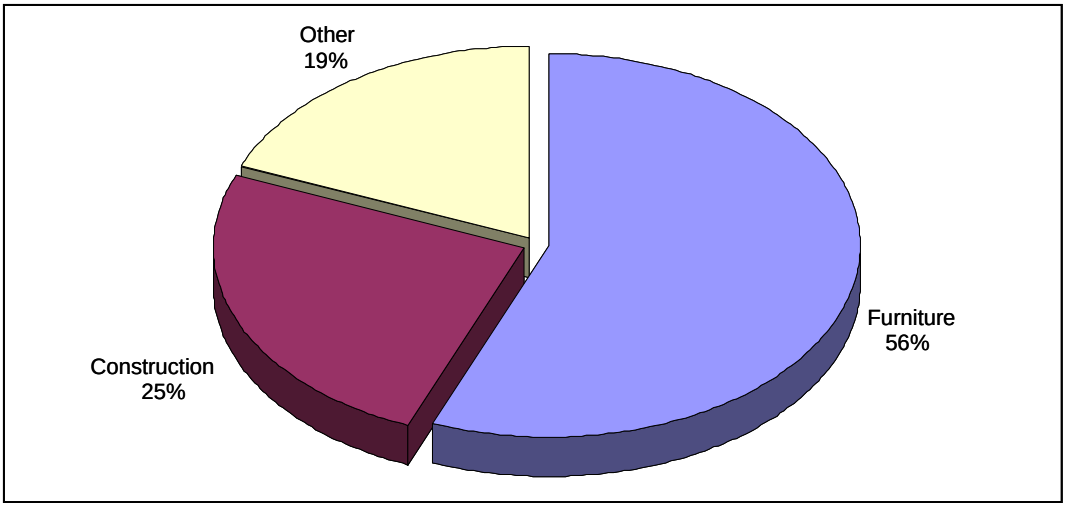
Plywood dominates panel production in Indonesia. The plywood industry uses entirely tropical hardwood peeler logs from natural forests. Indonesia remains a global leader in production of hardwood plywood producing around 9 million m³ in 2000 (Figure 3-27). However, due to log scarcity and therefore increasing costs, plywood production is projected to decline in the next two to three years. Consequently, it is expected that reconstituted panels will become increasingly important as an alternative to plywood in the next decade.

Figure 3-27:
Indonesia Plywood Production and Trade



Around 95% of the domestic production is exported to the main markets of Japan, South Korea, China and Taiwan, where plywood is used in various applications from construction to interior. In Indonesia, the major plywood end-uses are in the furniture and construction sectors (Figure 3-28), where both 900 mm x 1800 mm and 1200 mm x 2400 mm (reject grades of the export sizes) are utilised.

Figure 3-28:
Indicative End-uses for Plywood in Indonesia



3.3.3 Opportunities for Australia

Softwood

Throughout the world, plywood is manufactured from a number of softwood species. The critical attributes for plywood production are that the wood is soft enough to be peeled, that the log is cylindrical of reasonably large diameter, and the species is capable of yielding a veneer of appropriate appearance and strength for the intended end-use. Radiata pine is principally manufactured in Australia into structural plywood, although clear veneers are used for decorative plywood in doors and panelling.

In the Asian markets, the main competitors of radiata plywood are Malaysian and Indonesian meranti (hardwood), North American softwoods, principally Douglas fir, and Russian larch. For decorative plywoods, a wide range of temperate and tropical hardwoods command the major share of the Asian market.

The overall plywood market in Asia Pacific is mature, but the share of softwood and combi plywood continue to grow strongly. This presents opportunities to suppliers of softwood veneer, softwood plywood and combi plywood.

With the decline in tropical hardwood species, Japan has recently started utilising radiata as the core material for hardwood faced plywood known as combi plywood. This is a positive event and the usage of radiata is steadily increasing.

The preferred plywood or veneer sheet length in Japan and some of the other Asian countries is 1800 mm. Whereas, most of the current Australian plywood

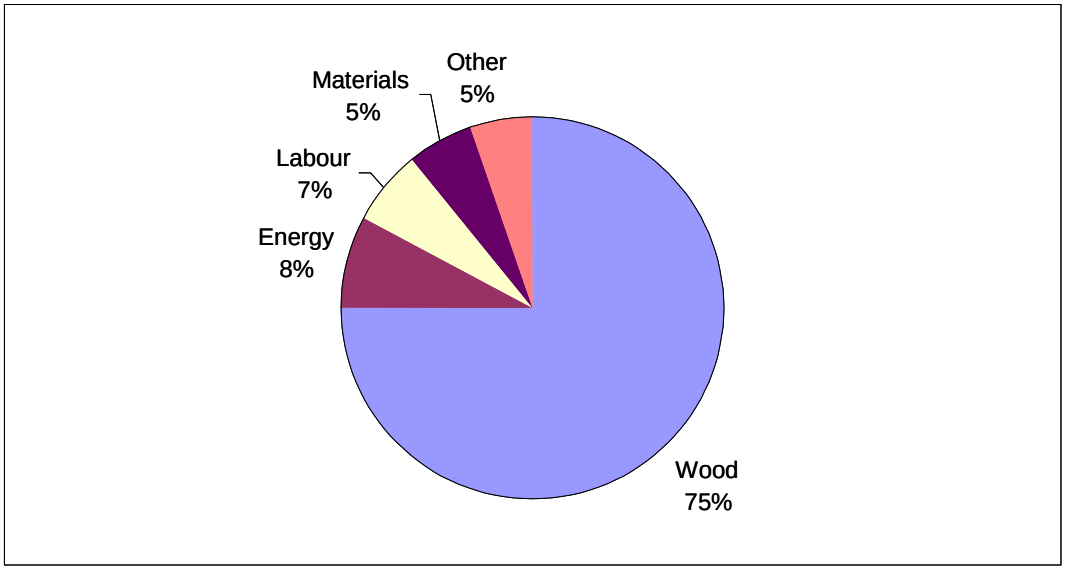
mills concentrate on producing 2400 mm sheets, which means their costs of manufacture are higher when producing 1800 mm sheets.

There are suitable softwood plantation opportunities available within Australia for a greenfield export focused plywood or veneer mill to be established. It is suggested that the a mill would be constructed to initially produce 1800 mm length product for the Japanese market – the product could be either veneer or plywood.

Hardwood

Figure 3-29 shows the weighted average (by volume) cost elements for producing a cubic metre of hardwood plywood in the Asia-Pacific region. Again, it highlights the importance of wood (log) cost in the unit cost of production.

Figure 3-29:
Hardwood Plywood Cost Chart



Australia is a competitive producer of hardwood plywood with the primary advantage obtained by the availability of a relatively low cost resource. Labour costs in Australia are however very high, and to remain competitive, any new mill should aim to introduce a high level of mechanisation than currently exists in Australian mills.

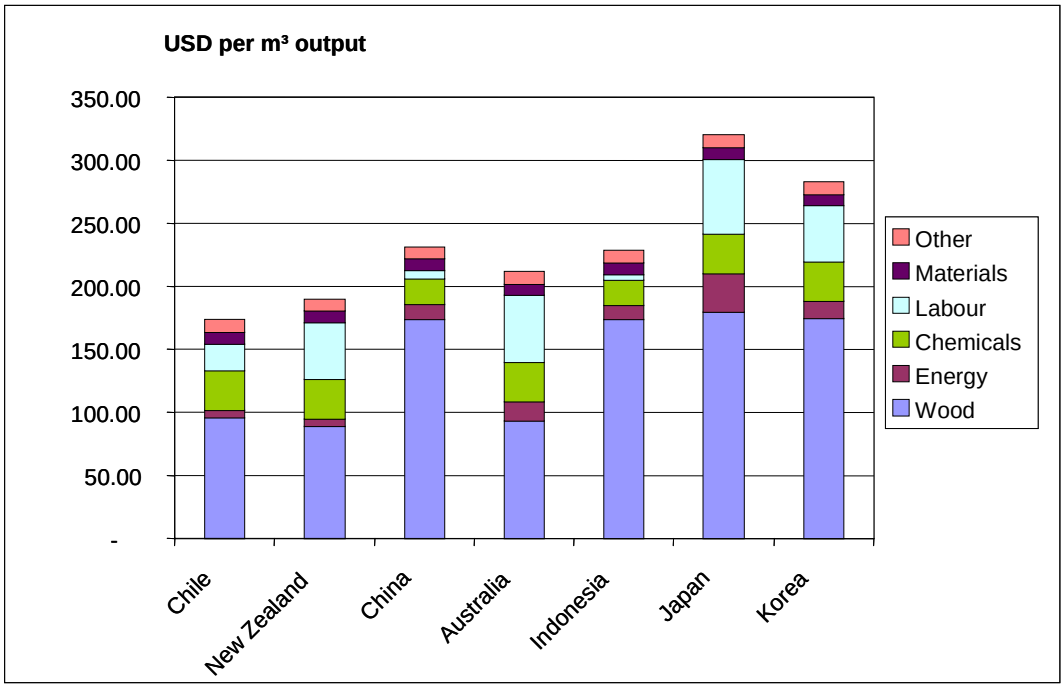
Processing regrowth and some plantation-grown eucalyptus can be difficult, with log end splitting, loose knots, high tangential shrinkage, veneer splitting, wavy veneer after drying, high wood densities and problems in gluing. There is a need for further research and development to ensure that the specific eucalypt species grown for plywood and veneer are suitable and that production processes are improved.

In the interim regrowth hardwood plywood and veneer opportunities should be investigated in Tasmania, Victoria and NSW, as there are niche export market opportunities in Asia for Australian hardwood plywood or veneer.

In northern NSW, selected regrowth and plantation grown *E. grandis* logs are successfully being processed into hardwood plywood. The timber is of medium to high density with good strength, hardness and appearance qualities. Regrowth and plantation grown logs can be successfully rotary peeled, dried, glued and made into plywood. It is understood that almost all of the current Australian production is being sold as concrete form ply.

Figure 3-30 illustrates the comparative costs of producing hardwood plywood in a number of Pacific Rim countries and highlights the competitive position of Australia's hardwood plywood producers.

Figure 3-30:
Hardwood Plywood Production Cost by Country



3.4 Particleboard

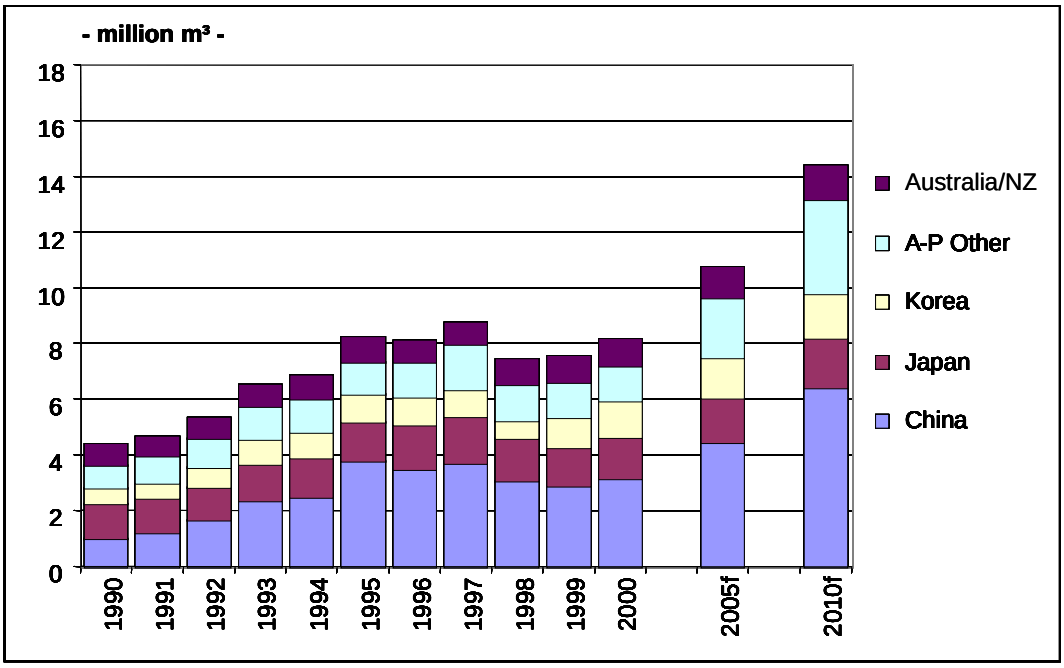
3.4.1 Development and Outlook

Although particleboard has been produced for many years throughout the Asia-Pacific, the product has suffered from a bad reputation as a direct result of the relatively low quality of board that was produced. In contrast, Australian manufacturers produce a very high quality particleboard. Fortunately, the reputation of Asia-Pacific particleboard in general is improving and the market is increasingly accepting this product as being suitable for a wide range of end-uses.

Particleboard consumption has been growing rapidly in the region and this trend is expected to continue (Figure 3-31). Overall particleboard demand could more than double to over 14 million m³ by 2010. Developments in overlaying technology will gradually become the key driver in a market where surface appearance and quality are of paramount importance.

With the exception of Japan, Australia and New Zealand, particleboard is not used in construction applications.

Figure 3-31:
Particleboard Consumption in Asia-Pacific, including Australia/New Zealand

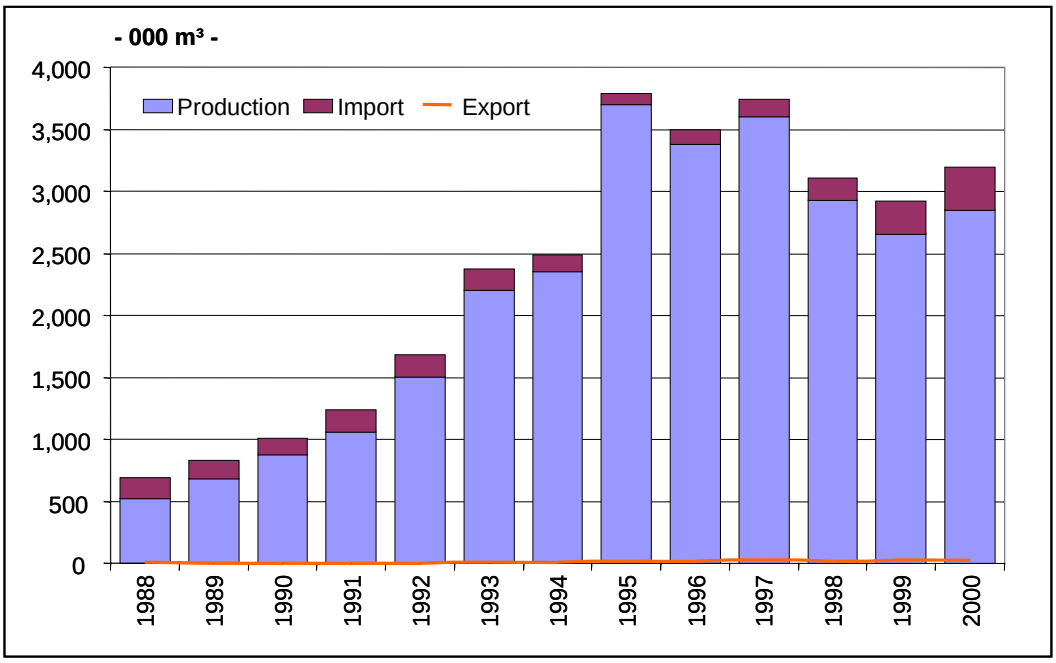


3.4.2 Major Consuming Markets

China

In 2000, China produced approximately 2.8 million m³ of particleboard, mostly of low quality (Figure 3-32). Particleboard capacity across the country is still largely based on comparatively small mills, with typical mill capacity in China being between 5,000 m³/a and 100,000 m³/a.

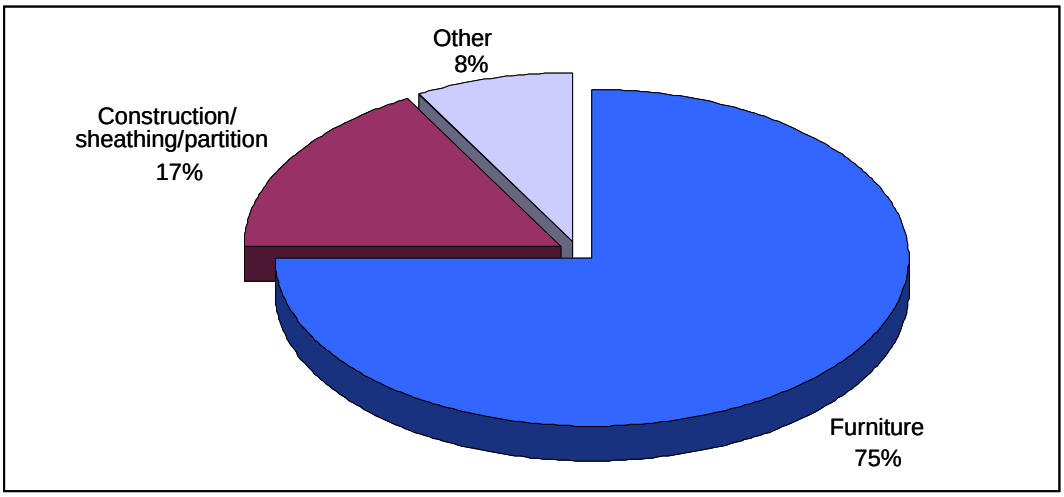
Figure 3-32:
China Particleboard Production and Trade



Although the major portion of demand is met from domestic suppliers, it is imports that are steadily increasing their share in the total supply (Figure 3-32). During 2000, 346,000 m³ of particleboard was imported. At present, imports are mostly special particleboard such as thin particleboard and zero formaldehyde panels. Sources of particleboard imports are from Thailand, Malaysia and USA.

Particleboard is primarily used in furniture production, particularly in kitchen and office furniture (Figure 3-33). Usage of particleboard as construction materials has so far been limited, due mainly to the dominance of plywood in those applications. However, some particleboard is used in partitions and sheathing type applications, where it is cost effective.

Figure 3-33:
Indicative End-uses for Particleboard in China

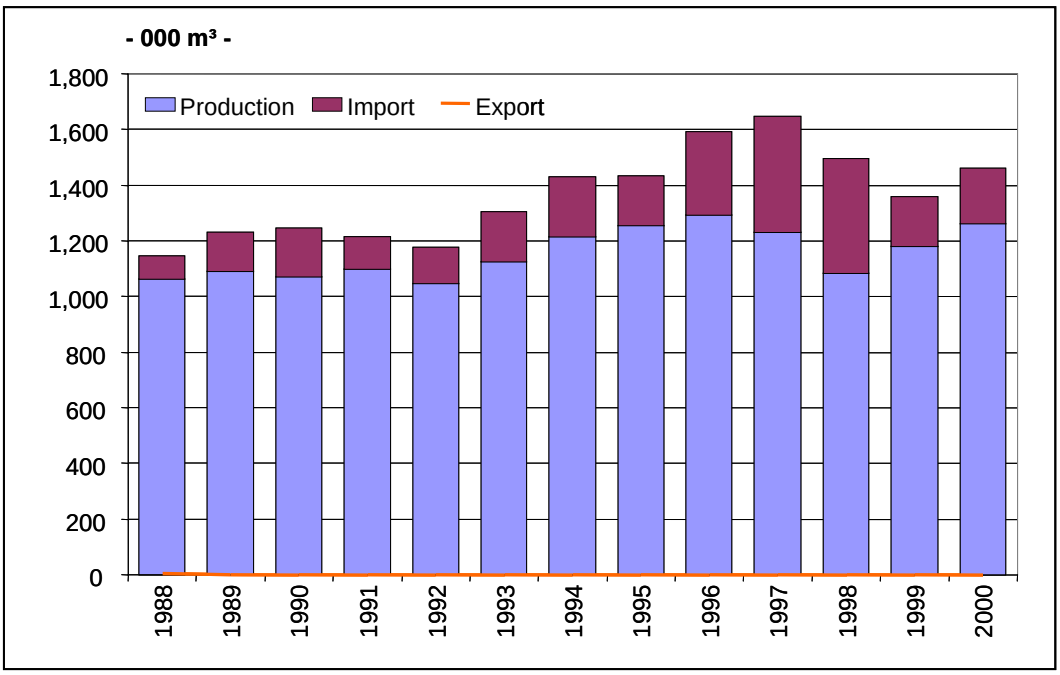


Common sizes in China include 1200 mm x 1800 mm, 1200 mm x 1800 mm, 1200 mm x 2400 mm and 1800 mm x 2400 mm, with conventional thicknesses of 16 mm and 18 mm. A tariff of 18% currently applies to particleboard imports into China.

Japan

In 2000, Japan produced 1.3 million m³ and imported 200,000 m³ of particleboard (Figure 3-34). Compared to other wood-based panels in Japan over the last decade, domestic particleboard production has remained consistently strong, representing 84% of total supply.

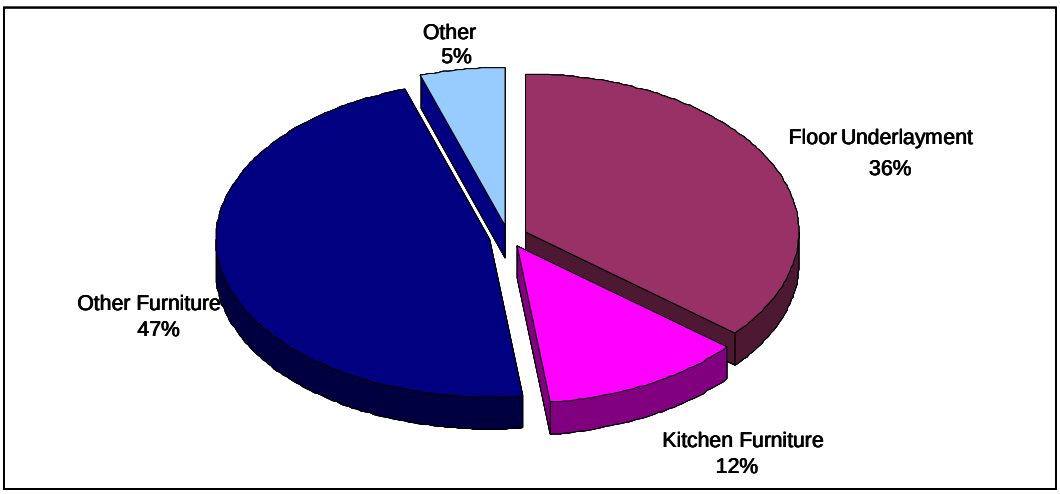
Figure 3-34:
Japan Particleboard Production and Trade



Among imports, Canada is the largest supplier into the market, followed by New Zealand and Australia.

Furniture is the largest end-use of particleboard in Japan, accounting for 47% of all particleboard consumption (Figure 3-35). In addition to this general category of furniture, some 12% of the particleboard used in Japan is consumed in kitchen furniture. The use of particleboard for floor underlay is growing rapidly and now accounts for 36% of total use. This application requires moisture resistant grade panels.

Figure 3-35:
Indicative End-uses for Particleboard in Japan



Similarly to other panel products, 900 mm x 1800 mm is the most common particleboard size used in Japan, with thicknesses of 12 mm and 15 mm. The 1200 mm x 2400 mm size is also seen in the market but the share to date has been insignificant.

The tariffs applying to particleboard imports (Harmonised System Code 4410) to Japan are shown in Table 3-6.

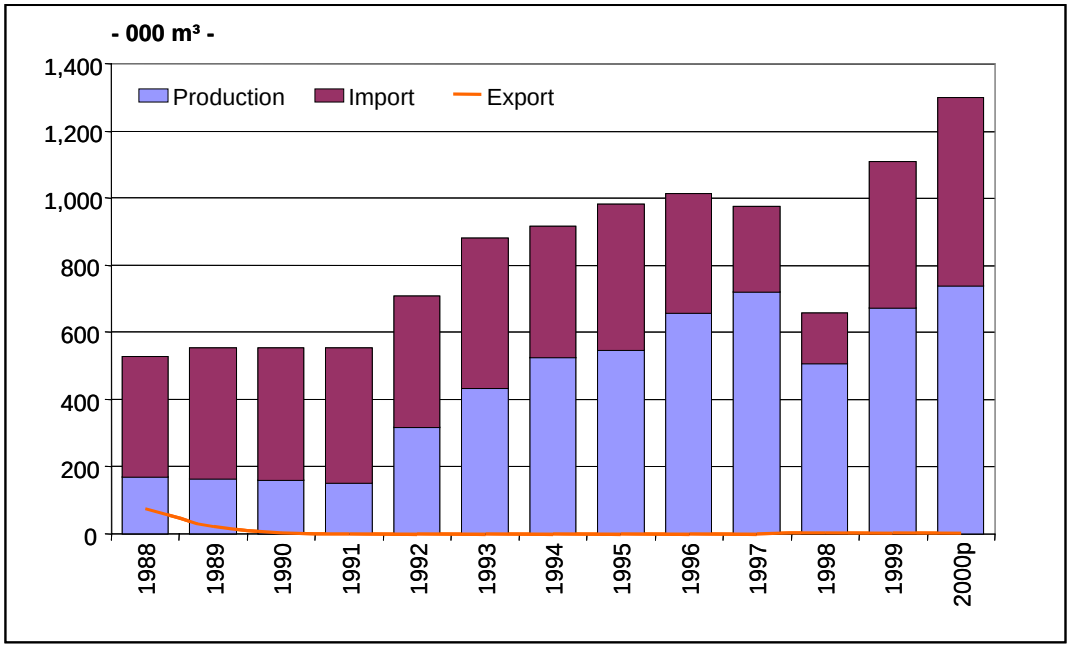
Table 3-6:
Japanese Particleboard Import Tariffs

HS code	Description	Tariff general	Tariff WTO
4410.11.01	Waferboard, including OSB; in sheets or in boards	8.0%	6.0%
4410.11.02	Waferboard, including OSB; Other	10.0%	5.0%
4410.19.01	Other; In sheets or in boards	8.0%	6.0%
4410.19.02	Other; Other	10.0%	5.0%
4410.90.01	Of other ligneous materials; in sheets or in boards	8.0%	7.9%
4410.90.02	Of other ligneous materials; Other	10.0%	6.6%

Korea

Consumption of particleboard in Korea rose steadily throughout the early 1990's and stayed reasonably flat until the Asian crisis in 1998. Demand has recovered strongly and is now exceeding the pre-crisis level (Figure 3-36).

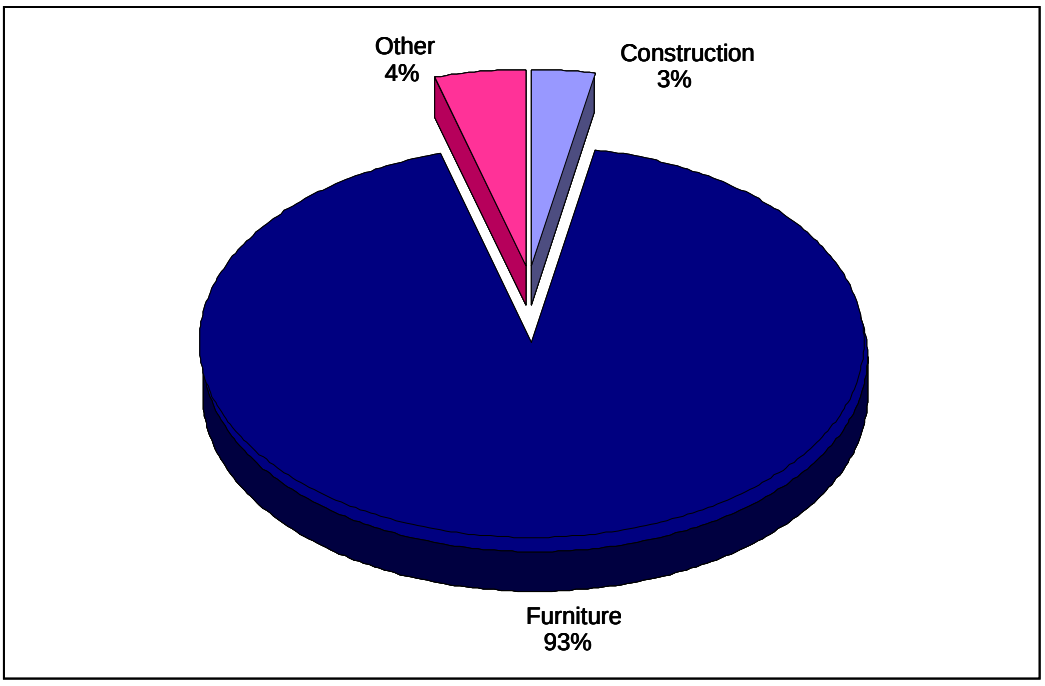
Figure 3-36:
Korea Particleboard Production and Trade, 1988-2000



In the last decade, it is domestic production that has significantly grown while the volume of imports has remained fairly constant. More than half of the capacity is located in the port city of Inchon.

The furniture industry dominates the use of particleboard in Korea, representing 93% of the total (Figure 3-37). The majority is used for kitchen and office furniture, followed by general furniture. In Korea, 15 mm and 18 mm are the most common thicknesses although 12 mm and 23 mm are also seen. The normal sheet size is 1200 mm x 2400 mm.

Figure 3-37:
Indicative End-uses for Particleboard in Korea



A tariff of 8% applies to particleboard imports (Harmonised System Code 4410) to Korea. No other special requirement/import-barrier is observed.

3.4.3 Costs

Figure 3-38 shows the weighted average (by volume) cost elements for producing a cubic metre of softwood particleboard in the Asia-Pacific region.

Figure 3-38:
Particleboard Cost Chart

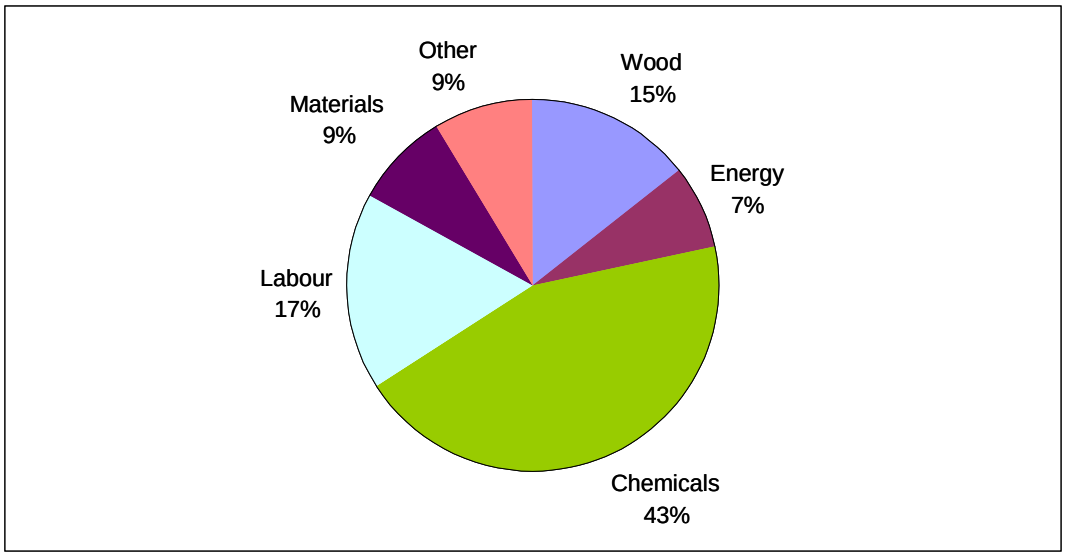
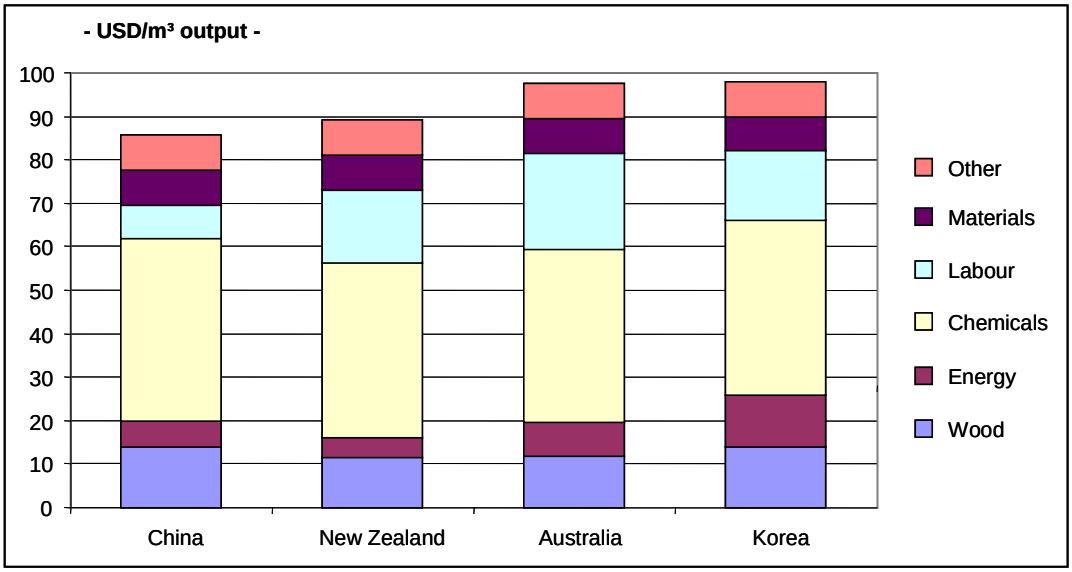


Figure 3-39 illustrates the comparative cost of producing softwood particleboard in a number of Pacific Rim countries and highlights the current cost status of Australian manufactured softwood particleboard.

Figure 3-39:
Particleboard Production Cost by Country



China's low overall production costs are primarily obtained through the availability of low cost labour. Chemical costs throughout the region are similar. Modern large scale mills would benefit less from low labour costs and would improve Australia's overall competitive position.

3.4.4 Opportunities for Australia

The Asia-Pacific market for particleboard continues to grow. Australia is a net exporter of particleboard, made from radiata and pinaster pine. Increasing demand for western style furniture in Asia is expected to provide further export opportunities for Australia's particleboard manufacturers. Although particleboard has lost ground in its conventional furniture markets to other reconstituted wood panels (fibreboards), its inherent advantages of lower cost and lighter weight have enabled the product to maintain and grow its market share.

The outlook within the Pacific Rim for particleboard is positive. However, one disadvantage for the Australian particleboard industry is the relative small size and location of the plants. To become more competitive in the export markets, it will be necessary for the existing industry to invest further to increase the scale of operations and improve efficiencies and cost-competitiveness. A modern world scale particleboard mill would have an output of approximately 300,000 m^3/a and would require a fibre input of some 420,000 m^3/a. Developments modern overlaying, where surface appearance and quality are important, will become the key driver in expanding the markets for softwood particleboard.

To date there has been limited production of hardwood-based particleboard in Australia. Technically it is possible to produce a board suitable for flooring using coarse under-screen fines (a by-product of woodchip production). Further research will be required to prove the feasibility of this opportunity.

In South Africa, Argentina and Brazil, eucalypts are used in the manufacture of particleboard.

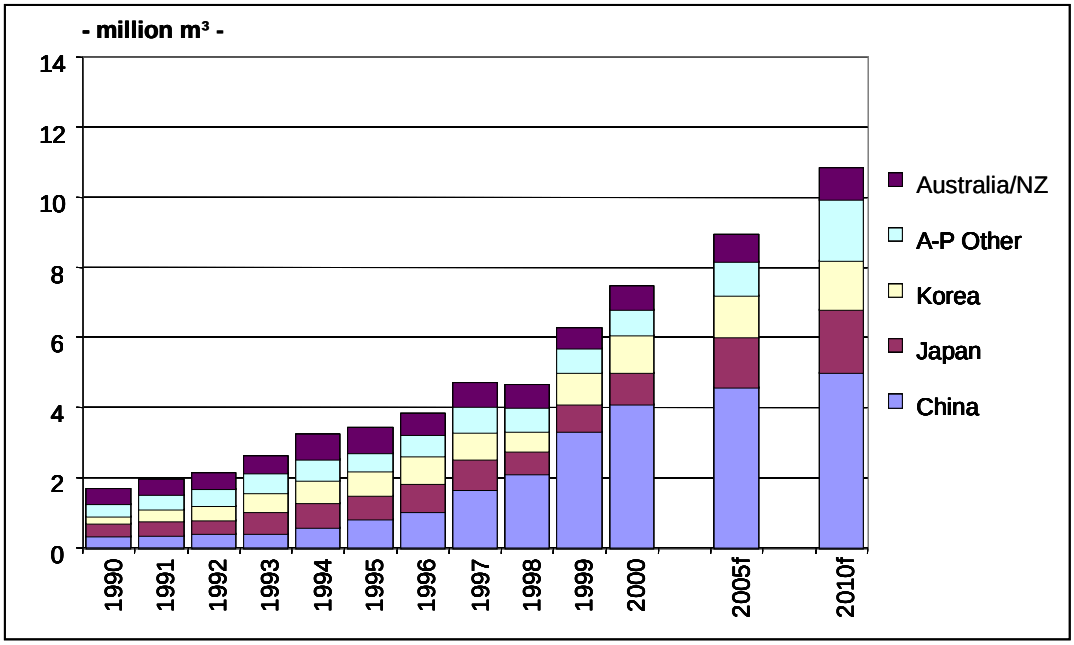
3.5 Medium Density Fibreboard

3.5.1 Development and Outlook

Medium Density Fibreboard (MDF) growth in Asia-Pacific has been very strong and suffered least during the 1998 crisis. The announcement of new capacity before the industry has really recovered from the recent crisis underlines the confidence of the MDF industry in the future prospects for this panel. Its superior surface properties and machinability are highly regarded.

MDF demand in Asia-Pacific, including Australia/New Zealand, is expected to remain strong and reach nearly 11 million m^3 by 2010. China in particular, but also Japan, South Korea, Malaysia, Thailand and Australia will be the primary growth centres for MDF in the region (Figure 3-40).

Figure 3-40:
MDF Consumption in Asia-Pacific, including Australia/New Zealand

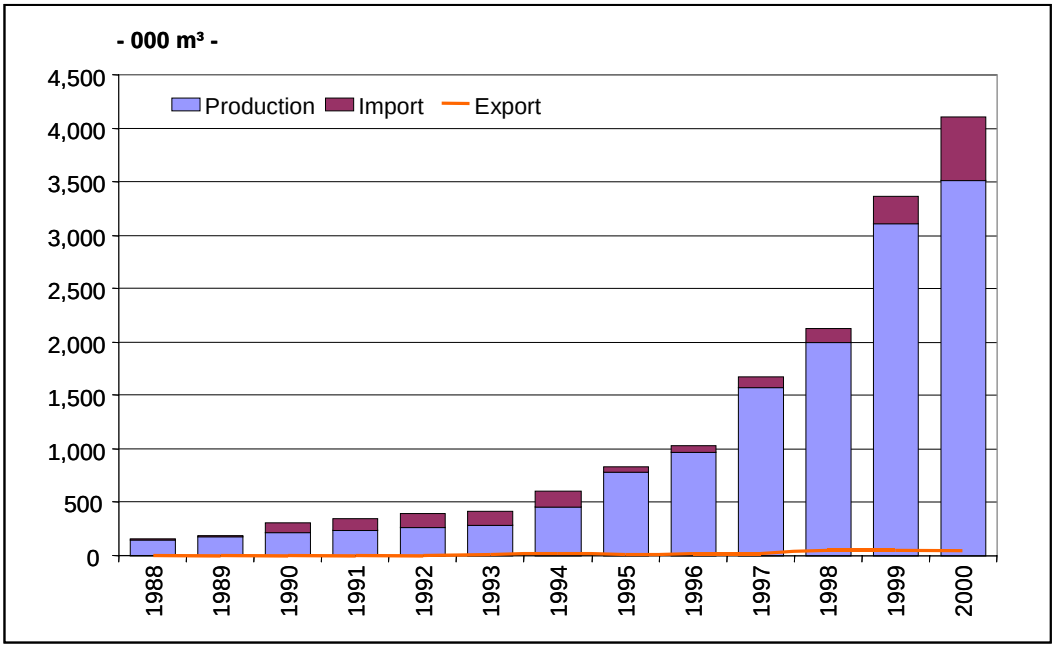


3.5.2 Major Consuming Markets

China

In the last decade, China has become the single largest market for MDF in the Asia-Pacific. The market has developed rapidly, is primarily supplied by domestic producers (Figure 3-41) and demand for MDF is forecast to continue to grow strongly over the next decade.

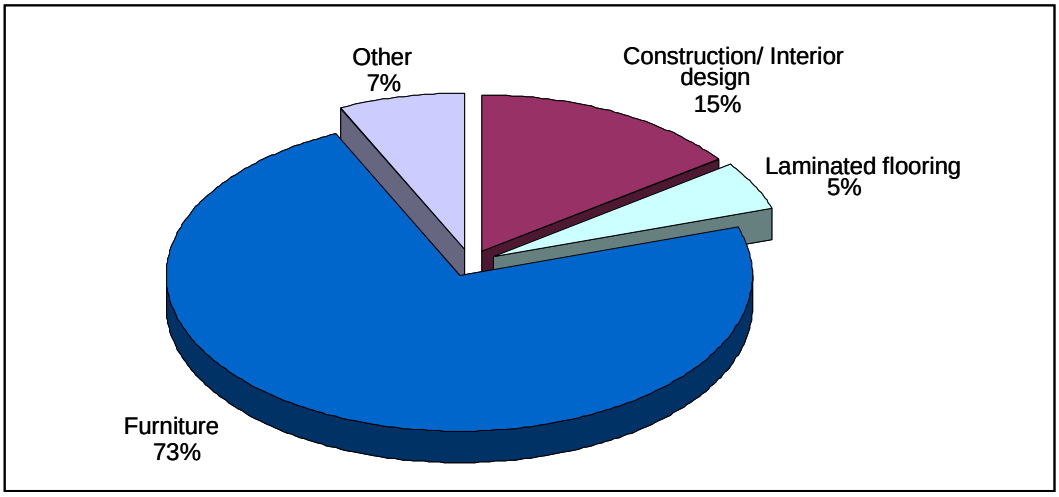
Figure 3-41:
China MDF Production and Trade



China is a net importer of MDF. Imports in 2000 totalled 600,000 m³. Australia and New Zealand supply around 27% of all imported MDF to China. MDF imported from Europe is mainly high-density board used in the manufacture of melamine-laminated flooring.

MDF use in furniture manufacturing has grown rapidly and the furniture industry is the largest consumer of MDF in China today (Figure 3-42), using 70% of all MDF. Home furniture accounts for half of this amount, while the remainder is office and kitchen furniture. End-uses for imported MDF to China also include, melamine laminated flooring and musical instruments, such as pianos.

Figure 3-42:
Indicative End-uses for MDF in China

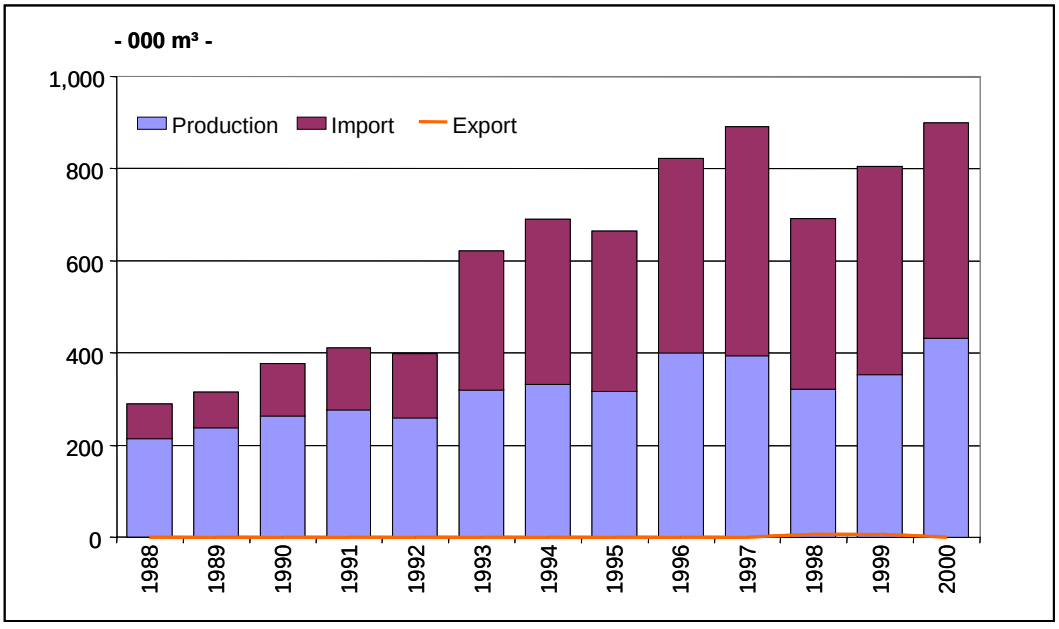


Typical MDF sheet sizes in China are 900 mm x 1800 mm, 2100 x 2400 mm and 1200 mm x 1800 mm. Common thicknesses are 3 mm, 9 mm, 12 mm, 15 mm and 18 mm. A tariff of 18% currently applies to MDF imports into China.

Japan

In 2000, Japan produced 433,000 m³ and imported 467,000 m³ of MDF, representing increases of 64% and 311% respectively in the last decade. As a result, the consumption in 2000 of 900,000 m³ marginally exceeded the previous peak recorded in 1997 (Figure 3-43) at a time when economic growth was slow and sawntimber consumption fell.

Figure 3-43:
Japan MDF Production and Trade

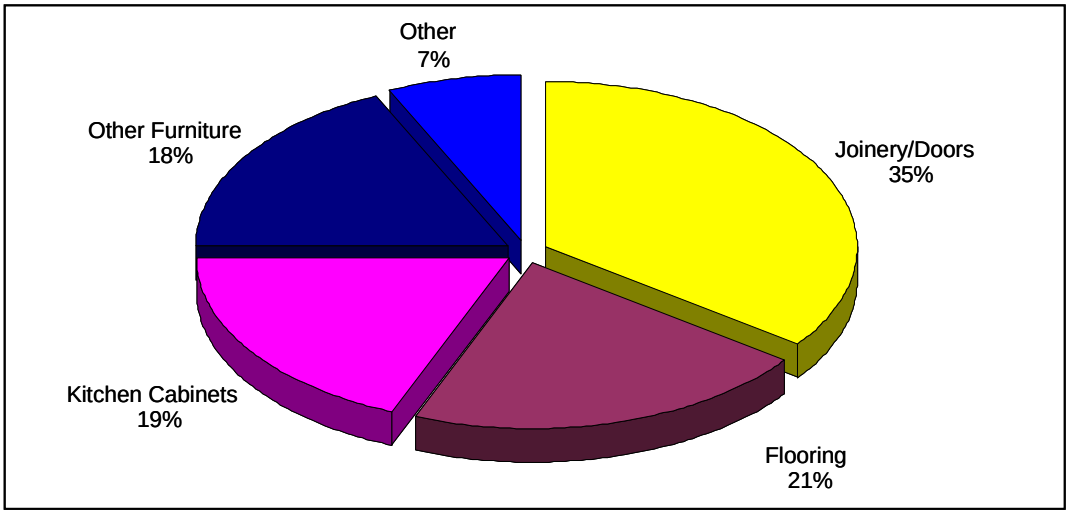


New Zealand, Malaysia and Australia have been the main exporters to Japan. In these countries, Japanese owned mills are operating and are exporting back to Japan.

Joinery and door end-uses including door and window frames represent the greatest use of MDF (Figure 3-44). The smooth surface of MDF has aided its penetration into the large flooring market. Although MDF can be veneered to produce decorative flooring, its use in laminate flooring is limited. Interesting end-uses found within the other categories include musical instruments and electronic boards. However, overall consumption in these highly specialised end-uses is relatively small.

The Japanese MDF market is expected to continue to develop strongly, driven by a suitable material for use in an ever increasing number of products. However, demands on the product properties will increase, requiring suppliers to continue developing products that can perform in these end uses. It is not expected that significant capacity expansion will occur in Japan, and hence increases in future demand will be supplied by imports.

Figure 3-44:
Indicative End-uses for MDF in Japan



The most common MDF panel size in Japan has been 900 mm x 1800 mm, but 1200 mm x 2400 mm is also becoming more popular. Thicknesses vary to a great extent depending upon the end-use.

The tariffs applying to fibreboard imports (Harmonised System Code 4411) into Japan are shown in Table 3-7.

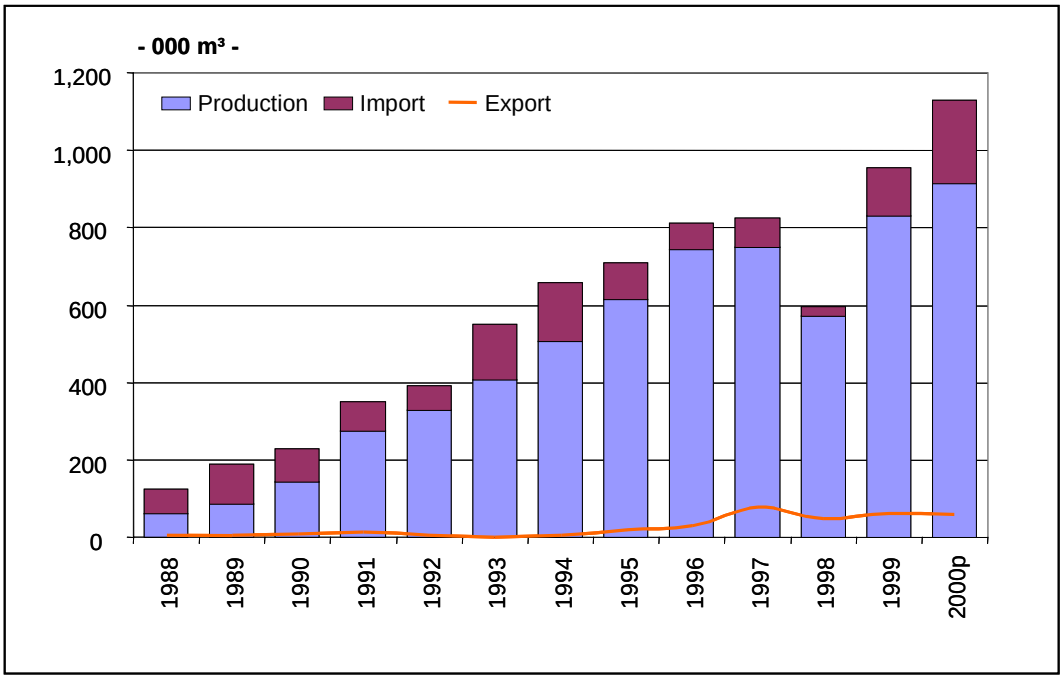
Table 3-7:
Japanese MDF Import Tariffs

HS code	Description	Tariff general	Tariff WTO
4411.11	Density exceeding 0.8 g/cm³	5.2%	2.6%
4411.21	Density exceeding 0.5 g/cm³ but not exceeding 0.8 g/cm³	3.5%	2.6%
4411.31	Density exceeding 0.35g/cm³ but not exceeding 0.5 g/cm³	3.5%	2.6%

Korea

With the exception of the 1998 crisis, growth of MDF production in Korea over the last decade is remarkable. Annual consumption in 2000 is estimated to have exceeded 1 million m³ (Figure 3-45).

Figure 3-45:
Korea MDF Production and Trade

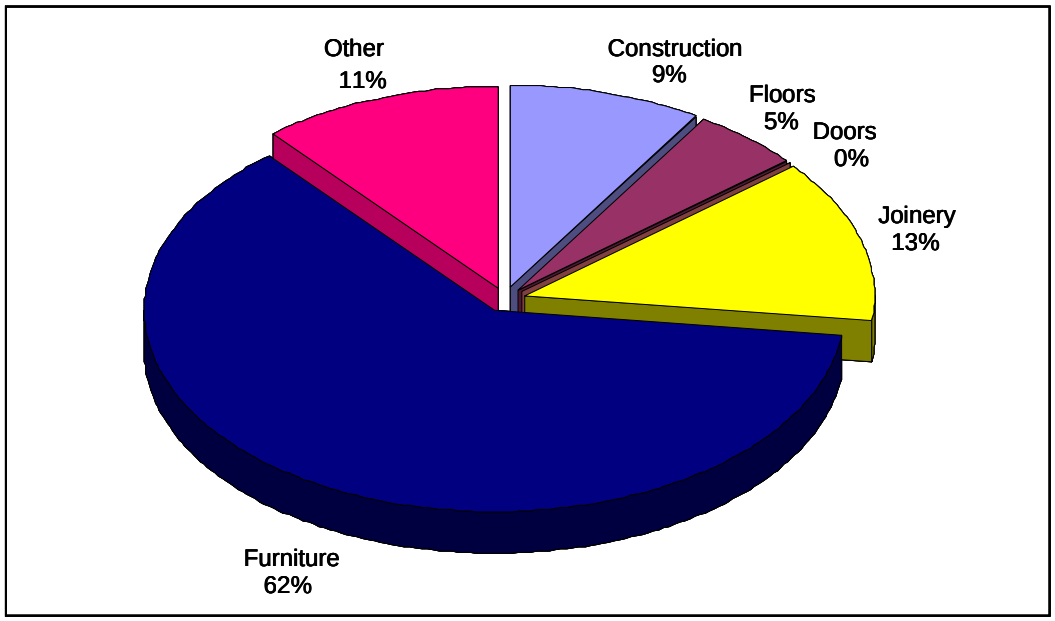


For domestic manufacturers, the main fibre supply sources are Korean red pine, imported radiata pine pulp logs and woodchips, and sawmill residues.

In Korea, furniture is the dominant end-use for MDF, accounting for 62% of the total market (Figure 3-46). However, developments in laminate flooring, MDF mouldings and joinery have resulted in increasing use of MDF in these and other end-uses. The rapid MDF capacity expansion in Korea has ensured good

availability of MDF on the domestic market and assists further in the development of additional end-uses.

Figure 3-46:
Indicative End-uses for MDF in Korea



The most common size for MDF consumed in Korea is 1200 mm x 2400 mm, with thicknesses typically ranging from 3 mm to 18 mm in increments of 3 mm.

A tariff of 8% applies to MDF imports (Harmonised System Code 4411) to Korea. No other special requirement/import-barrier is observed.

3.5.3 Costs

Figure 3-47 shows the weighted average (by volume) cost elements for producing a cubic metre of softwood medium density fibreboard in the Asia-Pacific region.

Figure 3-47:
Softwood Medium Density Fibreboard Cost Chart

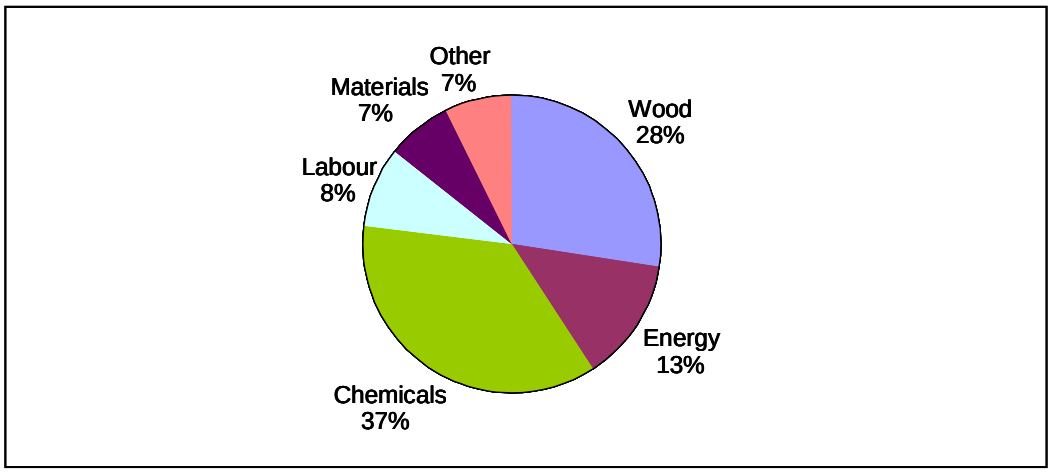
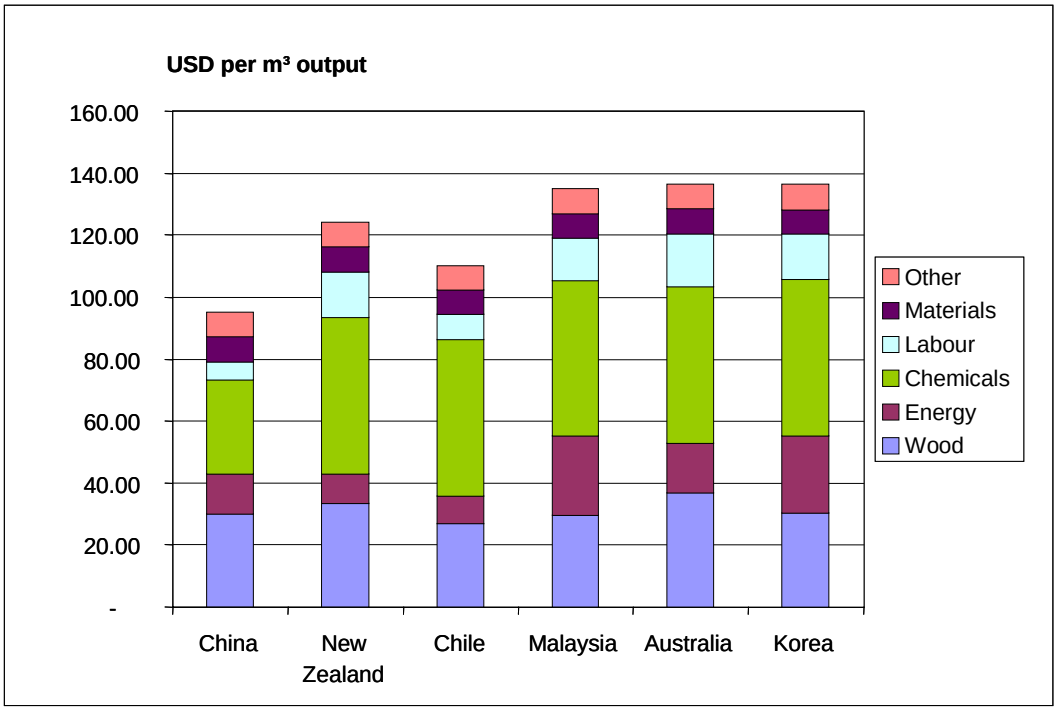


Figure 3-48 illustrates the comparative cost of producing softwood medium density fibreboard in a number of Pacific Rim countries and highlights the current cost status of Australian manufactured medium density fibreboard.

Figure 3-48:
Medium Density Fibreboard Cost by Country



Australia has higher production costs compared to New Zealand and Chile who both produce MDF of a very similar quality. However, taking into account distribution costs to key markets, Australia is a very competitive producer of high quality MDF. Although production costs in China are considerably lower, they manufacture MDF of a quality well below that of the main producers.

3.5.4 Opportunities for Australia

Softwood

Medium Density Fibreboard (MDF) manufactured from *Pinus radiata* and *pinaster* is priced at the top of the range in Japan. This is the outcome of effective marketing supported by the product's consistent pale colour and smoothness. Asian manufactured MDF is generally of dark colour and the finish is not as smooth. It is manufactured from a variety of softwood and hardwood raw materials.

The existing capacity of MDF manufacturers in Australia already exceeds the anticipated domestic demand for the foreseeable future. The industry will

therefore continue to be strongly export focused with demand for MDF in the Asia-Pacific region expected to continue growing over the next decade.

New opportunities are potentially available for expanding the production of MDF in Australia. The expansion could be undertaken as greenfield mills or through additional lines to existing mills. The success of such expansion will depend on strategically identifying the target market and ensuring that the mill outputs are cost competitive.

Potential greenfield locations for new MDF mills in Australia can be identified in Central Victoria, Bombala and possibly SE Queensland. Numerous opportunities for brown field expansion are present in Tasmania, Western Australia, Central Tablelands and the Victorian side of the Murray Valley.

Hardwood

Mixed furnish of old growth hardwood and radiata pine have been trialed for MDF manufacture in Australia. To date, the outcome has met with variable success. The significant variations between softwood and hardwood fibres have created production difficulties with the resin properties and panel density. Using hardwood also eliminates the quality advantage of Australian MDF based on plantation grown softwood.

Today, plantation grown eucalypt fibre is being successfully used in the manufacture of MDF in South Africa, Argentina, Portugal and Brazil. Producing MDF from the plantation hardwood estates that have been developed in the past 10 years is an option worth further investigation. While the current market seems to prefer consistent lighter colour softwood MDF, plantation grown hardwood MDF should have satisfactory surface density and smoothness. The need to be cost competitive with the Asian producers of darker colour MDF panels will be most important.

3.6 Laminated Veneer Lumber and Glue-laminated Lumber

3.6.1 Development and Outlook

Laminated veneer timber (LVL) consumption in the Asia-Pacific has been increasing and is estimated to have reached some 450,000 m^3 in 2000. Japan is the key market for LVL with over 80% of regional consumption, although the Australian market has been quite buoyant. Future demand growth for LVL is expected to be strong, particularly in Australia/New Zealand, driven by structural applications in scaffolding, concrete formwork systems and structural beams as well as non-structural decorative applications.

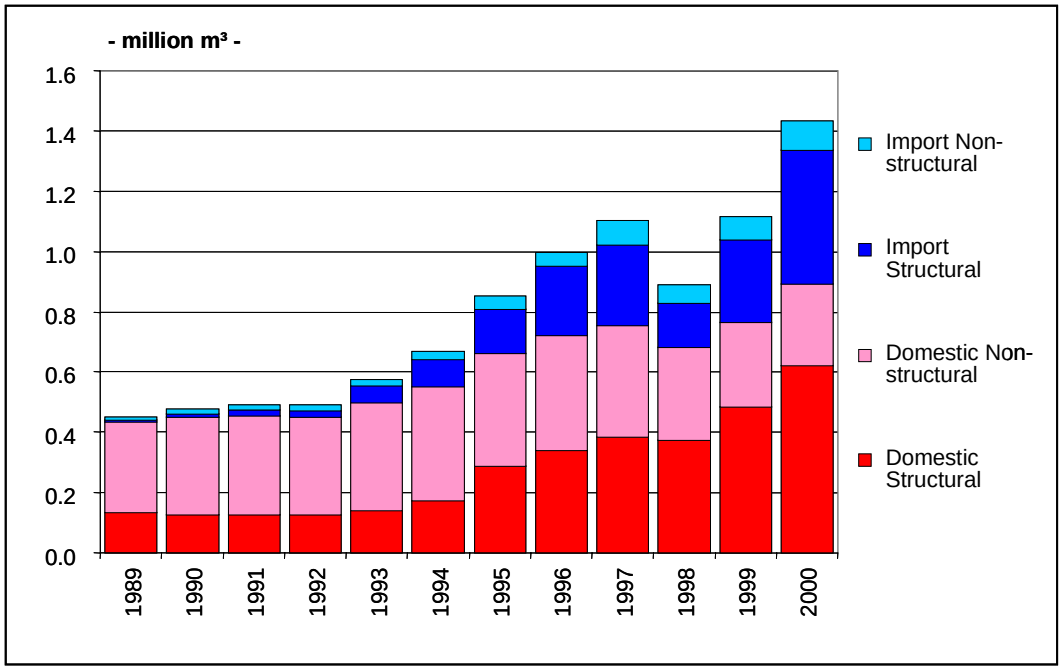
Glue-laminated timber consumption in the Asia-Pacific is centred in Japan. Although the use of large dimension laminated beams has been common in Australia, the volumes consumed in the Asia-Pacific region are small.

3.6.2 Major Consuming Markets

Japan

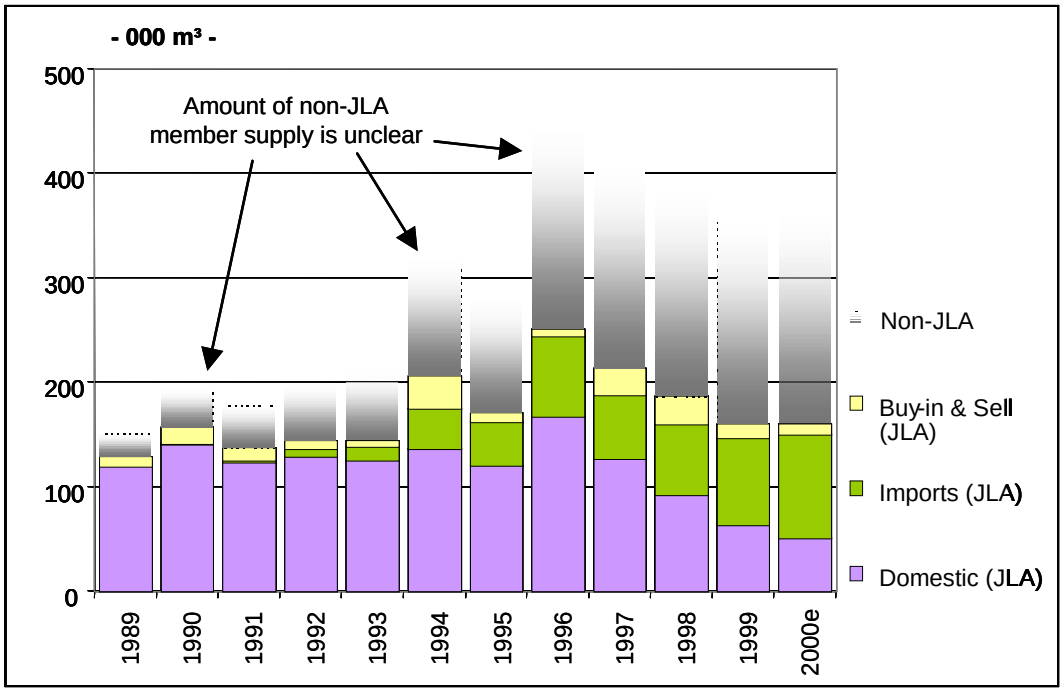
In Japan in the 1990s, glue-laminated lumber aggressively substituted for solid sawnwood in conjunction with the requirements for "quality-assured" housing structural components. While domestic manufacturers steadily increased their output of structural products, it is imports that have gained increasing acceptance in the market (Figure 3-49). The trend is forecast to continue.

Figure 3-49:
Glue-laminated Lumber Supply in Japan



At present, statistical information about LVL in Japan is not as well established as for other wood products. The Japan LVL Association (JLA) summarises the members' activity, but the portion of non-members' involvement is believed to be significant. In total, LVL consumption in 2000 was estimated to be 350,000 m³. As shown in Figure 3-50, domestic production is declining and imports are increasing.

Figure 3-50:
LVL Supply in Japan



Traditional "post-and-beam" components are the main applications for structural glue-laminated lumber and LVL. The post sizes are traditionally 105 x 105 mm and 120 x 120 mm, and the beam sizes are 105/120 mm x 120-300 mm with thickness in increments of 30 mm.

Import tariffs for glue-laminated lumber and LVL are yet to be clearly defined under the current coding system, however, the duties that currently apply are shown in Table 3-8.

Table 3-8:
Japanese LVL and Glue-laminated Lumber Import Tariffs

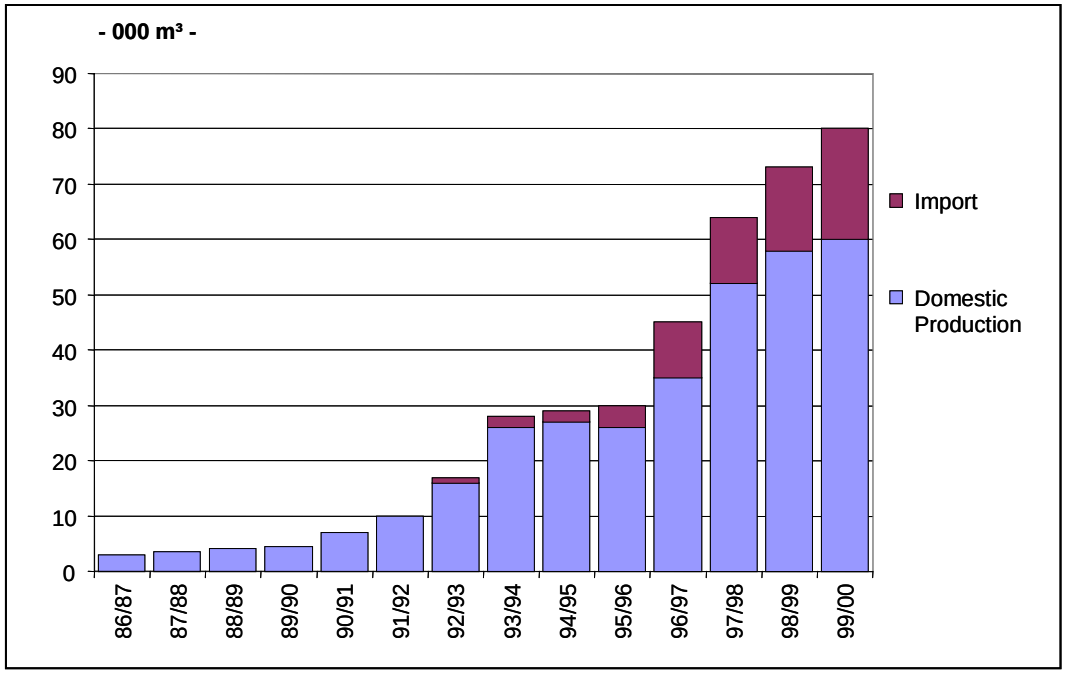
HS code	Description	Tariff general	Tariff WTO
4418.90.222	Parquet panels	3.9%	2.0%
4418.30.001	Structural laminated timber (Glulam)	3.9%	3.9%
4412.22.010	Plywood & similar; Laminated timber; with at least 1 ply of tropical wood	15.0%	6.0%
4412.23.010	Plywood & similar; Laminated timber; with at least 1 ply of particleboard	15.0%	6.0%
4412.29.010	Plywood & similar; Laminated timber; Other	15.0%	6.0%

Australia

The Australian LVL market has developed strongly over the past four years and total consumption reached 80,000 m³ in 1999/2000 (Figure 3-51). LVL is used predominantly for structural applications almost entirely in construction. It is substituting large dimension, high strength structural products that were typically supplied by hardwood or imported products such as oregon.

There have been no LVL exports from Australia to date, although some small volumes may have been exported as components in kit homes to the Japanese and Pacific Islands markets.

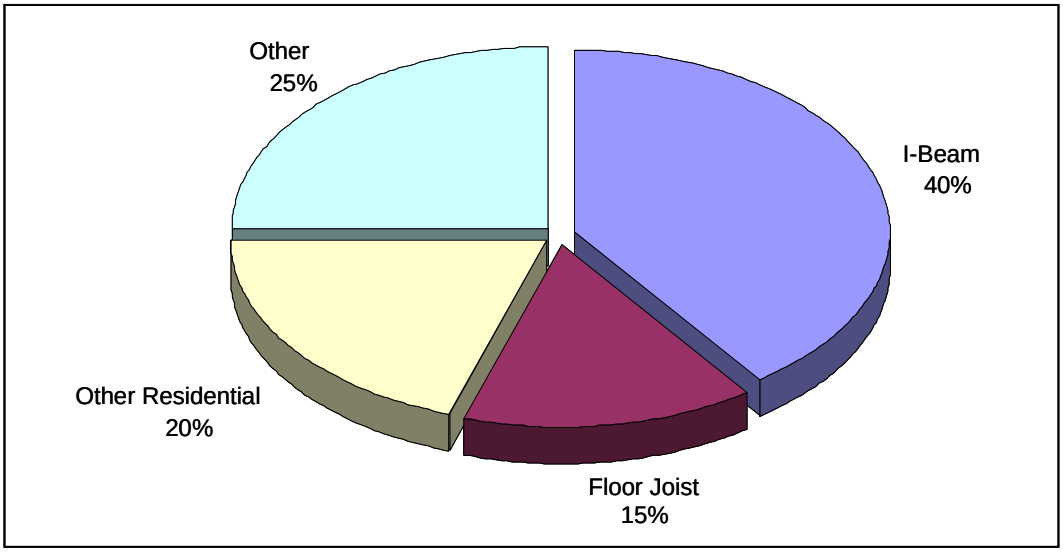
Figure 3-51:
LVL Supply in Australia



The bulk of LVL is used in new residential construction and the home improvement market (Figure 3-46). There is a small volume used for scaffold planks due to its durability and stability. However, there has been virtually no appearance grade or non-structural LVL used in Australia. Solid LVL is used for bearers, joists, lintels/heads, and beams, under-purlins and rafters in roof construction. I-beams are utilized as ground floor and upper storey joists.

In LVL applications, common thicknesses are 65 mm, 85 mm and 115 mm, with widths ranging from 150 mm to 350 mm.

Figure 3-52:
Indicative End-uses for LVL in Australia



3.6.3 Costs

LVL

Figure 3-53 shows the weighted average (by volume) cost elements for producing a cubic metre of softwood laminated veneer lumber in the Asia-Pacific region. It highlights the importance of wood (log) cost in the unit cost of production.

Figure 3-53:
Softwood Laminated Veneer Lumber Cost Chart

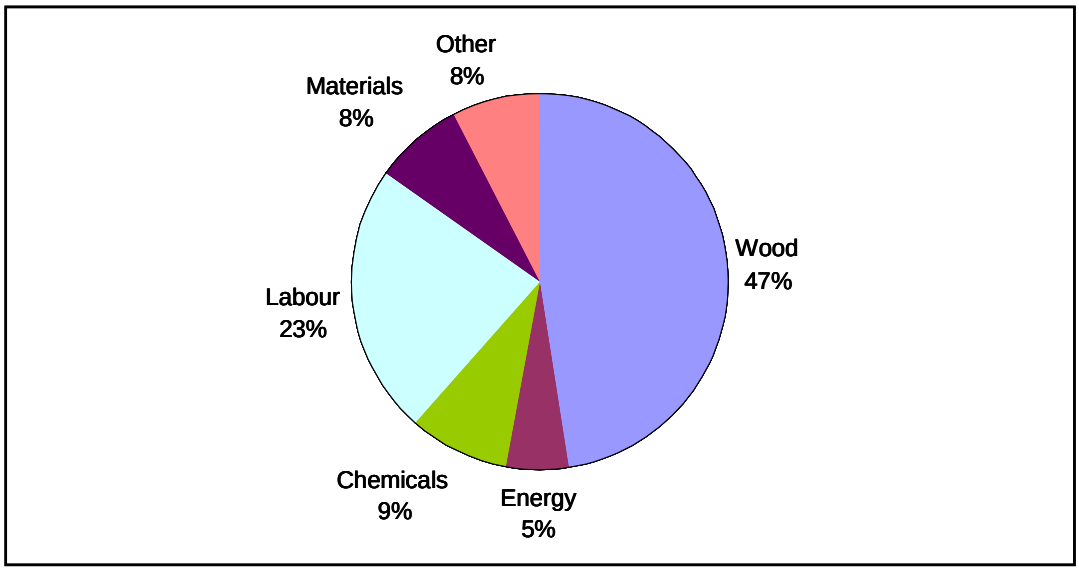
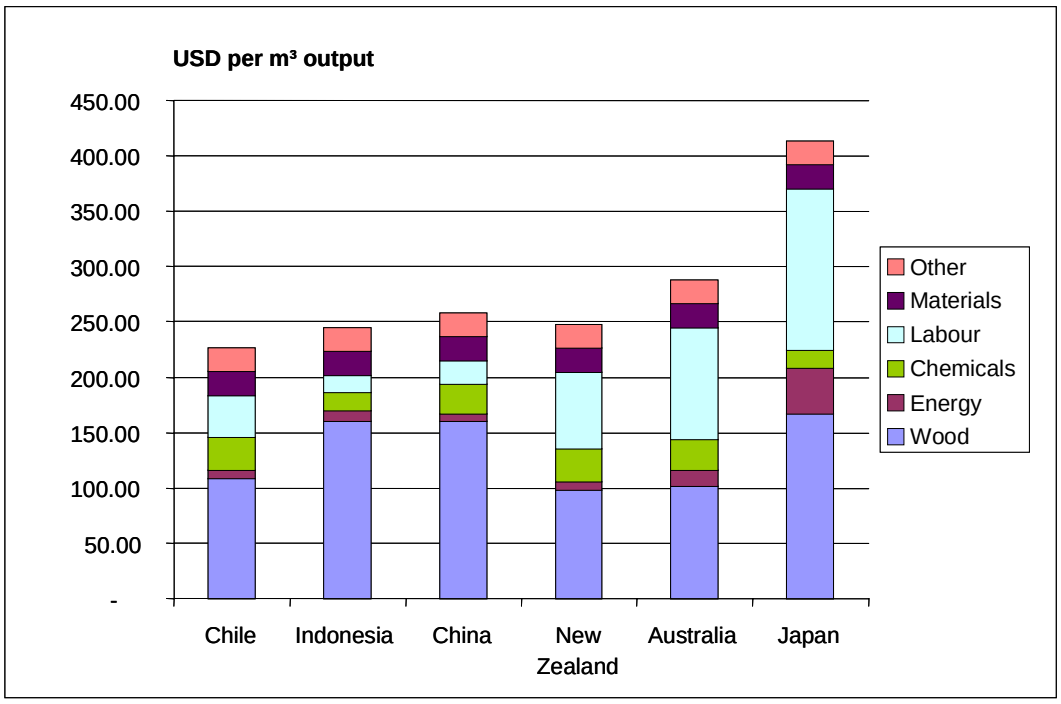


Figure 3-54 illustrates the comparative costs of producing laminated veneer lumber in a number or Pacific Rim countries and highlights the current cost status of Australian manufactured laminated veneer lumber.

Figure 3-54:
Laminated Veneer Lumber Production Cost by Country



Both Australia and New Zealand have a real advantage in raw material costs, but are disadvantaged by high labour costs. However, overall production costs are competitive, and a producer based in Australia can be expected to be a very competitive supplier of LVL both to the domestic market as well as in export markets.

3.6.4 Opportunities for Australia

LVL

Laminated Veneer Lumber (LVL) manufacturing requires logs that are of reasonably good form to be rotary peeled. However, in its lay-up and utilisation, LVL's wood quality requirements are lower than plywood. Some softwood resources in Australia are suitable for manufacture into LVL.

To date, Japan has been the only country in Asia where LVL is widely used. Although most of the LVL consumption in Japan has been in non-structural uses, the culture is changing and it is the structural segment that offers the greatest potential for growth.

The LVL market in Australia is also expected to grow significantly, particularly in those areas of the construction industry where large section hardwood and imported softwood sizes have traditionally been used. Substitution for solid sawntimber offers a good marketing opportunity for engineered wood products such as LVL.

A number of potential locations can be found in Australia for the establishment of a world scale LVL manufacturing facility. This would require some 150,000 to 200,000 m^3 per annum of logs. Potential locations identified are in Western Australia, Bombala and north Queensland.

Glue-laminated Lumber

To date, Japan is the only Asian country to be considered as a potential market. Demand for glue-laminated lumber, particularly structural, is increasing rapidly in conjunction with the recently established performance-driven regulations. In the Japanese glue-laminated structural market, radiata pine currently represents approximately 2%, most of this is supplied by New Zealand.

While radiata pine is now recognised in the Japanese glue-laminated lumber markets as a price competitive option, it is the Nordic/European glue-laminated suppliers that have successfully gained the largest portion of the market. They have been assisted by the relative low value of the Euro. Australia could also participate in the supply of glue-laminated lumber, but the competition is expected to be hard for new suppliers.

Glue-laminated production facilities could either utilise material from already established mills, or alternatively use a dedicated mill. Scale of production is relatively small, and this would allow glue-laminated lumber production facilities to be located throughout Australia.

Figure 3-55 shows the weighted average (by volume) cost elements for producing a cubic metre of softwood glue-laminated lumber in the Asia-Pacific region. Again, it highlights the importance of wood (log) cost in the unit cost of production.

Figure 3-55:
Softwood Glue-laminated Lumber Cost Chart

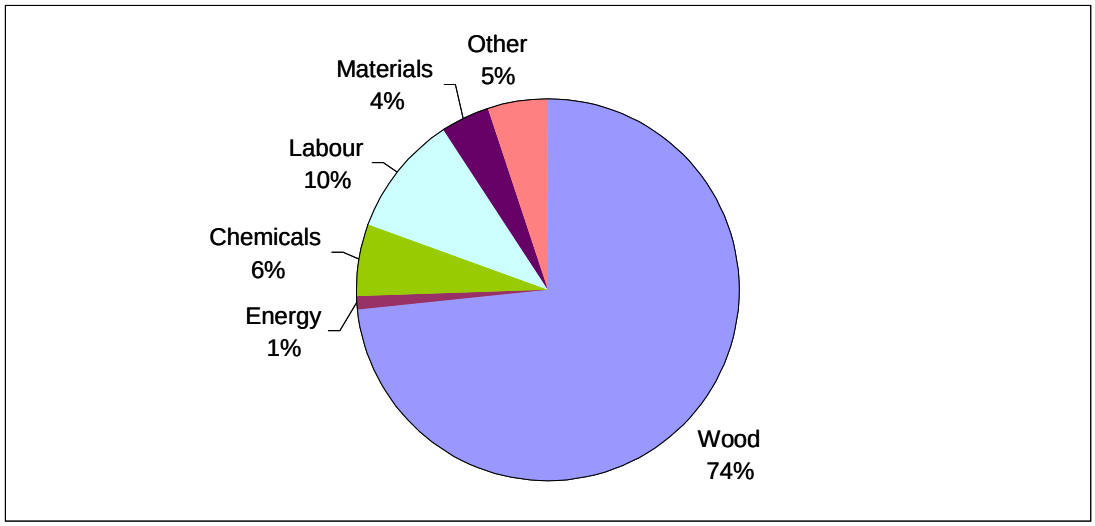
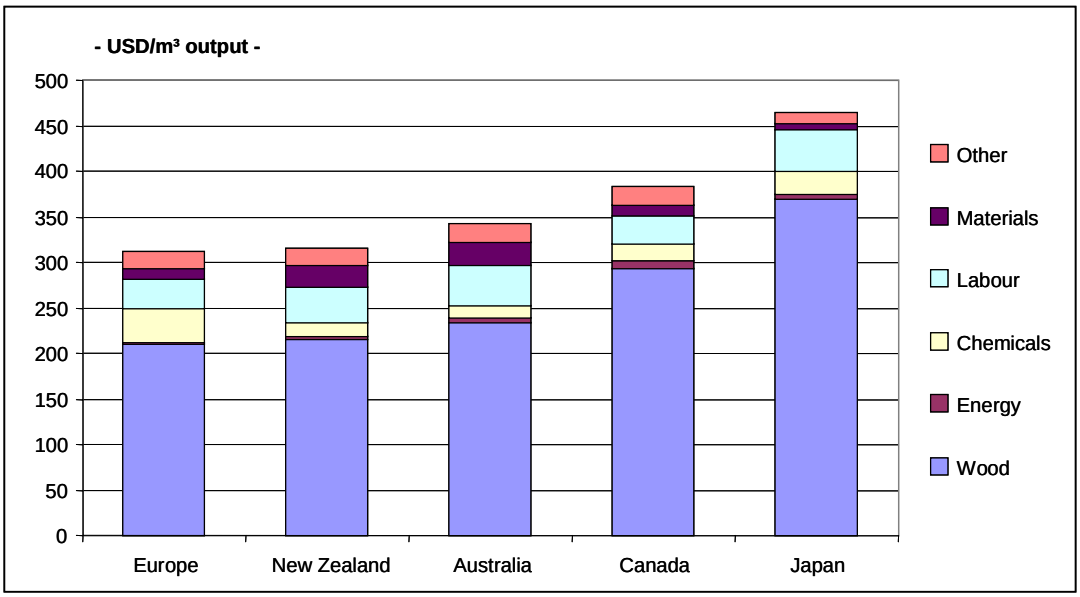


Figure 3-56 illustrates the comparative costs of producing softwood glue-laminated lumber in some Pacific Rim countries and highlights the current cost status of Australian manufactured glue-laminated lumber.

Figure 3-56:
Softwood Glue-laminated Lumber Production Cost by Country



4. ASIA-PACIFIC MARKET: WOODCHIPS

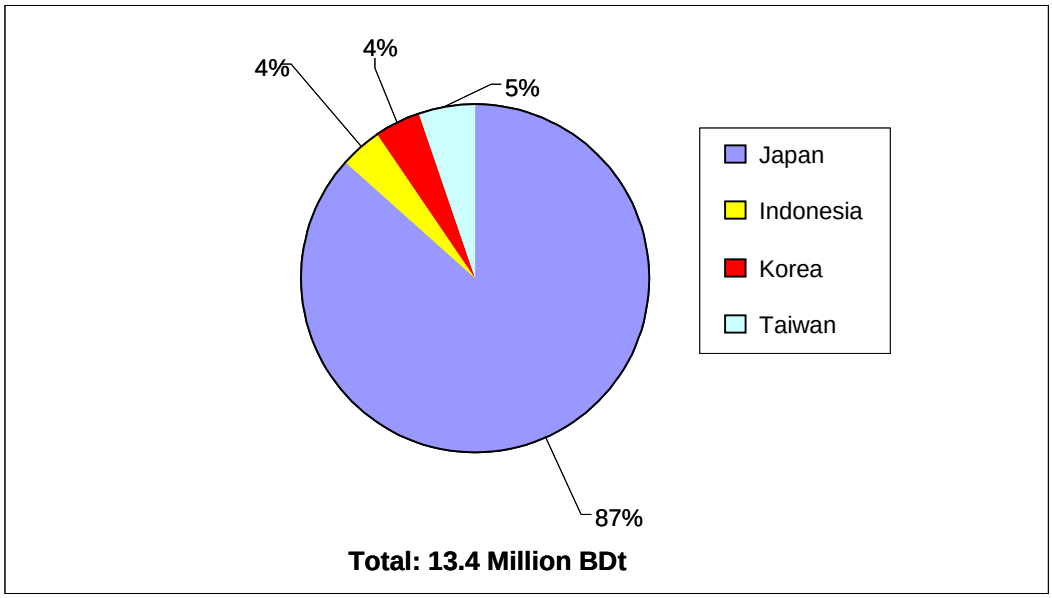
4.1 Major Consuming Markets

Japan

HARDWOOD WOODCHIPS

Japan dominates the Pacific Rim hardwood woodchip market consuming 87% of the woodchips traded (Figure 4-1). The next most significant importing markets are Taiwan, Korea and Indonesia with emerging markets in China, and possibly India.

Figure 4-1:
Major Asia-Pacific Hardwood Woodchip Importers, 2000



Japanese hardwood woodchip imports from Australia began in 1969 and developed slowly to account for 35% of the total hardwood fibre demand by 1985. At that stage, Australia supplied around 65% of the hardwood woodchips imported into Japan. As a consequence of increasing Japanese requirements and a number of Australian issues including a proposed pulp mill in Tasmania, increased environmental action and political uncertainty, Japanese buyers rapidly moved to diversify their hardwood woodchip sources and between 1985 and 2000, Australia's share of the Japanese market subsequently declined from 65% to 28%. Figure 4-2 shows the increasing demand for woodchips by Japan and the importing countries market share from 1982 to 2000.

Figure 4-2:
Hardwood Woodchip Sales to Japan (m³)

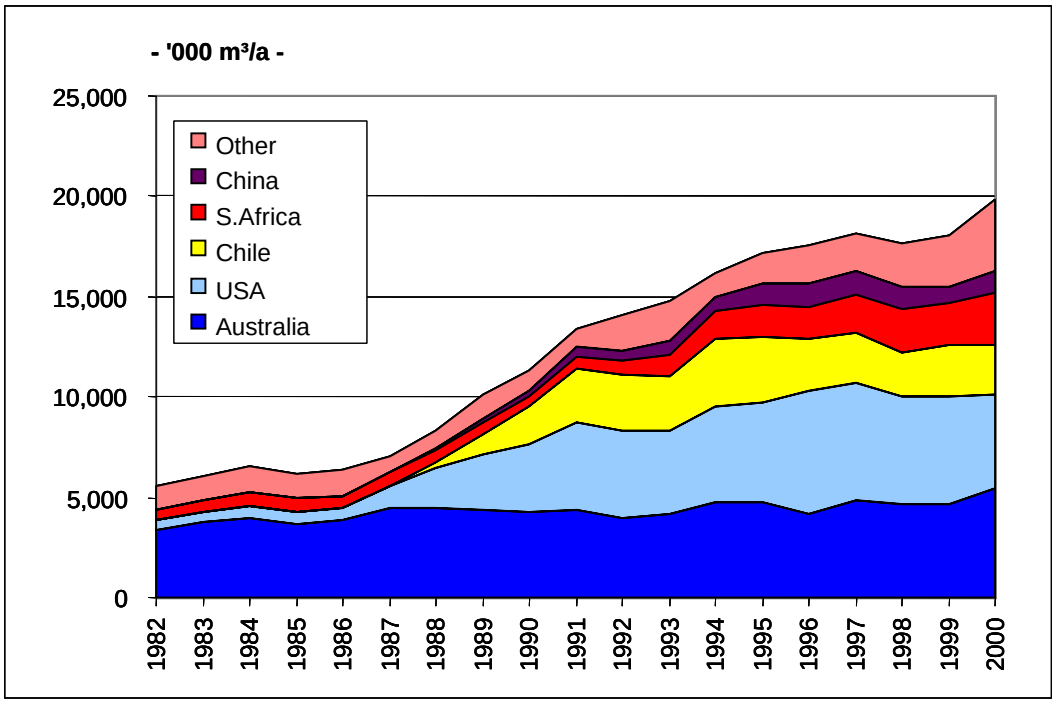
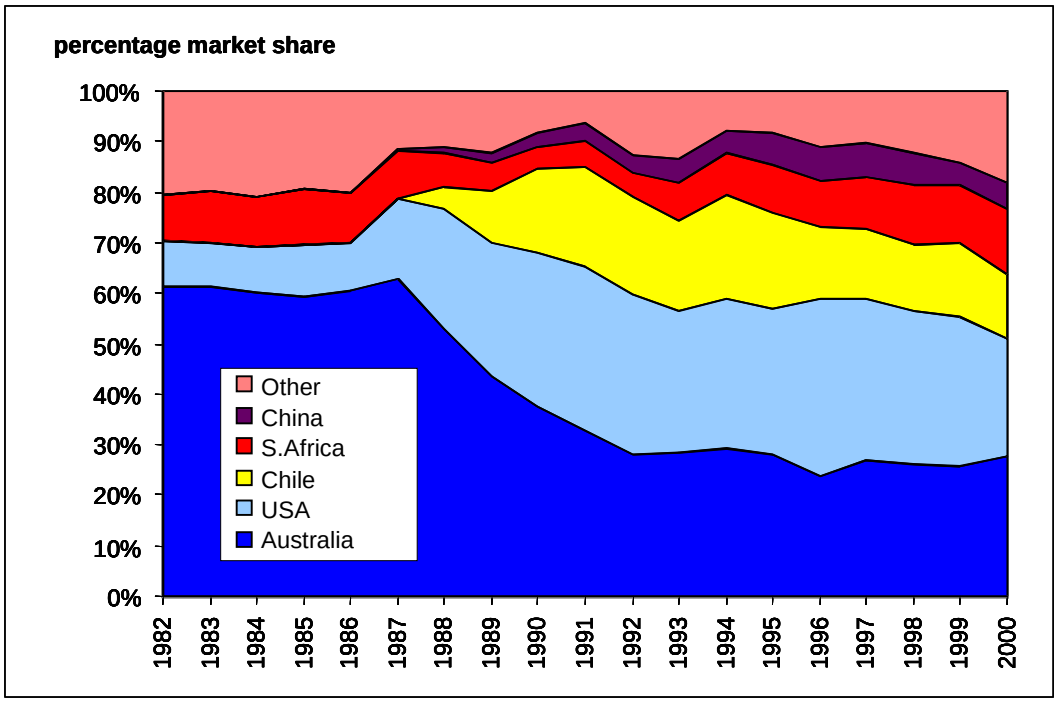


Figure 4-3 identifies that in the last 2 years Australia has started to increase market share while at the same time higher cost suppliers such as the USA have lost market share. It is also apparent that Japanese companies are sourcing more woodchip volume from other sources with some 16 countries exporting hardwood woodchips to Japan in 2000.

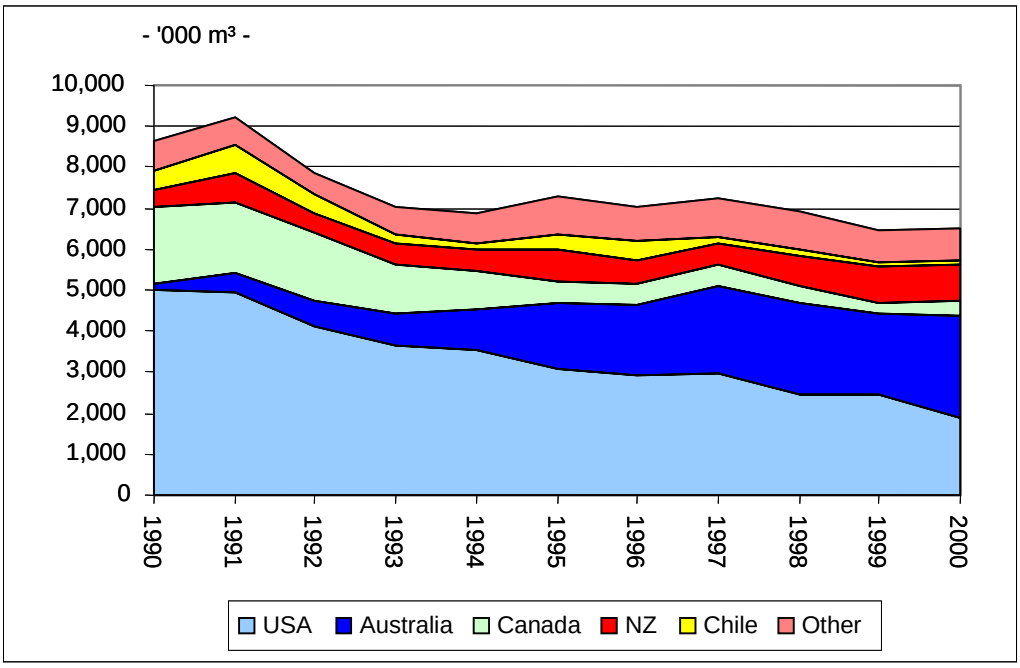
Figure 4-3:
Percentage Share of Japanese Hardwood Woodchip Market



SOFTWOOD WOODCHIPS

Australia has been exporting softwood woodchips to Japan since the early 1980s. Japan is the only significant buyer of softwood woodchips from Australia, and has increased imports from 173,000 m^3 in 1990 to approximately 2.5 million m^3 in 2000. Japan currently imports softwood woodchips from 9 countries with the USA and Australia as the dominant suppliers (Figure 4-4). Australia has increased its share of the Japanese market from 30% in 1999 to 38% in 2000, at the expense of the USA, which reduced from 39% to 30% of market share from 1999 to 2000.

Figure 4-4:
Japanese Softwood Woodchip Imports, 1990-2000



Indonesia

In 1999 Indonesia started importing lower quality native forest hardwood woodchips from Australia and *Acacia mangium* and *Gmelina arborea* logs from Malaysia. The combined imported volume is estimated to be around 500,000 BDt in 2000 and 2001 of which Australia's share is approximately 240,000 BDt/a.

This is a result of the large pulp and paper companies' fibre demands exceeding the availability from native forests and plantations. Native forest harvesting is currently running at unsustainable levels as a result of legal and illegal harvesting, and wildfires. The medium to long-term pulpwood supply will therefore be limited from this source. Taking into account the increasing distances from the mills to the forest concession areas and the poor infrastructure, some mills will, and are currently, facing shortages of pulpwood as their hardwood plantations are yet to mature.

There is evidence that the predicted supply levels from these plantations are not likely to be achieved. Plantation areas and yields appear to be overstated in many cases. The future planting rates stated by many companies will not be achieved particularly as the government subsidies for plantation establishment ceased in 1998.

Korea

Korea has only one chemical pulp mill, Donghae, with an annual capacity of 435,000 ADt/a. This mill has operated in bankruptcy since 1998. Four other mills have non-chemical pulping capacity, but these are smaller scale. Donghae Pulp is the main hardwood woodchip importer. Woodchips are sourced primarily from China, with USA and Australia also being important suppliers. Korea imports significant volumes of softwood pulplogs, although some are consumed by sawmills.

Australia has exported small volumes of softwood woodchips to Korea since 1997 with around 25,000 m^3 exported in 1999 and 4,000 m^3 in 1998. Korea has a substantial MDF industry, with fibre sourced from domestic residues, imported woodchips, and imported pulp logs. Of the imported material, radiata pine is the preferred species for the MDF industry.

Taiwan

Taiwan's pulp industry consists of only two significant producers, Chung Hwa (with capacity of 260 Kt/a BHKP) and Taiwan Pulp and Paper (130 Kt/a BHKP). Recent merger discussions between the two have been unsuccessful.

Imported pulp supplies around 75% of Taiwan's pulp requirements with Taiwan having very limited domestic resources. Pulp production will be directly reflected in demand for imported woodchips. Taiwan has shifted from a reliance on the US and Australia at the beginning of the 1990s towards imports from China. Given the outlook for resource availability, this trend is likely to continue.

Taiwan has not imported Australian softwood woodchips since 1996, when approximately 30,000 m^3 were imported.

Emerging markets

Market pulp, rather than pulpwood, is likely to be the product imported into China to satisfy a rapidly expanding demand for paper. This should increase fibre demand in the main pulp producing regions such as Indonesia.

China has faced a range of challenges in establishing plantations to meet expanding demand, but has not always been successful. However, techniques are improving and reasonable growth rates are expected to improve from recent plantings. Many of these plantings are in small fragmented areas resulting in high costs. Lower volumes than are officially predicted from previous plantings and regional shortages of fibre can be expected to be met by woodchip imports.

Other than the countries discussed, India holds the greatest potential for becoming a woodchip importer. However, it is not expected that this potential will be totally realised during the next decade. Given its large population and reasonable

economic prospects, India is a potentially important future importer of a range of wood products. India's existing wood-pulping capacity is generally small in scale and not designed to use imported fibre. Over the next five years, it does not appear that this situation will change.

4.2 Grades

Hardwood woodchips

Hardwood pulpwood in Australia is harvested from 2 main sources: eucalyptus native forests and eucalyptus hardwood plantations. Traditionally all hardwood pulpwood was harvested from native forests and exported on the basis of meeting a minimum quality standard. Some Australian woodchip exporters now segregate woodchips by pulp yield (pulp yield = oven dry weight of pulp/oven dried weight of wood), which has allowed them to increase market share and enter new markets. The segregated grades are identified in Table 4-1.

Table 4-1:
Hardwood woodchip grades currently being exported to Japan and Indonesia from Australia.

Source	Pulp yield grade	Destination
Native forest	48%	Indonesia
Native forest	50%	Japan, Taiwan & Korea
Native forest regrowth & eucalyptus plantations	54%	Japan

Within all grades, the minimum woodchip quality, percentage of fines, woodchip size, fire damage, percentage of rot and other contaminants are specified by the customers.

Softwood woodchips

Softwood woodchips exported from Australia are sold as the one grade. In some cases mixed species softwood woodchips have realised a lower price than single species shipments.

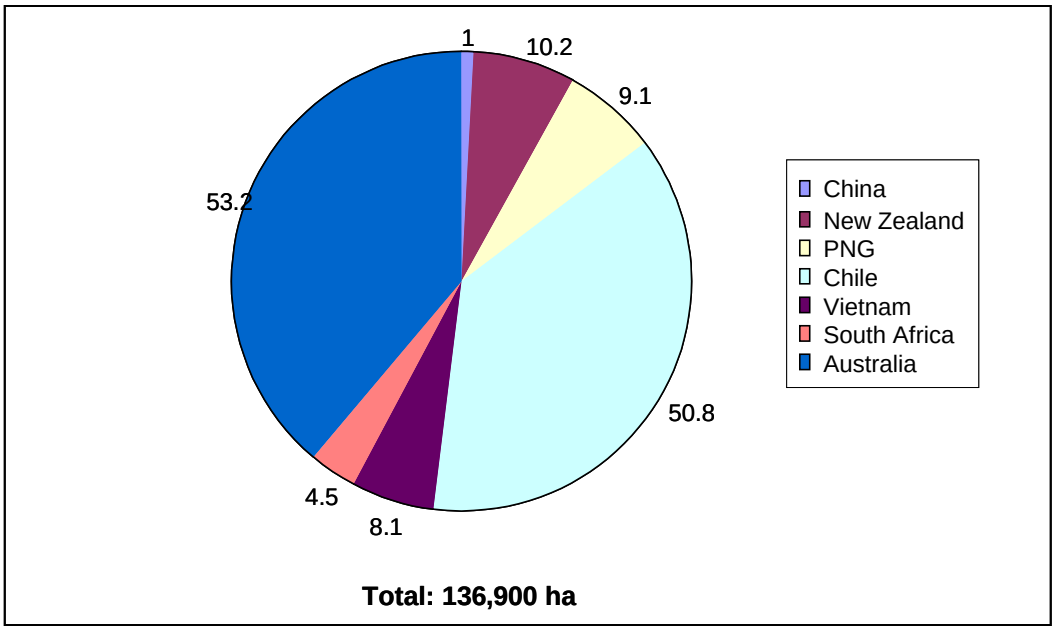
The majority of Australian softwood woodchip exports consist of radiata pine (*Pinus radiata*), which has a higher wood density than radiata pine sourced from New Zealand. This provides the producers of bleached softwood kraft pulp with more fibre per cubic metre processed. Slash pine (*P. elliottii*) and small amounts of hoop pine (*Araucaria cunninghamii*) are exported from Queensland.

4.3 Market Trends

Japan

Today, some 16 countries are exporting hardwood woodchips to Japan, involving around 30 companies. Importantly, most of this supply has come from native forests in each of the supplying countries. Further securitisation of future supplies to the Japanese pulp industry will be through the direct or part ownership of offshore plantations. Today, Japanese interests own over 137,000 ha of hardwood plantations in seven countries, which is intended to supply fibre to the Japanese pulp industry.

Figure 4-5:
Area of Japanese Overseas Hardwood Plantations Planted for the Japanese Pulp Industry, December 2000 ('000 ha)

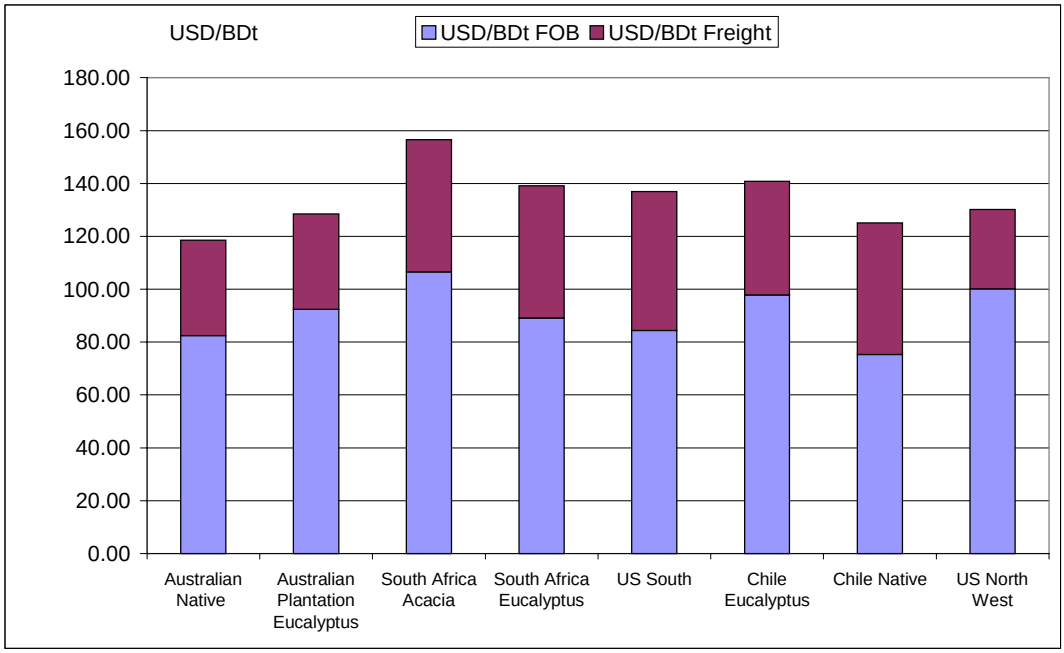


In the late 1960's, harvesting volumes in Japan peaked at over 50 million m³/a, and have since decreased to the present level of 19 million m³/a with the hardwood pulpwood component at approximately 3.4 million m³/a. The local supply of residues has declined because of decreasing sawnwood and plywood production. The domestic wood supply (both harvesting volumes and residue volumes) is expected to decline further creating greater demand for imported hardwood fibre. Japan's hardwood pulpwood demand should be stable over the next decade. Imports of woodchips will therefore increase due to declining domestic supply and the relative high cost of domestic pulpwood.

Japanese pulp and paper producers have an increasing preference for plantation grown hardwood woodchips because they are high quality and not as environmentally sensitive as native forest woodchips.

Australia is also the lowest priced supplier to the Japanese market (Figure 4-6).

Figure 4-6:
Comparison of Landed Costs for Japanese Imported Hardwood Woodchips based on 2000 FOB prices



The situation for softwood imports to Japan will be different, as the domestic harvest is projected to increase. Offsetting this, forecast declines in domestic sawmilling production (by 25% between 2000 and 2010) will be reflected in a reduction of sawmill residues available to the pulp industry. Most of the growth in overall fibre demand over the next decade will be met from recycled paper use and this will reduce the demand for softwood fibre. The net deficit in softwood pulpwood will remain stable or decline slightly. However, Australia has shown over the last year, through increasing exports, that it will continue to pick up market share as other producers, such as the USA, face reduced supplies.

China

Pulp needs will grow strongly, due both to overall demand growth and to substitution towards wood-based papers. However, much of this growth will be met by direct imports of pulp, and the remainder by increased availability of domestic plantation pulpwood. In net terms China is expected to remain an exporter of woodchips.

Korea

Like Japan, pulp production in Korea is not cost-competitive by global standards because of the high delivered cost of pulpwood (as well as quite high costs in other areas). For this reason, it is unlikely in the present investment climate that

Korean pulping capacity will expand in the future. It is expected that Korea's hardwood woodchip imports will remain approximately constant.

Although dependent on imported fibre, further MDF capacity expansions have been announced. Softwood pulpwood will continue to be in demand, primarily from the expanding panels industry. It is expected that the net deficit of softwood pulpwood will increase. This demand is not likely to be met by rising imports.

Taiwan

It is unlikely that pulp capacity in Taiwan will expand in the future as environmental restrictions will limit the attractiveness of any new expansions. Hardwood pulpwood needs are not expected to grow substantially over the next decade and it is expected that imports will continue to provide the bulk of Taiwan's pulpwood needs.

Indonesia

Pulping capacity will continue to increase (although less rapidly than during the 1990s) and availability of mixed tropical hardwood pulpwood will decline. Indonesia's import needs will depend on the effectiveness of the acacia plantation programs underway which appear to be well behind supply needs. Regional shortages are likely.

Opportunities for Australia

Australia is in a strong position to regain market share in the Japanese hardwood woodchip market due to the relative competitiveness of both plantation and native forest woodchips. Markets for native forest woodchips in Korea, Taiwan and Indonesia will also be available to Australian exporters. An over supply situation is likely to develop by 2010 and increasing plantation grown pulpwood is likely to be substituted for native forest woodchip in the Japanese market.

Softwood woodchip markets will also continue to be available in Japan. Importantly, this report has assumed that pulpwood exported as woodchips (and logs) is "available" for processing in Australia. These volumes are, however, only available where there is no contractual commitment to importers and where domestic processing has the ability to pay export parity prices.

5. ASIA-PACIFIC MARKET: PULP AND PAPER

5.1 Papermaking Fibres Overview

Fibre furnishes by manufacturers depend on the specific properties of the paper and paperboard grades, the production practices and the availability of raw materials in the various geographical locations of the Asia-Pacific region.

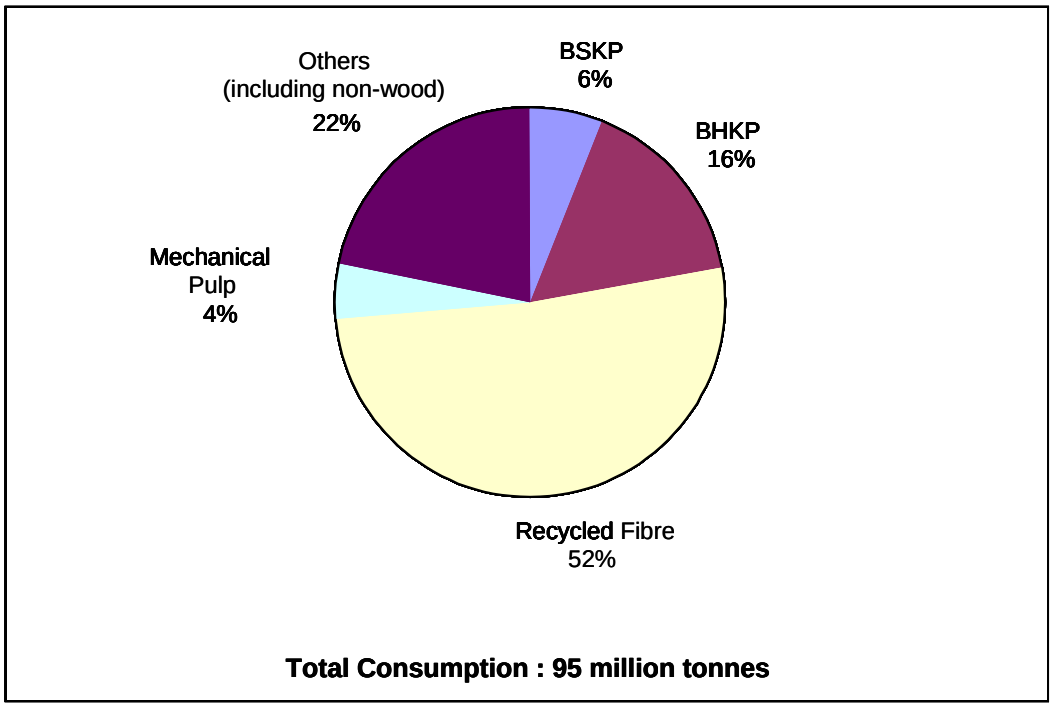
As a general guideline, furnish composition for various paper and paperboard grades are as follows:

- Standard newsprint fibre furnish consists of 50% mechanical pulp and 30% recycled paper.
- Fibre furnishes for wood containing paper such as LWC usually contain mechanical pulp and reinforcement pulp, mostly BSKP.
- A standard fibre furnish for woodfree printing and writing paper consists of 0-50% BSKP and 50-100% BHKP.
- Kraftliner has been traditionally made from high-yield unbleached softwood kraft pulp with the top layer of standard unbleached softwood kraft, whereas testliner has been produced from recycled waste, primarily old corrugated containers.
- Cartonboards constitute quite a diversified product group with a widely varying furnish composition. Solid bleached sulphate (SBS) board contains mainly bleached softwood and hardwood sulphate pulp. Folding boxboard (FBB) consists of three or more layers, with bleached on the top layer and the centre typically made of mechanical pulp. White-lined chipboard consists of a white top layer with recycled paper in the middle.

5.1.1 Development and Outlook

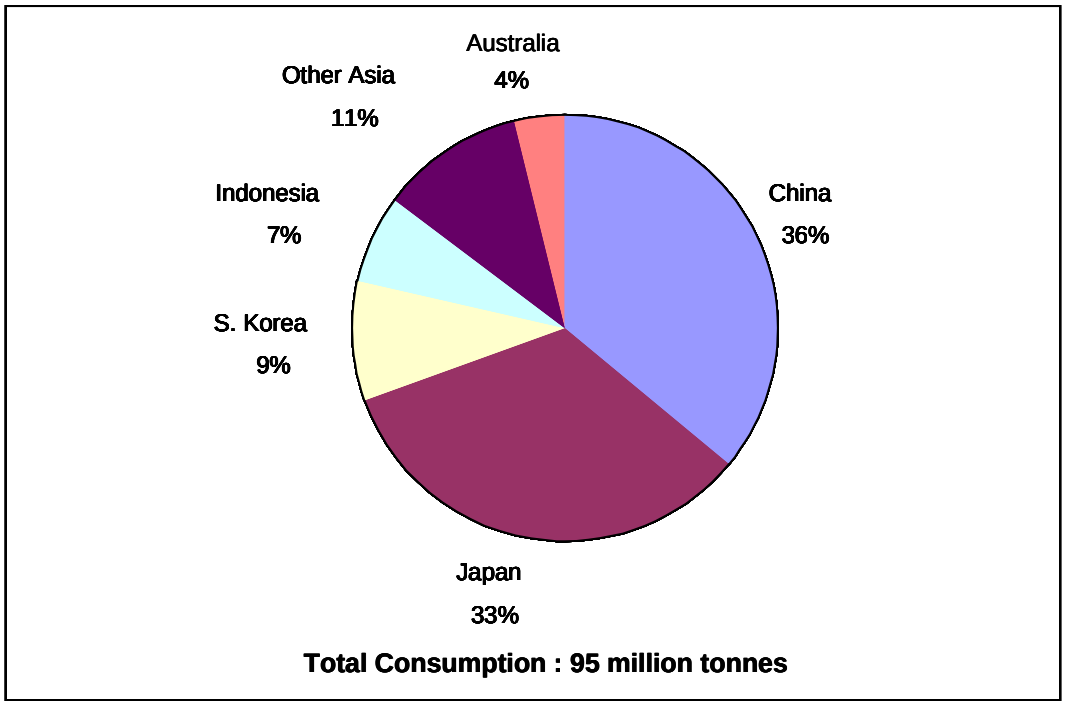
Papermaking fibre consumption in the Asia-Pacific region amounted to 95 million tonnes in 2000. Recycled fibre makes up half of the total papermaking fibre consumption. Bleached hardwood kraft pulp accounts for 16% of the total papermaking consumption and is increasingly replacing non-wood pulp consumption, especially in China.

Figure 5-1:
Consumption of Papermaking Fibres in Asia-Pacific by Grades 2000



China is the biggest consumer of papermaking fibre accounting for more than one-third of Asia-Pacific total consumption. The Chinese fibre market is largely supplied by domestic non-wood pulp although there is an increasing use of recycled fibre with imported wood pulp added to the furnish. Japan is the second biggest market accounting for another third of total Asia-Pacific consumption. The Japanese fibre market is largely supplied by domestic recycled fibre (55%) and chemical pulp produced from imported woodchips (approximately 20%).

Figure 5-2:
Consumption of Papermaking Fibres in Asia-Pacific by Country 2000



5.2 Bleached Hardwood Kraft Pulp (BHKP) and Bleached Softwood Kraft Pulp (BSKP)

5.2.1 Development and Outlook

In 2000, the Asia-Pacific demand for bleached kraft pulp totalled 21 million tonnes, of which 11 million tonnes was used in integrated operations. The remaining 10 million tonnes was sold as market pulp with 5.9 million tonnes of BHKP and 4 million tonnes of market BSKP.

For BSKP, a distinction is normally made between three different sub-grades, based on different types of softwood used – northern bleached softwood kraft pulp (NBSKP), southern bleached softwood kraft pulp (SBSKP) and radiata grades. Radiata grade is made from *Pinus radiata* and similar species grown mainly in Chile, New Zealand and Australia. NBSKP from the Nordic countries and from northern parts of North America has long been the benchmark for BSKP and is considered the best quality BSKP. However, BSKP made from radiata pine now shows faster consumption growth and is well accepted by papermakers in the Asia-Pacific region.

In Asia, printing and writing papers represent the largest end-use of BSKP. The hardwood component of woodfree printing and writing papers in Asia is often mixed tropical hardwood, which is weaker than eucalyptus or birch. Thus a greater proportion of BSKP for reinforcement is required in the fibre furnish, especially for coated grades. Also, the high share of non-wood pulp in most grades of papers produced in China means a greater need for BSKP reinforcement. BSKP is also used for reinforcement or to provide additional strength in other paper and board grades such as in tissue and bleached packaging grades.

For BHKP, a distinction is made between at least six different sub-grades: eucalyptus, birch, mixed northern, mixed southern, acacia and mixed tropical hardwood. Amongst the different types of BHKP available on world markets, eucalyptus is the dominant grade. BHKP is mainly used in production of printing and writing papers. Eucalypt BHKP from plantations is considered to be one of the best hardwood species for printing and writing grades. BHKP is also used in tissue grades and other bleached packaging grades.

5.2.2 Major Consuming Markets

BSKP

Japan, China and South Korea are the main buyers of market BSKP accounting for nearly three quarters, or 3 million tonnes, of the regional consumption in 2000. Taiwan and Indonesia were the next largest users.

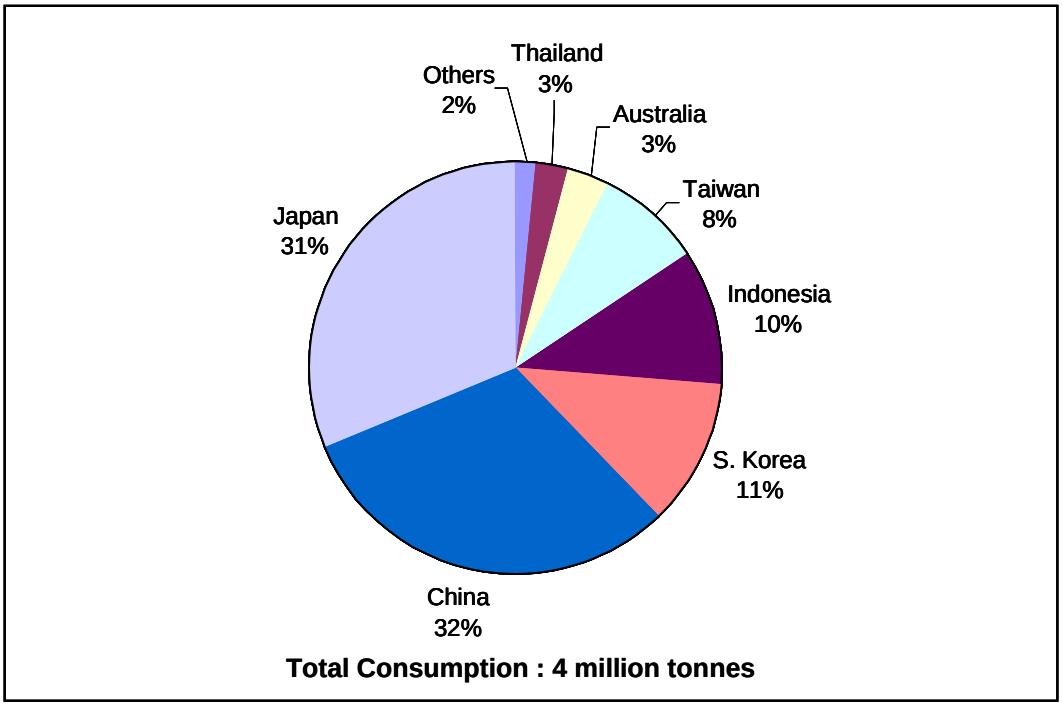
JAPAN
Japan imported 1.2 million tonnes of BSKP in 2000, supplementing the domestic market BSKP production of 40,000 tonnes. Total BSKP production in Japan was 1.3 million tonnes in 2000. Canada was the main source country for BSKP imported into Japan, supplying 61% of total imports. The USA was the second largest source, supplying 28% of total imports. In total, North America accounted for nearly 90% of Japan's imports.

CHINA
China produced 140,000 tonnes of market BSKP in 2000 and imported 1.1 million tonnes in the same year. Total BSKP production in China was 500,000 tonnes in 2000. Canada and Russia were the main source countries of BSKP for China each accounting for 37% and 31% of total imports respectively. North America and Chile were the other main sources.

AUSTRALIA
Australia imported 80,000 t of BSKP in 2000. New Zealand was the main source country accounting for nearly half of total imports with the rest coming from Canada and the USA. The pulp was used for tissue production and as reinforcing pulp across a range of paper grades.

There are currently no BSKP mills in Australia although there is one small, 90,000 t/a capacity, softwood magnesium sulphite mill, integrated with a tissue mill at Kimberly Clark's site at Mt Gambier, South Australia. This sulphite pulp is a less widely used type of chemical pulp than kraft pulp. However, it can be used to replace BSKP in some applications such as tissue manufacturing.

Figure 5-3:
Consumption of Market Bleached Softwood Kraft Pulp in Asia-Pacific 2000



BHKP

Japan, China and South Korea are the main buyers of market BHKP using 80% of the 5.9 million tonnes consumed in 2000.

JAPAN
Japanese domestic production of market BHKP was 350,000 tonnes in 2000 and the country imported 1.2 million tonnes. Total BHKP production in Japan was 6.5 million tonnes in 2000. Brazil and Canada are the main source countries for BHKP imports into Japan, supplying 65% of total imports. The USA and Indonesia are the other important source countries accounting for 34% of total imports. In total, Brazil, Canada, the USA and Indonesia accounted for nearly 99% of Japan's import.

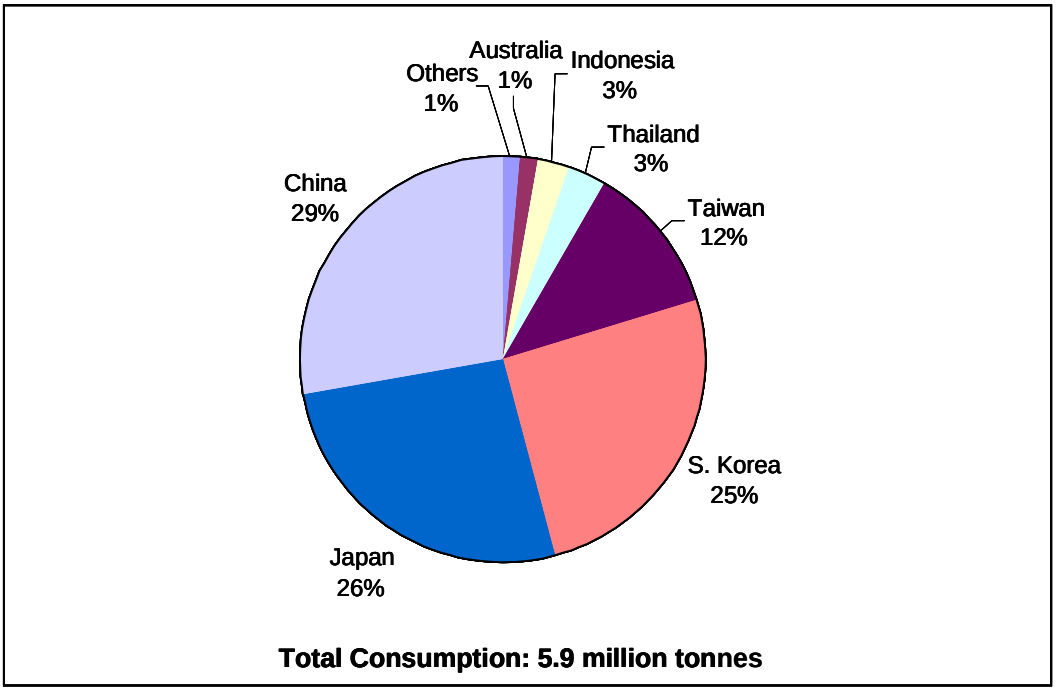
CHINA
Domestic production of market BHKP amounted to 220,000 tonnes and China imported 1.4 million tonnes in 2000. Total BHKP production in China was

810,000 tonnes in 2000. Indonesia and Brazil are the main source countries of BHKP for China together accounting for 75% of total imports.

SOUTH KOREA
Indonesia and North America are the main sources for Korea accounting for over 60% of the 1.1 million tonnes of BHKP imports, supplementing domestic production of 410,000 tonnes.

AUSTRALIA
Australia imported 159,000 t of BHKP in 2000 mainly from Indonesia (33%), New Zealand (18%) and Thailand (18%). Imports have jumped since the late 1990s when a new UWF paper machine started-up and an old BHKP mill closed down. The imports are used mainly for printing and writing grades and also for some tissue production.

Figure 5-4:
Consumption of Market Bleached Hardwood Kraft Pulp in Asia-Pacific 2000

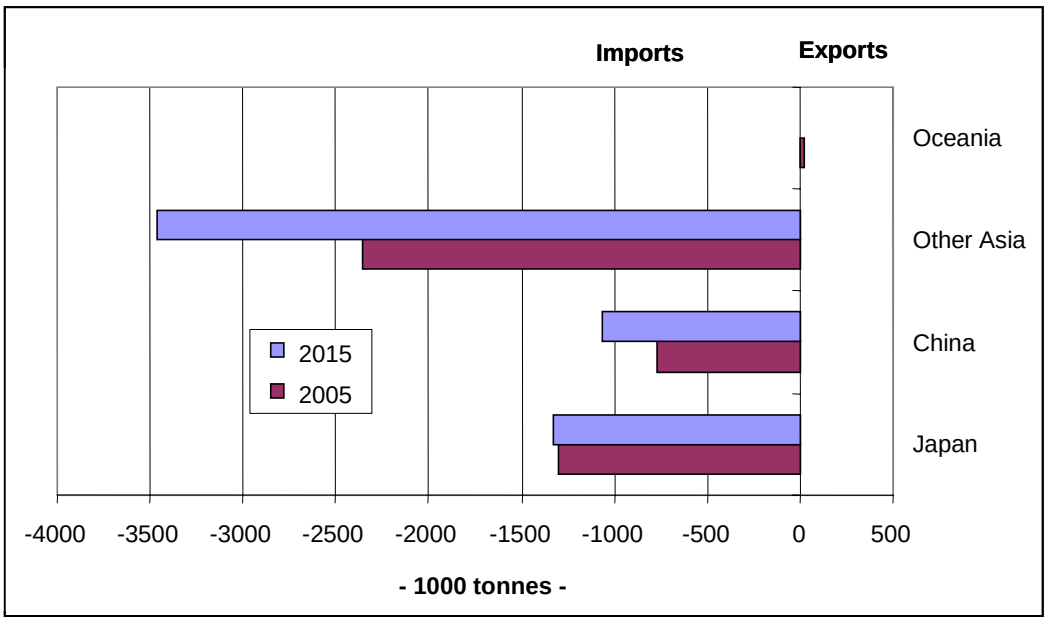


5.2.3 Opportunities for Australia

BSKP

Countries in the Asia-Pacific region will continue to rely on imports to fulfil demand for bleached softwood kraft pulp. Supplies of softwood resource are very limited in the region. There is almost no softwood available in south-east Asia and while there are significant volumes in Eastern Russia, these are largely inaccessible due to political and infrastructure problems.

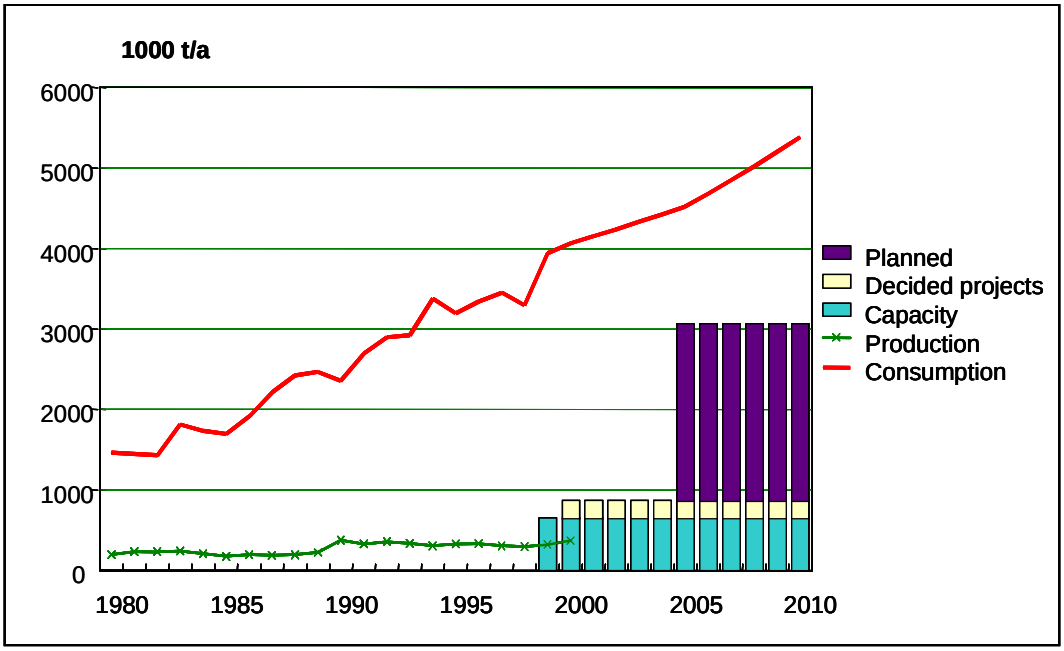
Figure 5-5:
Net Trade Balance of Bleached Softwood Kraft Pulp in Asia-Pacific 2005-2015



Note that the balanced trade position shown for Oceania in Figure 5-6 above is due to the fact that New Zealand has two mills producing and exporting market BSKP, while Australia imports all of its requirements. Australia has no BSKP mills. There is one small bleached magnefite softwood mill at Kimberly Clark's site at Tantanoola in South Australia. This is integrated with their tissue production.

In view of limited production and few capacity expansion projects, the region will continue to be a net importer of BSKP. Since 1999, there has been only three new BSKP projects undertaken, all of which are in China and added 280,000 t to Asia's capacity. There is one decided BSKP project, Rizhao Wood Pulp in Shandong, China with a capacity of 220,000 t/a starting in early 2002. Of the 2.2 million tonnes of BSKP projects announced to be in the planning stage, 2.1 millions tonnes are in China. However, most of the Chinese projects have problems with financing and it is believed only 1.4 millions tonnes or so will eventually proceed, and even these will move slowly. Note that the lower wage costs in China and other market conditions mean that smaller scale mills can be competitive in China.

Figure 5-6:
Demand and Supply of BSKP in Asia-Pacific 1980-2010



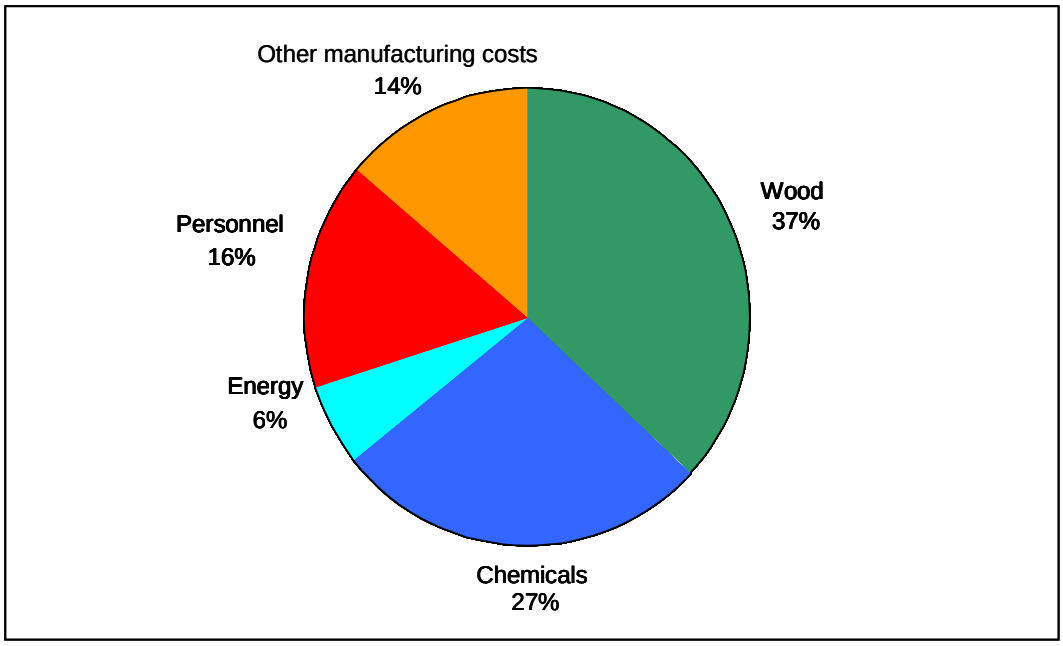
Australia's demand for market BSKP has been relatively constant for the past 20 years at 100-120,000 t per annum, which is about 20% of the capacity of a world scale mill. Canada, New Zealand and USA are the main source countries. In addition to the current level of imports required to produce the present paper and board grades, there are additional domestic markets, which could be available for a new BSKP mill. At present, there is minimal production of the paper and board grades that require large proportions of BSKP bonded into their furnish, mostly due to the lack of BSKP production in Australia. Grades using BSKP not produced in Australia and currently imported include coated mechanical printing and writing paper grades, (such as LWC) solid bleached board (for high quality cartons), milk carton board and liquid packaging grades. (PaperlinX's Wesley Vale mill now makes some coated printing and writing paper.)

Australia enjoys an advantage in landed wood costs, which accounts for nearly 40% of BSKP production cost. Also, Australia's personnel costs are lower than in North America, Europe and Japan, although higher than the rest of Asia (see Appendix 6 for personnel cost comparison). Australia is one of the more expensive countries in the region for chemical cost, however, a kraft pulp mill can minimise the impact of these costs by having on-site manufacture of bleaching chemicals.

The opportunity to establish a BSKP mill has been limited by the availability of sufficient resource in a particular area. A world scale mil of say 500,000 t/a BSKP requires 2.5 million t/a of wood. There is still no area in Australia with

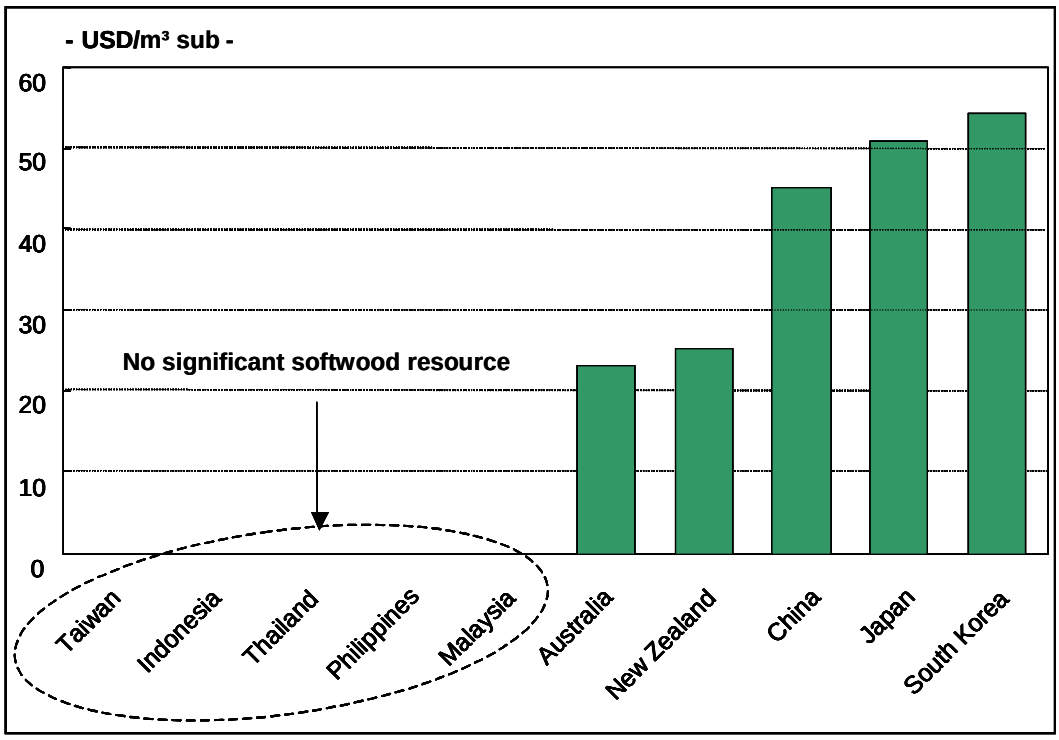
sufficient softwood resources alone to support a world scale BSKP mill of this size. However, increasing softwood and hardwood resource availability in the Green Triangle area means that in 5 to 10 years there would be sufficient resource for a combined BHKP/BSKP mill, or a smaller scale BSKP mill integrated with paper or board production.

Figure 5-7:
Typical Cost Structure of BSKP Production



Note: Based on New Zealand cost structure where wood cost is relatively cheap.

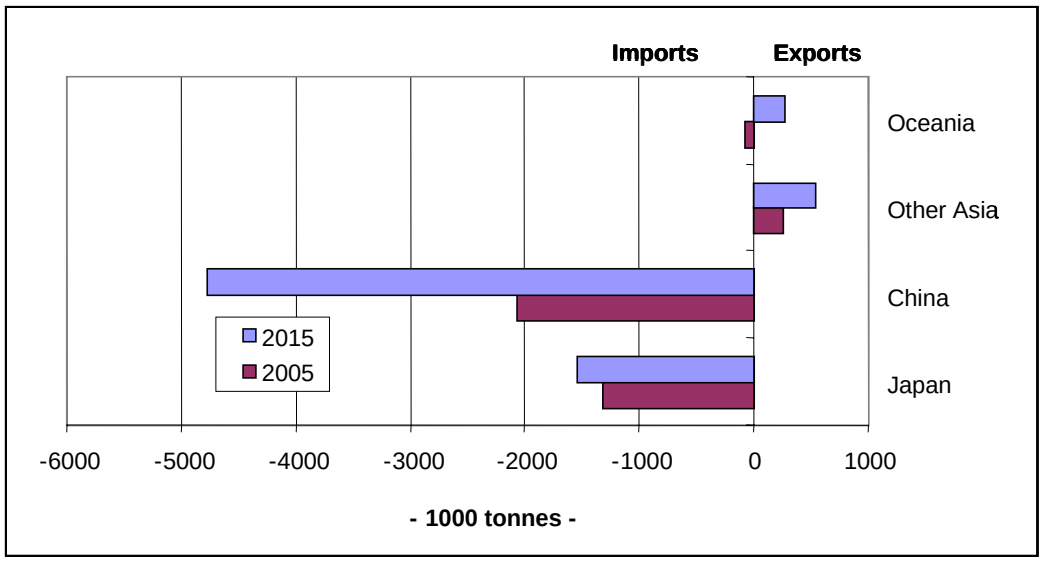
Figure 5-8:
Softwood Cost 2001



BHKP

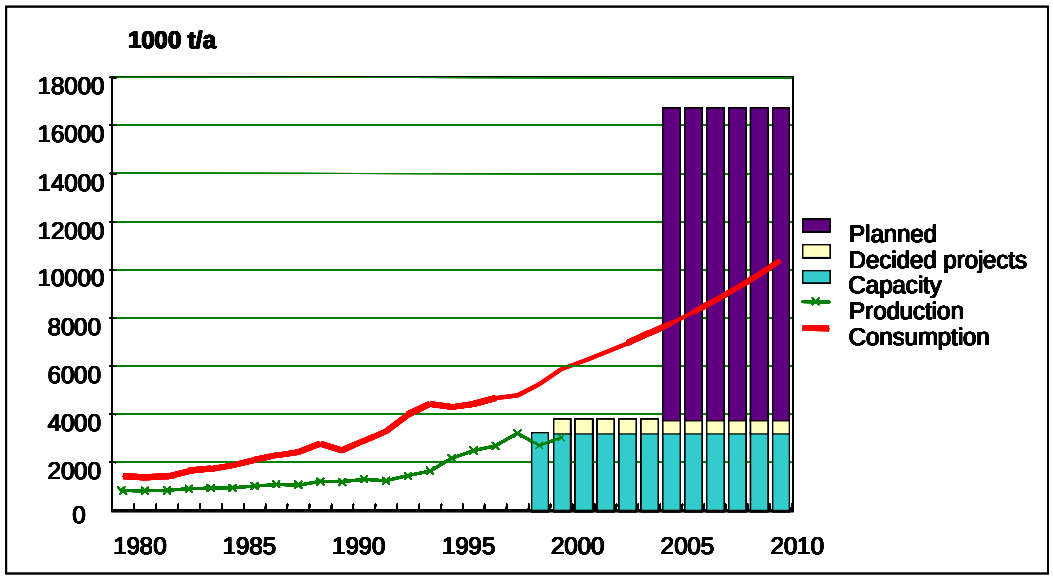
With the exception of China and Japan, who will continue to rely on imports to supplement their BHKP needs, the rest of Asia is more than self-sufficient. Japan is importing significant quantities of BHKP in addition to the large volume of woodchips it imports for domestic BHKP production. Australia also imports around 140,000 t/a of BHKP. Australia has a BHKP mill at Maryvale (PaperlinX), which is integrated with paper production. There is also a small bleached magnifite eucalypt pulp mill integrated with tissue production of Kimberly Clark's mill in South Australia.

Figure 5-9:
Net Trade Balance of Bleached Hardwood Kraft Pulp in Asia-Pacific 2005-2015



The regional market BHKP capacity stands currently at 3.2 million t/a with the latest addition of 450,000 t/a at Tanjung Enim Lestari in Southern Sumatra. There are numerous projects in planning stages across Asia, potentially adding another 11 million tonnes to the regional capacity. Importantly, most of these projects are unlikely to materialise due to shortage of finance and in some cases, shortage of resource. Some of the larger planned BHKP projects include Borneo Pulp and Paper Project in Sarawak, Malaysia and Advance Agro's pulp line expansion in Thailand.

Figure 5-10:
Demand and Supply of Market BHKP in Asia-Pacific 1980-2010



Wood is the biggest cost component in the manufacture of BHKP. From a pure cost perspective, Australia is in a competitive position (Figure 5-12). Asia is now home to several world scale BHKP mills and the Indonesian producers have become the biggest market BHKP producers in the region, but resource security and the cost of those resources is an issue even though these producers have the lowest costs in the region. New Zealand is also producing some BHKP at a low cost but has a limited hardwood resource.

With increasing wood costs in Indonesia as lower quality mixed tropical hardwood resources are exhausted and replaced by more expensive plantation wood or imported woodchips, there is potential for an Australian BHKP mill to be competitive. There are significant quantities of plantation eucalypt becoming available in a number of areas in Australia and there is now also a significant domestic market to supply. A BHKP mill could also be partly integrated with some paper production, which would help reduce the need to export into Asia.

Northern Tasmania is currently the only area in Australia that could support a new large BHKP mill, even then some native forest wood would be required in the initial years. However, within 10 years Western Australia and the Green Triangle area would also have sufficient resources for a world-scale mill with the Green Triangle operational prior to that time by using softwood resources.

If Australia doesn't use the resources domestically, there remain substantial opportunities for Australia to export eucalyptus logs/woodchips to pulp mills in Japan, Indonesia and China, and to some extent, Korea and Taiwan.

Figure 5-11:
Typical Cost Structure of BHKP Production

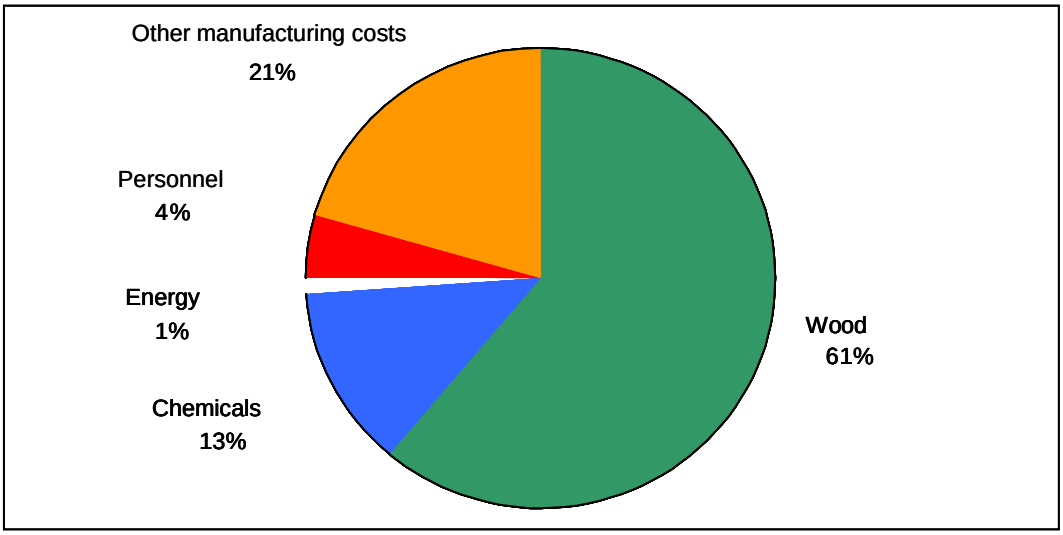
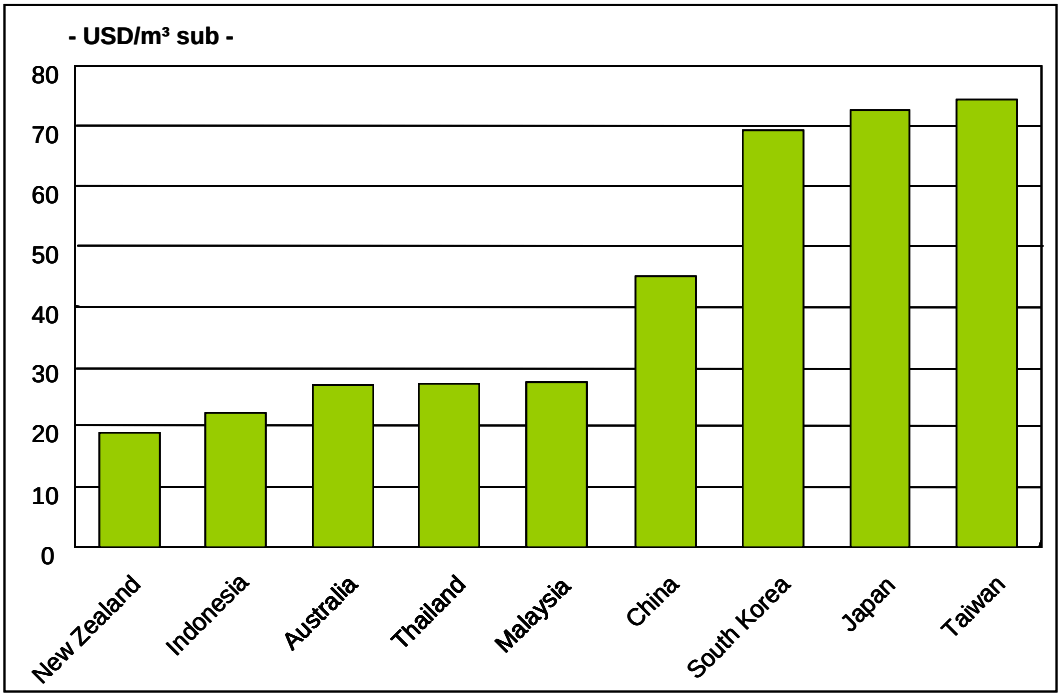


Figure 5-12:
Hardwood Pulpwood Cost at Pulp Mill Gate 2001



5.3 Mechanical Pulp

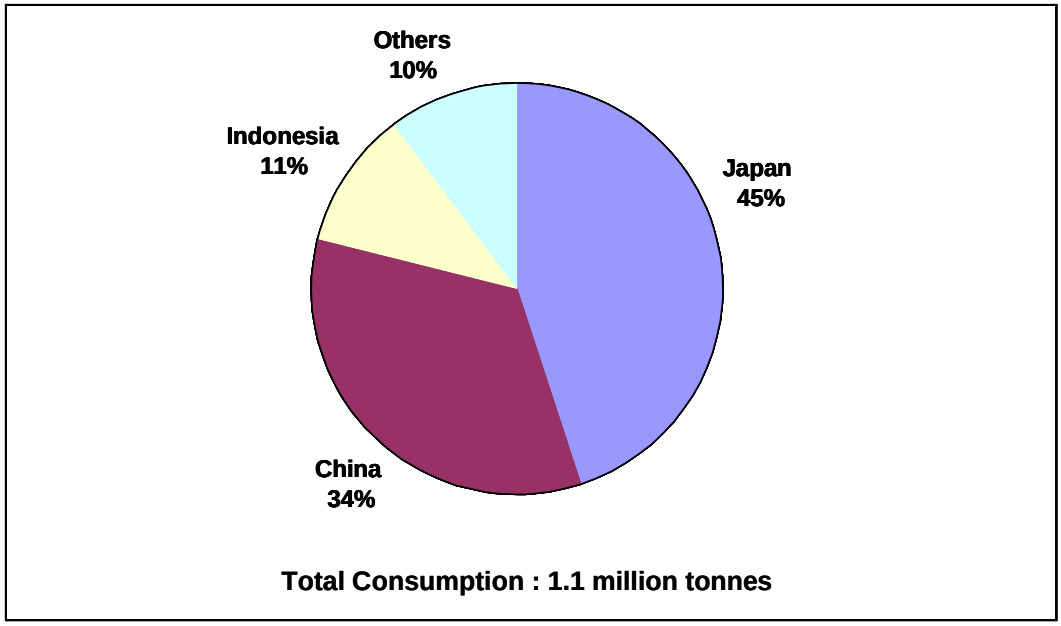
5.3.1 Development and Outlook

In 2000, the production of market mechanical pulp in the Asia-Pacific region amounted to 380,000 t with consumption of 1.1 million tonnes. Local production is limited by the availability of softwood resources in the region. Demand for mechanical pulp is expected to grow by 2.3% per annum in the period 2000-2010.

Compared to total production in those countries, Japan, China and Indonesia are the main markets for mechanical pulp accounting for 90% of total consumption. There is no market mechanical pulp production in all three countries. New Zealand and Canada are the main suppliers to the region.

Currently, 75% of mechanical pulp is used in the production of newsprint and other publication papers – this is expected to remain unchanged. The increasing trend of using recycled content in newsprint will be compensated for by an increasing volume of mechanical wood pulp being used in wood-containing printing and writing grades. Smaller quantities of mechanical pulp are used in tissue and cartonboard manufacture.

Figure 5-13:
Demand for Mechanical Pulp in Asia-Pacific 2000



5.3.2 Major Consuming Markets

INDONESIA
In 2000, Indonesia imported all its mechanical pulp needs (114,000 tonnes) from New Zealand, mainly from Winstone Pulp due to an ownership linkage.

JAPAN
With no domestic market mechanical pulp production, Japan relies on imports for their market mechanical pulp needs. In 2000, the country imported 475,000 tonnes, of which 65% came from New Zealand and 35% from Canada.

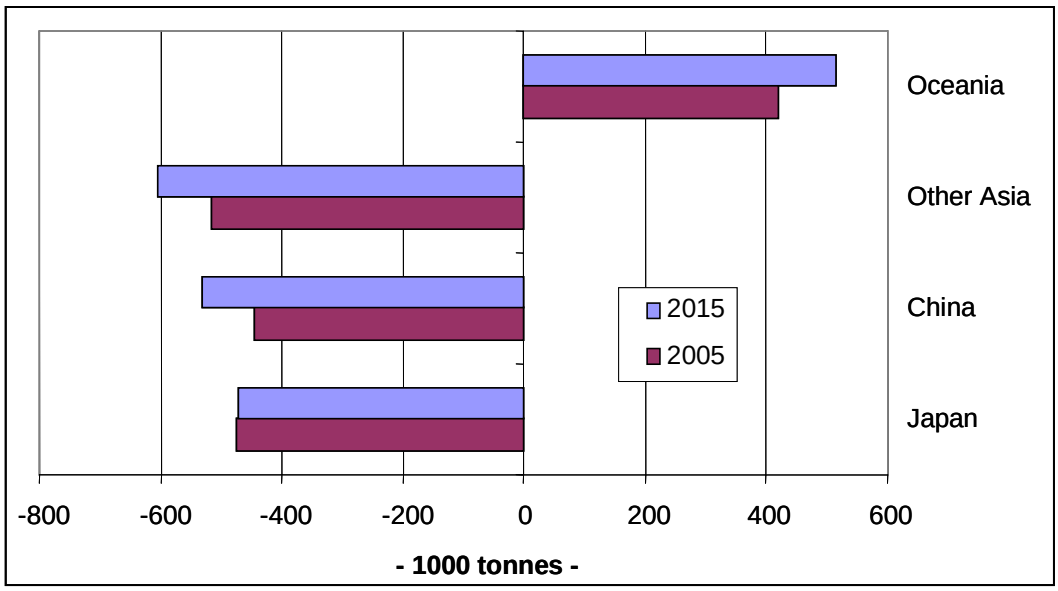
CHINA
China has no domestic market mechanical pulp production and the country imported 360,000 tonnes in 2000. Canada is the major supplier to China accounting for 75% of total mechanical pulp imports with New Zealand accounting for nearly 20%.

AUSTRALIA
Australia imported 8,000 t of mechanical pulp from New Zealand in 2000 to supplement its own production. However, most Australian paper mills that use mechanical pulp are integrated with mechanical pulp mills. This includes Norske Skog's Albury and Boyer mills, Kimberly Clark's Millicent mill and PaperlinX's Wesley Vale mill. Total production is around 500,000 t/a.

5.3.3 Opportunities for Australia

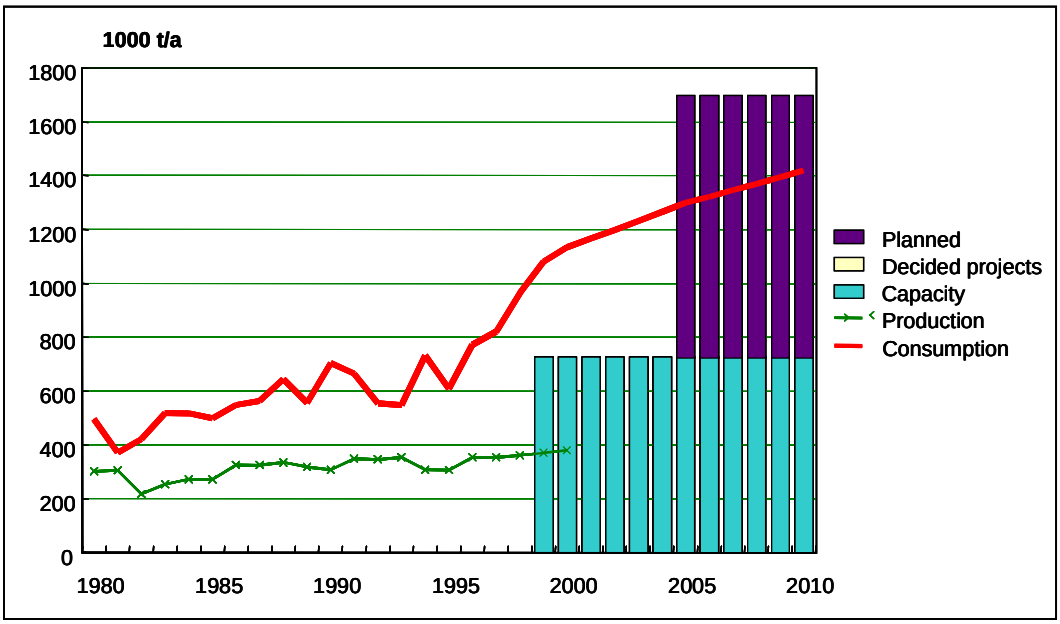
New Zealand is the biggest regional producer and exporter of market mechanical pulp to Asia. Pan Pacific Forest Industries, owned by Oji Paper and Nippon, is a key supplier of mechanical market pulp to Japan with market pulp capacity of 240,000 t at its Napier mill. Winstone Pulp is the main producer of chemi-mechanical pulp in the region, with an ownership linkage to Indonesia.

Figure 5-14:
Net Trade Balance of Mechanical Pulp in Asia-Pacific 2005-2015



The regional market mechanical pulp capacity stands currently at 730,000 t/a with New Zealand accounting for 53% of total capacity. Some of the capacity in China is not fully utilised due to shortage of wood or other reasons. There are plans for additional capacity increment in the region, amounting to one million tonnes, of which 900,000 t are in China. None of the Chinese projects have yet been publicly confirmed.

Figure 5-15:
Demand and Supply of Mechanical Pulp in Asia-Pacific 1980-2010



Australia enjoys a competitive position in softwood fibre cost, which accounts for 25% of the total mechanical pulp production cost (Figure 5-16). Energy is the next biggest cost component accounting for 29% of total production cost. Purchased power is a key component of energy cost and Australia has the lowest purchased power cost in the region (see Appendix 6 for energy cost comparison by countries).

A mechanical pulp mill requires much less fibre[2] than a kraft pulp mill, and there are a number of locations in Australia that could support a large softwood mechanical pulp mill or a large hardwood mechanical pulp mill. However, the size of world scale mills has been increasing, particularly in Canada, and there are now some large mills supplying mechanical pulp into the Asian market.

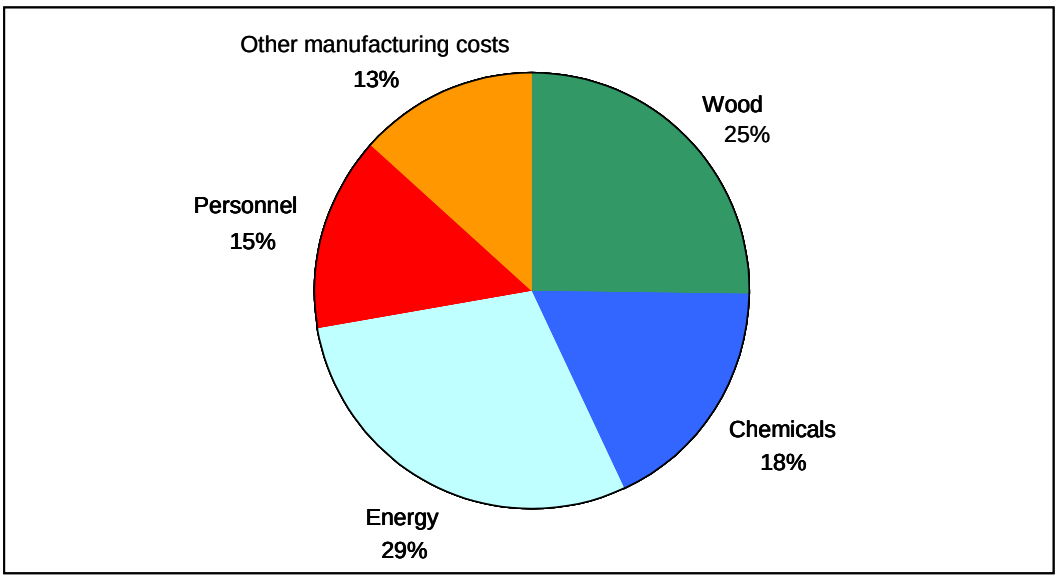
An Australian mill supplying market pulp to Asian mills is an investment opportunity, particularly for softwood. Eucalypt BCMP is one opportunity, although BCMP made from eucalypt is not yet an established product on world markets.

There is currently very little demand for market mechanical pulps in Australia, because most mechanical pulp mills in Australia are integrated with paper production. However, a new mechanical pulp mill integrated, or closely linked with new production capacity for newsprint, folding boxboard or uncoated mechanical printing and writing paper grades may also represent an opportunity.

[2] Typically mechanical pulp requires approximately 2.5 to 3.5 m^3 of green wood/ADt of pulp, whereas kraft pulp requires 4 to 5 m^3/ADt.

There is also the possibility for Australia to continue to be a softwood log and woodchip exporter to softwood pulp mills in the region.

Figure 5-16:
Typical Cost Structure of Mechanical Pulp Production



5.4 Recycled Fibre

5.4.1 Development And Outlook

In 2000, the collection of recovered paper in the Asia-Pacific region amounted to 42 million tonnes with consumption of 48 million tonnes. Demand for recovered paper is expected to grow by 4% per annum in the period 2000-2010. There are recycled fibre plants at all Amcor and Visy mills in Australia as well as at PaperlinX's Maryvale and Shoalhaven mills.

Recycled fibre is commonly used in the production of newsprint, tissue, containerboard and cartonboard. There are a number of different grades of recycled fibre made from different types of recovered paper:

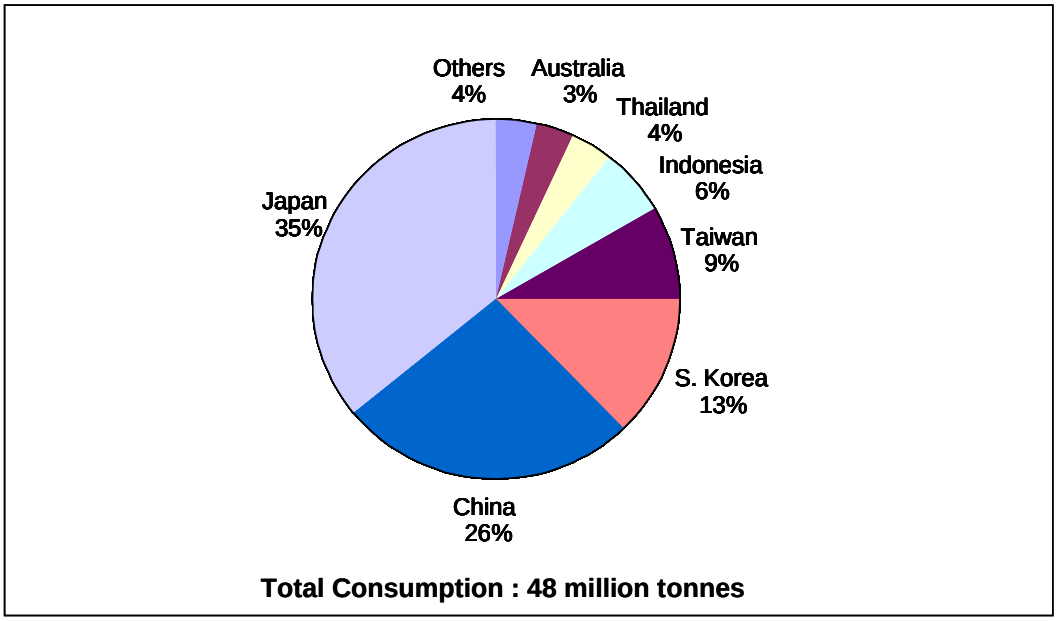
- old newsprint (ONP)/magazines is typically deinked and used to produce newsprint and tissue or used in the liner plies of some packaging grades;
- recovered printing and writing paper is deinked and used to produce printing and writing paper; and
- old container cuttings (OCC) and mixed waste are generally used for packaging grades.

Higher utilisation of recycled fibre in the production of paper and paperboard is expected in the future, driven mainly from a cost perspective, as recycled fibre is an inexpensive raw material. Also, both consumers and government bodies are increasingly in favour of expanding the use of recycled fibre as raw material.

5.4.2 Major Consuming Markets

Japan, China and Korea are the main markets for recycled fibre accounting for over 70% of the total 48 million tonnes consumed.

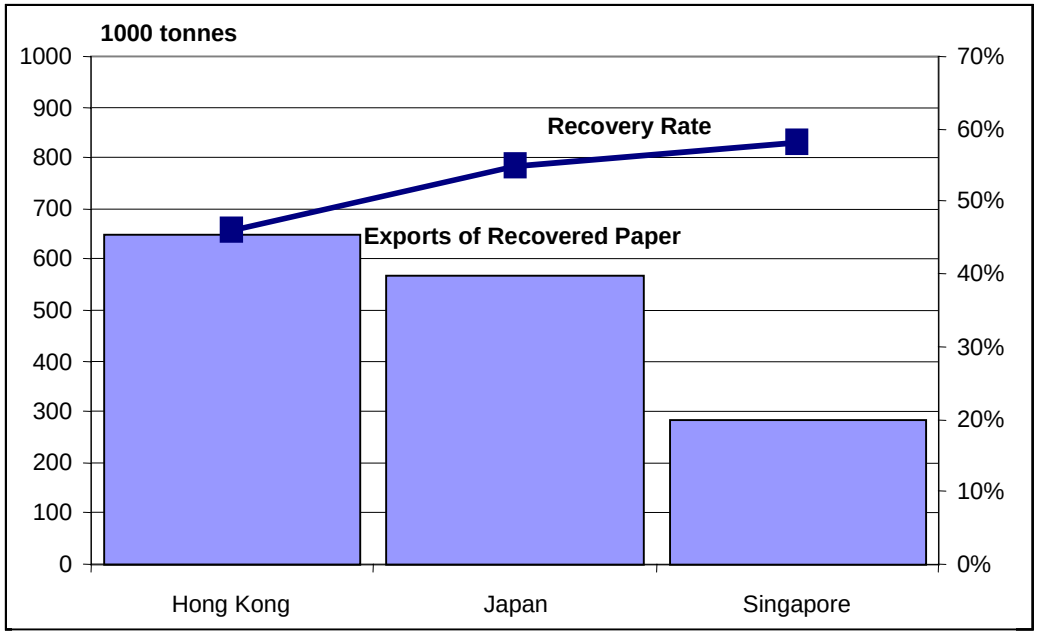
Figure 5-17:
Demand for Recovered Paper in Asia-Pacific 2000



Korea, Taiwan, Singapore and Japan have the most efficient recovery system in the region and achieved the highest waste paper recovery rate (above 45%) compared with the other Asian neighbours.

Singapore, Japan and Hong Kong are the major exporters of recovered paper in the region with total volume amounting to 1.5 million tonnes, or 3% of regional consumption, in 2000.

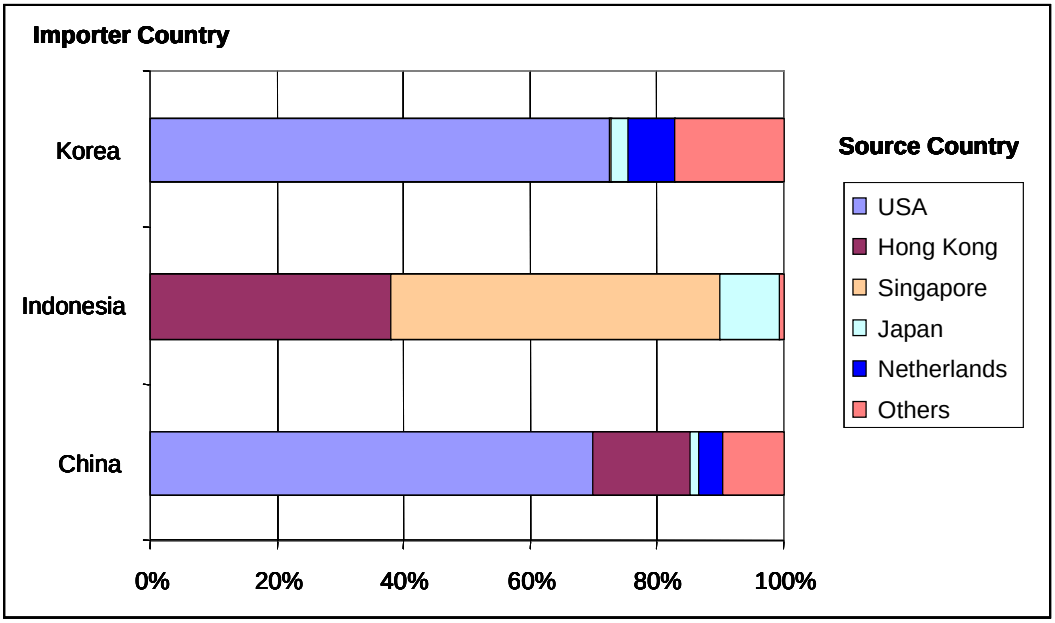
Figure 5-18:
Exporters of Recovered Paper and Recovery Rate 2000



China, Korea and Indonesia are the biggest importers of recovered paper in the region, with total volume amounting to 8 million tonnes in 2000. The USA is the main source country for both Korea and China while Hong Kong and Singapore are the main sources for Indonesia. China imports more expensive recovered paper, which increases the average price of recycled fibre.

Australia imported 44,000 t of recovered paper mainly from the USA and New Zealand in 2000. This was mostly old newsprint/magazines imported from New Zealand, or kraft container clippings imported from the USA. A weak Australian dollar in the past year helped to boost Australia's recovered paper exports to Asia, reaching a new record of 300,000 t last year.

Figure 5-19:
Recovered Paper Sources for Major Importers 2000



5.4.3 Opportunities for Australia

The recovery rate in Australia is currently at 48%, still somewhat below other Asian recycled fibre exporting nations such as Singapore (58%) and Japan (55%). Australian recycled fibre cost is lower than in other Asian countries due to its efficient collection system and less dependence on expensive imported recovered fibre. There is opportunity for Australia to increase its waste paper recovery to provide for both export markets and increased domestic production. Recycled paper export has been a growing business for Australia, with its main market being Indonesia.

Figure 5-20:
Recovered Paper (OCC) Cost 2001

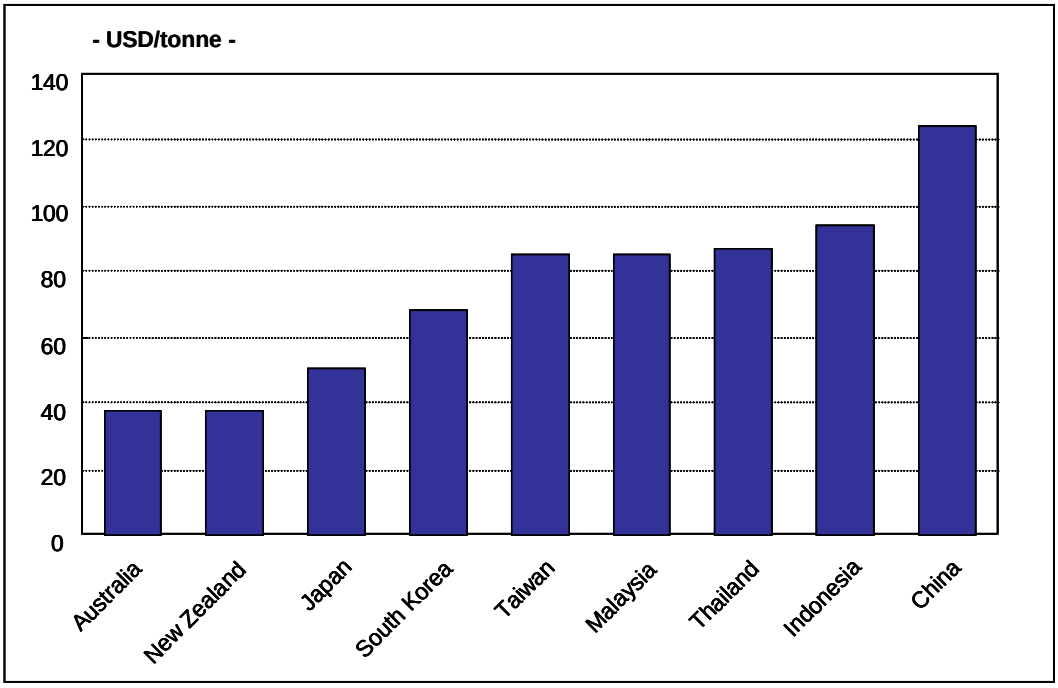
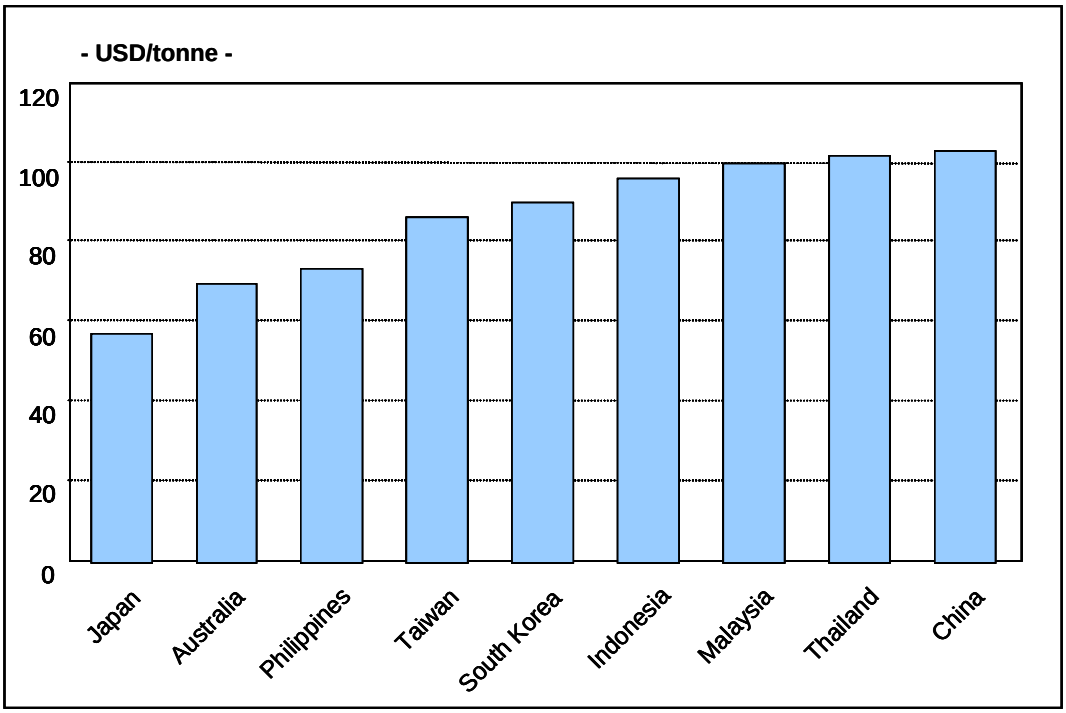


Figure 5-21:
Recovered Paper (ONP) Cost 2001

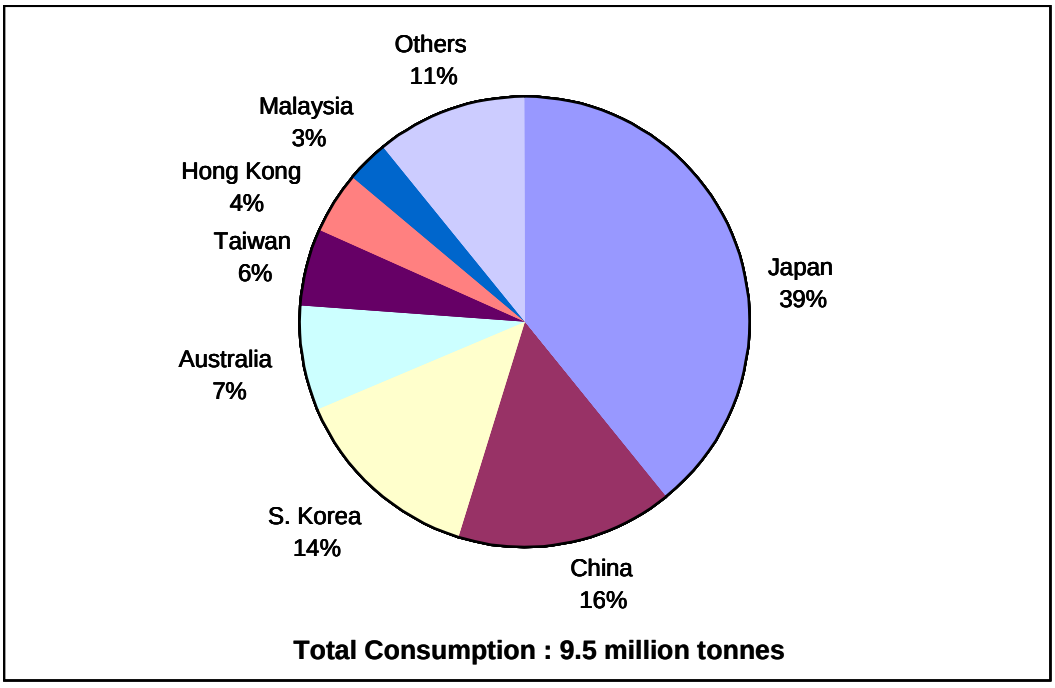


5.5 Newsprint

5.5.1 Development and Outlook

Newsprint is normally made from mechanical pulp or recycled fibre. In 2000, newsprint consumption in the Asia-Pacific region totalled 9.5 million tonnes, of which Japan, China and South Korea were the main consumers. Newsprint demand is expected to grow to 12.4 million tonnes by 2010, with an average growth rate of 2.7% per annum. The fastest growth is forecast for China, Indonesia and Thailand, with slower growth in Australia and Japan. Growth in the mature markets of Japan and Australia is lower than average for the region at 1.5-2%.

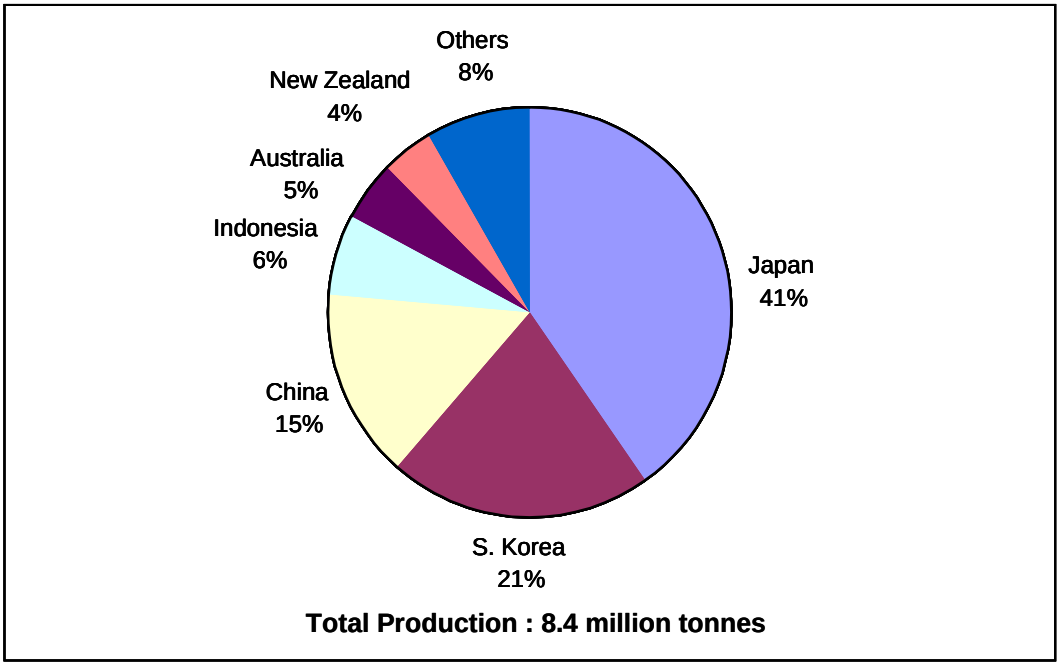
Figure 5-22:
Demand for Newsprint in Asia-Pacific 2000



Newsprint production in Asia-Pacific amounted to 8.4 million tonnes in 2000. Japan, South Korea and China are the main newsprint producers, accounting for 76% of the total production.

Among the top newsprint producers in Asia-Pacific, Japanese mills have the largest capacity. Nippon Unipac in Japan is the biggest producer with a capacity of 1.8 million t/a, followed by Oji in Japan (1.2 million t/a), Pan Asia Paper (headquartered in Singapore with its main mills in South Korea) (1 million t/a), and then Daio in Japan (810,000 t/a).

Figure 5-23:
Supply of Newsprint in Asia-Pacific 2000



Overall Demand Growth

Figure 5-24:
Consumption of Newsprint in 2010

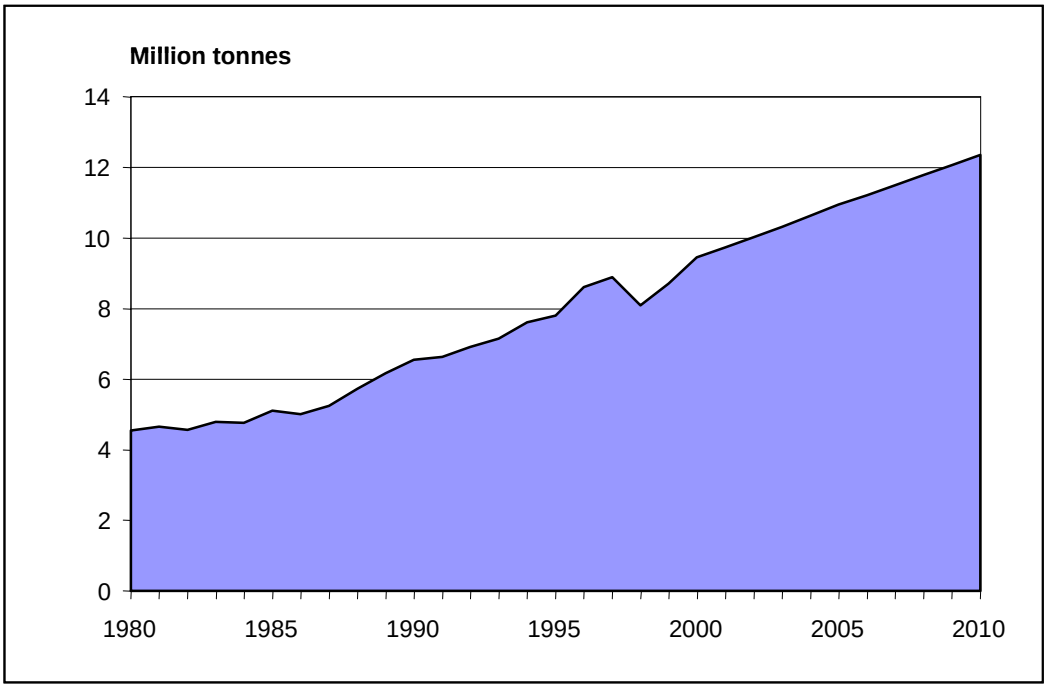
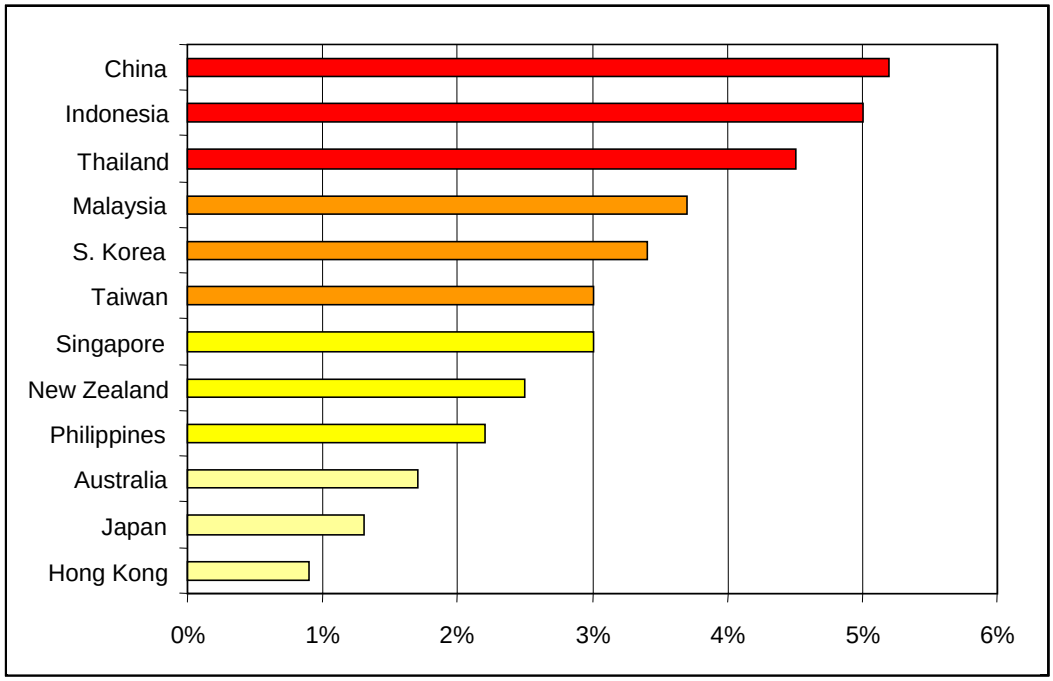


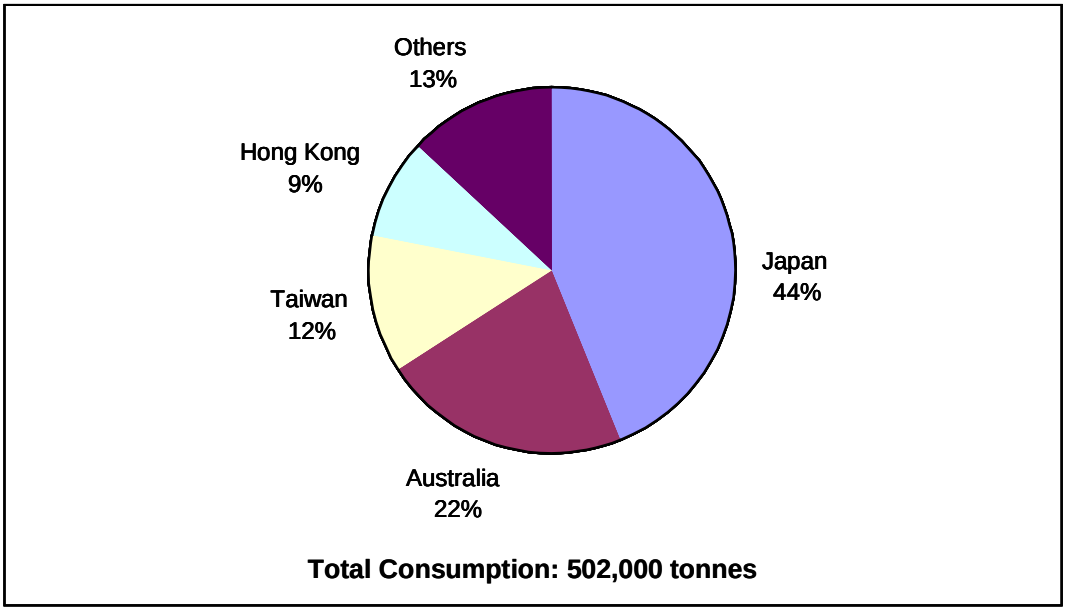
Figure 5-25:
Consumption Growth by Countries 2000-2010 (% growth/a)



Improved Newsprint

Improved newsprint is used for better quality newspapers and inserts. It is typically made using higher brightness mechanical pulps and recycled fibre and is often made on older newsprint machines. Out of the 9.5 million tonnes of the total newsprint consumption in Asia-Pacific, the consumption of improved newsprint in 2000 amounted to 502,000 t. The main improved newsprint markets are Japan, Australia, Taiwan and Hong Kong. Japan is the biggest market in the Asia-Pacific region, accounting for about half of the total consumption.

Figure 5-26:
Demand for Improved Newsprint in Asia-Pacific 2000



Improved newsprint production in the Asia-Pacific totalled 332,000 t in 2000. Production is limited to Norske Skog mills in Australia and New Zealand, Oji Paper in Japan and PT Aspex in Indonesia.

Norske Skog's Boyer mill is the major producer of improved newsprint in Oceania with the Tasman mill (Kawerau) also producing smaller quantities. Oji Paper is producing the grade only on a request basis for long-term customers, while half of PT Aspex's production is consumed domestically, and the other half is exported to Hong Kong and Taiwan.

The total improved newsprint imports to the region amounted to 190,000 t in 2000, mainly supplied by European mills such as UPM-Kymmene, Norske Skog and StoraEnso.

AUSTRALIA
Australia consumed 110,000 t of improved newsprint in 2000, of which 80% was supplied by Norske Skog's Boyer and Tasman mills. The rest of the market was supplied by Finland and North America (mainly Norske Skog Canada). The Australian market has been growing strongly in recent years.

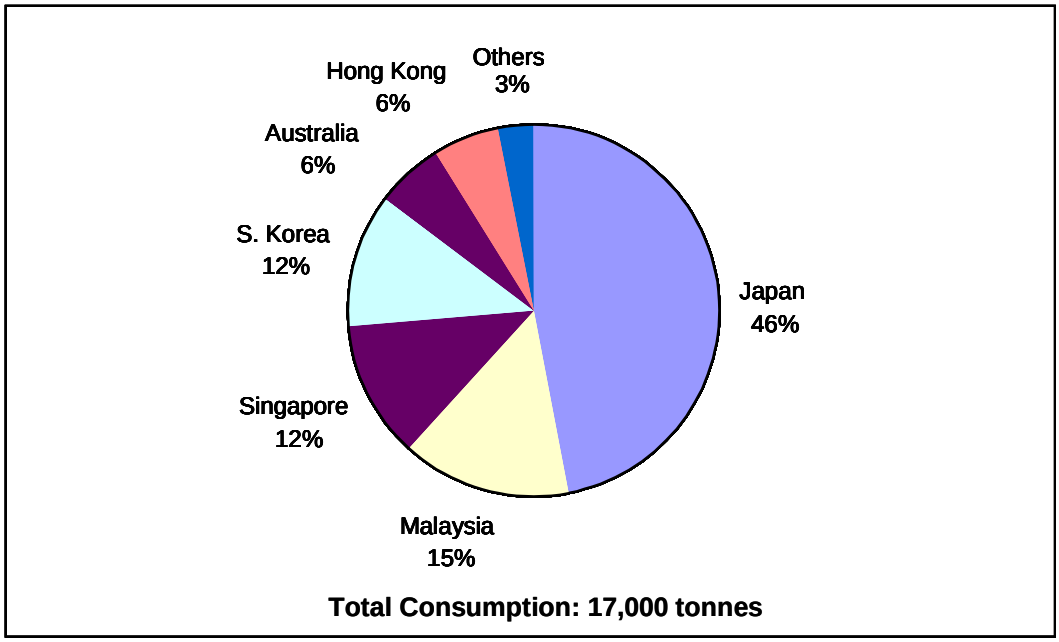
Coloured Newsprint

Out of the 9.5 million tonnes of the total newsprint consumption in Asia-Pacific, the consumption of coloured newsprint only amounted to 17,000 t in 2000, with

7,000 t produced by Japan. Fifty-eight percent of coloured newsprint (10,000 t) was imported from Europe.

The main coloured newsprint markets are Japan, Malaysia, Singapore and South Korea. The main coloured newsprint suppliers are UPM-Kymmene and StoraEnso.

Figure 5-27:
Demand for Coloured Newsprint in Asia-Pacific 2000



AUSTRALIA
Australia consumed 1,000 t of coloured newsprint in 2000, most of which is used by one newspaper that publishes a weekly TV guide in green coloured newsprint. Some Australian regional country newspapers use coloured newsprint but the volume is negligible as only odd pages are printed using that material.

The main coloured newsprint supplier is Norske Skog's Tasman mill in New Zealand.

5.5.2 Major Importing Markets

Japan, Taiwan, Hong Kong, Australia and China are the major newsprint importers. South Korea, Indonesia, Japan and New Zealand are the major newsprint exporters.

1.1 million tonnes of newsprint was imported to Asia-Pacific in 2000, of which 40% was from North America.

JAPAN

Japan imported 613,000 t of newsprint in 2000, of which 52% was from the USA and 39% from Canada, supplementing domestic production of 3.2 million tonnes. The imports mainly came from Japanese owned mills in North America. However, Japan also exported 140,000 t to other countries.

TAIWAN

Taiwan had 421,000 t of newsprint imports in 2000, of which 21% of the imports were from Indonesia, 19% from Canada, 15% from Norway and 12% from Sweden. Taiwan Chung Hsing Paper is the sole producer of newsprint with production amounting to 103,000 t in 2000.

HONG KONG

Hong Kong had 394,000 t of newsprint imports in 2000, of which 36% were from Canada, 20% from Indonesia and 17% from South Korea. There is no domestic production of newsprint in Hong Kong.

AUSTRALIA

Australia had 292,000 t of newsprint imports in 2000, of which 55% of the imports were from New Zealand, 21% from South Korea and 12% from Indonesia. The imports from New Zealand are from a mill owned by Norske Skog, which owns the two newsprint mills in Australia.

CHINA

China imported 210,000 t of newsprint in 2000 to supplement domestic production of 1.2 million tonnes. The biggest source was Russia (32%), followed by Japan (28%) and the Philippines (11%).

Figure 5-28:
Major Newsprint Importers in Asia-Pacific 2000

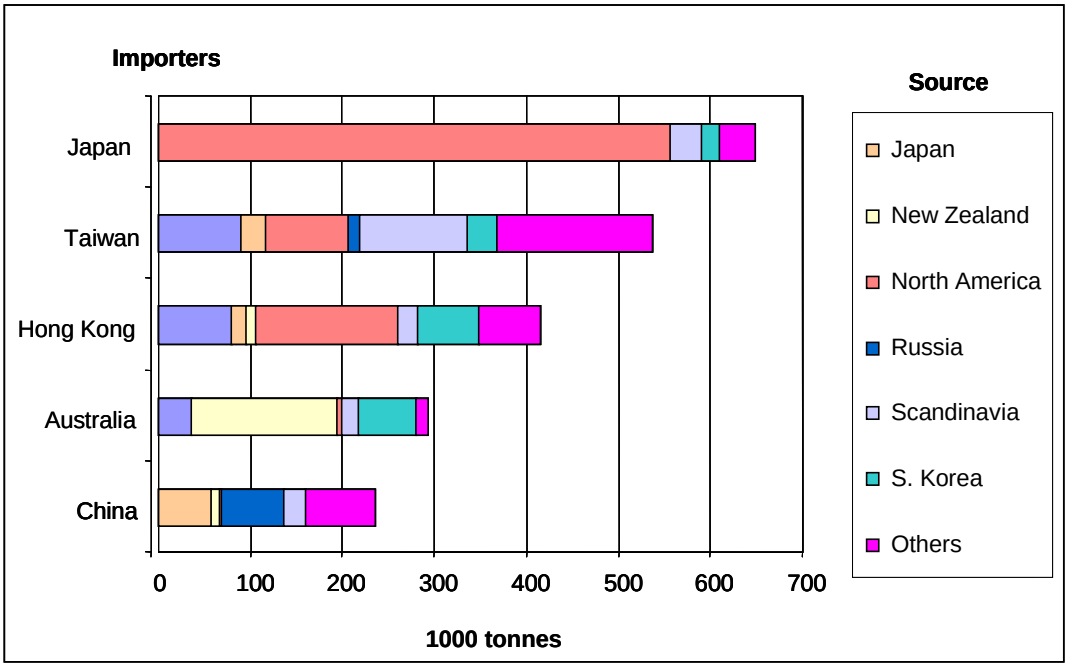
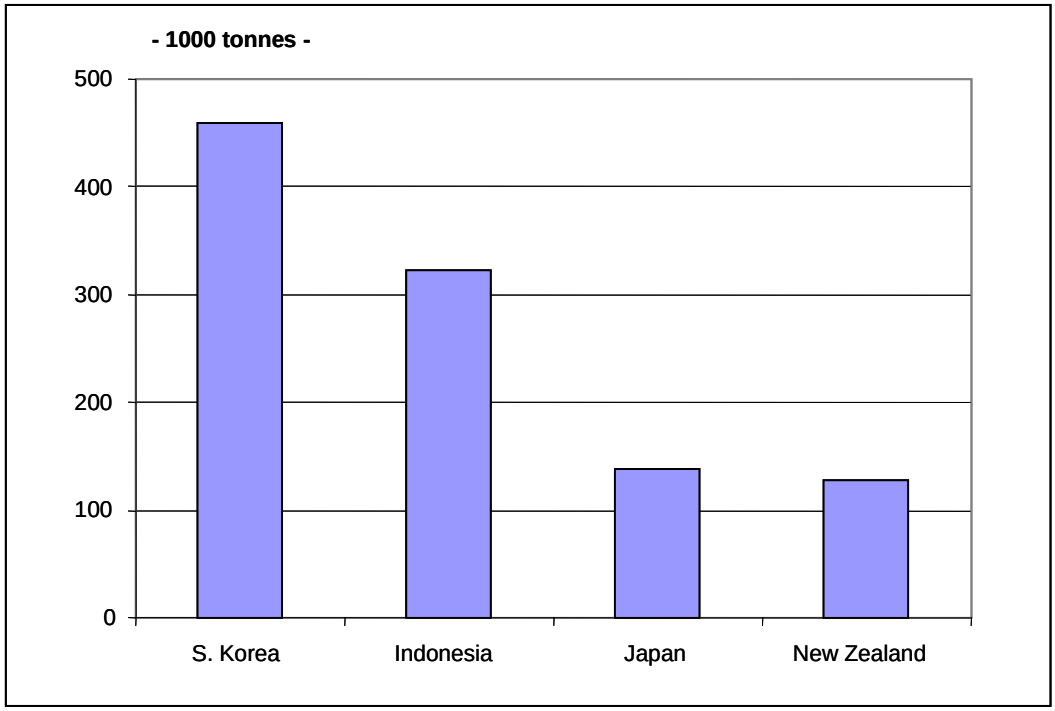


Figure 5-29:
Major Newsprint Exporters in Asia-Pacific 2000

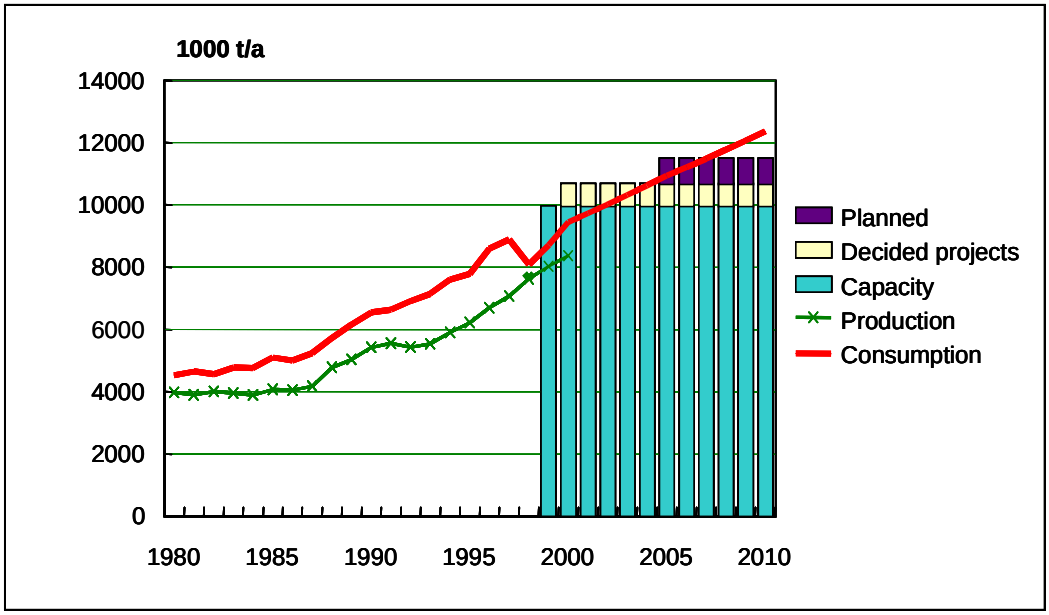


5.5.3 Opportunities for Australia

The gap between newsprint demand and supply in Asia-Pacific is slowly decreasing. The majority of the decided projects will be carried out in China, including capacity expansion of 200,000 t for Shixian, 180,000 t for Jiangxi, 170,000 t for Qiqihar and 150,000 t for Shandong Huatai.

There are several planned capacity expansion projects in China too – these include Zhaoxiang's 200,000 t, PanAsia Potential's 180,000 t, and Yalujiang's 130,000 t.

Figure 5-30:
Demand/Supply Balance of Newsprint in Asia-Pacific 1980-2010



With a newsprint consumption of 675,000 t in 2000, Australia produced 385,000 t and imported 292,000 t (43%) mainly from New Zealand, South Korea and Indonesia. The exports were 2,000 t only.

Australia has two newsprint mills, Boyer (capacity of 270,000 t, partly used for improved newsprint) and Albury (capacity of 220,000 t). These mills, along with the Kawerau newsprint mill in New Zealand, have recently been acquired by Norske Skog, the world's second largest producer of newsprint with a capacity of 5.1 million tonnes. Overall, Norske Skog supplies over 80% of the Australian newsprint market.

Details of all Australian pulp and paper companies and their Australian mills are summarised in Appendix 7.

The demand/supply balance of standard newsprint in Australia indicates that there is the potential to add another newsprint machine at one of the mills to replace imports. However, with excise-free trade permitted between Australia and New Zealand and the dominant position of Norske Skog in Australia and New Zealand, it could be difficult for another company to penetrate the market.

IMPROVED NEWSPRINT
Australia is one of the main improved newsprint markets in Asia-Pacific and consumption has been growing rapidly in recent years. However, as with the newsprint, the dominant position of Norske Skog makes it difficult for another company to enter the market.

COLOURED NEWSPRINT

The coloured newsprint market in Australia is very small and is totally supplied by Norske Skog. It is possible that the Asia-Pacific coloured newsprint market could be a niche market to be developed, although the total volume is small.

Australia has a solid cost position in the production of newsprint made from de-inked pulp (DIP) due to lower old newspaper pulp (ONP) (Figure 5-32) and purchased power costs, compared to other countries in the region. Low power costs, together with low softwood costs also give Australia an advantage in producing newsprint from virgin fibre.

Figure 5-31:
Typical Cost Structure of Newsprint (DIP) Production

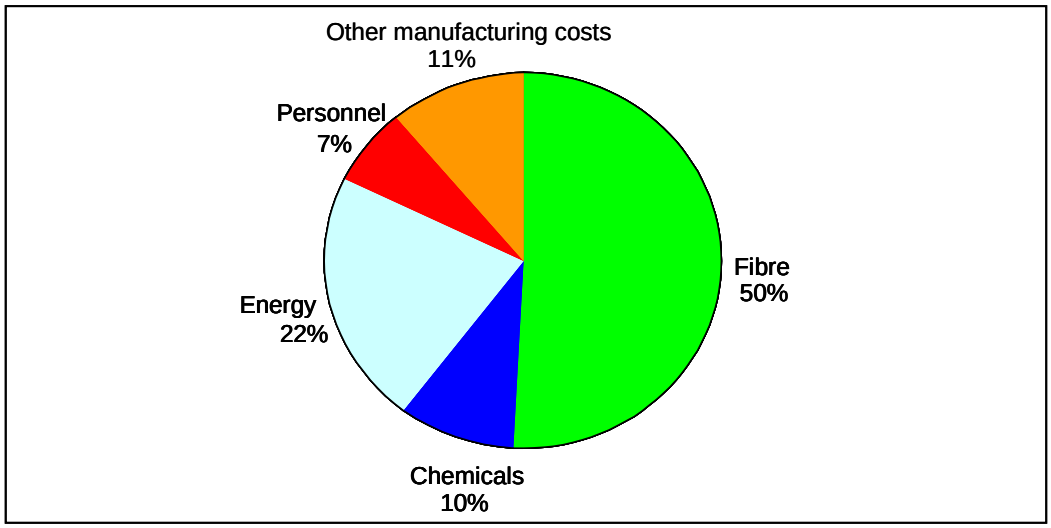
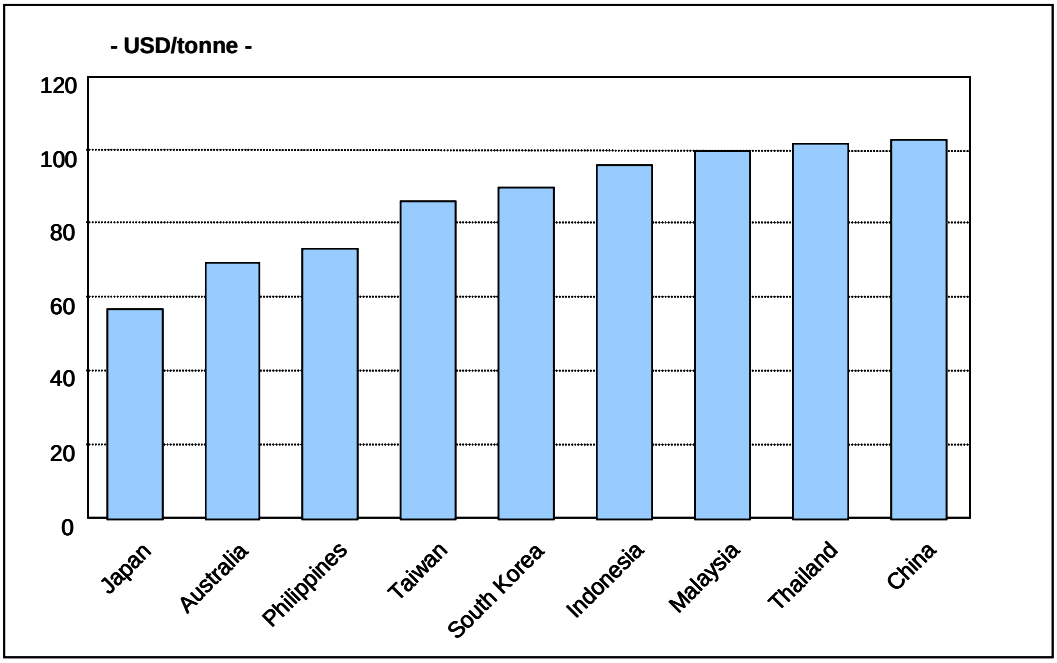


Figure 5-32:
Recovered Paper (ONP) Cost 2001



5.6 Printing and Writing Paper

5.6.1 Development and Outlook

Printing and writing papers are typically split into four sub-groups:

- Uncoated woodfree – grades made from predominantly BHKP such as photocopy paper.
- Coated woodfree – as above but coated. Used in high quality magazines and advertising material or good quality glossy books.
- Uncoated mechanical – made from predominantly mechanical pulp, typically higher quality newsprint grades, or newsprint inserts.
- Coated mechanicals – as above but coated, e.g. LWC. Used for magazine papers and advertising brochures

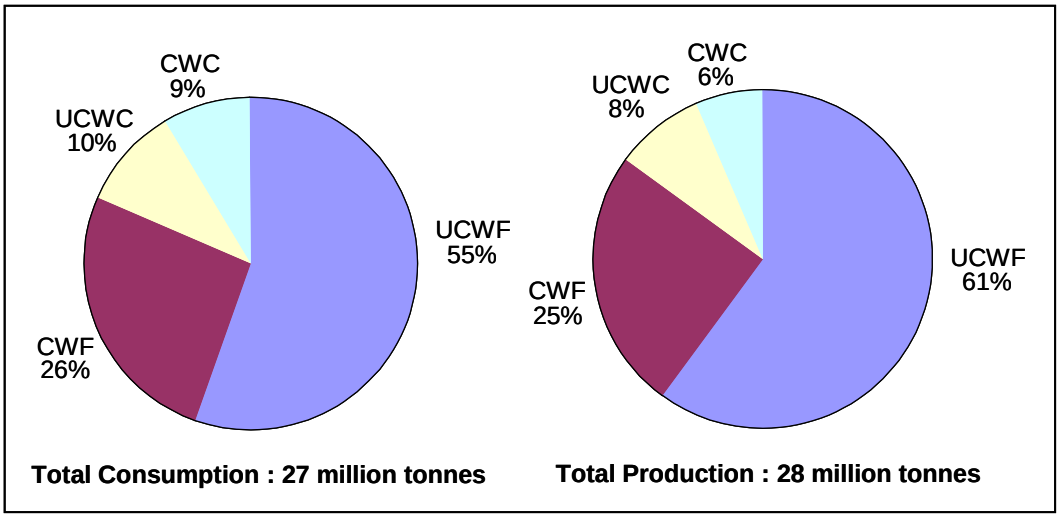
PaperlinX is the major producer of these grades in Australia/New Zealand. This company has recently been formed as a result of splitting off the printing and writing paper division of Amcor. PaperlinX makes uncoated woodfree grades at its Maryvale mill, Burnie in Tasmania and Shoalhaven, NSW. It also makes coated and mechanical grades at Wesley Vale.

Norske Skog also makes uncoated mechanical grades at its Boyer mill in Tasmania.

The consumption of printing and writing paper in the Asia-Pacific region amounted to 27 million tonnes in 2000. Woodfree grades form the bulk of total printing and writing paper consumption accounting for over 80% of that total with wood-containing grades sharing the balance.

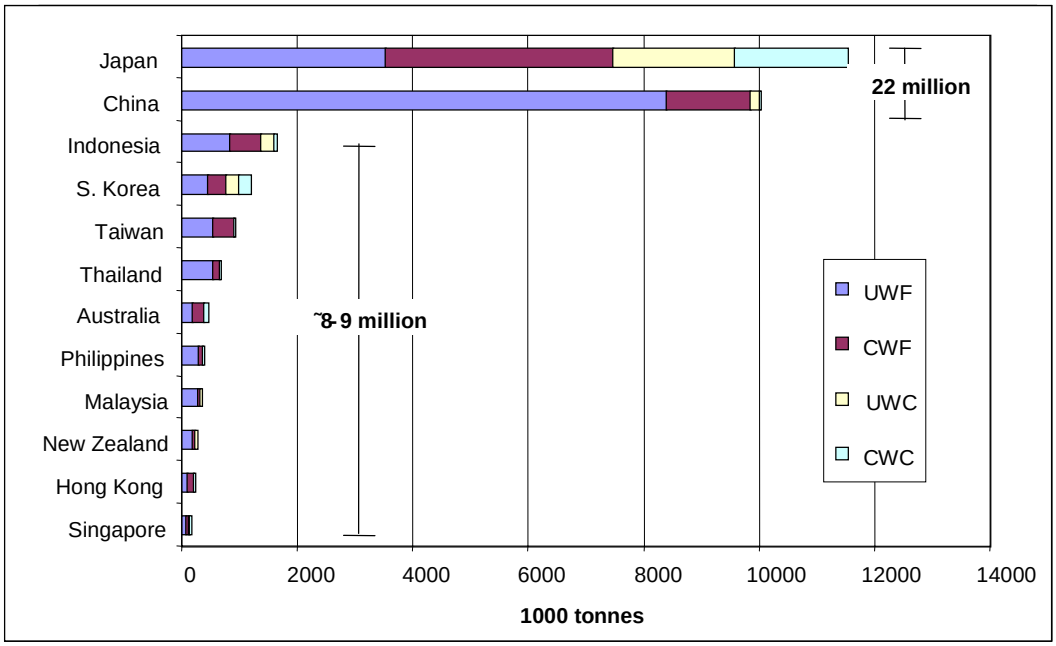
Production of printing and writing paper in the region amounted to 28 million tonnes in 2000, with 86% being woodfree grades.

Figure 5-33:
Production and Consumption of Printing and Writing Paper in Asia-Pacific by Grades 2000



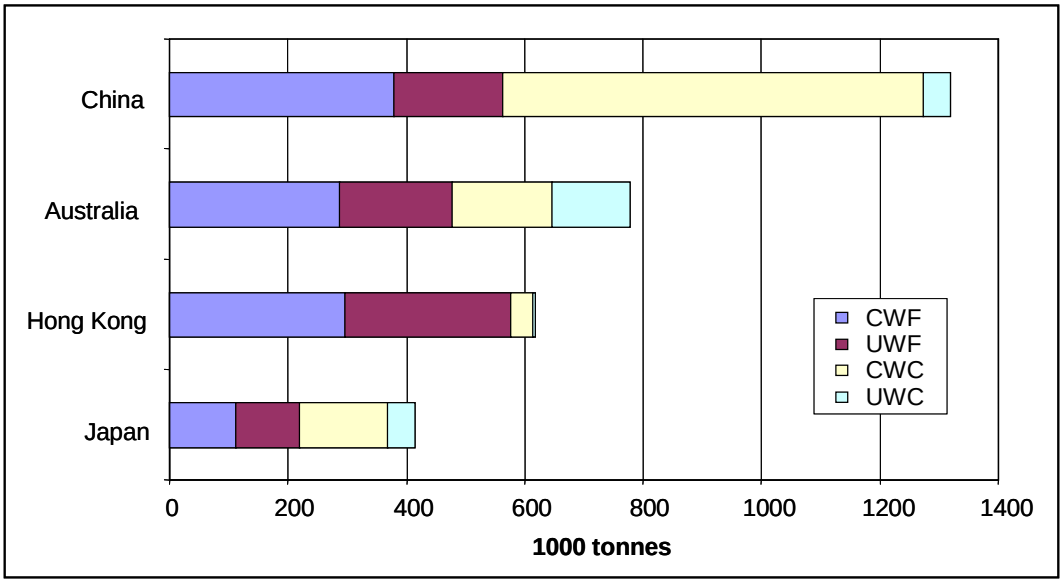
Japan is the biggest market for printing and writing paper, followed by China. These two markets are more than twice the size of all other markets combined in the Asia-Pacific region. Mechanical papers are mainly consumed in Japan and to a lesser extent in Australia, Hong Kong, Singapore and Korea.

Figure 5-34:
Consumption of Printing and Writing Paper in Asia-Pacific by Grades 2000



China, Australia, Hong Kong and Japan are the biggest importers of printing and writing paper in the region.

Figure 5-35:
Major Importers of Printing and Writing Paper by Grades 2000



5.6.2 Major Consuming Markets

CHINA
Over 60% of China's imports of printing and writing grades are from Korea, Indonesia and Japan. Imports from Korea and Japan are mainly coated woodfree paper. Imports from Indonesia were mostly uncoated woodfree.

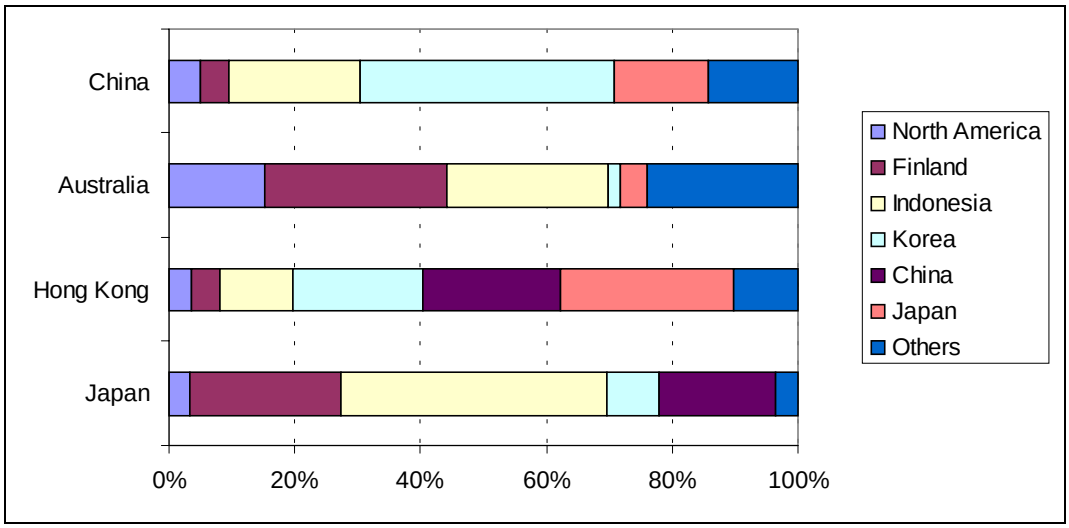
AUSTRALIA
Indonesia is the biggest exporter of woodfree paper into Australia, while Finland is the biggest source of both coated and uncoated mechanical paper for Australia. Australia's imports of printing and writing paper in 2000 can be split up as follows:

- UWF: 72,000 t/a
- CWF: 280,000 t/a
- UWC: 130,000 t/a
- CWC: 170,000 t/a

JAPAN
Japan's imports are mainly provided from Indonesia, Finland and China. Indonesia supplied 60% and Finland 20% of UWC; Indonesia 40% and Finland 70% of CWF paper imports to Japan. China has been exporting all printing and writing grades including 'imitation LWC' to Japan.

HONG KONG
In 2000 Japan, China and Korea were the main sources of coated woodfree paper to Hong Kong, while uncoated woodfree imports came mostly from China, Thailand, Japan and Indonesia.

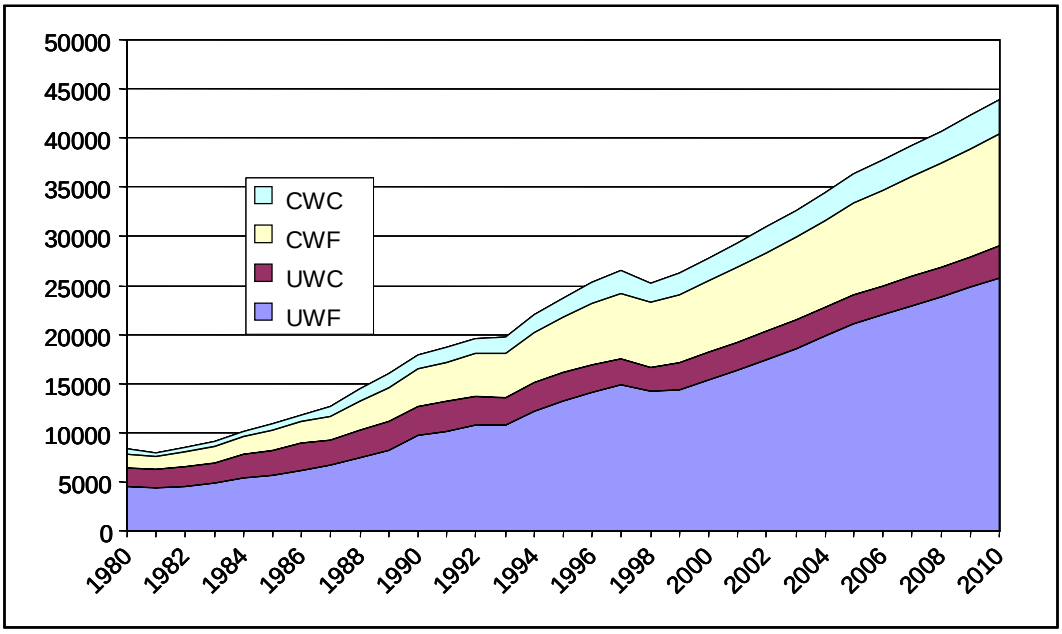
Figure 5-36:
Major Sources of Printing and Writing Paper Imports 2000



Overall Demand Growth

Demand for printing and writing paper in the region should continue to demonstrate good growth. Uncoated woodfree paper is forecast to show the strongest growth at 5.3% per annum, followed by coated woodfree at 4.6% per annum. Mechanical paper consumption will grow at a slower rate of 3.8% per annum for coated and 1.4% per annum for uncoated.

Figure 5-37:
Consumption of Printing and Writing Paper to 2010

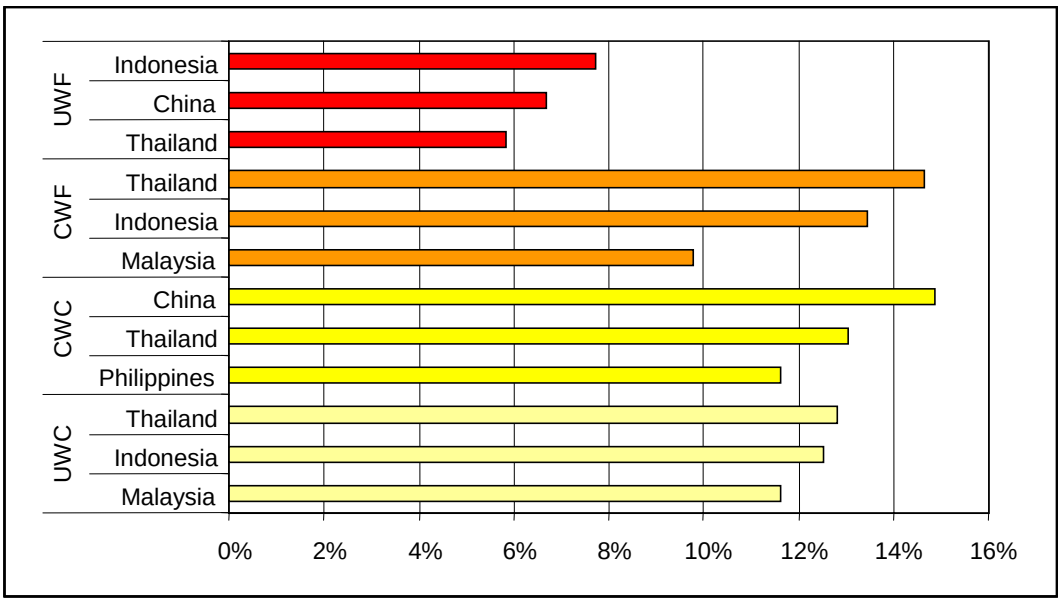


Demand Growth by Grades and Countries

For uncoated woodfree, Indonesia is expected to enjoy the strongest demand growth of 8% per annum to 2010, followed by China at 7% per annum and Thailand at 3% per annum. Indonesia, Malaysia and Thailand are still recovering from their economic crisis, but are forecast to enjoy higher than average consumption growth for coated woodfree to 2010.

The Chinese market for coated mechanical paper is forecast to enjoy the highest growth rate at 15%/a, followed by Thailand and Philippines. Thailand's uncoated mechanical market shows the strongest growth potential followed by Indonesia and Malaysia, but from a very small base.

Figure 5-38:
Consumption Growth by Grades 2000-2010



5.6.3 Opportunities for Australia

The Asia-Pacific region has been relatively self-sufficient in woodfree grades in the recent years and with new projects in the pipeline the situation will remain unchanged in the near term. However, while the regional supply/demand balance is not that favourable to the production of woodfree grades in Australia, the significant import substitution possibilities in the domestic market, and large quantities of eucalypt resource available, indicate that there is a potential opportunity for a BEK pulp mill integrated with woodfree paper production. This opportunity is worth investigating in further detail, particularly if Indonesian wood costs continue to increase in the future. Nevertheless, an Australian mill would face strong competition from Indonesia, Thailand and Korea in the manufacture of uncoated and coated woodfree grades.

The Asia-Pacific region will continue to be a net importer of mechanical grades. Australia also imports a significant quantity of these grades. Hence, investment in mechanical printing grades could also be an opportunity. Planned new capacity of about 1 million tonnes of mechanical paper has been announced in China; however, none of the projects have been publicly confirmed. Moorim's plan for a new 400,000 t/a LWC mill in Korea has been delayed with no new datelines announced.

Figure 5-39:
Demand and Supply of UWF in Asia-Pacific 1980-2010

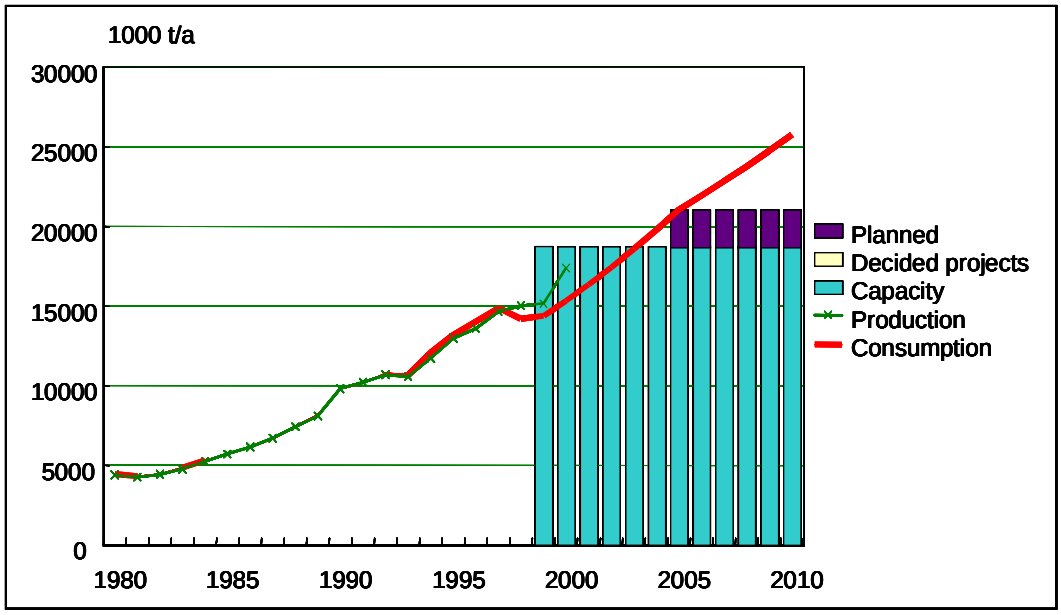


Figure 5-40:
Demand and Supply of CWF in Asia-Pacific 1980-2010

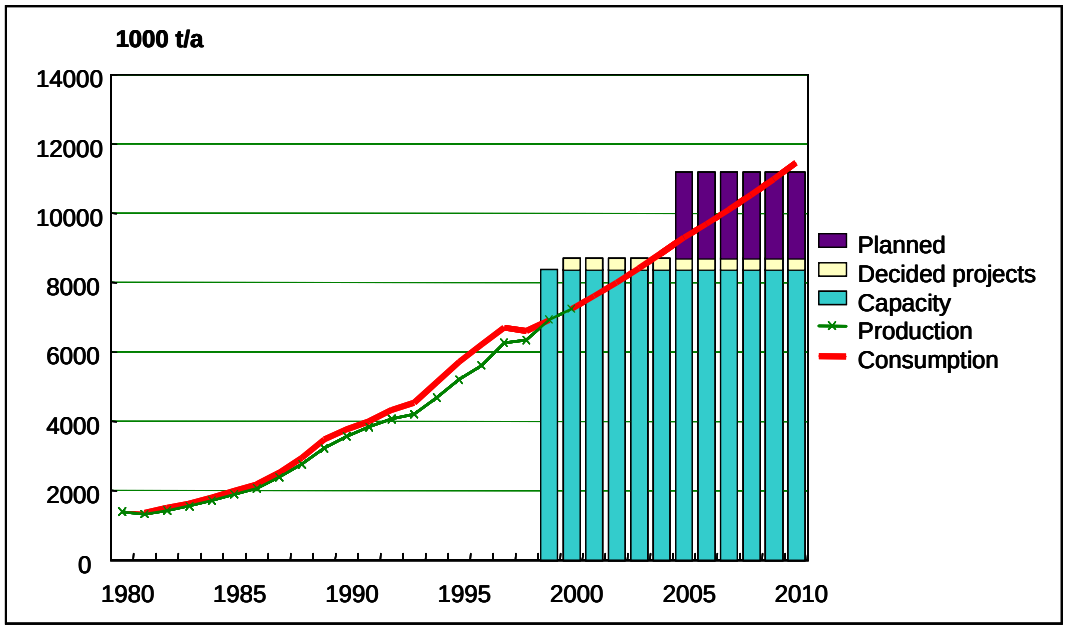
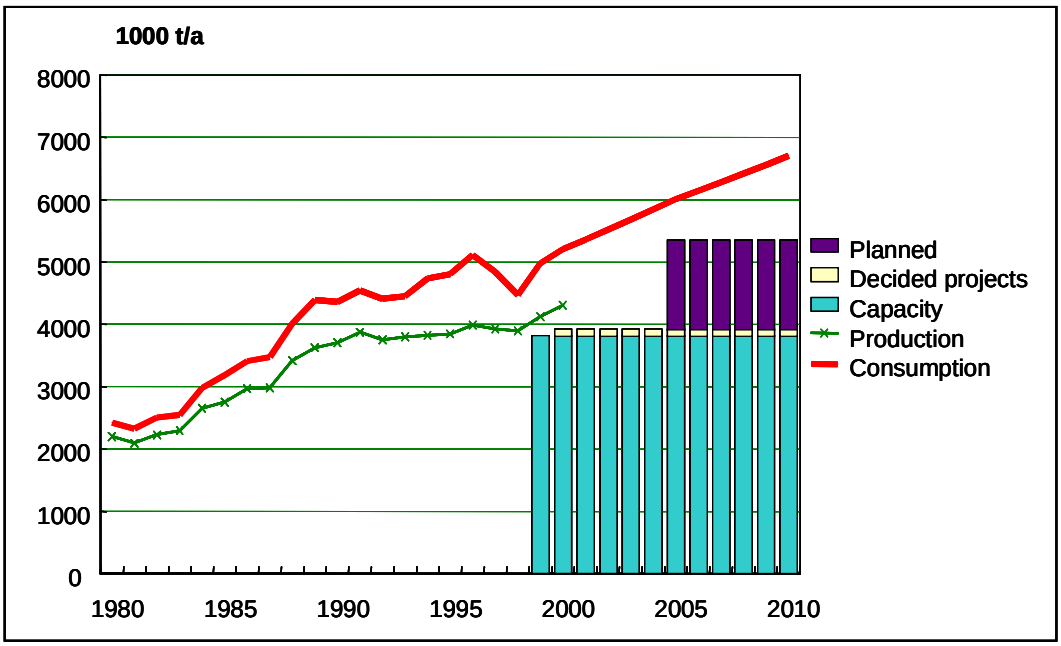


Figure 5-41:
Demand and Supply of Mechanical Papers in Asia-Pacific 1980-2010



For the production of woodfree grades, fibre is the major cost component and Australia is in an average position for this factor of production relative to other Asian countries.

Figure 5-42:
Typical Cost Structure of UCWF Production

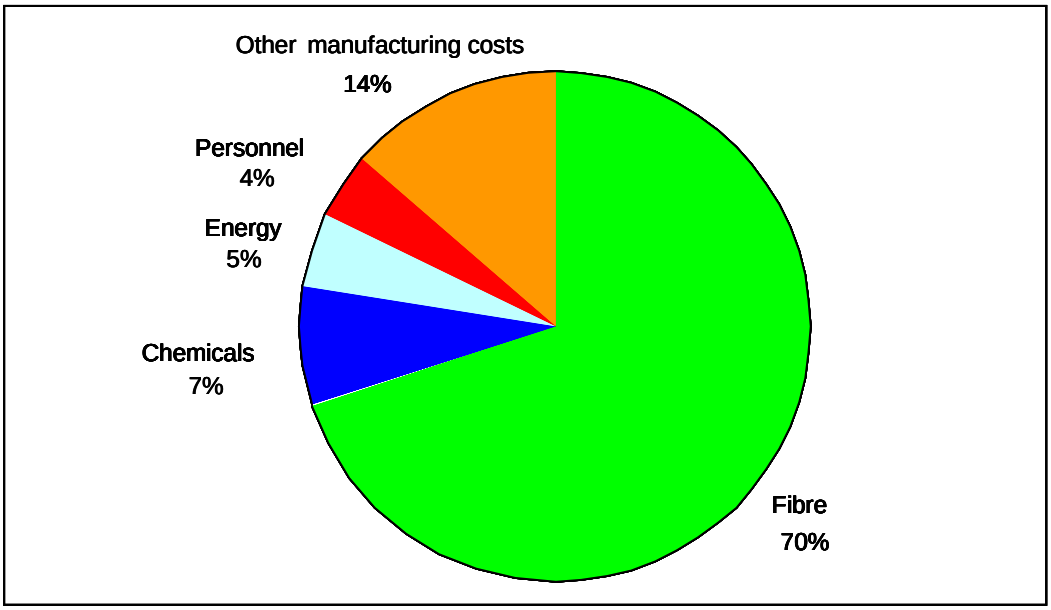


Figure 5-43:
Typical Cost Structure of CWF Production

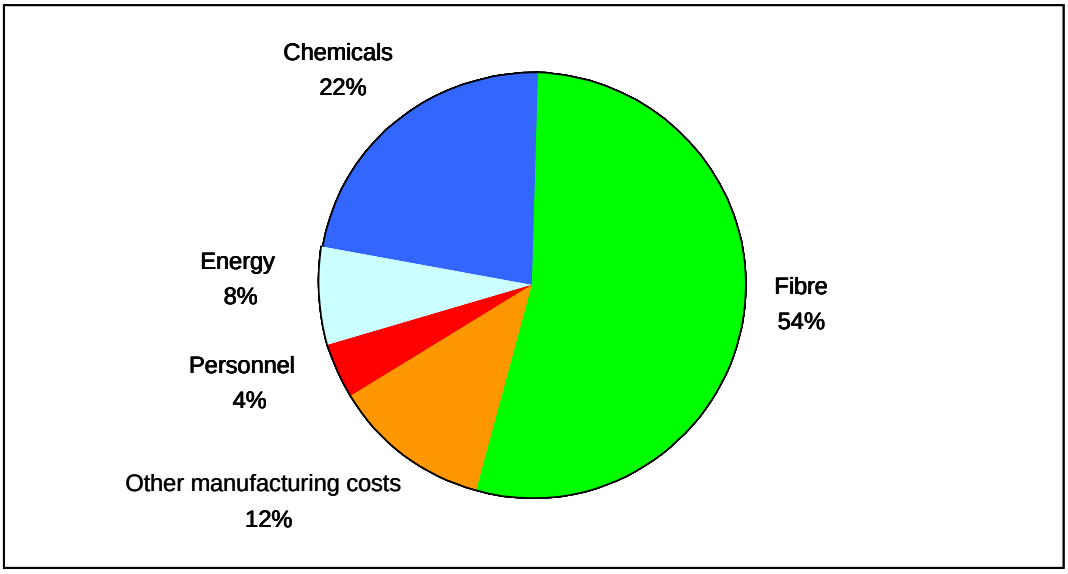
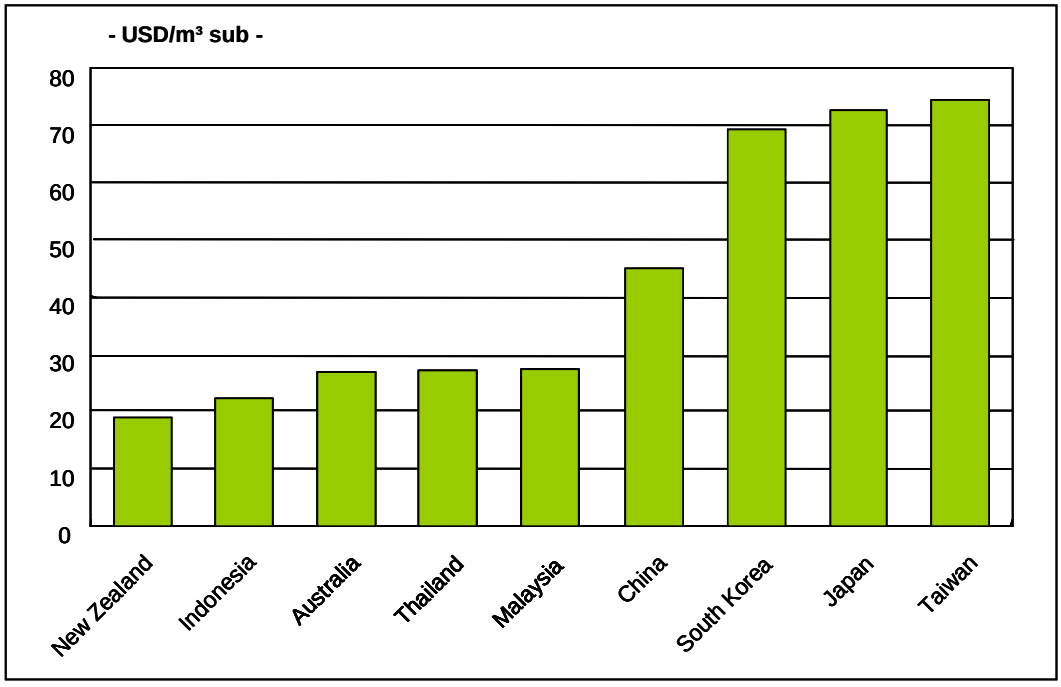


Figure 5-44:
Hardwood Fibre Cost 2001



For mechanical grade such as lightweight coated paper, fibre and coating pigments and chemicals are the main cost components. Australia has the strongest cost position for softwood fibre but suffers a weaker position for coating materials.

Figure 5-45:
Typical Cost Structure of LWC Production

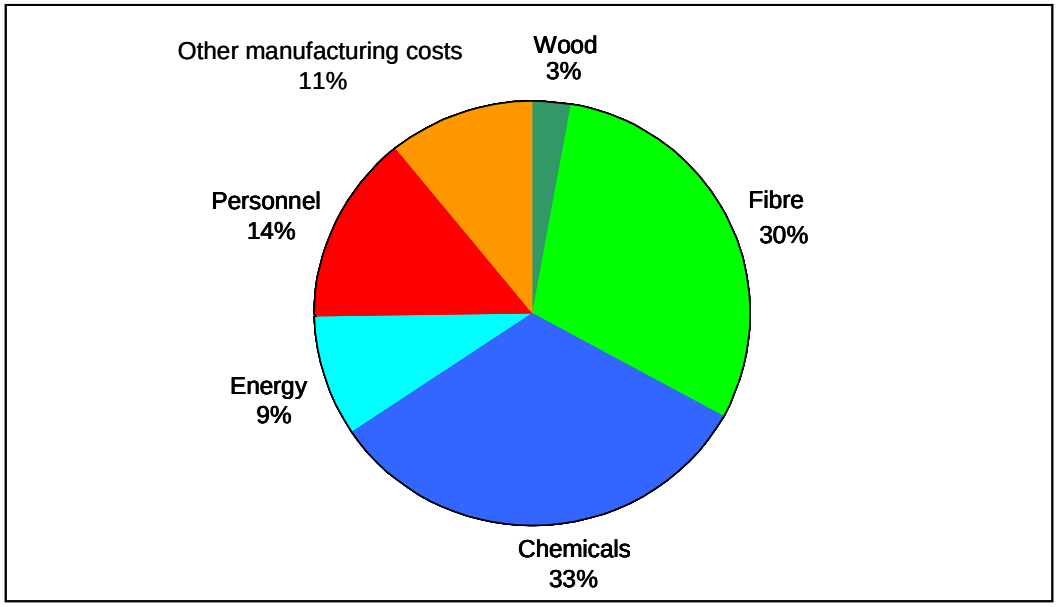


Figure 5-46:
Softwood Fibre Cost 2001

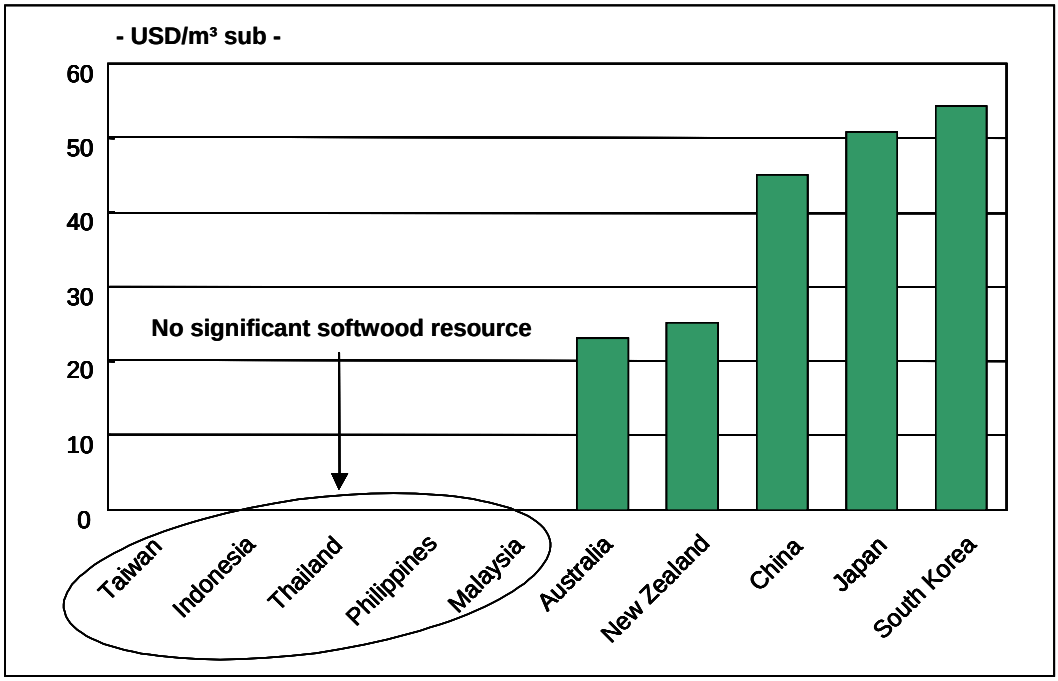
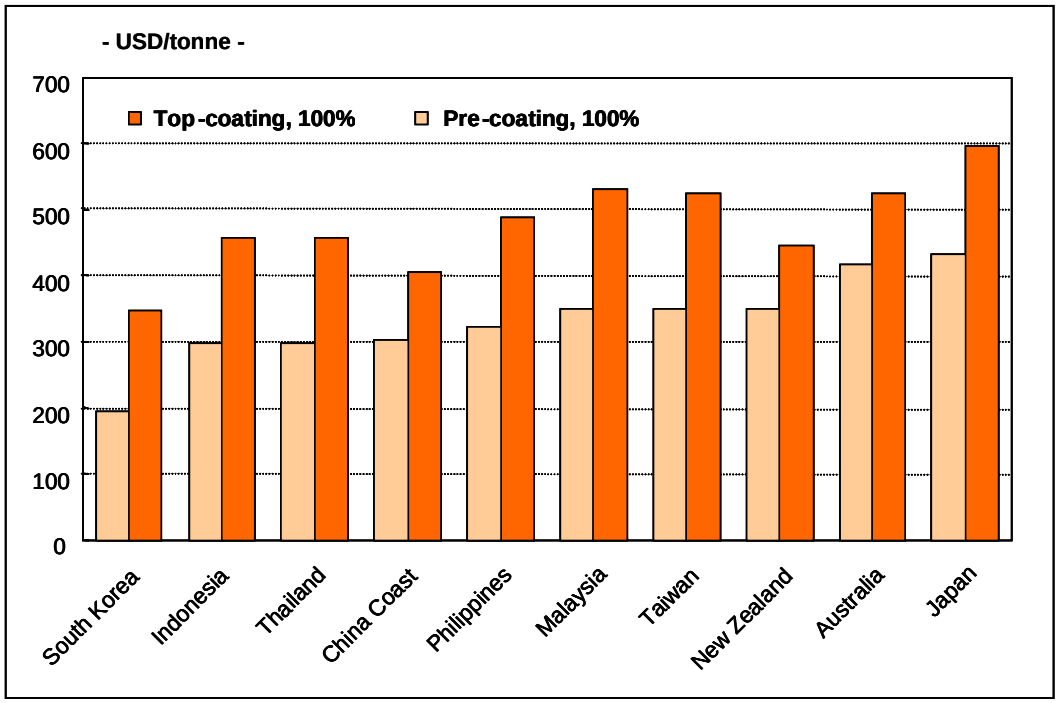


Figure 5-47:
Coating Pigment Cost 2001

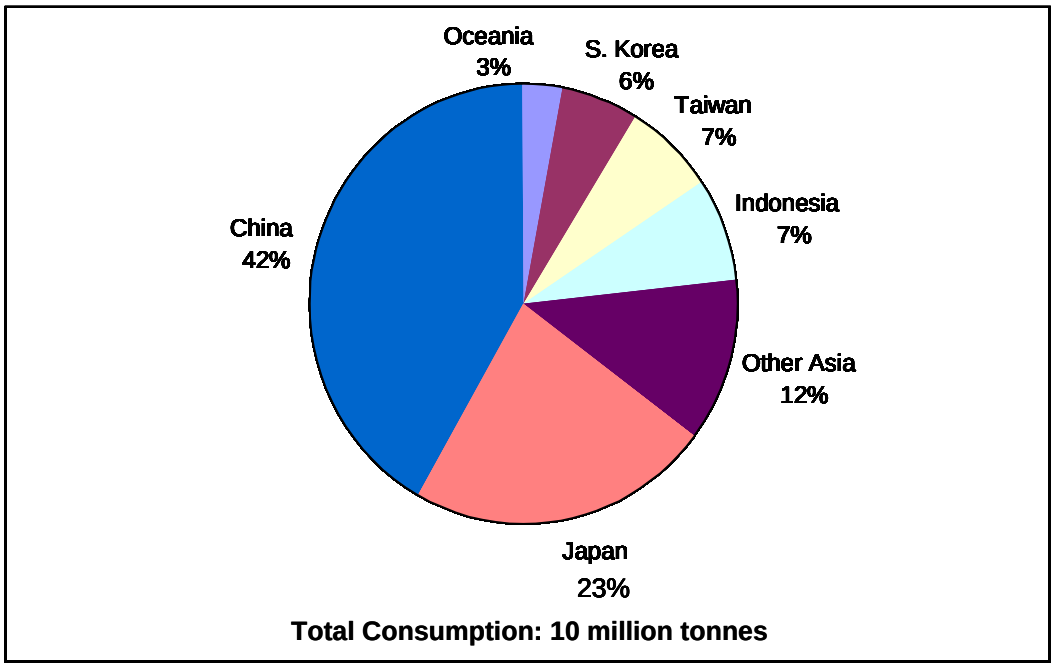


5.7 Cartonboard

5.7.1 Development and Outlook

In 2000, cartonboard consumption in the Asia-Pacific region totalled 10 million tonnes, of which China and Japan accounted for two-thirds. Since 1994, China has overtaken Japan's position as the biggest market in the region.

Figure 5-48:
Consumption of Cartonboard in Asia-Pacific by Countries 2000



Duplex board or white-lined chipboard (WLC) is the main grade consumed accounting for two-thirds, or 6.6 million t/a, of cartonboard consumption in the region. Of that 6.6 million t/a, nearly 80% is coated duplex board. White-lined chipboard/duplex board is used in less demanding, lower cost packaging applications in which the packaged products are not sensitive to the use of recycled fibre either because of hygienic issues (food products) or image. Typical end-uses include consumer electronics, shoes, toys, soap, non-luxury pharmaceuticals.

A few mills produce FBB (folding box board) based on imported mechanical pulp. FBB is mainly for the cigarette industry and some other high-end packaging uses, such as cosmetics, pharmaceuticals and some food processing. Usually high quality grades of FBB are imported.

FBB is made with a liner ply of bleached kraft pulps and mechanical pulp in the other plies of the board. Folding boxboard usually consists of three layers of which the top layer is bleached chemical pulp. The middle layer is mechanical pulp and the back layer is either chemical or mechanical pulp.

WLC uses bleached kraft or deinked recycled grades in the liner ply and recycled fibre in the other plies.

SBB (solid bleached board) is made mostly with bleached kraft pulps.

Figure 5-49:
Consumption of Cartonboard in Asia-Pacific by Grades 2000

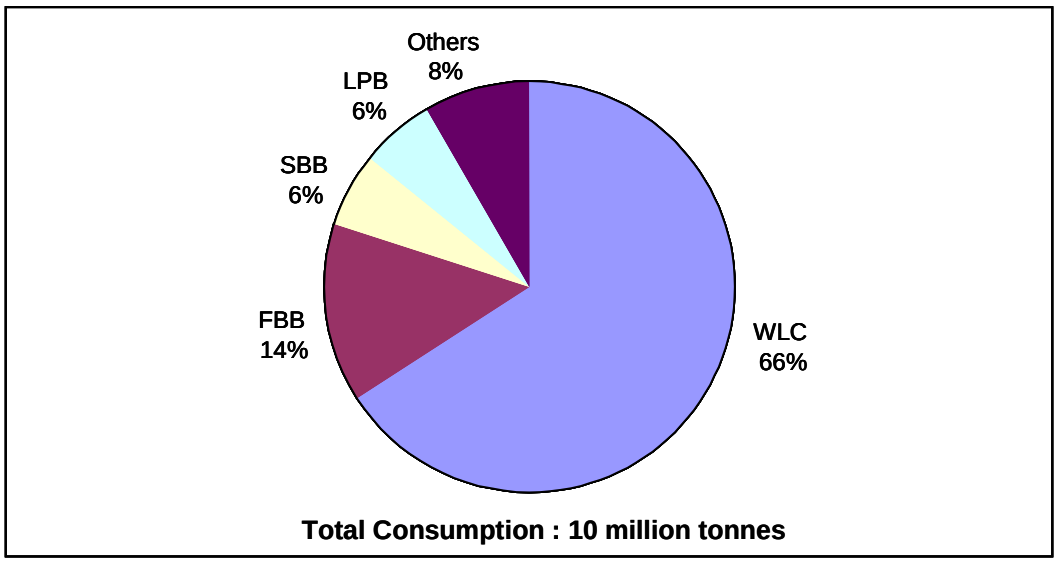
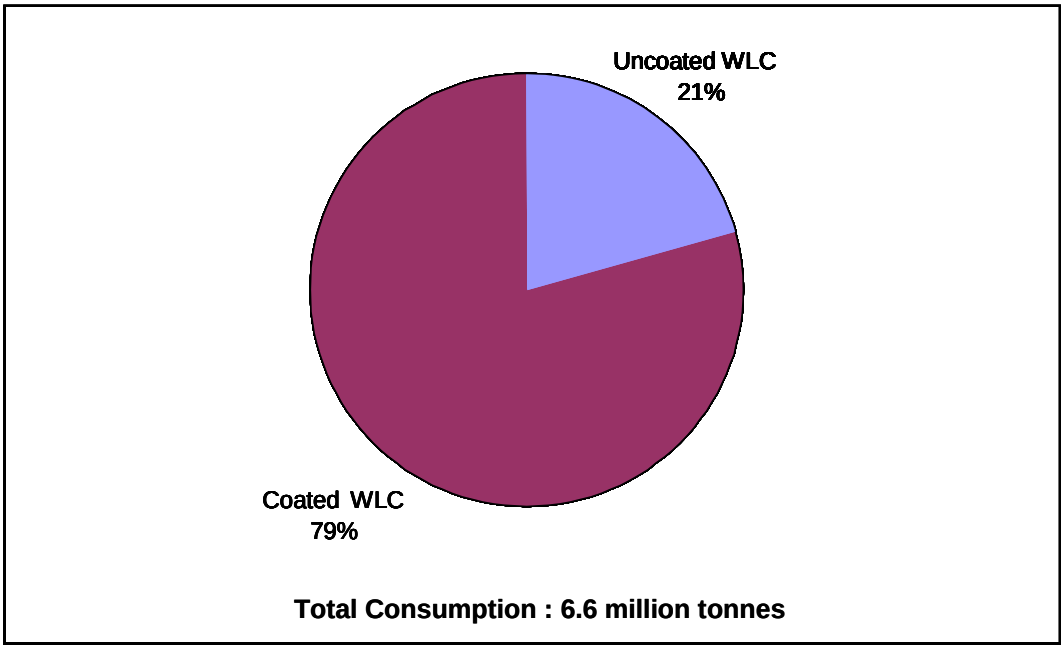


Figure 5-50:
Consumption of WLC in Asia-Pacific 2000



China, Hong Kong and Japan are the biggest importers of cartonboard in the region, while Korea, the USA and Indonesia are the biggest suppliers of cartonboard to the region.

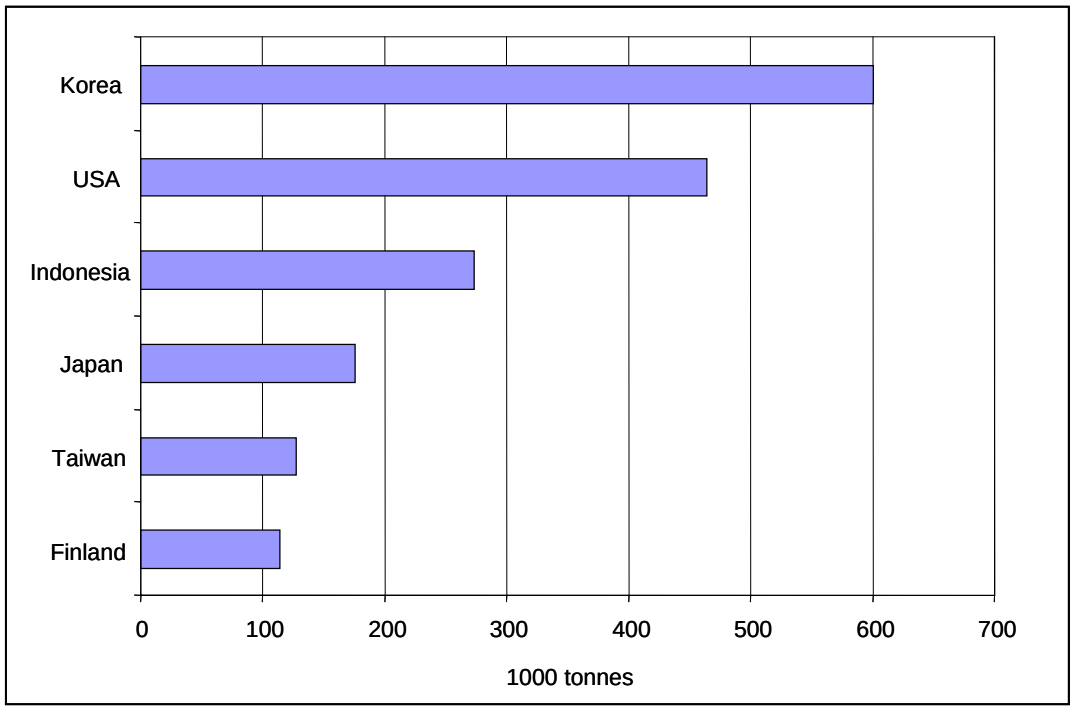
5.7.2 Major Consuming Markets

CHINA
China's production of cartonboard amounted to 3.2 million tonnes in 2000. The country imported another 1.1 million tonnes, of which 80% were coated board, to supplement domestic products. Korea, Indonesia and the USA were the main source countries supplying nearly 70% of the country's imports.

JAPAN
Japanese cartonboard production amounted to 2.1 million tonnes in 2000 and the country imported 380,000 tonnes. Almost 100% of Japanese cartonboard imports were coated grades with the USA accounting for 80% of the total.

HONG KONG
Hong Kong's domestic production amounted to 90,000 tonnes and the country imported 850,000 tonnes in 2000. Almost all cartonboard imports into Hong Kong were coated grades. Korea, Japan and Indonesia were the main source countries supplying nearly 65% of total imports.

Figure 5-51:
Major Exporters of Cartonboard to Asia-Pacific 2000



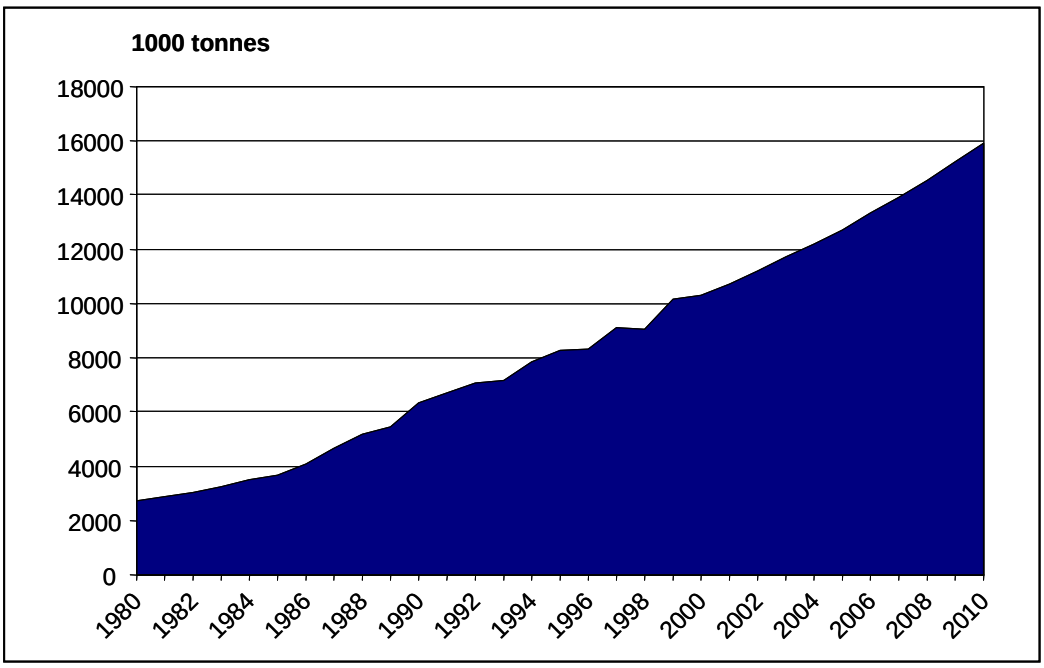
AUSTRALIA
Australia is a net importer of cartonboard, with the USA and New Zealand being the primary sources of coated cartonboard. Amcor is the only producer of cartonboard in Australia with a capacity of 130,000 t/a at its Petrie mill. The mill

focuses primarily on supplying the domestic coated cartonboard market, but has also been successful in penetrating the overseas market particularly in China, Malaysia and New Zealand. The mill produces coated WLC.

Overall Demand Growth

Demand for cartonboard in the Asia-Pacific region will continue to enjoy good growth, at an average of 4.5% per annum.

Figure 5-52:
Consumption Growth of Cartonboard in Asia-Pacific to 2010



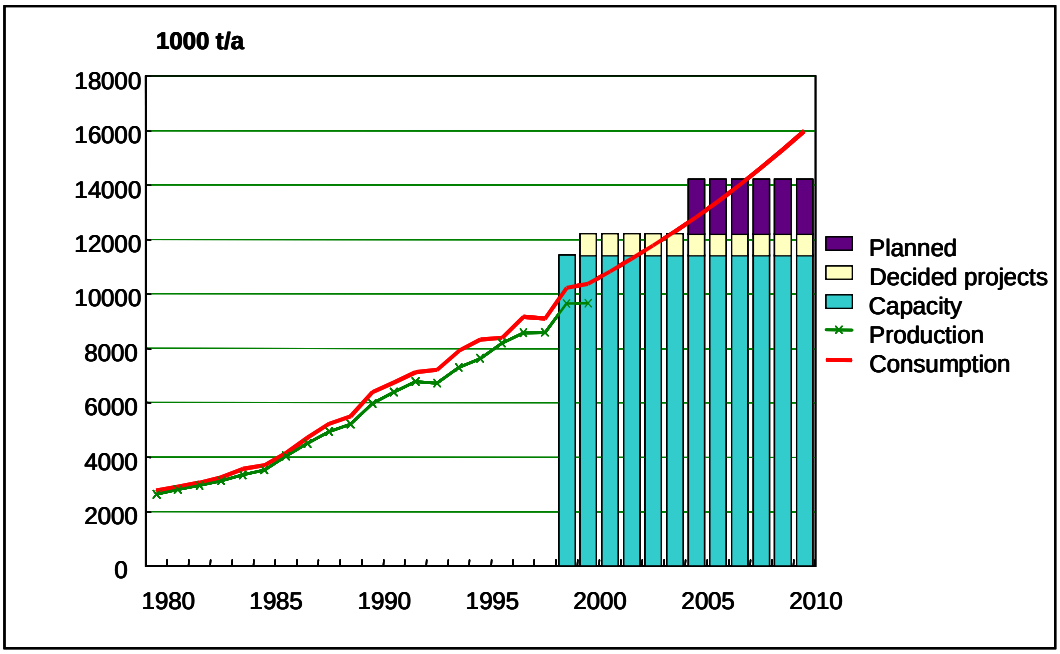
Developing markets such as China, Malaysia and Philippines will enjoy higher than average consumption growth of 5-7% per annum to 2010, while the developed Australian market is forecasted to grow at 2.9% per annum within the same period.

5.7.3 Opportunities for Australia

The Asia-Pacific region is a net importer of cartonboard mainly due to the lack of regional supply for high quality virgin fibre based cartonboards, used primarily for cigarette packaging. Asian producers focus mainly on recycled based grades, and the production capacity in pulp based SBB and FBB grades is limited. The region is self sufficient for all recycled fibre based cartonboard grades.

Slightly more than half a million tonnes of cartonboard capacity has been decided to come on-line within the next two years in China. Furthermore, planned projects in the region amounted to 2 million tonnes, of which 1.3 million tonnes are in China.

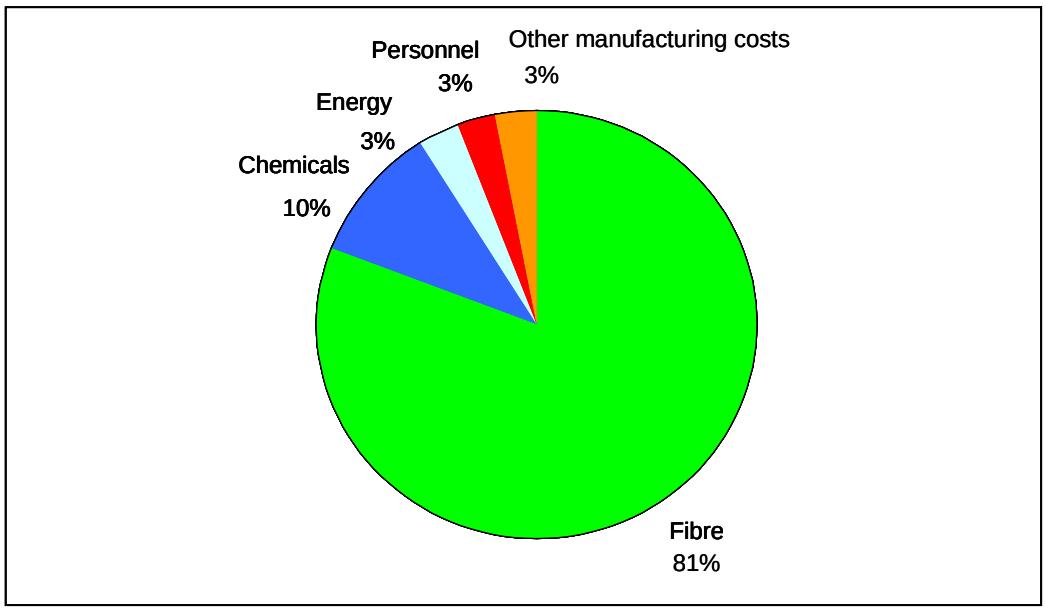
Figure 5-53:
Demand and Supply of Cartonboard in Asia-Pacific 1980-2010



Fibre is the biggest cost component accounting for 81% of total FBB production cost. Australia stands to benefit from a strong position on softwood cost coupled with low cost supply of bleached hardwood pulp from its Asian neighbours.

The Australian domestic market is not big enough to justify a new cartonboard mill, and any new mill would have to be export-oriented. There is an opportunity for high quality cartonboard mill based on mechanical, chemi-mechanical or BSKP for both domestic and regional markets. This would be best done in conjunction with a new chemical or mechanical pulp mill.

Figure 5-54:
Typical Cost Structure of FBB Production



* Cost structure based on non-integrated Asian producers who rely on purchased softwood.

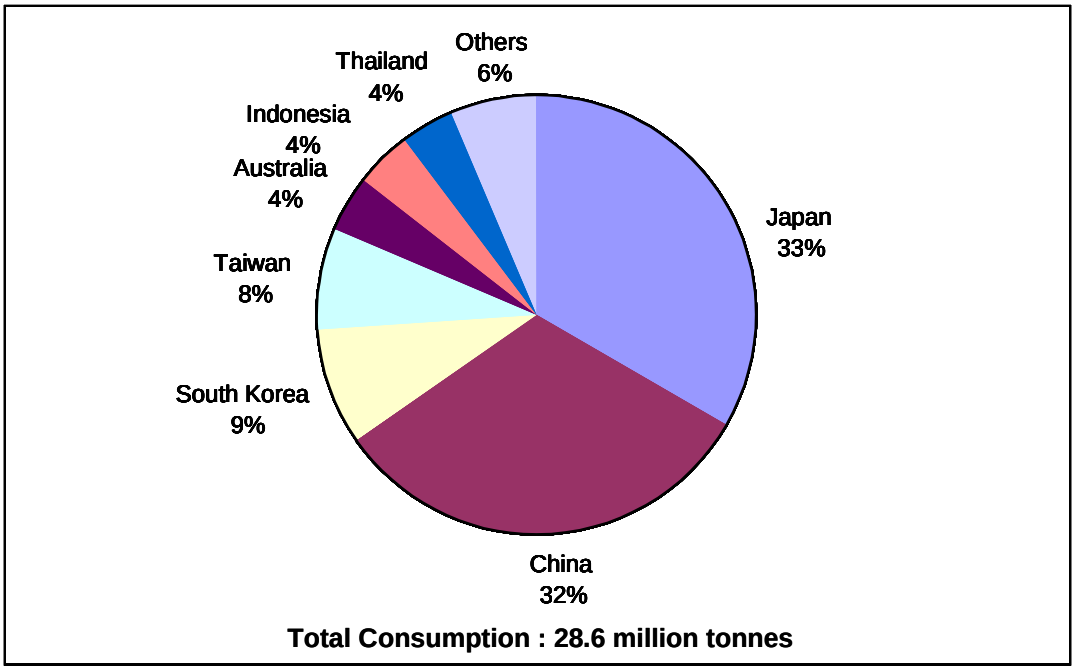
5.8 Corrugating Materials

5.8.1 Development and Outlook

Corrugating materials are used for the manufacture of corrugated boxes and can be made from unbleached kraft pulps (e.g. kraftliner) or recycled fibre (testliner and fluting). Some corrugating medium is made from semi-chemical hardwood pulp. The container materials made from virgin fibre are stronger than those made from recycled fibre, particularly in high humidity or refrigerated storage conditions.

The consumption of corrugating materials in Asia-Pacific totalled 28.6 million tonnes in 2000. Japan and China are the two main consuming countries, each representing about one-third of the total consumption. The majority of corrugating materials consumption is recycled fibre-based testliner and recycled fluting.

Figure 5-55:
Demand for Corrugating Materials in Asia-Pacific 2000



In 2000, the corrugating materials production in the Asia-Pacific region amounted to 26.7 million tonnes, of which Japan and China accounted for 61%.

Japanese producers are the biggest in the region, with Rengo being the largest producer (1.9 million tonnes), followed by Nippon Unipac (1.7 million tonnes) and Oji Paper (1.3 million tonnes).

Figure 5-56:
Supply of Corrugating Materials in Asia-Pacific 2000

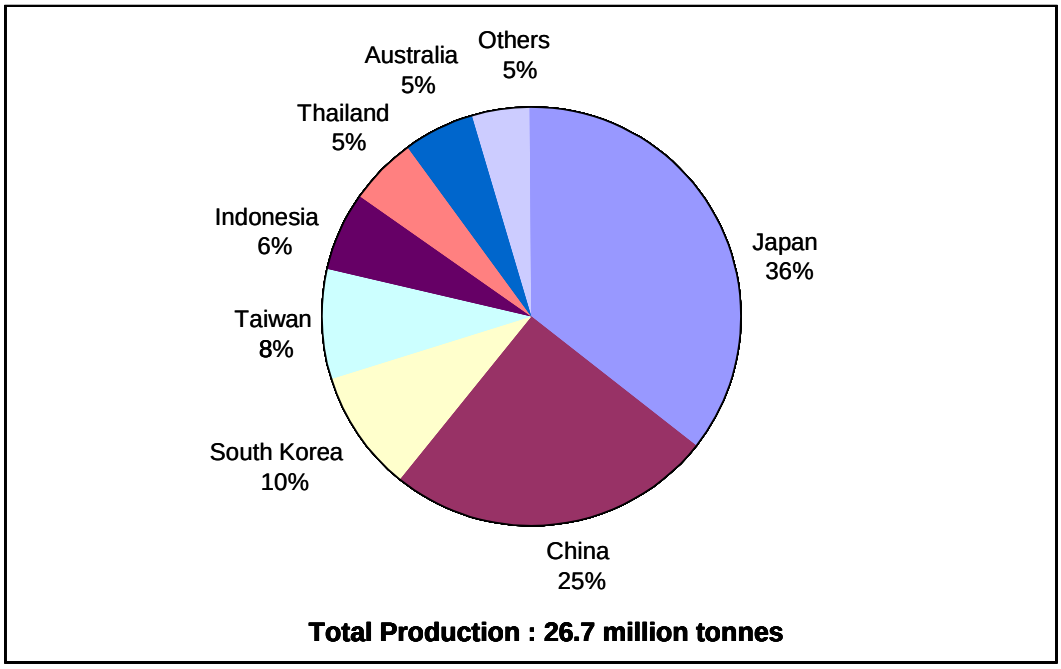
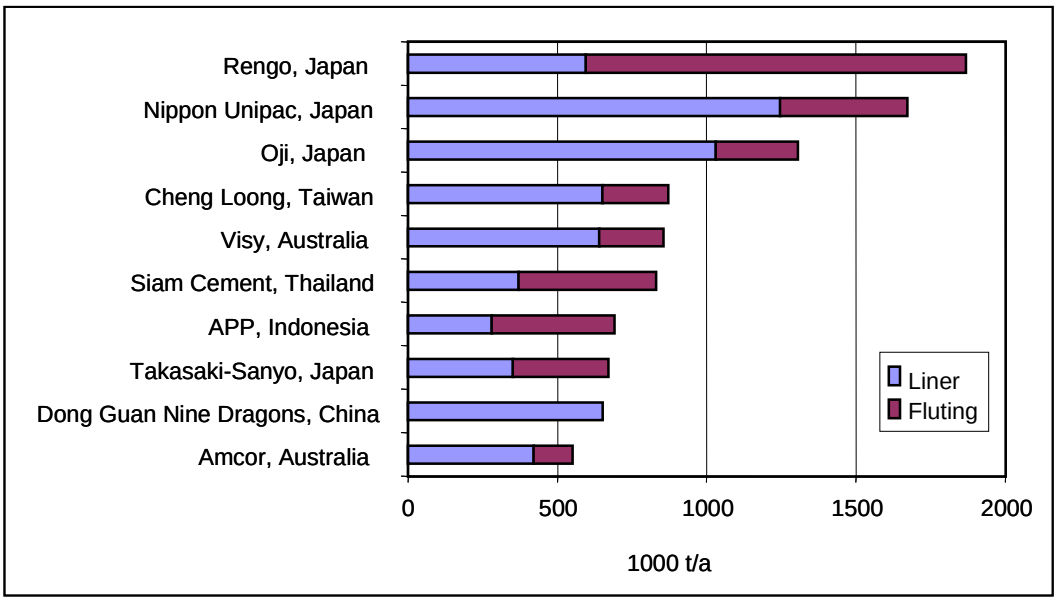


Figure 5-57:
Top Producers of Corrugating Materials in Asia-Pacific 2000



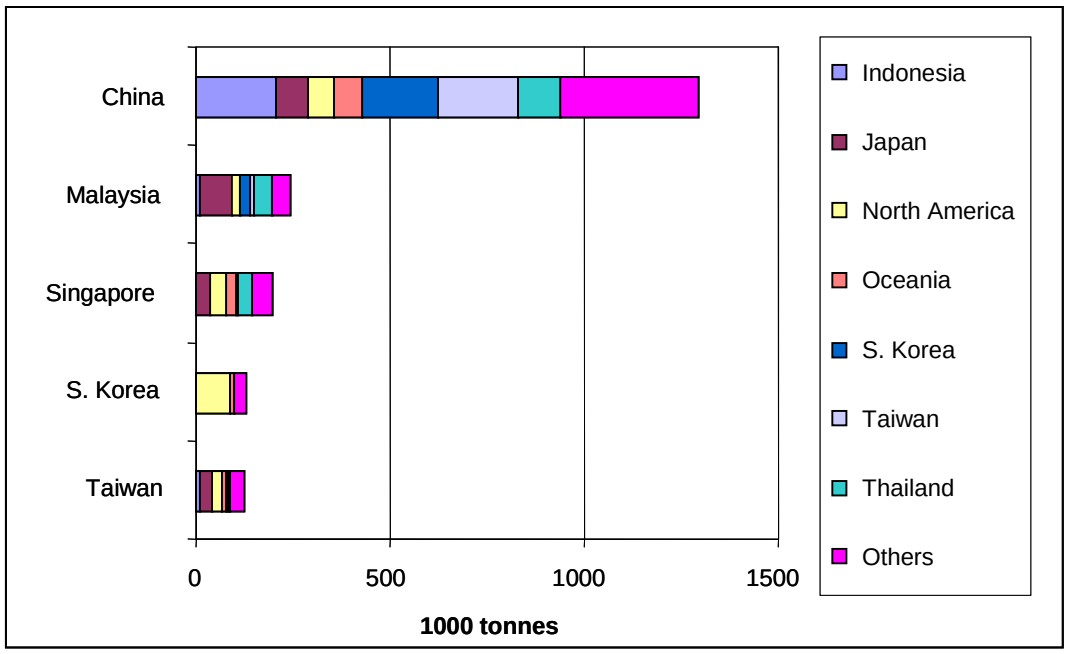
NB: Visy's capacity includes the new kraftliner machine and Amcor's capacity include PaperlinX, which it has since divested.

Local production met 93% of total regional consumption and 1.9 million tonnes of corrugating materials were imported to Asia-Pacific in 2000. There is limited

production of virgin fibre based kraftliner in Asia, and it is a major import item from North America and New Zealand.

China, Malaysia, Singapore, Korea and Taiwan are the major corrugating materials importers in Asia-Pacific.

Figure 5-58:
Major Corrugating Materials Importers in Asia-Pacific 2000



5.8.2 Major Consuming Markets

CHINA
China is the largest corrugating materials importer in Asia-Pacific. Out of the 1.3 million tonnes of imports in 2000, 16% was from Indonesia, 16% from Taiwan and 15% from South Korea.

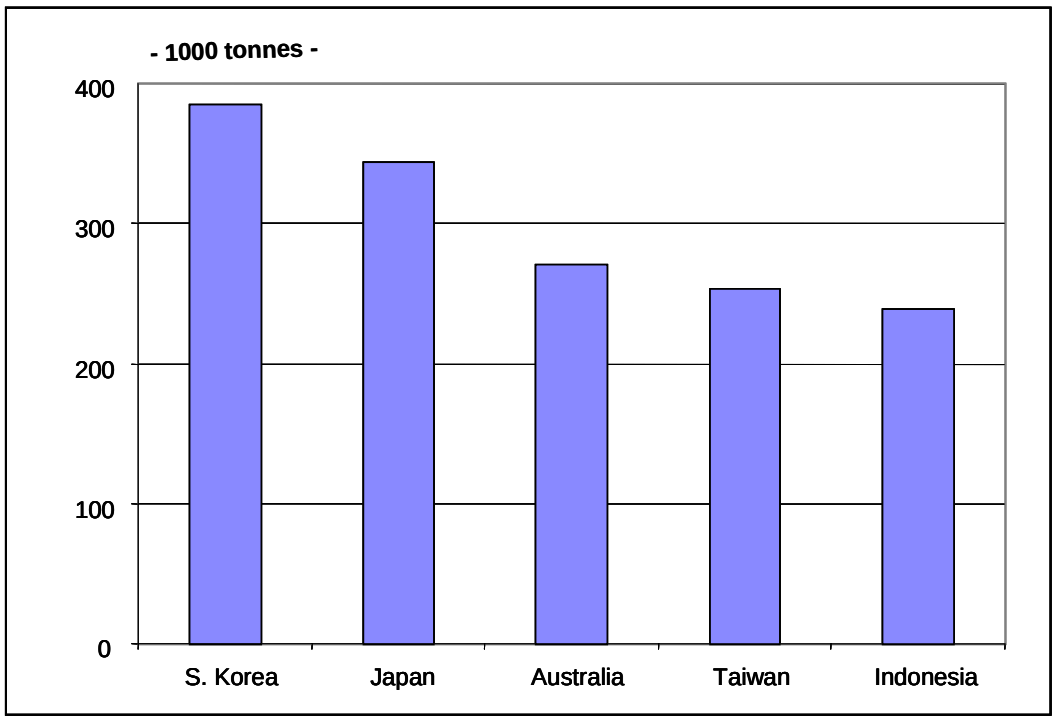
MALAYSIA
Malaysia imported 240,000 t of corrugating materials in 2000, of which 33% was from Japan and 19% from Thailand.

SINGAPORE
Singapore imported 196,000 t of corrugating materials in 2000. The biggest source was North America (21%), followed by Japan (19%), Thailand (18%) and Oceania (13%).

SOUTH KOREA
Though South Korea exported 385,000 t of corrugating materials to other countries in 2000, it also imported 131,000 t of kraftliner, of which 65% was from North America.

TAIWAN
Taiwan imported 125,000 t of corrugating materials in 2000, of which 22% was from North America, 21% from Japan and 10% from Indonesia.

Figure 5-59:
Major Corrugating Materials Exporters in Asia-Pacific 2000



In 2000, South Korea, Japan, Australia, Taiwan and Indonesia were the major corrugating materials exporters.

In the Asia-Pacific, the consumption of corrugating materials has largely been driven by economic growth, development of supply chains and increasing box quality requirements (especially for export packaging).

The demand for corrugating materials is forecast to grow from 28.6 million tonnes in 2000 to 40.8 million tonnes in 2010, and the fastest growth is forecast for Indonesia, Thailand, China and Malaysia.

Figure 5-60:
Consumption of Corrugating Materials in Asia-Pacific 1980-2010

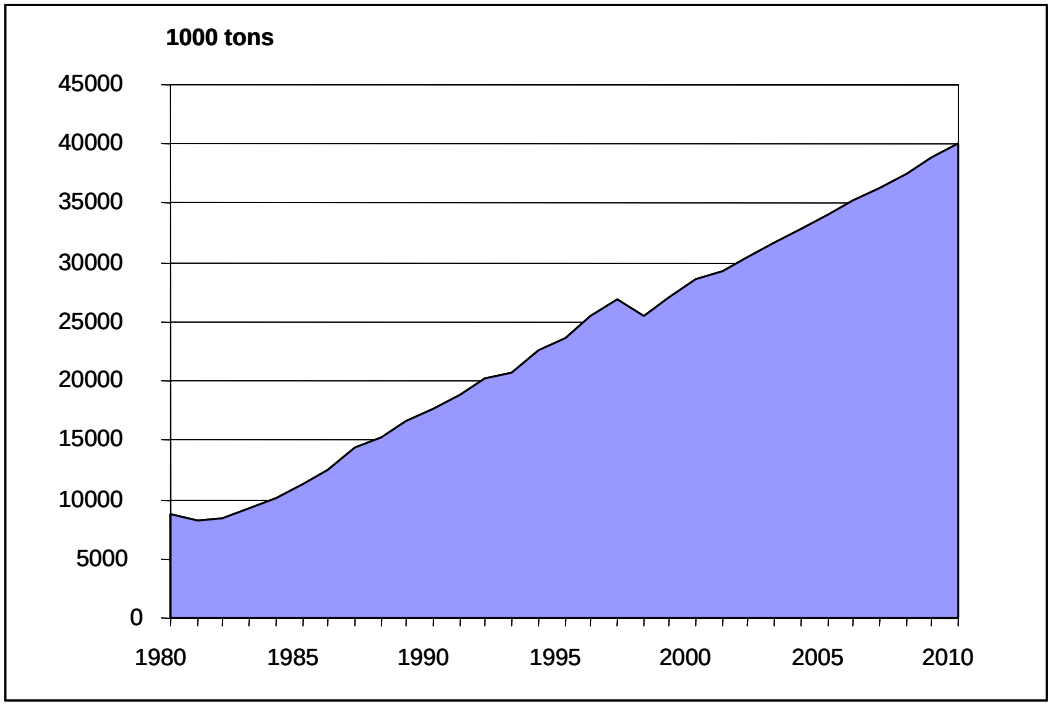
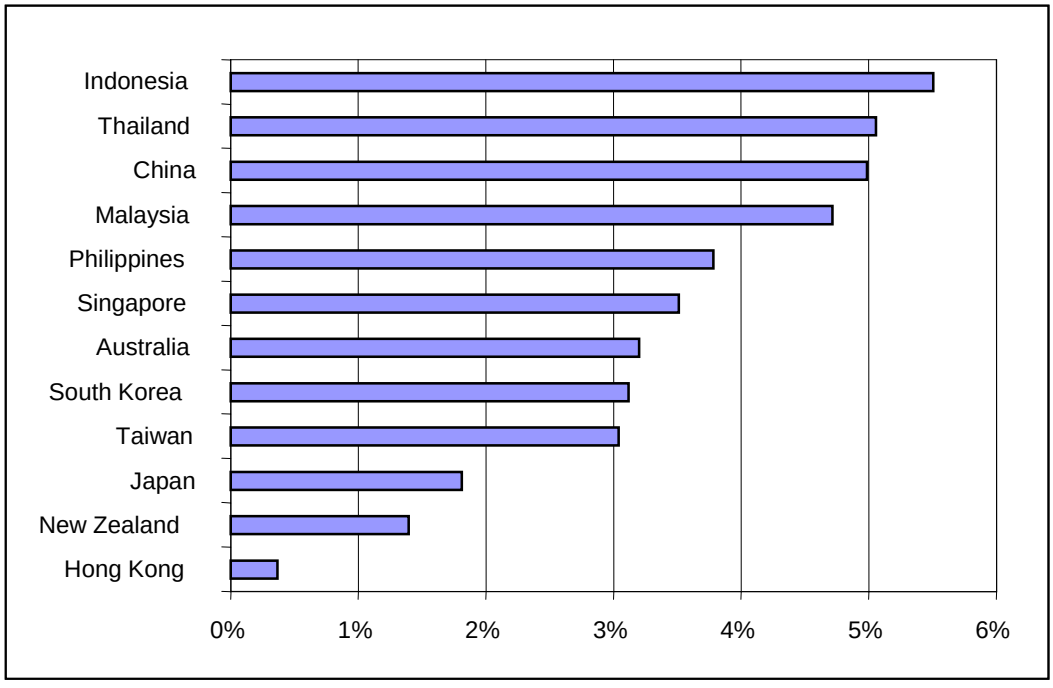


Figure 5-61:
Consumption Growth by Countries to 2010 (% growth/a)



5.8.3 Opportunities for Australia

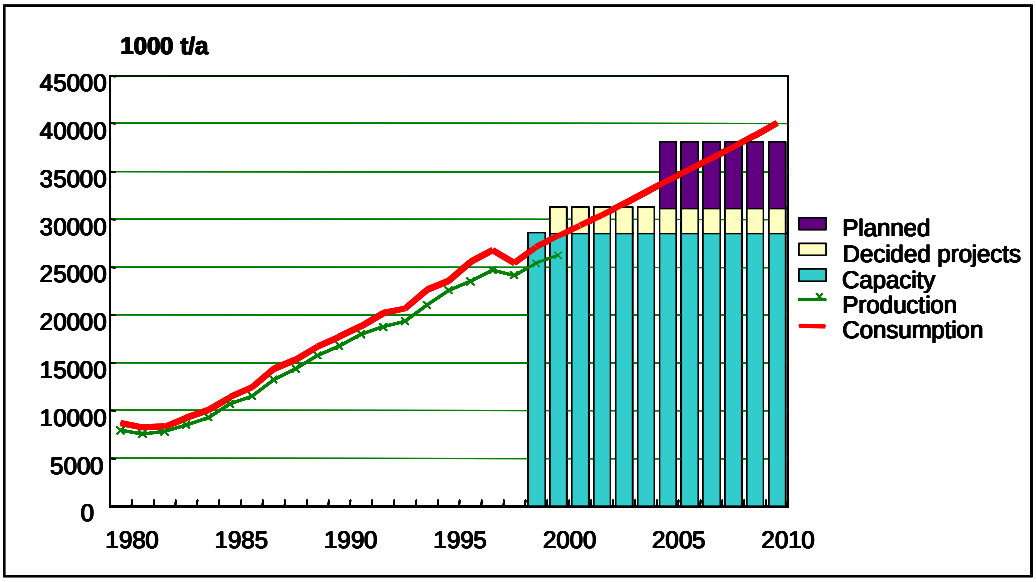
The Asia-Pacific regional production of corrugating materials has always lagged slightly behind the regional consumption. High quality kraftliner is imported mainly from North America. The imports of kraftliner are foreseen to continue as Asia-Pacific will only focus capacity expansions on testliner and recycled fluting due to lack of suitable softwood fibre.

Some major decided projects include Dongguan Nine Dragons's 400,000 t of recycled fluting in China, Visy's 240,000 t of kraftliner in Australia, Yinhe's 200,000 t of recycled fluting in China and Rengo Hung Hing's 150,000 t of testliner in China.

Almost half of the planned projects are in China. Some big projects are: Ningbo Asia Pulp & Paper's 440,000 t of recycled fluting; Wanlida's 400,000 t of testliner and recycled fluting; Lee & Man's 350,000 t of testliner and recycled fluting; and Wuxi Longda's 220,000 t of testliner and recycled fluting.

There are a large number of planned projects also in Taiwan, Malaysia, Indonesia, Korea and Thailand, but many of them are unlikely to go ahead at least in the medium term due to financing difficulties. These projects include Yuen Foong Yu's 450,000 t of testliner and recycled fluting and Tien Long Paper's 210,000 t of testliner in Taiwan, Genting Sanyen's 300,000 t of recycled fluting in Malaysia, PT Fajar Surya Wisesa's 250,000 t of recycled fluting in Indonesia, Korea Export Packaging's 200,000 t of testliner in Korea, and Asia Kraft Paper's 180,000 t of testliner and recycled fluting in Thailand.

Figure 5-62:
Demand/Supply Balance of Corrugating Materials in Asia-Pacific 1980-2010



Australia produced 1.4 million tonnes of corrugating materials and consumed 1.2 million tonnes in 2000. While imports of corrugating materials amounted to 73,000 t, consisting mainly of kraftliner from New Zealand, exports totalled 271,000 t which were mainly exported to New Zealand and China where Australian producers have corrugated box plants

The production of corrugating materials in Australia is dominated by Visy (capacity of 640,000 t, increasing to 880,000 t with the additional capacity of its new kraftliner machine) and Amcor (capacity of 400,000 t). Amcor has recently spun off its fine papers and kraftliner businesses into a separate company called PaperlinX. PaperlinX now produces around 270,000 t/a of kraftliner, while Amcor produces only recycled-based products. Visy currently only produces recycled-based corrugating materials but has a new kraftliner mill, which commenced operation in July 2001.

The present capacity in Australia is sufficient to meet the domestic demand. The Australian corrugating materials consumption is forecast to grow at 3.2% per annum, reaching 2.0 million tonnes by 2010.

As Australia is a net exporter of corrugating materials, its domestic market shows limited opportunities for capacity expansion. However, since the Asia-Pacific is a major importer of high quality kraftliner, there is an opportunity to produce kraftliner for export markets. Australia has a strong cost position, with fibre constituting 65% of production cost and domestic softwood being relatively cheap.

Visy is now taking up this opportunity. Given the reasonable level of success which Australian manufacturers of container materials have had in supplying product to the Asia-Pacific countries, there may be further opportunities to expand in either recycled or virgin based products in the future in line with some steady growth in the Australian market to absorb some of the new capacity.

Figure 5-63:
Typical Cost Structure of Kraftliner Production

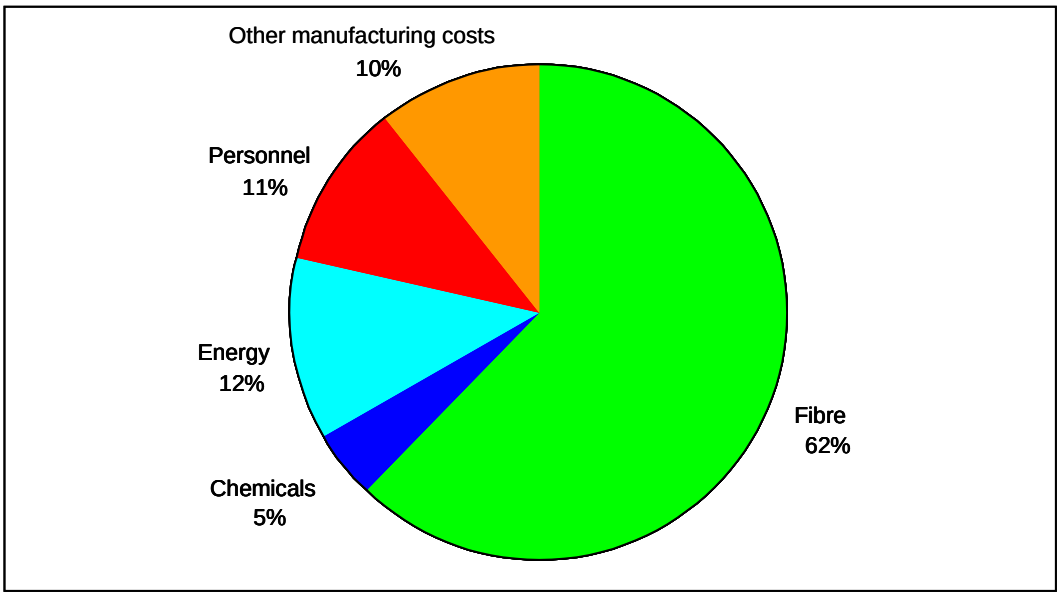
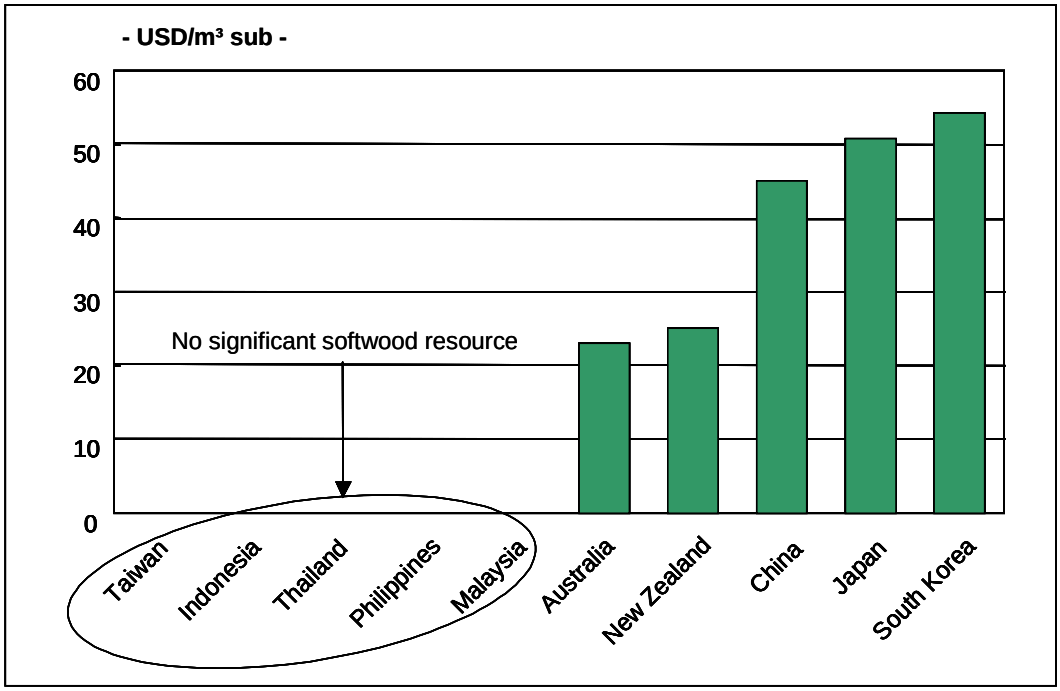


Figure 5-64:
Softwood Fibre Cost 2001



6. INVESTOR REQUIREMENTS

Potential investors in the forest products industry will review a number of general criteria prior to spending any significant time and expense investigating the full feasibility of the opportunity. These general criteria include:

4. Sufficient resource volumes for the scale of investment required.

5. Political certainty associated with doing business in the country or region (i.e. that any approval process or legislation will not be arbitrarily altered to their detriment).

6. The industry is generally well organised, has a clear strategy and is welcomed by the community and government alike.

7. Sufficient infrastructure is in place or planned that will not restrict competitiveness.

Investment opportunities for the forest products industry may be greenfield (the development of new processing facilities at a new location) and brownfield (the purchase or redevelopment of an existing processing site to increase capacity or the range of products).

6.1 Greenfield

For a greenfield investment, the following requirements are common:

Wood supply

- Sufficient volume
- Competitive price
- Secure access
- Suitable available land to expand resources, if required.

Infrastructure

- Road, rail, ports etc.
- Water, power, energy sources
- Effluent/waste disposal options
- Land.

Emphasis on current availability of these is considered in terms of the potential competitiveness of the mill, by either reducing investment needs or reducing operating costs.

Markets

- Suitable market opportunities.
- Minimum barriers to entry, both tariff and non-tariff.

Technology

- The scale fits with the market, resource availability and competitive size of a potential mill.
- Access to technology has been a problem but is more “off the shelf” today.
- Availability of well-trained technical and managerial labour force.

Approvals process and environmental issues

- Needs to be well defined, efficient and provide certainty in the decision making process.
- Expect environmental controls which minimise environmental impacts, are consistent with best practice, but do not impose unnecessary costs on the investment.

Cost competitiveness

Partly controlled by mill scale, technology and management of the operations, but other factors are important, such as:

- Low unit costs of inputs.
- Minimum additional taxes, charges, compliance costs, etc. Need to consider that competition is international.

Finance

- Need access to competitive finance
- Minimal perceived risks
- Climate conducive to investment.

Returns

- Favourable taxation system
- Minimal restrictions on taking profit out of the country.

Risk

- Business risk – country risk, financial and other general business
- Political risk – Federal, State and local government legislation risk, i.e. taxation and business regulations provide surety of regulatory approval process and certainty in the decision making
- Environmental risk – fire, drought, wind etc.

Information

To attract investor interest, it is important that they can get easy access to information on all the above areas to reduce the cost of making the initial identification of a potential opportunity.

6.2 Brownfield

Industrial investors in the Australian forest industry now come from a broad national and international background and have a wide range of experience. In general they have very limited local knowledge but substantial international and national knowledge. The approach and type of investment questions differ between investors and no single checklist would be appropriate for all investors. However, there are some broad fundamental questions common to most investors. In addition, there are some common investment steps, beginning with an initial interest in an investment opportunity to finally securing an investment.

The indicative major steps for an investment in an existing operation could be:

1. Opportunity identification – personal contact, personal knowledge, advertisement, targeted approach etc.
2. Receive initial information – Executive Summary from an Information Memorandum, 1-2 pages on the investment, direct contact, initial inspection, etc.
3. Sign confidentiality agreement
4. Receive more detailed Information Memorandum
5. Site visit
6. Submit Expression of Interest based on Information Memorandum– qualified offer
7. Exclusive due diligence offered
8. Due diligence period
9. Full bid – unqualified offer
10. Implementation

Clearly, there are different approaches and other steps are also taken internally, such as Board approval, funding issues and partnerships. However, the above represents an actual approach to an investment offering in Australia. Using this example, the following list of typical questions came from a potential investor having identified an opportunity to purchase a forest processing facility.

1. What were the last EBIT and EBITDA multiples on Gross Revenue?
2. The forecast increase in production is slightly above the historic production trend line for the operation. What backs up this number, as it appears fundamental to EBIT results?
3. Why haven't existing operators in the region taken on this investment?
4. What are the operational months per year? What have been the best and worst months in the last 10 years?

5. Is the operation supply constrained, operationally constrained or market constrained?
6. What prices and market share are being achieved in the main growth markets?
7. Does the species suit market demand?
8. What other foreign and domestic companies operate in the investment-offering region and what is the ratio of foreign to domestic investment?
9. How secure are the Wood Supply Agreements?
10. What proportion of production is covered by long-term purchase agreements?
11. What is the average length of service of the employees and staff turnover by position?
12. What does the future log mix look like in volume sizes and value?
13. Do the average prices reflect any quality differential relative to other log prices from the same region?
14. What is the average haulage distance and future trend?
15. What are the greatest risks? e.g. Fire, labour, supply, logistics, prices, markets (volume), environmental closure, government regulation, competition, etc.
16. What volumes are left in the field due to meeting harvesting productivity requirements?
17. What payments are made to the land/forest owners, i.e. for the leasehold or concessions i.e. $/m³, $/ha etc.
18. What government legislation impacts on the operation of the facility? What processes are required to expand?

While this shows a wide range in questioning, it demonstrates that investors will have numerous issues to be resolved before considering an investment in more detail. This is invariably due to industrial investors having many investment options and more commonly these are international in nature. Consequently, the initial assessment is of vital importance because it is the first impression that will determine whether an inspection will be made and the investment pursued further. If so, the starting point will then be wood supply issues, in particular, volume, sustainability, quality and price, followed by markets and production issues.