WAKING THE SLEEPING GIANT - AN ANALYSIS OF AUSTRALIA'S POSITION IN THE INTERNATIONAL PULPWOOD MARKET

DR. GARY INIONS

1992 GOTTSTEIN FELLOWSHIP REPORT

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Bill Gottstein was an outstanding forest products research scientist working with the Division of Forest Products of the Commonwealth Scientific Industrial Research Organization (CSIRO) when tragically he was killed in 1971 photographing a tree-felling operation in New Guinea. He was held in such high esteem by the industry that he had assisted for many years that substantial financial support to establish an Educational Trust Fund to perpetuate his name was promptly forthcoming.

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4. Study Tours - industry group study tours are arranged periodically and have been well supported.

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Waking the Sleeping Giant

An analysis of Australia's position in the international pulpwood market

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DECLARATION

The opinions and views expressed in this work are my personal view and may or may not be the opinions or views of the Department of Conservation and Land Management, WA or the members of the Gottstein Trustees.

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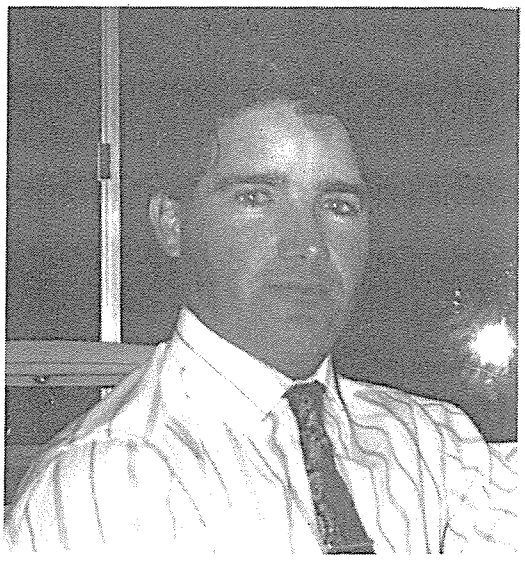
Dr Gary Inions



Dr Gary Inions, Projects Officer to the Executive Director of the Department of Conservation and Land Management (CALM) in Western Australia, holds a B.Sc.(For)(Hons) degree from the Australian National University and was awarded the Schlich Memorial Trust Medal in 1985. In 1992 he received his Ph.D from the University of Western Australia for studies related to the establishment of hardwood plantations. He has been employed by the Department since 1979 holding positions ranging from cadet to professional officer. He is currently closely involved in various aspects of the management of the increasing hardwood (*Eucalyptus globulus*) plantation resource in Western Australia which is now of the order of 13000 hectares. The development of a strong chip export market is one of the proposed end results from these On his Fellowship Gary visited Japan and several countries also developing plantations for chip or pulp export programs. It is anticipated that the information presented in this Gottstein report will make a significant contribution to the Western Australian projects and will, in addition, be of particular interest to hardwood plantation managers in other parts of Australia.

ACKNOWLEDGEMENTS

In the researching and preparation of this document numerous individuals and organisations freely gave me assistance and support. I am particularly indebted to the Joseph William Gottstein memorial trustees for their encouragement and fiscal support through the year. I sincerely hope that the trust considers this work adequate and useful in their aim in furthering of the Australian Forests Industries.

I am also indebted to Dr Syd Shea, Executive Director of the Department of Conservation and Land Management, for encouraging me to apply for the Gottstein fellowship and for his and the Department's support throughout the duration of the fellowship. The fiscal contribution from the Department was also greatly appreciated.

I am particularly appreciative for the hospitality and assistance show to me when researching the work, and during my travels, by the following companies. Itochu Corporation (Japan), Oji Paper Company (Japan), Japan Paper Association , Ministry of International Trade and Industry (Japan), Hunt Leuchards and Hepburn Timber Products (Pty) Ltd. (Republic of South Africa), SilvaCel (Republic of South Africa), Itochu Chile Ltda (Chile), Forestal San Jose S.A. (Chile), Inversiones Forestales C.C.A. S.A. (Chile), Forestal Anchile Ltda (Chile) and Afodech Ltda (Chile). Mr Y Morimoto of Itochu Corporation was particularly helpful in arranging visits, and his help was greatly appreciated.

Ms Sharon Eccleston typed the manuscript and never once complained about my copious requests for alterations,

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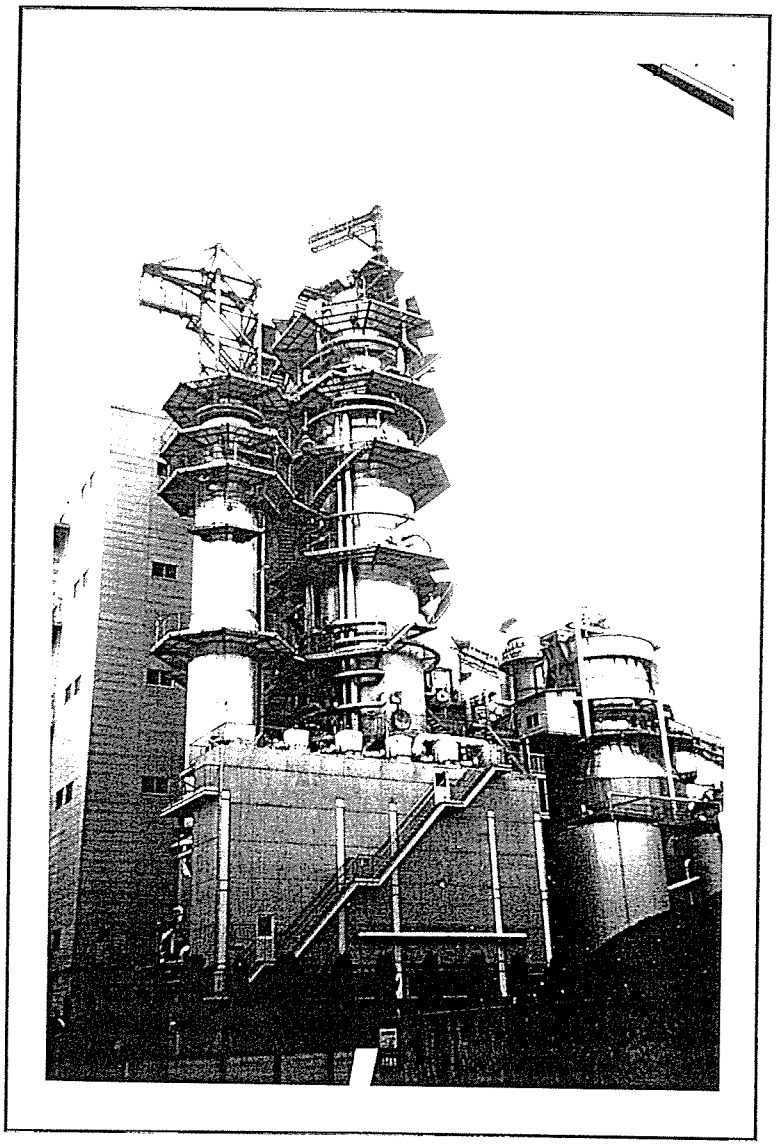
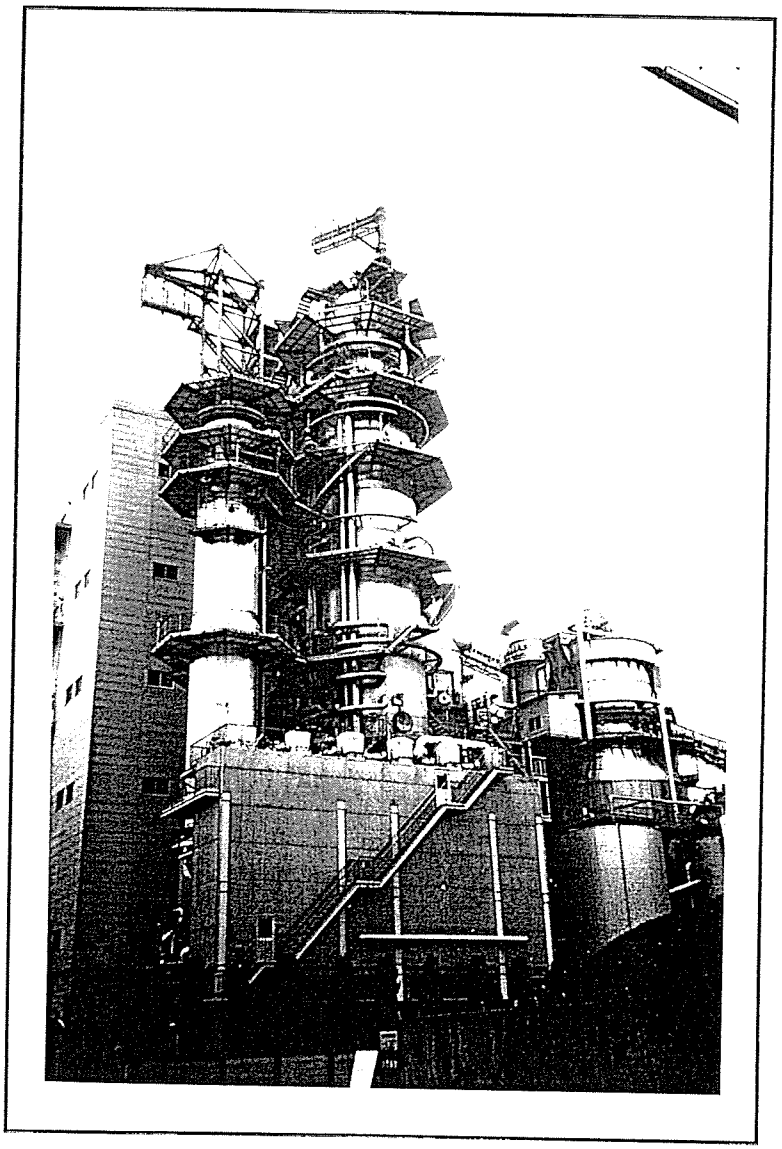


Pulpmill digesters, Japan

CHAPTER ONE

The World's Production of Pulp, Paper and Paper Boards



Pulpmill digesters, Japan

1 THE WORLD'S PRODUCTION OF PULP, PAPER AND PAPER BOARDS

INTRODUCTION

The forecast for the Australian forests products industry, under an assumed modest economic growth and a recovery in residential construction, is for an increase in domestic consumption. Sawn timber consumption is forecast to rise six percent in 1991-92 and by two percent per annum over the medium term, while wood-based panel consumption is forecast to rise by nearly three percent in 1991-92 and by 4.5 percent per annum in the medium term. However, consumption of paper and paper products is projected to rise by less than one percent in 1991-92 but by three percent a year over the medium term.

The Australian Bureau of Agricultural and Resource Economics (ABARE) summary and projections of Australian consumption statistics for forest products is given in Table 1.

Table 1: Summary and projections of Australian consumption statistics for forest products

	Unit	*1989 -90*	*1990 -91$_p$*	*1991 -92$_f$*	*1992 -93$_z$*	*1993 -94$_z$*	*1994 -95$_z$*	*1995 -96$_z$*	*1996 -97$_z$*
Sawn timber	'000m^3	4556	4100	4350	4450	4550	4640	4730	4825
Wood based panels									
Particleboard	'000m^3	738	605	641	673	700	728	757	788
Plywood	'000m^3	181	155	126	118	127	138	149	161
Hardwood and softboard	'000m^3	123	102	105	108	111	114	116	118
Medium density fibreboard	'000m^3	210	220	241	255	268	282	295	313
Total	'000m^3	1252	1082	1113	1154	1206	1262	1317	1380
Paper and paper products									
Newsprint	kt	672	581	580	606	630	650	663	676
Printing and writing	kt	772	709	712	737	763	786	806	822
Tissue	kt	162	139	143	148	153	157	161	165
Packaging and industrial	kt	1112	1093	1104	1137	1165	1188	1212	1236
Total	kt	2718	2522	2539	2628	2711	2781	2842	2899

$_p$ Preliminary $_f$ ABARE forecast $_z$ ABARE projection

The international trade in forest production is growing annually and as Australia is heavily dependent on imports to meet its consumption demands we are increasingly dependent upon this trade. For example, imports provided around 30 percent of sawn timber requirements in 1990-91 and are expected to continue to supplement Australian suppliers (Table 2). Details of Australia's trade in forest products are shown in Table 3. The data reveal that Australia is a large net importer of newsprint, printing and writing paper, plywood, sawn timber and wood pulp. On the other hand Australia is a large net exporter of pulpwood in the form of woodchips. In 1989-90 Australia imported $2309 million of forest products compared with exports of $548 million. Pulpwood export accounted for 68 percent of the export value.

International trade in forest products range from commodities to specialty products with the advanced, heavily populated regions, such as Western Europe and Japan, leading in higher value specialty products. Other regions, such as Australia, North America and South America tend to produce and trade in the lower value commodities.

Australia has a comparatively small export trade in forest products centred mainly on low value added commodities such as pulpwood. The high value added component of imports, by comparison is large, hence, our untenable and undesirable balance of payment figures for the industry (Table 3).

Table 2: Imports required to meet demand

	ACTUAL					
	1990-91	*1990*	*2000*	*2010*	*2020*	*2030*
	'000m^3	*000m^3*	*'000m^3*	*'000m^3*	*'000m^3*	*'000m^3*
High consumption						
Sawn timber consumption (ABARE)	4042	4420	5577	5438	5886	6460
Availability (AFC)						
- softwood	1292	1644	2722	3443	3870	3897
- hardwood	1530	1624	1411	1406	1450	1398
Total availability	2822	3268	4133	4849	5320	5295
Level of imports required	1235	1152	1444	589	566	1165
Low consumption						
Sawn timber consumption (ABARE)	4042	4420	5077	4730	4877	5156
Availability (AFC)						
- softwood	1292	1644	2722	3443	3870	3897
- hardwood	1530	1624	1411	1406	1450	1398
Total availability	2822	3268	4133	4849	5320	5295
Level of imports required	1235	1152	944	(119)	(443)	(139)

ABARE's high and low consumption projections have been compared with the Australian Forestry Council's projections of availability, and 1990-91 actual figures.

For a country such as ours, rich in forest resource and exporting low value added commodities, access to markets is considered straightforward. Competitiveness is commonly believed to be a matter of having lower delivered costs than the competition. Cost competitiveness is believed to be derived from operating large scale plant and obtaining low priced outputs. For value added speciality products, cost competitiveness is not considered sufficient. Other factors such as quality, consistency, reliability and market strategy will influence market success. With regard to value added non-commodity products, marketing tends to favour differentiation of the product from its competitors in the eyes of the customer.

While this view prevails, the Australian forest products industry will risk maintaining the current imbalance in trade and will find our market share of our major export (pulpwood) eroded. It is the aim of this work to detail the unique characteristics of the international trade in pulpwood and Australia's position in this market. I hope to clearly demonstrate why quality, consistency, reliability and market strategy is as important as unit cost in maintaining or gaining market share with reference to pulpwood exports.

Table 3: Australian production and trade in forest products, 1989-90

Product	*Production*	*Imports*	*Exports*
Paper'000 tonnes			
Newsprint	384	288	0
Printing and writing	369	435	32
Tissue	163	0	1
Packaging and industrial	1087	148	123
Panel products ('000m^3)			
Particleboard	743	15	20
Plywood	125	58	2
Hardwood	112	3	1
Softboard	11	0	2
Other products			
Woodchips ('000 tonnes)	4774	0	4774
Railway sleepers ('000m^3)	142	1	4
Sawn wood ('000m^3)	3330	1727	21
Wood pulp ('000m^3)	1037	27	62

Sources: ABARE (1990a and 1990b)

WORLD PRODUCTION OF PULP, PAPER AND PAPERBOARDS

The nature and strength of the pulpwood industry has been moulded and driven partly by the demand exerted by the international pulp, paper and paperboard industry. As such, it is worthwhile diverting from the major thrust of this document to briefly describe the characteristics and trends evident within the international pulp, paper and paperboard industry. By doing so the uniqueness of the international trade in pulpwood will be emphasised.

The world's production of paper and paperboard experienced a prolonged period of growth throughout the 1980s. Production increased by 2.3 percent to a total of 238 781 000 tonne from 1989 to 1990, while from 1990 to 1991 production increased by a mere 0.7 percent to 240 811 000 tonne; the ninth successive year increased production has been attained.

During 1989 to 1990 the largest increase in production was experienced in the printing and writing grades, with an increase of 3.51 percent to produce a total 67 726 000 tonne. Newsprinting exhibited a modest increase of 1.98 percent to 89 535 000 tonne, while other board grades increased by 1.01 percent to 24 209 000 tonne, and "other" paper grades exhibited a negative growth of -0.72 percent to 24 532 000 tonne. During the period 1990 to 1991 packaging grades displayed the largest percentage increase up 2.25 percent to 91 786 000 tonne, followed by the printing and writing grades up 1.08 percent to 68 345 000 tonnes. Other board grades also recorded a 1.36 percent increase to 24 498 000 tonne, while newsprint and other paper grades exhibited decreased production down 1.89 percent to 32 234 000 tonne and 2.58 percent to 23 948 000 tonne respectively. The two largest categories of paper and board grades are printing and writing grades and packaging grades. These categories have also displayed the largest growth rates increasing 36.5 percent and 44.3 percent respectively since 1985.

Total production, consumption and growth of the paper and paperboard industry varies markedly between geographic regions. The largest producer is North America which has increased its production by 17.4 percent since 1985 and in 1991 produced 88 722 000 tonne. Western Europe is the next largest producer, increasing production by 28.4 percent since 1985 to produce 63 065 000 tonne in 1991. The third largest producer and the region exhibiting the largest growth in production is the Asian region. Production has increased 59.4 percent since 1985 and in 1991 Asia produced 60 448 000 tonne. Only Eastern Europe recorded a negative growth and since 1985 decreased production by 28.5 percent to 12 044 000 tonne. A breakdown of production by year, grade and region is given in Table (?).

Unlike paper and paperboard production, the total production of pulp fell for the second consecutive year. From 1989 to 1990 production fell by 1.8 percent, while from 1990 to 1991 production fell by 173 000 tonne or 0.7 percent to a total of 162 400 000 tonne. Pulp now accounts for c. 67.5 percent of the industry's furnish and this percentage has been declining by about one percent point each year as a result of a record demand for recycled and non-wood fibre alternatives.

The world's production of chemical pulps increased slightly from 1990 to 1991, from 119 600 000 tonne to 120 396 000 tonne, after recording a 2.43 percent decrease in production in the previous year. Mechanical pulps on the other hand recorded a -2.4 percent decrease in production to 34 710 000 tonne after recording a 1.25 percent increase in production during the previous year. The other pulp grades also displayed a decreased production, recording a -1.5 percent decrease to yield 7 291 000 tonnes.

Most geographic pulp producing regions exhibited decreased production. The most marked reduction was in the eastern European bloc recording a 18.89 percent decrease to 10 231 000 tonne. This decrease follows a 19.9 percent decrease for the previous year. Western Europe, Scandinavia and the E.E.C. countries exhibited reductions of 0.3 percent, 2.9 percent and 0.9 percent respectively. Only Asia recorded increases in production of any significance, recording a 4.56 percent growth in production to 26 386 000 tonne. A breakdown of pulp product by year, grade and region is given in Table 4.

Table 4: **World paper and paperboard production by grade and region, 1985-1991 (source P.P.I. 1991) (x1000 tonne)**

REGION	*GRADE*											
	Newsprint		*Printing and Writing*		*Packaging*		*Other Paper*		*Other Board*		*Total*	
	1985	*1991*	*1985*	*1991*	*1985*	*1991*	*1985*	*1991*	*1985*	*1991*	*1985*	*1991*
EEC	1950	3180	10855	14526	9304	12606	4063	4329	3678	5172	29850	39813
Scandinavia	4282	4230	4834	6952	3848	4155	880	887	2228	2679	16072	18903
Other W. Europe	473	636	1150	1767	814	1069	221	298	492	579	3150	4349
Total W. Europe	6705	8046	16839	23245	13966	17830	5164	5514	6398	8430	49072	63065
E. Europe	1886	1607	2930	1869	4245	4017	2482	1985	5345	2566	16888	12044
Total Europe	8591	9653	19769	25114	18211	21847	7646	7499	11743	10996	65960	75109
North America	13915	15182	18618	23447	25239	38310	6837	6927	10677	4856	75286	88722
Latin America	942	969	2135	2551	3831	4922	1270	1571	1035	959	9213	10972
Asia	3788	5310	8807	16208	13521	24146	6565	7499	5565	7285	38246	60448
Australasia	679	721	294	424	672	1366	216	253	473	64	2334	2828
Africa	351	399	458	601	957	1195	173	199	307	338	2246	2732
Total World	**28266**	**32234**	**50081**	**68345**	**62431**	**91786**	**22707**	**23948**	**29800**	**24498**	**193285**	**240811**

Table 5: World pulp production by grade and region, 1985-1991 (source PPI) (x1000 tonne)

REGION	GRADE							
	Chemical Pulp		*Mechanical Pulp*		*Other Pulp*		*Total Pulp*	
	1985	*1991*	*1985*	*1991*	*1985*	*1991*	*1985*	*1991*
EEC	5112	6086	2716	3508	630	235	8458	9829
Scandinavia	12242	12710	6411	7158	424	492	19077	20360
Other W. Europe	1122	1096	380	571	125	140	1627	1807
Total W. Europe	18476	19892	9507	11237	1179	867	29162	31996
E. Europe	10232	8284	2306	1825	266	122	12804	10231
Total Europe	28708	28176	11813	13062	1445	989	41966	42227
North America	54772	63302	13487	16457	1304	1466	69563	81225
Latin America	5312	6386	608	732	7335	720	6579	7838
Asia	8505	19988	2428	2976	659	3422	18268	26386
Australasia	573	1178	922	1058	510	102	2005	2338
Africa	1118	1366	524	425	552	592	2194	2383
Total World	**98988**	**120396**	**29782**	**34710**	**11805**	**7291**	**140575**	**162397**

The slowing of growth in the pulp, paper and paperboard industry evident during the early 1990s is attributable to a number of factors. Firstly, a run of profitable years and strong demand during the late 1980s prompted companies to increase capacity. The result was excess supply and thus falling prices and profits. Secondly, there is a general economic slow down world-wide, particularly in some of the larger paper consuming countries such as the United Kingdom and the United States of America with its subsequent effect on demand. Thirdly, environmental pressure and media exposure have prompted consumers to seek wood free substitutes for paper products (see section below). Finally, some commentators believe the large cyclic variation in price, production and profitability experienced by the industry is largely a result of the unique characteristics of the industry itself and the boom and bust cycle may be brought on and consequently controlled by the industry's managers themselves (PPI 1992).

WORLD TRADE IN PULP, PAPER AND PAPER BOARDS

There exists a marked difference between countries in their apparent per capita consumption of paper and paper products (Table 6). The difference is not necessarily related to the country's capacity to produce pulp, paper and paperboards. but more readily reflects the affluence, and to some extent culture, of the country concerned. As a consequence of the difference which exists between production and consumption in any one country, there has developed a large trade in pulp, paper and paperboards within the international community.

Table 7 lists the top thirty paper and paperboard producing countries and the top thirty paper and paperboard consuming countries. The table emphasises the large international trade in paper and paperboard products, as most countries are either net importers or net exporters. However, what is termed the international trade in paper and paperboards is mostly intra-regional trade. The three large geographical markets are North America, Western Europe and Japan and these regions are largely self-sufficient in paper and paperboards, however, North America and Western Europe are also net exporters to other areas in the world.

Table 6: **Apparent per capita consumption of major paper consuming countries (Kg) (1990 base)**

Country	*Weight*	*Country*	*Weight*
USA	311.4	United Kingdom	163.5
Finland	279.2	Taiwan	165.9
Germany	231.5	France	158.1
Sweden	230.7	Norway	155.1
Japan	228.3	Italy	123.2
Canada	215.3	Hong Kong	116.4
Switzerland	214.5	Spain	111.8
Belgium	210.1	Israel	106.5
Denmark	205.4	South Korea	103.7
Netherlands	203.2	Iceland	103.6
Singapore	188.9	Cyprus	103.4
New Zealand	168.9	Ireland	99.6
Austria	166.4	Czechoslovakia	79.4
Australia	164.8	Portugal	74.5
Luxembourg	164.0	Malta	72.6

To emphasise this point one need only to view the 1990 export figures of paper and paperboard from the Nordic region where 82 percent of Nordic export went to Europe (Torbjörn 1991).

Table 7: **The world's largest paper and paperboard producing and consuming nations for 1991 (x 1000 tonne) (source P.P.I.)**

PAPER AND PAPERBOARD PRODUCTION			*PAPER AND PAPERBOARD CONSUMPTION*		
	1991	*% change 91/90*		*1991*	*% change 91/91*
1. USA	72 151	1.0	1. USA	76 378	-1.7
2. Japan	29 068	3.5	2. Japan	29 106	3.1
3. Canada	16 571	0.2	3. Germany	15 931	3.0
4. China, Peo. Rep.	14 787	7.8	4. China, Peo. Rep.	15 888	10.1
5. Germany	12 762	-0.1	5. United Kingdom	9 177	-2.0
6. Finland	8 777	-2.1	6. France	8 766	0.2
7. Sweden	8 342	-1.0	7. CIS	7 692	-20.8
8. CIS	7 682	-21.6	8. Italy	7 121	0.5
9. France	7 322	3.9	9. Canada	5 688	1.2
10. Italy	5 786	1.0	10. Korea, Rep. of	4 877	13.2
11. United Kingdom	4 951	0.8	11. Spain	4 582	5.6
12. Korea, Rep. of	4 922	8.8	12. Brazil	4 182	0.7
13. Brazil	4 888	0.9	13. Taiwan	3 593	8.2
14. Taiwan	3 746	12.3	14. Netherlands	3 269	7.2
15. Spain	3 426	-0.6	15. Mexico	3 240	8.7
16. Austria	3 090	5.4	16. Australia	2 645	-5.7
17. Mexico	2 896	0.9	17. India	2 576	2.0
18. Netherlands	2 860	4.3	18. Belgium	2 182	4.4
19. India	2 400	4.6	19. Sweden	1 882	-4.0
20. Australia	2 028	0.8	20. South Africa	1 557	-0.3
21. South Africa	1 905	0.1	21. Switzerland	1 431	-1.2
22. Norway	1 784	-2.0	22. Indonesia	1 430	4.2
23. Indonesia	1 700	18.2	23. Austria	1 368	6.6
24. Switzerland	1 259	-2.8	24. Finland	1 262	-9.0
25. Belgium	1 126	-5.9	25. Turkey	1 148	3.2
26. Czecho-Slovakia	1 045	-21.0	26. Thailand	1 373	15.4
27. Thailand	1 015	15.7	27. Argentina	1 117	34.3
28. Poland	1 000	-6.0	28. Denmark	1 105	3.5
29 Argentina	963	4.0	29 Malaysia	1 072	5.6
30. Portugal	866	10.9	30. Hong Kong	1 015	12.8

Market pulp

While trade in the semi-commodity products of paper and paperboards is essentially intra-regional, trade in pulp commodities is truly international. Pulp traded in the international arena is termed market pulp and is usually surplus to integrated operations or produced specifically for the international market.

World production of all grades of market pulp totalled 34.1 million tonne in 1990, down by 2.8 percent from 1989 production levels. Prices of market pulp have also decreased substantially in recent times, however, the decreased prices and downturn in production are not solely attributable to the cyclic boom or bust pattern evident in the pulp and paper industry. Environmental concerns, especially in the chlorine bleached fields, have recently asserted influence.

Regional production by market pulp grades for 1990 are given in Table 8. The dominant grade of market pulp is the bleached kraft, which accounted for 68.9 percent of production. Bleached softwood kraft accounted for 40 percent of production in 1990, down one percent from the 1989 figure. Bleached hardwood pulp accounted for 28.9 percent of production down 3.2 percent from 1989 figures. Bleached hardwood kraft market pulp is expected to increase its importance and percentage share of the market when major projects in Latin America begin production in 1992. The only grades to have increased their outputs for 1990 were chemi-thermomechanical pulp and recycled grades. However, these grades account for only 4.1 percent and 0.6 percent of production respectively.

The largest market pulp exporting countries were the USA, Canada, Sweden, Finland, Norway and Brazil. The tonnages these countries export and the receiving geographical regions are given in Table 9. It can be seen from this table that market pulp is truly an internationally traded commodity.

Table 8: Regional production of market pulp by market pulp grade for 1990 (x 1000 tonne) (source P.P.I.)

GRADE	*REGION*						
	Europe	*North America*	*Latin America*	*Asia*	*Australasia*	*Africa*	*1990 Total*
BSK	3741	8834	765	100	138	75	13653
BHK	4016	3266	1431	978	-	171	9862
UBK	575	579	361	268	138	146	2067
Sulfite	1955	580	23	26	-	-	2584
Dissolving	396	1604	22	350	-	219	2591
Semichemical	207	-	-	40	-	-	247
Soda	-	-	83	-	-	-	83
SGW	472	71	-	-	-	-	543
RMP,CMP,TMP	140	235	-	-	10	-	385
CTMP	383	839	60	-	110	-	1392
Non Wood	94	162	25	162	-	53	496
Recycled	87	118	-	-	-	-	205
TOTAL	**12066**	**16288**	**2770**	**1924**	**396**	**664**	**34108**

BSK = Bleached softwood kraft (sulfate)
BHK = leached hardwood kraft (sulfate)
UBK = Unbleached kraft
SGW = Stone ground wood
RMP = Refiner mechanical pulp; CMP = Chemi-mechanical pulp; TMP = Thermomechanical pulp
CTMP = Chemi-thermomechanical pulp

Table 9: **1990 export tonnages of market pulp from six major producers (x 1000 tonne)* (source P.P.I.)**

MAJOR IMPORT REGION	*EXPORT COUNTRY*					
	USA	*Canada*	*Sweden*	*Finland*	*Norway*	*Brazil*
Europe	2031	2226	2434	1280	560	358
North America	207	3718	38	8	-	334
Latin America	448	116	-	2	-	19
Asia	2202	1471	248	107	16	257
Australasia	46	68	13	13	-	4
Africa	118	4	36	5	6	1
TOTAL	**5052**	**7602**	**2769**	**1415**	**582**	**973**

* Lists export market pulp and does not account for domestic consumption.

The role of wastepaper

Pulp accounted for 67.5 percent of the world's furnish requirements in 1991 compared with 67 percent in 1990 and 70 percent in 1989. Increasingly the role of pulp as a furnish is being replaced by recycled wastepaper, not only in the newsprints, but also in higher quality recycled printing paper grades; a recent trend as traditionally wastepaper has been associated with the lower quality grades. Table 10 lists the wastepaper recovery and consumption, trade, utilisation rate and recovery rate by region.

There are marked differences in wastepaper consumption and utilisation between countries depending upon culture, taste and the availability of raw resources. For example, Hong Kong had a 100 percent utilisation rate in 1990 and a recovery rate of 72 percent. However, Australia's utilisation rate for the same period was 42 percent and the recovery rate was 28 percent.

Table 10: **Wastepaper recovery, consumption, trade, utilisation and recovery rate by region (1990) (source P.P.I.)**

Region	*Recovery (x 1000 tonne)*	*Consumption (x 1000 tonne)*	*Imports (x 1000 tonne)*	*Exports (x 1000 tonne)*	*Utilisation %*	*Recovery %*
EEC	19104	19447	4059	3673	51	37
Nordic	1546	1612	378	260	8	39
Other W. Europe	1381	1760	729	350	42	50
E. Europe	4806	4494	162	186	29	32
Total Europe	26837	27313	5328	4469	35	36
North America	27552	21558	609	6162	25	33
Latin America	3762	4811	1118	4	44	33
Asia	23898	28058	5230	680	49	39
Australasia	870	896	61	35	32	26
Africa	820	872	30	-	32	23
Total World	**85413.8**	**85178.2**	**12623.5**	**1157.0**	**35**	**35**

Utilisation = Wastepaper consumption as a percentage of total paper and board production.
Recovery = Wastepaper recovery as a proportion of total paper and board consumption.

Future prospects for pulp, paper and paperboard

During the early 1980s the outlook for the pulp, paper and paperboard industry was not one of optimism. However, many of the fears of the period concerning saturation and stagnation, electronic media, the paperless office and plastic packaging, proved to be without foundation. Most commentators now suggest that consumption and demand for pulp, paper and paperboard will increase, albeit not at the rapid increments experienced during the late 1980s.

The wealth of the industrialised world is concentrated in the three large regions of North America, Japan and Europe. They account for 15 percent of the world's population but 60 percent of the world's GNP and 80.3 percent of the world's pulp, paper and paperboard consumption. Any forecast of future consumption levels should effectively take into account the forecasts for these three regions. However, the importance and future importance of Asian countries cannot be overlooked. For example, if the newly industrialised countries (NIC) of Korea, Taiwan, Hong Kong and Singapore, increase their per capita consumption of paper and paperboards by 50 kg a^{-1} an extra 3.56 million tonne of paper and paperboard would be required per annum. If China alone was to increase its per capita consumption from 12.6 kg a^{-1} to 20 kg a^{-1} a further 8.46 million tonnes a^{-1} would be required. These assumptions, while seemingly hypothetical, are likely to be conservative, for example the per capita consumption of paper and paperboard in Korea has increased from 40.4 kg per capita per annum in 1980 to 101.1 kg per capita per annum in 1990 and is forecast to be 270.7 kg by the year 2000 (Lee 1991). Consequently, because of its large population base and rapid economic development, future developments in the Asian arena must be carefully assessed.

Most forecasts of future consumption are based upon GDP forecasts. However, these do not take into account changes in the end use sectors and the substitution of materials, as a consequence forecasts of future consumption vary widely. Salonen and Niku (1988) make the projection that 417.2 million tonnes of paper and paperboard will be consumed world-wide by 2016. To meet this increase and to compensate for the closures of existing facilities, 60 to 80 new paper machines and 150 to 200 major rebuilds will be required annually over the next 30 years. This translates to a capital investment of approximately US$10 billion a^{-1} by the industry.

Some respected pundits forecast that the world consumption of paper and paperboards will exceed 305 000 000 tonne by the year 2000. This is an extra 61 443 400 tonne amounting to a 25.2 percent increase in production from 1990. (FAO 1985; Simons 1990; Jaakko Pöyry 1991). The largest increment is expected in the printing and writing grades, followed by containerboard. Figure 1 shows the expected increments by grades from 1990 to 2000.

As with paper and paperboard consumption, consumption of pulp is expected to increase more or less in proportion with paper and paperboard consumptions, although some substitution of wastepaper is likely (PPI 1991).

World demand for market pulp is expected to grow at approximately 2.3 percent a^{-1} to produce a 10 000 000 tonne increase in the volume of market pulp consumed world-wide. Bleached kraft pulp is expected to show the largest percentage increase and also the largest increase in absolute terms (Figure 2). Substantial increments in consumption of bleached kraft market pulp are expected in the three major regions of North America, Europe and Asia (Figure 3). However, the increase in Asia is the most dramatic in percentage terms and in absolute growth terms and is expected to exceed that of North America.

While consumption is forecast to grow, investment in the pulp, paper and paperboard industry, for the maintenance of current production and to meet future consumption increases, has fallen to its lowest level in four years. Low prices for pulp, paper and paperboards, surplus production capacity and recession in two of the largest consuming regions are cited as causes for reducing investment (PPI 1992). Many companies have used this period to restructure and concentrate their interests, through mergers and takeovers. This will generally have the effect of greater globalisation of the industry with greater concentration of ownership (Aurell and Pöyry 1988; Clarke 1991).

Table 11 lists the additions to capacity by region since 1982. It is evident that the regions are reducing investments in extra capacity. Again the notable exception is Asia which reported a 31 percent growth in capacity. Pulp capacity has also shown a marked downturn with a total of 12.5 million tonne due to come on stream in 1992-1995. This is a downturn of 22 percent from the previous period (1991-1994). Once again Asia is the notable exception and reports a 6.2 percent increase in capacity over the 1991-1994 period.

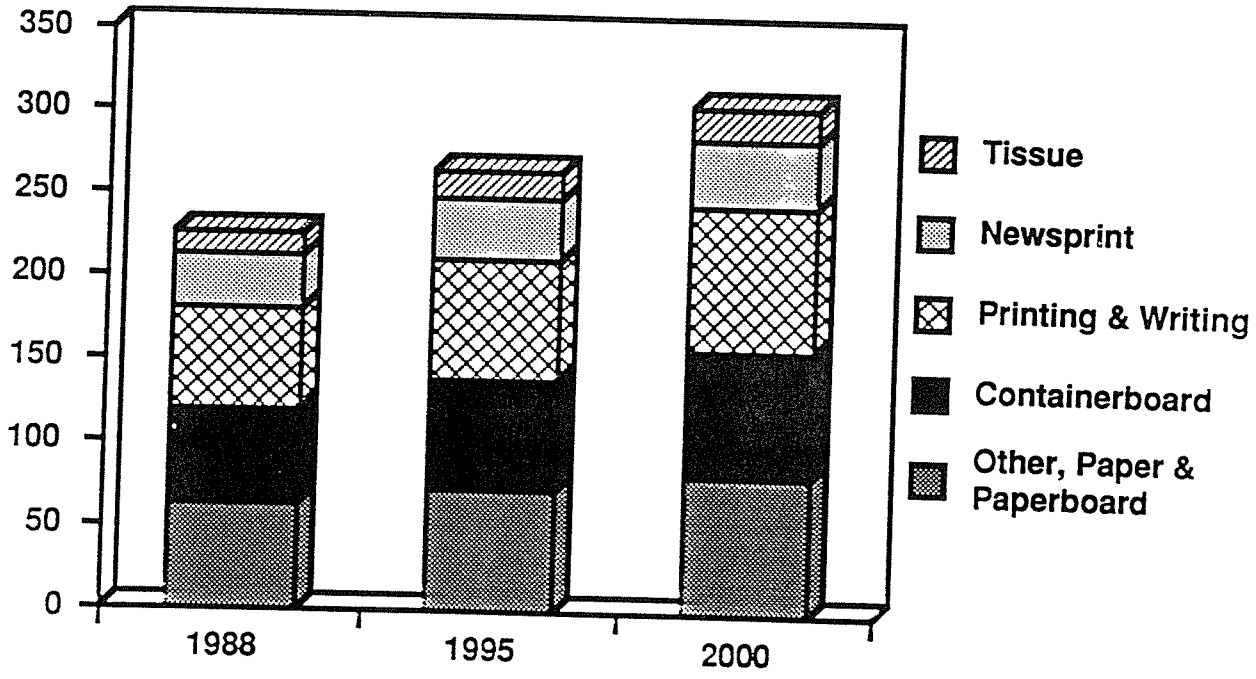
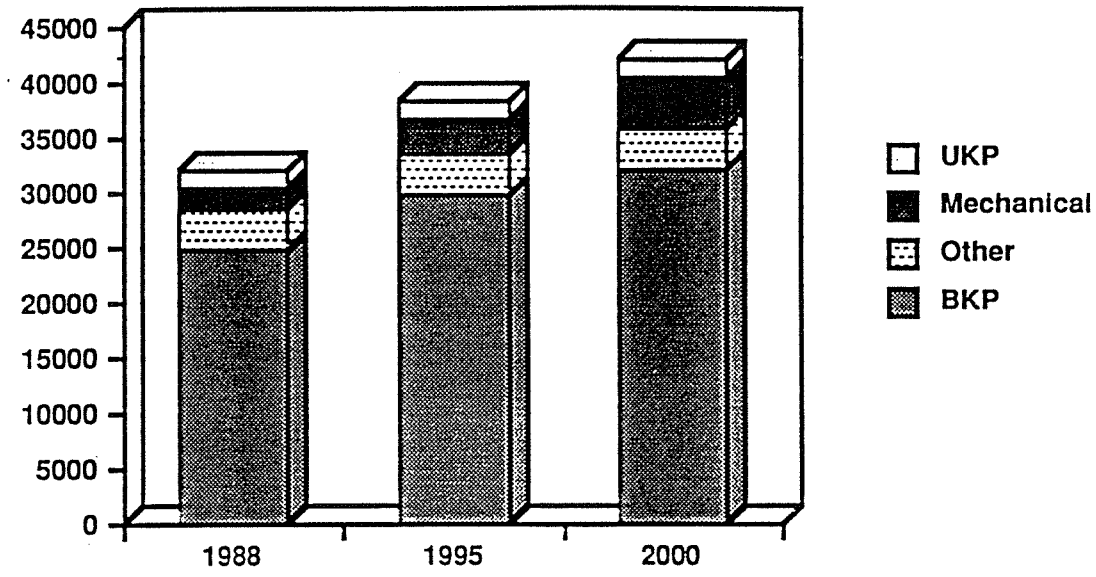


Figure 1: **World Paper and Paperboard Demand 1988-2000** (millions of tonnes) (source Simons 1990)



Other = sulfite, dissolving

Figure 2: **World Market Pulp Demand 1988-2000**
(000 tonnes) (source Simons 1990)

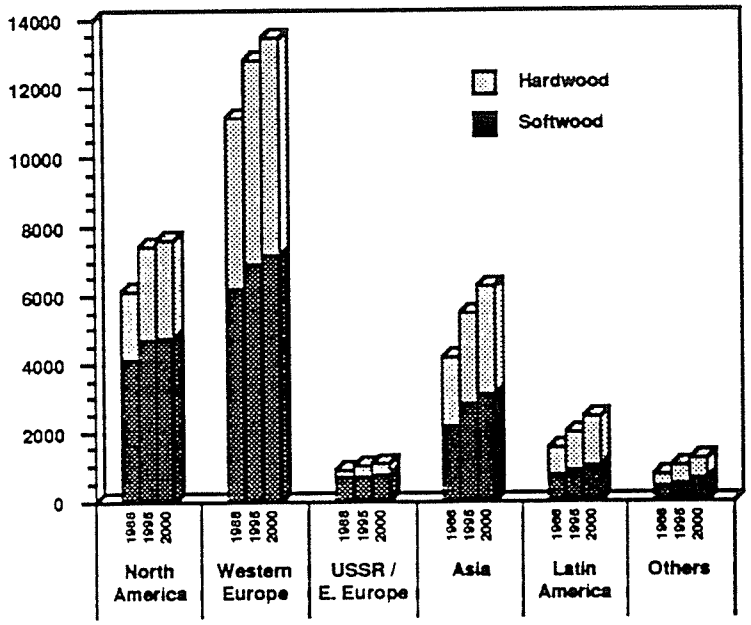


Figure 3: **Estimated Global Market BKP Demand 1988-2000**
(thousands of ADMt) (source Simons 1990)

Table 11: Capacity additions 1982-1995 (x 1000 tonne a^{-1}) (source P.P.I.)

	PERIOD									
REGION	*1983-86*	*1984-87*	*1985-88*	*1986-89*	*1987-90*	*1988-91*	*1989-92*	*1990-93*	*1991-94*	*1992-95*
Paper and Board										
Africa	1 034	930	754	258	302	193	255	140	44	23
Asia	2 964	5 359	4 254	3 217	3 254	2 405	2 050	1 380	1 555	2 037
Australasia	522	250	195	275	315	164	562	375	360	230
Europe	3 623	4 538	5 111	5 295	5 414	4 582	8 413	8 413	7 799	6 820
North America	3 667	3 249	3 999	4 946	2 160	4 585	6 572	5 856	4 117	2 475
Latin America	2 126	1 920	1 336	906	393	393	1 277	2 245	1 810	1 310
Total	**13 936**	**16 246**	**15 649**	**14 897**	**11 838**	**12 321**	**19 129**	**18 409**	**15 685**	**12 895**
Pulp										
Africa	1 768	1 395	775	450	555	460	460	160	105	60
Asia	2 216	1 986	2 068	1 725	1 098	1 065	706	1 120	1 810	1 930
Australasia	250	152	102	105	105	230	1 000	590	635	525
Europe	2 506	2 551	2 359	3 502	3 158	2 628	3 835	5 090	4 735	3 585
North America	3 327	2 745	2 653	2 082	1 564	2 984	4 386	5 232	4 277	3 600
Latin America	2 279	1 908	1 587	1 775	1 490	1 976	3 020	4 475	4 305	2 615
Total	**12 346**	**10 737**	**9 544**	**9 639**	**7 970**	**9 343**	**13 407**	**16 667**	**15 867**	**12 315**

Table 12 lists the world paper and paperboard additions from 1992-1995 for firm projects and projects at advanced planning stages, for the major grades. The total additions to 1995 amount to 13 131 900 tonne, which is only 21.4 percent of the additional capacity needed to meet the projected world consumption expected in 2000.

Table 12: World paper and paperboard capacity additions from 1992-1995 (x 1000 tonne)

Region	*Newsprint*	*Printing and Writing*	*Packaging*	*Tissue*	*Other Paper*	*Case Making*	*Other Board*	*Total*
Africa	0	23	0	0	0	0	0	23
Asia	492	830	0	0	0	390	325	2037
Australasia	80	0	0	0	0	150	0	230
Europe	1585	2826	100	320	168	1255	546	6820
North America	365	340	0	105	0	815	850	2475
Latin America	440	570	80	0	40	50	130	1310
Total	**2962**	**4589**	**180**	**425**	**208**	**2660**	**1851**	**12895**

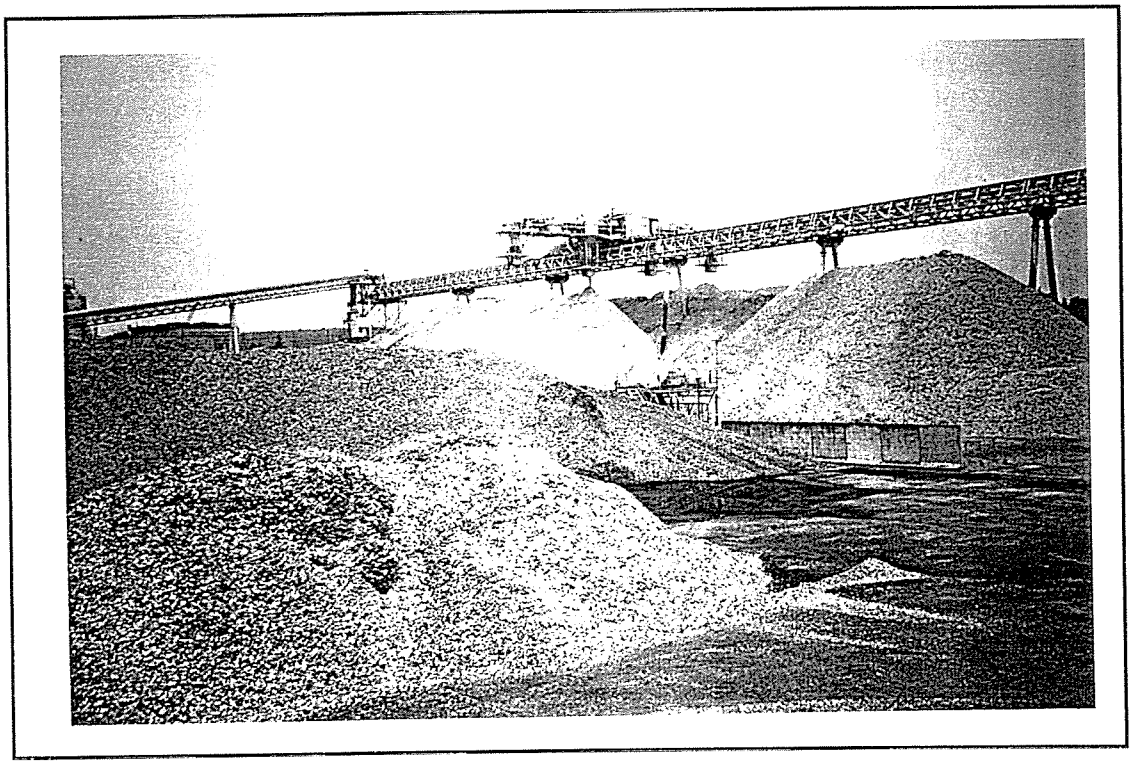
As pointed out by Pöyry (1991), "It is important for the industry to fulfil this growing demand. In fact, it is as important as the ongoing structural changes in the industry, even though these changes are more frequently discussed than the demand situation. Globalisation in the forest industry is an important process, but will not of itself produce more paper." To meet the expected demand at the turn of the century, investment in new capacity will have to grow at levels greater than those experienced at the end of the 1980s (O'Brien and Pearson 1991).

In summary, the world's production of pulp, paper and paperboard has slowed after dramatic growth during the 1980s. The world's production of paper is centred in Europe, North America and Japan, and the trade in paper and paperboards tends to be intra-regional rather than truly international, however, this trend is likely to change as a result of the restructuring of the industry due to the current downturn within the industry. The world trade in pulp on the other hand is truly international rather than intra-regional.

The predictions for the world's demand and consumption of pulp paper and paperboards is predicted to increase at approximately 2.5 percent per annum.

CHAPTER TWO

The World Trade in Pulpwood and the Influence of the Japanese Pulp and Paper Industry



Pulpmill woodyard Japan

2 THE WORLD TRADE IN PULPWOOD AND THE INFLUENCE OF THE JAPANESE PULP AND PAPER INDUSTRY

INTRODUCTION

There is little doubt that the world demand for paper and paper products will continue to increase and, as a consequence, world demand for pulp will also escalate. The major raw material for producing pulp furnish is wood fibre and a large international trade in pulpwood has developed to meet this need.

In the last thirty years the international trade in pulpwood has undergone massive changes in product flow and form, value and distribution mechanisms. For example, in the early 1960s total world imports of pulpwood totalled c. 12 000 000 cubic metres and most of this volume was in the form of conifer roundwood traded between boarder countries. At this time leading importers included the USA (23.5 percent), West Germany (15 percent), Norway (9.5 percent), Italy (9.5 percent), France (7 percent), East Germany (5.7 percent) and Sweden (5.1 percent). At the time the three largest pulpwood exporters were Finland, Canada and the Soviet Union.

During the period 1960-1965 the world trade in woodchips amounted to only 523 000 m^3a^{-1} (FAO, 1984). Because woodchips have low value and a low weight per unit volume ratio, efficient movement of the commodity was difficult and expensive. The first large scale movement of woodchips was undertaken by the Japanese pulp and paper industry in a converted oil tanker fitted with specialised chip loading equipment, and by 1964 the Japanese paper industry had introduced a vessel designed especially for the transportation of woodchips. This ship differed from other bulk carriers by having higher sides, a flat hull and onboard chip loading equipment. With such a configuration the load was not limited by volume alone and greater tonnages were moved before volume capacity was exceeded. The success of this vessel's introduction was to dramatically alter the nature, scale and value of the international trade in pulpwood.

In 1990 the world trade in pulpwood totalled c. 49 000 000 cubic metres. Half of this volume was traded as pulpwood while half was traded as woodchips (Hagler, 1992). The dramatic increase in the volumes of woodchips traded, from c. 500 000 cubic metres in 1960 to over 20 000 000 cubic metres in 1990, is directly attributable to the evolution of specialised woodchip transport vessels and the development of an ocean trade in the product. This in turn has facilitated the development and acceptance of woodchips as an increasingly standardised, internationally traded forest product. The trade in pulpwood (roundwood), on the other hand, has basically remained restricted to "boarder" trade between neighbouring countries.

After its successful introduction of woodchip transport vessels, Japan rapidly began to dominate the international trade in woodchips. By 1967 Japan had established itself as the largest importer of woodchips in the world, and by 1976 Japan was responsible for c. 73 percent of the world trade in woodchips. In recent years Japan has accounted for over 77 percent of the total international trade. Other countries which import woodchips include Sweden (c. 8 percent), USA (c. 4 percent), Norway (c. 3 percent) and Finland (c. 4 percent). The dominance of Japan in the international woodchip market is clearly demonstrated if one removes the data for the intercontinental boarder flows between the Scandinavian countries and between Canada and the USA from the supply scenario, in which case Japan accounts for over 90 percent of the international trade.

As Japan is the dominant importer of woodchips and Australia, being an island state and dependent upon oceanic trade, this discussion will concentrate on Japan and the international trade in woodchips. Other countries which import woodchips, with the exception of Taiwan and Korea, are too remote to our ports to be considered potential importers of Australian woodchips at this point in time.

STRUCTURE OF THE JAPANESE PULP AND PAPER INDUSTRY

Paper and Paperboards

Japan's per capita consumption of paper and paper products has increased from 228.3 kg/person in 1990 to 234.6 kg/person in 1991, the fifth highest in the world. Consuming 28 218 000 tonnes of paper and paperboards in 1990 and 29 107 000 tonnes in 1991, Japan is ranked second behind the USA as the largest consumer country of paper products. Japan is also ranked second behind the USA in terms of total production, producing 28 086 000 tonnes of paper and paperboard in 1990 and 29 068 000 tonnes in 1991. As such, the country is largely self-sufficient in paper and paperboard products, despite the massive size of the Japanese demand.

Imports of paper and paperboards totalled only 1 033 000 tonnes (3.68 percent of production) in 1990 and 1 078 000 tonnes (3.71 percent of production) in 1991, most of which was newsprint (42 percent) and printing and writing papers (22 percent). Exports totalled 900 000 tonnes in 1990 and 1 038 900 tonnes in 1991, most of which (56 percent) were printing and writing papers. Exports have risen dramatically (by 66.7 percent from 1989 to 1990 and by 15.5 percent from 1990 to 1991), largely due to the excess of supply which exists within the industry at present. Unlike the two other large centres of pulp and paper consumption, North America and Europe, Japan is largely self-sufficient in paper products and its paper and paperboard industry is not export orientated.

In 1990 printing and writing papers accounted for 9 251 000 tonnes (32.9 percent) of the paper and paperboards produced. This figure had increased to 9 730 000 tonnes (33.5 percent) by 1991. Casing material production totalled 8 275 000 tonnes (29.5 percent) in 1990 increasing to 8 568 000 tonnes (29.5 percent) in 1991, and together with printing and writing papers, are the major grades of product produced by the Japanese industry. During the 1980s the Japanese paper industry underwent rapid expansion, increasing its output from 19 344 000 tonnes in 1984 to 29 068 000 tonnes in 1991, an increase of 42 percent over the period. Figure 4 shows the production by product class for this period and clearly shows the role of printing and writing grades and casing grades in this expansion. Production of printing and writing grades increased 113.8 percent over the period 1984-1991 while the production of casing grades increased by a lesser, but no less spectacular 67.7 percent.

The massive expansion in the supply and demand of paper grade products, particularly during the latter half of the 1980s, is partly attributable to the general strengthening of the Japanese economy over the corresponding period. The strong relationship which exists between Japanese gross national product and paper and board production is clearly evident in Figure 5. While stimulation of the economy translates to greater consumption of all grades, the increase consumption in the paper grades could equally be attributed to what Kaido (1991) terms '*a reappraisal of paper as a communications media*'. The media and advertising sectors began to increase their use of paper grades for advertisements at this time resulting in increased consumption of the higher quality printing and writing grades.

Another factor influencing the consumption of printing and writing grade products was the period of '*office automisation*' which saw the Japanese office become more reliant on computers and the facsimile. This period had a vast effect, not only upon the demand for high quality printing and writing papers, but also for specialised thermosensitive and communications papers. During the mid-1980s the facsimile became a major form of communication between offices and consequently high quality, high resolution reproduction

was not only required for the new modes of communication, but was, and is, a necessity due to the intricate nature of the Japanese script itself. Because of the complexity of the *kanji* characters which, together with *hirangana* and *katakana* characters comprise the Japanese script, it is often easier for business personnel to write communiques by hand and transmit them via facsimile than to type them. Consequently, the need for high resolution reproduction is paramount as slight alteration in the form of the characters may change their meaning. The activities of Japanese business during the period of '*office automisation*' increased the demand for, and consumption of, the higher quality printing and writing grades in excess of the corresponding increases in gross national product.

While the general strength of the economy, the emergence of the print media in advertising, and the period of office automisation may be listed as the major causes of the rise in demand and capacity experienced during the period, two factors which exerted lesser influence are noteworthy. Firstly, a number of elections were held during this period, thus increasing consumption. Secondly, the death of the Emperor dramatically affected demand in the year of his death. The Japanese record years as the period over which the current Emperor has reigned. For example, 1992 was the third year of the reign of Emperor Akihito. Upon the death of Emperor Hirohito all letterheads, calendars etc. required reprinting, which had a once-off affect on demand.

Currently the Japanese pulp and paper industry supports 444 paper and boardmills and 58 pulpmills. Within the pulpmills there are 37 sulfate lines, 3 sulfite lines, 10 semi-chemical lines, 20 mechanical lines and two non-wood lines. Because of the over-capacity problem which exits in Japan at present, the paper and paperboard mills operated at 91 percent capacity (1990 base), while the pulpmills ran at only 82 percent capacity. The total number of employees in the industry totalled 59 707, while capital investment in the industry for 1990 was 407 000 million yen. Half of this investment was directed into new capacity, mainly for producing uncoated wood free, coated printing and communication papers.

In the last few years the structure of the Japanese pulp and paper industry has undergone a sweeping reorganisation. Due to a declining demand, compounded by the supply surpluses generated from the increases in capacity experienced during the late 1980s, the industry is facing its worst depression recorded. As a result the industry has, and is, experiencing a series of mergers and take-overs. For example, Jujo Paper Co. and Sanyo-Kokusaku Pulp Co. announced they will merge on 1 April 1993. Similarly, Oji Paper Co. will merge with Kanzaki Paper Mfg. Co. on 1 October 1993.

This trend is creating larger entities with larger control over market share. For example, the two mergers mentioned above may exceed the threshold of 25 percent market share, which will draw these merges to the attention of the Fair Trade Commission with respect to the anti-monopoly laws. While the names, structure and market position occupied by these companies will alter, the basic fundamentals of supply presented in this work will remain current.

FIGURE 4

JAPANESE PRODUCTION OF PAPER AND BOARD - BY GRADE

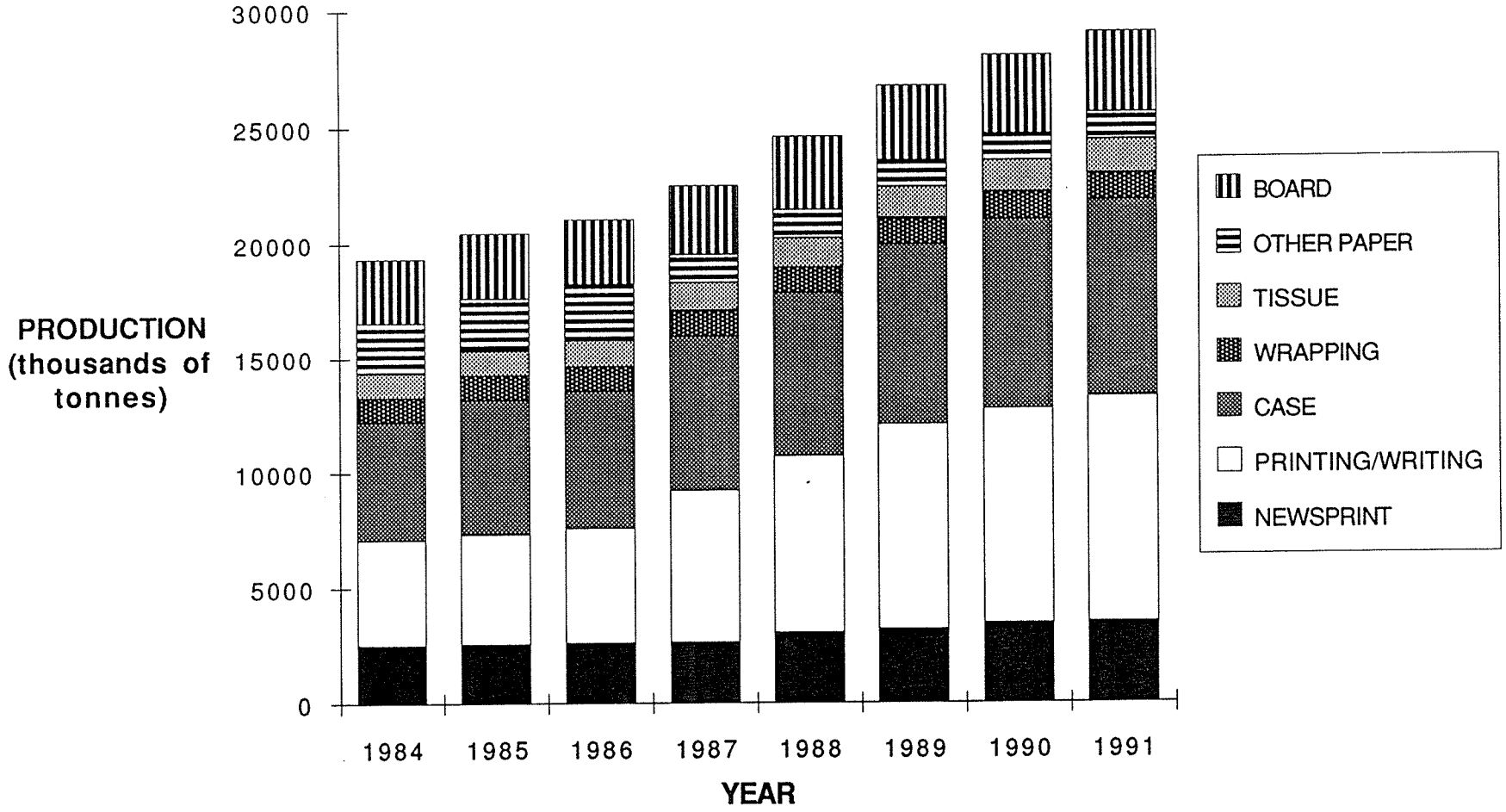
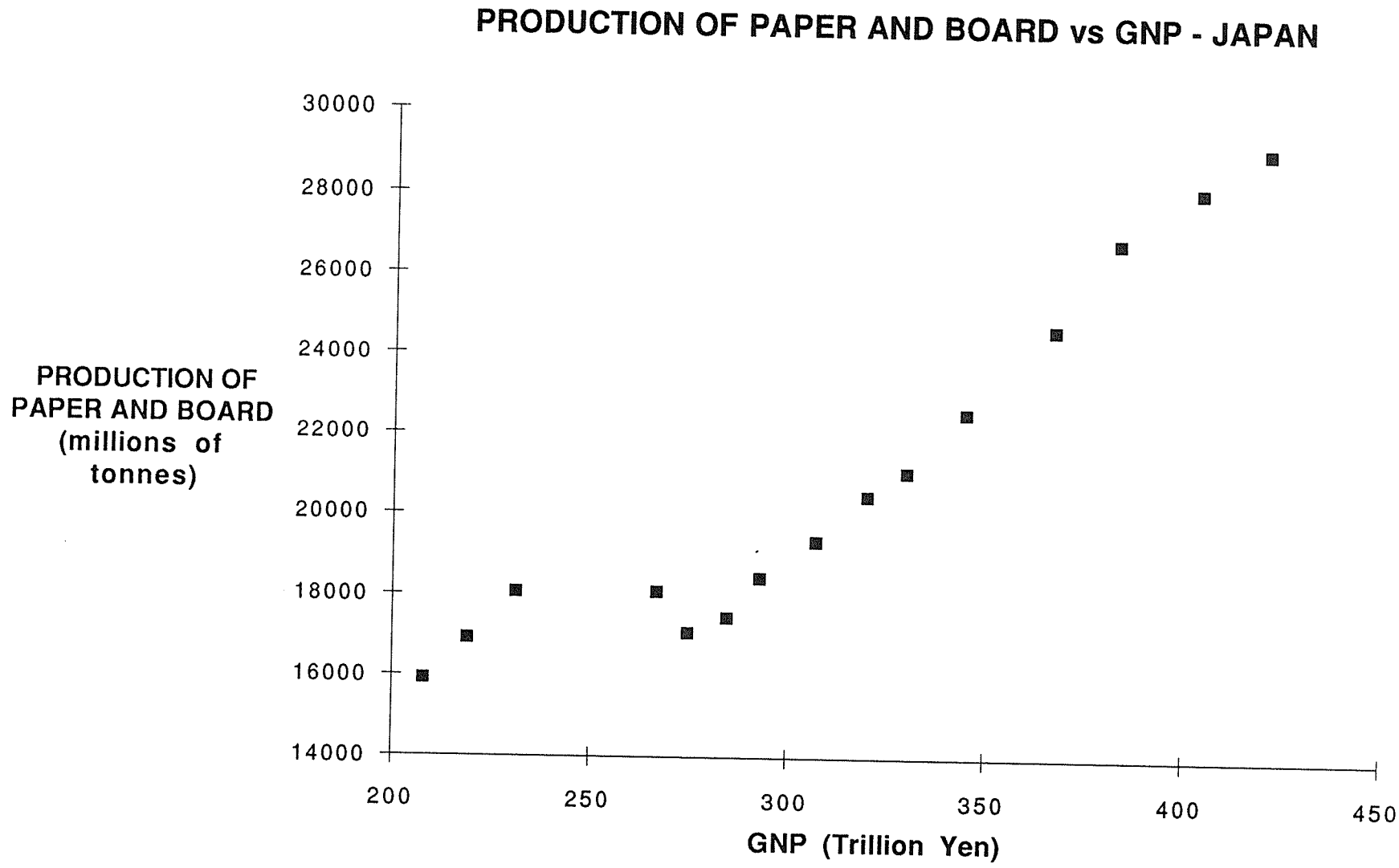


FIGURE 5


PRODUCTION OF PAPER AND BOARD vs GNP - JAPAN
PRODUCTION OF PAPER AND BOARD (millions of tonnes)
30000
28000
26000
24000
22000
20000
18000
16000
14000
200
250
300
350
400
450
GNP (Trillion Yen)

PULP PRODUCTION

Pulp production by the Japanese industry has increased 28.6 percent since 1984, from 9 121 000 tonnes to 11 728 940 tonns (1991 base); a modest increase compared to the expansion experienced in the production of paper and paperboards. Figure 6 demonstrates that most of this increase is attributable to the increased production of bleached sulfate pulp which recorded a disproportionate 52.6 percent incresae in production over the period (1984-1991). Printing and writing grades cover a wide variety of end use applications and are diverse in nature and form, however, many use bleached sulfate pulp as raw material. As such it is not surprising that this grade of pulp is the major grade (c. 61 percent) produced by the Japanese industry.

In 1990 total virgin pulp produced domestically totalled 11 083 000 tonnes, while in 1991 this figure increased to 11 422 000 tonnes. Imported pulp totalled 2 894 484 tonnes in 1990 and 2 929 623 tonnes in 1991. The major suppliers of market pulp to Japan were the USA (37.3 percent), Canada (33.2 percent), New Zealand (8.7 percent), Brazil (8.2 percent) and Chile (3.3 percent). The major grade of market pulp was bleached sulfate accounting for 68.6 percent of imports (1991 base).

Pulp imports account for only a small proportion (18.1 percent) of the total pulp furnish consumed by the industry. However, the reliance of the industry on imported market pulp has been steadily increasing over the last decade. In 1985, only 1 855 000 tonnes of market pulp was imported, while in 1991 this figure had increased to 2 521 000 tonnes. While the increase over this period amounts to 35.9 percent the proportion of the total pulp furnish imported has remained relatively constant at c. 18 percent. Figure 7 shows the importance of imported market pulp as a furnish. The dominance of bleached sulfate pulp as the major market pulp furnish is obvious in the figure and the effect of over-supply is clearly shown from 1990 on.

WASTE PAPER

In 1990 the Japanese industry consumed 14 486 043 tonnes of waste paper which was 51.3 percent of total domestic production of paper and paperboards. In 1991 the industry increased its waste paper consumption to 15 175 585 tonnes which amounted to 52.6 percent of the total domestic production. Imports of waste paper amounted to 634 254 tonnes (4.3 percent) in 1990 and 851 146 tonnes (5.6 percent) in (1991). Waste paper consumption has increased 56.4 percent since 1984, while importations have risen 172.8 percent over the same period. The increase in the consumption and importation of waste paper is shown in Figure 8.

The importance of waste paper as a furnish is often understated. The Japanese have developed a sophisticated system of waste paper collection. The highly organised Japanese public have been educated into recovering 95 percent of the waste paper consumed. The industry's reliance on the furnish is unlikely to abate. In April 1990 the Japanese Paper Association announced its intention to increase the industry's waste paper utilisation rate to 55 percent by 1995. The plan (titled Recycle 55-Plan) received legislative backing in October 1991 with the passing of the aptly named recycling law.

FIGURE 6

JAPANESE PRODUCTION OF PULP - BY GRADE

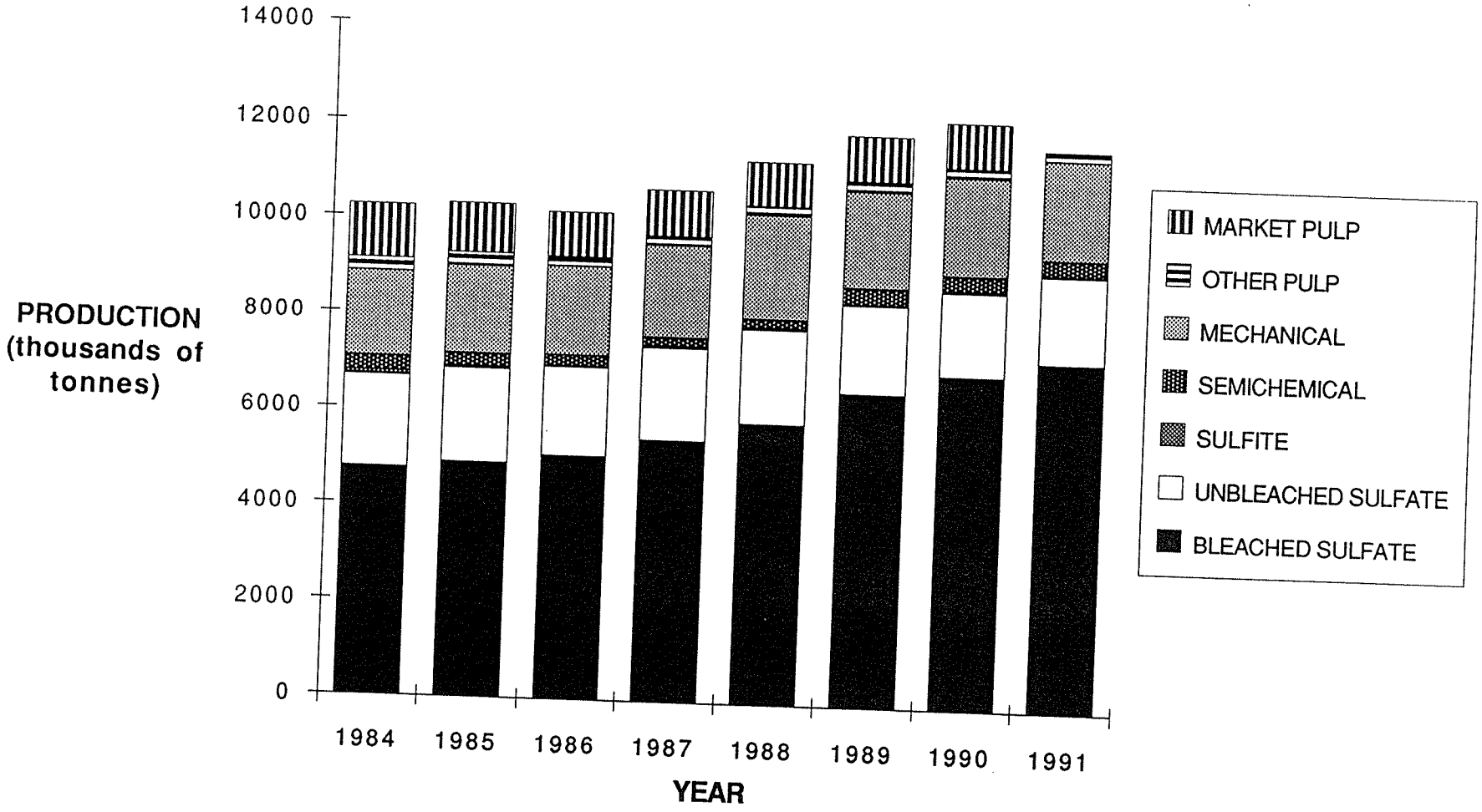


FIGURE 7

JAPANESE IMPORTS OF MARKET PULP - BY GRADE

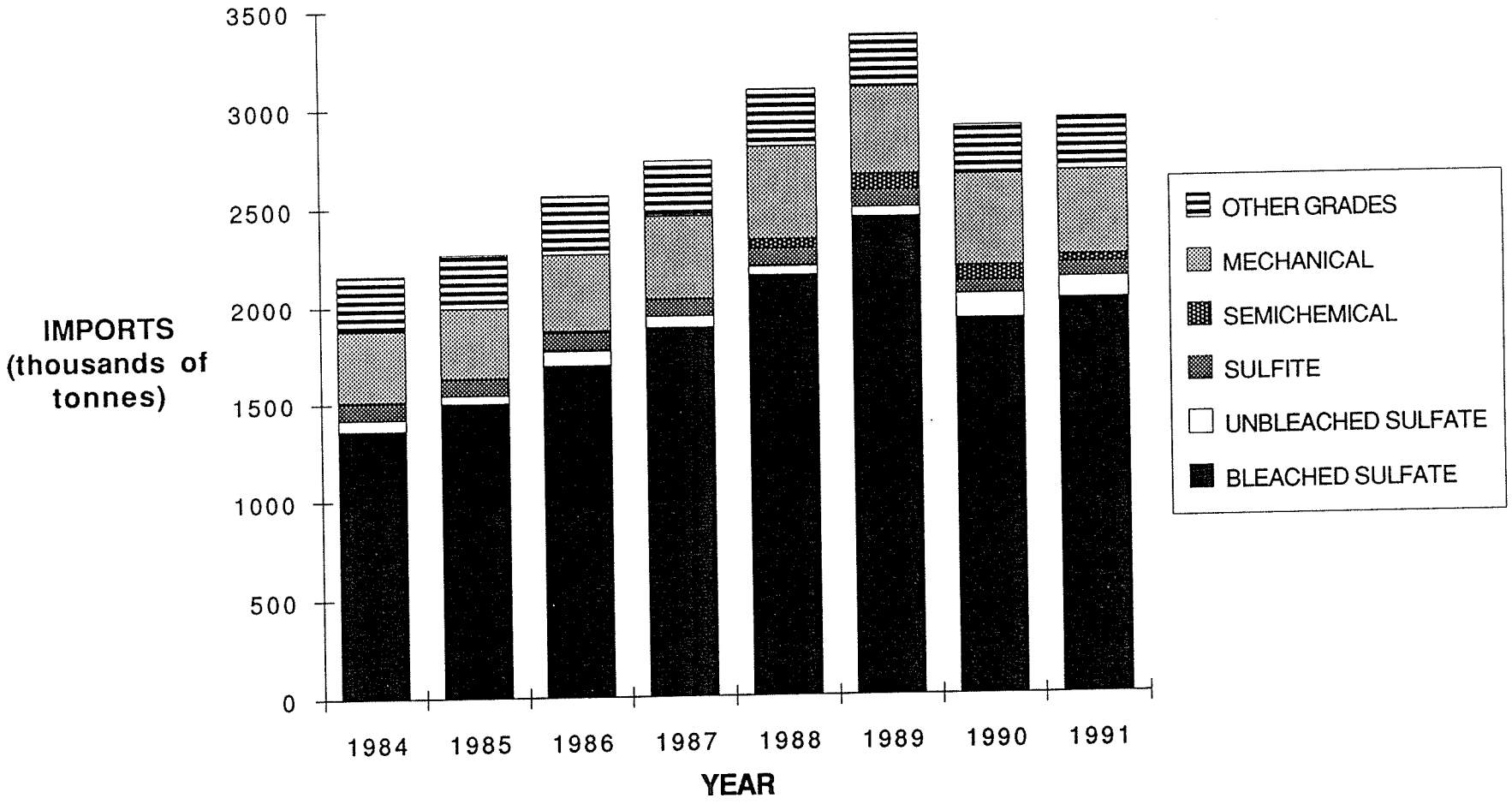
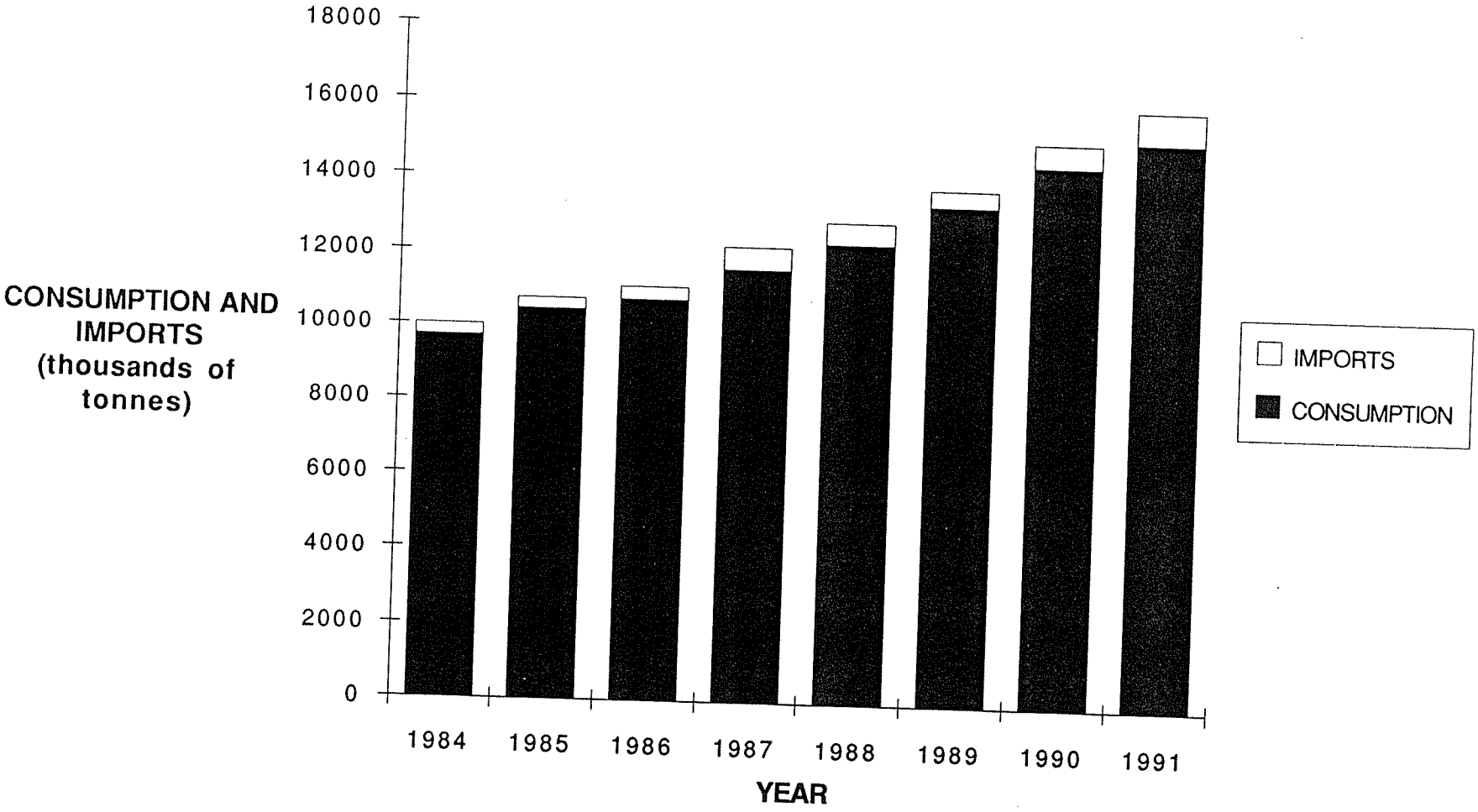


FIGURE 8

JAPANESE CONSUMPTION AND IMPORTATION OF WASTE PAPER



INDUSTRY CHARACTERISTICS AND RAW MATERIALS

The Japanese pulp, paper and paperboard industry is unique among the world's paper producers for the following reasons.

Firstly, despite its size it is largely self-sufficient and is neither reliant upon imports nor is it export orientated. The industry's dependence on the domestic market is also unique among other Japanese industries, which tend to be highly export orientated.

Secondly, unlike other major pulp and paper industries of the world, it is not located at its primary source of raw materials. Just how the Japanese pulp and paper industry was able to record such spectacular growth and size, while faced with a limited land area and raw resource base, requires further commentary.

In 1990, 51.2 percent of the industry's furnish was derived from waste paper and only 48.1 percent consisted of virgin pulp. 10.2 percent of the furnish was imported as pulp, while 37.9 percent was produced domestically. 47.3 percent of the pulpwood used in the production of the virgin pulp furnish was supplied from the Japanese domestic forests, while 52.7 percent was imported, mainly in the form of woodchips (Table 13). In 1955 the situation was considerably different. The Japanese paper industry had reached production levels equal to the pre-war figures. A spectacular achievement considering the industry was mostly destroyed during World War II. 2 204 000 tonnes of paper and paperboard were produced at this time and waste paper accounted for only 20.1 percent of raw material consumption, while pulp accounted for 66.8 percent. Practically all pulp was produced domestically and 100 percent of the pulpwood required was supplied from the domestic estate.

As the Japanese industry grew alternative sources of raw materials were required. The Japanese paper industry would produce only 7-10 million tonnes of paper products if it relied on domestic pulpwood (Swayne, 1985). An ever-increasing importance was placed upon waste paper at the expense of the "share" occupied by pulp throughout the 1960s, 1970s and 1980s. Waste paper became a larger and larger source of furnish as technological developments in drinking, purification, slime control etc. became available, and as the advantages of reduced waste disposal and energy costs became obvious.

A second strategy used to overcome the problems faced by a rapidly expanding industry with limited domestic raw resources was adopted in the 1960s and is termed by some commentators as the "globalisation" of the Japanese industry. At the time the Japanese industry was charged high rates for domestic energy and FOB prices of woodchips at remote ports were considered high by the purchasing companies. The mechanisms for ocean freight were not yet efficient and the cost of extracting the domestic pulpwood resource was becoming increasingly expensive. Faced with such factors some Japanese pulp and paper companies raised their ratio of imported pulp by increasing purchases from abroad. This strategy was based on the assumption that as pulp consumption increased, it would be more profitable to import pulp rather than expand domestic pulpmills. The companies pursuing this option include Kanzaki Paper and Kishu Paper (Ikawa, 1991). Consequently, the proportion of imported pulp rose substantively.

Table 13: Paper production and proportions of raw materials used

	YEAR					
	1955	*1965*	*1975*	*1985*	*1990*	*2000*
Paper and paperboard production (x 1000 tonne)	2204	7299	13601	20469	28647	36000
Raw material consumption (%)						
Waste paper	20.1	34.6	36.6	49.3	51.2	55.0
Pulp	66.8	60.5	62.9	50.5	48.1	45.0
Other	13.1	4.9	0.5	0.2	0.7	0.0
Pulp consumption (% of above figure)						
Imported	0.5	3.2	5.3	8.7	10.2	10.0
Domestic	66.3	57.3	57.6	41.8	37.9	35.0
Pulpwood consumption for domestic pulp production (%)						
Imported	0.0	3.1	40.0	38.4	52.7	57.0
Domestic	100.0	96.9	60.0	61.6	47.3	43.0

(Source: MITI; JPA)

Faced with the problems of the sixties other Japanese paper companies adopted the strategy of constructing pulpmills outside of Japan, at locations close to the raw resources, and exporting pulp to Japan to feed their domestic mills rather than expand domestically. Such mills were built in north America and New Zealand and include:

Honshu Paper, BKP at Crestbrook, 1967
Jujo Paper, RGP at MacKenzic, 1968
Daishowa Paper, BKP at Quesnel River, 1970
Oji Paper and Sanyo-Kokuasku, TMP at New Zealand, 1971

Today, the situation prompting the underlining philosophy of this strategy has changed and the advantages associated with pulp production outside Japan have declined. The disparity between FOB chip prices and mill door prices in other countries has lessened, the size and configuration of chip carriers have made transportation of woodchips cheaper, the Yen has remained comparatively strong, and the Japanese industry has adopted the use of highly efficient vacuum evaporators and recovery boilers, combined with the substitution of cheaper fuels for heavy oils, which have yielded large energy cost savings (Kawake, 1985). As a result investment in the domestic industry has increased substantially.

This is not to suggest that the globalisation of the Japanese pulp and paper industry has stopped. However, it has different aims and philosophies than those of the 1960s and 1970s. The industry operates a total of 16 pulp and paper plants overseas through joint venture or acquisition of shares or purchase, seven of which went into operation after 1986. The recent globalisation of the Japanese pulp and paper industry is beyond the scope of this work, however, it is worthy making the following points:

(i) recent overseas enterprise by Japanese paper companies are no longer confined to joint venture arrangements;

(ii) investments have now expanded from pulp production to paper output (mainly newsprint);

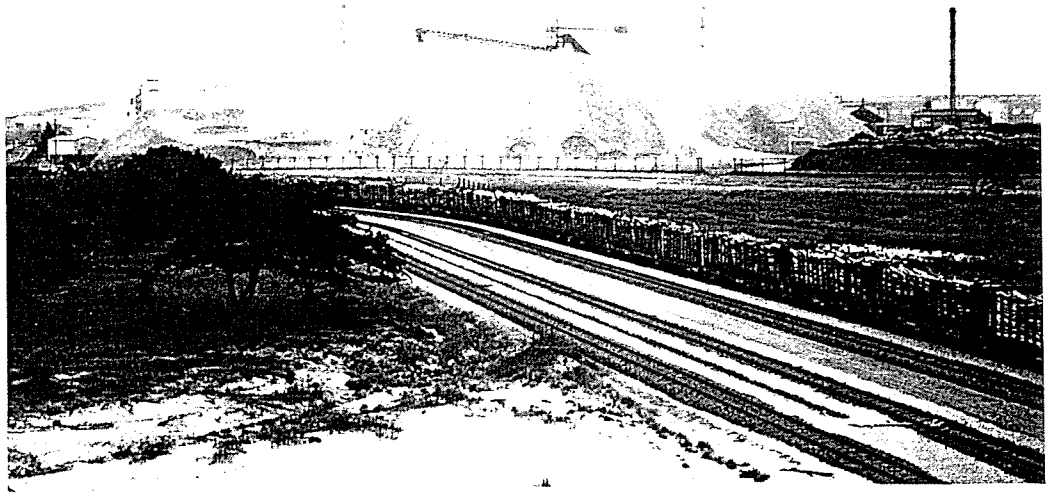
(iii) the shipment of products is not always confined to Japanese markets, but is increasingly concentrating on external markets;

(iv) there is a shift into thermosensitive paper and other types of paper products in the USA and Europe and board manufacture in south east Asia (Kawake, 1991).

Finally, to overcome the problems of a limited domestic source of raw materials, the Japanese industry has developed a well organised and highly structured mechanism for importing pulpwood in the form of woodchips to complement its domestic pulpwood supplies. Japan's forest estate exists to a large extent on mountainous slopes that are inaccessible or render harvesting expensive. The total pulpwood supply from domestic resources has been estimated at 18 000 000 m^3 a^{-1}. However, by 2000 a total of 42 500 000 m^3 a^{-1} will be required by the industry (source: JPA). Given the importance of woodchips as a source of raw material there is little wonder that the industry has developed a unique system of woodchip procurement. The mechanisms involved and the development of these mechanisms and the nature of the enterprise involved are dealt with in the next section.

In summary, the Japanese pulp and paper industry has characteristics which make it unique among pulp and paper industries. These include its self-sufficiency despite its size, its reliance on the domestic markets, its lack of export orientation, and its rapid growth and size without a substantial domestic raw resource. To attain the growth rates and size displayed the Japanese industry has:

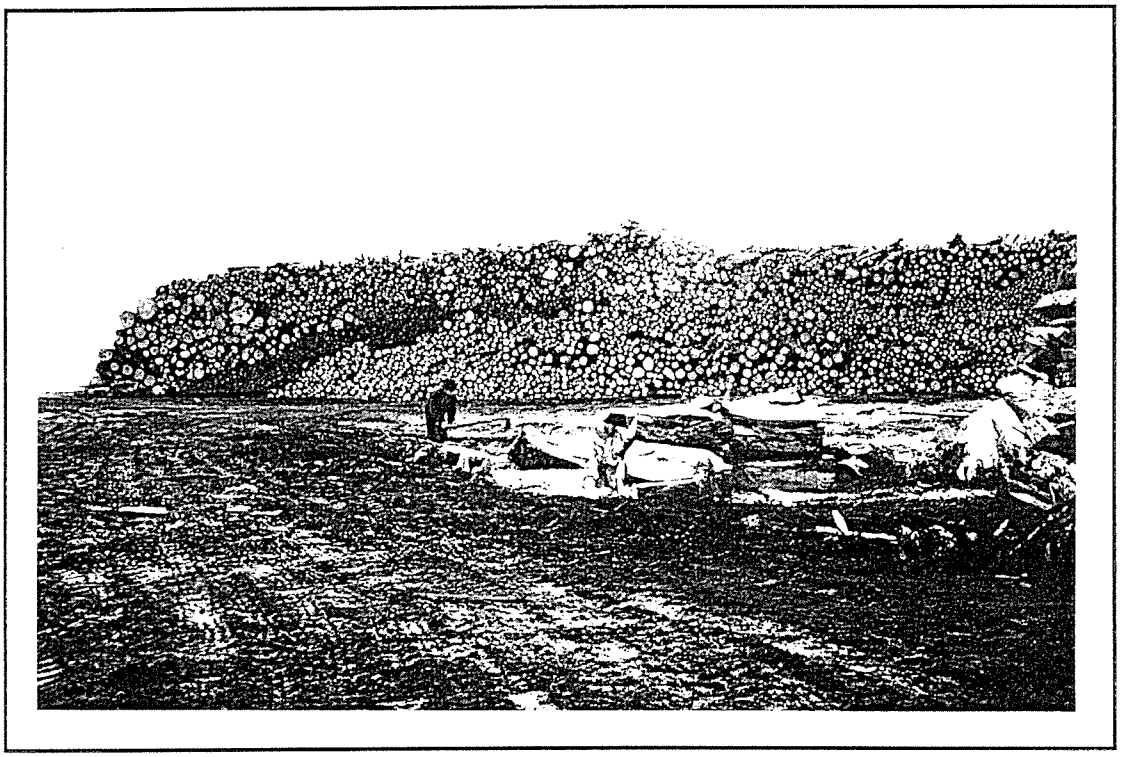
(i) increased its reliance on waste paper;
(ii) increased its investment in offshore enterprises;
(iii) increased its import of market pulp; and
(iv) developed a complex pulpwood procurement network for the importation of woodchips.



CTC chip stockpile; Richards Bay, Republic of South Africa.
Notice the "block" train loaded with roundwood in the foreground.

CHAPTER THREE

Pulpwood Procurement by the Japanese Pulp and Paper Industry



Chip mill stockpile of beech roundwood; Chile

3 PULPWOOD PROCUREMENT BY THE JAPANESE PULP AND PAPER INDUSTRY

INTRODUCTION

Japan began its importation of pulpwood in 1960. At this time 193 000 cubic metres of pulpwood logs were imported (JPA, 1983). The first woodchip imports were in carriers that were merely converted oil tankers. However, in late 1964 the Japanese industry introduced specialised woodchip carriers and the first consignment of woodchips shipped in this manner was exported from Coos Bay, Oregon, to Kure Japan, in 1965. Since this successful introduction the Japanese industry has accumulated a fleet of dedicated woodchip carriers and has developed a complex network of woodchip procurement for importation to complement its domestic resources.

By 1967 Japan had become the largest importer of woodchips in the world, and by 1970 Japan had increased its importation of woodchips to 5 031 000 cubic metres and during the early 1970s to the late 1980s accounted for between 73 percent and 85 percent of the world trade in woodchips. If intercontinental trade was removed from the supply scenario, Japan accounted for 90 percent of the total world trade during this period.

In 1991 Japan imported 22 555 000 cubic metres of woodchips and this escalation of imported volumes is a direct result of increased domestic demand for raw materials and the evolution of the oceanic trade in woodchips, with its ever-increasing efficiencies in the ocean transportation of the commodity. The importation of pulpwood as roundwood has remained relatively constant over the years and accounts for only a very minor proportion of total pulpwood imports. In 1991, 350 724 cubic metres of pulpwood were imported as roundwood, predominantly softwood logs from Chile and the Commonwealth of Independent States, and amounted to only 1.5 percent of total pulpwood imports for that year.

While the introduction of woodchip carriers and subsequent increases in volumes imported has been impressive to say the least, it is only recently that the volumes imported have been greater than the volumes supplied from Japanese domestic forests. Figure 9 shows the development patterns of Japan's pulpwood procurement since 1971. Clearly the domestic resource plays a large and significant role in the raw materials scenario, a point often overlooked or ignored by critics of the pulpwood industry. The industry's reliance upon domestic supplies of pulpwood has been steadily deceasing since the 1970s. Imports on the other hand are not only substituting for the domestic supply but also increasing to fill the increased demand for pulpwood. Total pulpwood consumption is clearly more closely associated with pulpwood imports than the domestic supply, which tends to be a comparatively stable source, while imports are varied according to demand at the time.

During the 1970s and 1980s hardwoods were the major contributor to the total domestic supply. However, the contribution of hardwoods in the domestic supply scenario has steadily decreased from c. 15.3 million cubic metres in 1970 to 8.2 million cubic metres in 1992 (Figure 10). The softwood contribution on the other hand has remained relatively consistent over time, supplying about 7.4 million cubic metres in 1970 and 9 million cubic metres in 1991.

Imports of softwood pulpwood have, until the late 1980s, been imported in greater volumes than hardwoods. Unlike the domestic softwood supply, this source of raw material exhibits wide fluctuations in volumes from year to year in response to changing demand (Figure 11). The major traditional suppliers of softwood chips to the Japanese industry have been the USA and Canada. Hardwood imports on the other hand have exhibited continuous and strong

growth trends since the early 1970s. In the mid-1980s the volumes of hardwood pulpwood imported exceeded that of softwood. The impressive increase in volumes imported from 1985 onward is closely associated with the escalation in the production of printing and writing papers (Figure 4) and increased demand for bleached sulfate pulp (Figure 6) over the same period. The major traditional suppliers of hardwood pulpwood has been Australia, however, recently both Chile and the Gulf states of the USA have made significant contributions to the total imported volumes.

Diversity of Source Countries

In 1979 the Japanese industry imported pulpwood for 10 separate countries. Despite this seemingly diverse supply scenario the industry was predominantly dependent upon the west coast of the USA for its softwood supply and Australia, particularly Tasmania, for its hardwood supply. At the time, the west coast of the USA supplied 81.3 percent of all imported softwood woodchips and 12.2 percent of all imported hardwood woodchips. Australia on the other hand supplied 57.2 percent of all imported hardwood woodchips and by 1984 occupied a 63.8 percent market share. Under such a scenario the heavily capitalised and rapidly expanding Japanese pulp and paper industry was largely dependent upon two remote sources for the majority of its imported raw resources. Such exposure is uncommon among similar Japanese industries, dependent upon remote sources of raw materials, as disruption to supply can have significant flow-on effects. Disruption to supply of woodchips did in fact occur and the events were collectively termed "chipshock" by the industry.

Between 70 to 80 percent of all wood fibre supply from the west coast of the USA consists of residual chips from the regional solid wood products industry (Hagler, 1991). Pulpwood availability can therefore fluctuate greatly as a result of changes in timber supply and/or the demand for solid wood products. In 1979, due to the rise in US interest rates, the US housing market went into recession. Consequently, production and demand for plywood and sawn timber declined and the accompanying decrease in residue supply caused a scarcity of woodchips. During this period the demand for pulpwood, in both domestic and international markets, remained strong and created intense competition for the previously abundant pulpwood product. As a result the major supplier of US woodchips to Japan (Weyerhaeuser) was able to increase its selling price from US$55/BDU in the fourth quarter of 1979 to US$131/BDU in the second quarter of 1980; an increase of 138 percent over a six month period (Schreuder and Anderson, 1985). Because the Japanese industry was so dependent upon this source of supply it was forced to accept these prices in order to maintain domestic production.

An unrelated but similar set of circumstances resulted from the fact that Australia has threatened to divert pulpwood exports for domestic processing for many years, and in spite of the many feasibility studies, the unsuccessful Wesley Vale proposal from North Broken Hill/Noranda was the first concerted effort to establish large scale domestic processing using previously exported woodchips. Had this proposal been successful, 35 percent of hardwood pulpwood exports form Australia would have been diverted to domestic processing. While this event did not cause a disruption to supply of the magnitudes experienced in the US "chipshock", it did serve to highlight to the Japanese industry the need for diversification among supply sources for both hardwood and softwood resources.

As a result of "chipshock", affecting softwood supplies, and the related Wesley Value incident, affecting hardwood supplies, the Japanese Ministry for International Trade and Industry, in conjunction with members of the Japanese pulp and paper industry, developed guidelines with the aim of preventing any future occurrence of the events. Apart from a rationalisation of the domestic resource and an increased use of waste paper as previously discussed, the industry has actively pursued alternative sources of pulpwood. For example, in 1981 Japan imported hardwood woodchips from 11 different countries, however, only seven supplied more than 100 000 m^3a^{-1}, while only four supplied more than 200 000 m^3a^{-1}. By 1991 Japan imported hardwood woodchips from 13 different countries, nine of which supplied quantities greater than 100 00 m^3a^{-1} and seven of which supplied more than

200 000 m^3a^{-1}. The same trend is evident for softwood supplies. In 1979 Japan imported softwood from only four countries, all of which supplied more than 200 000 m^3a^{-1}. In 1991 the number of supply countries had increased to seven, all of which supplied more than 200 000 m^3a^{-1}. This pattern of diversification and the strategy of increasing the number of large pulpwood suppliers, is a deliberate attempt to avoid a repeat of the 1979/1980 "chipshock". The strategy now influences the seller's ability to control price and in some situations offers a pseudo barrier to those wishing to enter the pulpwood exporting industry. The actions of a few corporate entities, in respect of chipshock and the Wesley Vale incident, has had a clear effect on the overall pattern of supply and I doubt whether such dependence upon a few suppliers will ever be seen in the industry again, and in my view with good cause.

Structure of the International Market for Woodchips

The transoceanic movement of woodchips has become a unique and increasingly specialised industry. It differs from other transoceanic trades in forest products because of the type of vessel used for transportation, the terms of sale and the equipment required. While this uniqueness does not form an impediment to enter the industry it does, however, enable the buyer, predominantly the Japanese pulp and paper industry, to exert strict controls on price, volumes, quality and transportation schedules and routes. As such, woodchips may not be considered a truly internationally traded commodity, subject to international market forces. The trade is strictly controlled, at present, by the Japanese pulp and paper industry which is hardly surprising given the massive domestic capitalisation of the industry, its ever increasing reliance upon remote sources of raw materials and the history of supply chipshock etc.

Woodchip Carriers

The mainstay horse of the woodchip trade is the specialised woodchip carrier vessels. In contrast to the standard gantried open hatch bulk carriers, chip carriers have been designed to overcome the drawbacks of poor storage. For this reason chip carriers are wider and have higher moulded depths than bulk carriers of the same length. Typical chip carriers have the following dimensions:

Length (O.A.)	199.99	m
Length (B.P.)	194.00	m
Breadth (MLD)	32.20	m
Depth (MLD)	22.35	m
Hold Capacity	99 654.2	m^3
Gross Tonnage	38 884	ton.
Dead Weight Tonnage	42 739	ton.

At the end of 1992 the Japanese pulp and paper industry had a fleet of 102 designated woodchip carriers with a combined dead weight tonnage of 4 291 282 tons. The more recent chip carriers offer c. 2.3 cubic metres of hold capacity per tonnage of designed dead weight. The age profile of this specialised fleet is given in Table 14. Clearly the two periods which witnessed the major commissionings of carriers was from 1971 to 1975 and again from 1986 to 1991. These two periods also correspond to the two periods of maximum growth in the imported volumes of woodchips into Japan (Figure 9).

Most of the chip carrier fleet are contracted to the various Japanese pulp and paper companies for extended periods. However, 22 of the fleet are not contracted on a long-term basis, and together have a combined dead weight tonnage of 923 989 tons or 21.5 percent of the total dead weight tonnage of the fleet. The fact that most of the fleet are bound by long-term contract to the chip purchasing companies and/or their partners emphasises the importance placed on security of supply by the purchasing companies themselves. A fact also emphasised by the nature of the contractual arrangements within the indsutry.

Table 14: Age profile of woodchip carriers

	SIZE RANGE (1000 DWT)						
Age	*10-20*	*20-30*	*30-40*	*40-50*	*50-60*	*60-70*	*Total*
Pre 1970	-	-	-	1	-	-	1
1971-1975	-	4	6	13	4	1	28
1976-1980	-	-	3	6	-	-	9
1981-1985	-	-	-	3	-	-	3
1986-1990	2	1	4	36	4	1	48
1991-1995	-	-	-	11	2	-	13
TOTAL	2	5	13	70	10	2	102

Contractual Arrangements

Unlike other forest products woodchips are purchased by the buyer on a Free on Board (FOB) or Free Along Side (FAS) basis rather than Cost Insurance and Freight (CIF) bases. Therefore, the transportation of the woodchips is paid for by the buyer, rather than the seller, which is the more standard approach. The buyer, usually a pulp and paper company and/or a trading house, will enter into an agreement with a ship owner or operator for a contract of affreightment. The contract of affreightment is typically for a 5 to 10 year period and usually contains evergreen provisions. Depending upon the volumes stipulated in the contract of affreightment, current and future commitments, and the size of the shipping company's existing fleet, the shipping company or operator may contract new chip carriers to be constructed. As most buyers are Japanese pulp and paper companies and/or trading houses, the fleet servicing this trade is not only owned by the Japanese industry but also tightly controlled by it.

The buyer will also enter into arrangements with the seller for contracts of supply for typical five year periods, with evergreen provisions. Within such contracts, factors which affect product quality are dictated. The definition of quality varies, but generally factors such as contaminants, chip size and size distribution, and wood quality parameters, such as basic density, are specified. Prices are negotiated on a quarterly or semi-annual basis, while volumes are negotiated on a semi-annual or annual basis.

Whether the buyer or the seller owns or controls the port ship loading facilities will have a significant influence upon whether the contract of sale is on a FOB or FAS basis and its nature. Usually port loading facilities require a port of 11 m draft and loading facilities capable of loading 625 green tonnes per hour. In addition, on-site chip storage (wood yards), discharge and reclaim equipment and chip quality testing facilities are also required.

While the specialised nature and control of the chip carrier fleet and the structure of the contract of affreightment and supply contracts, together with the need for specialised port loading facilities, does not offer impediments to entry into the international trade in woodchips *per se*, they do virtually eliminate true competition within the market. Such a market structure offers stringent control by the buyer over volumes imported, quality, schedules of supply and costs.

FIGURE 9

PULPWOOD CONSUMED BY JAPANESE PULP AND PAPER INDUSTRY - BY SUPPLY SOURCE

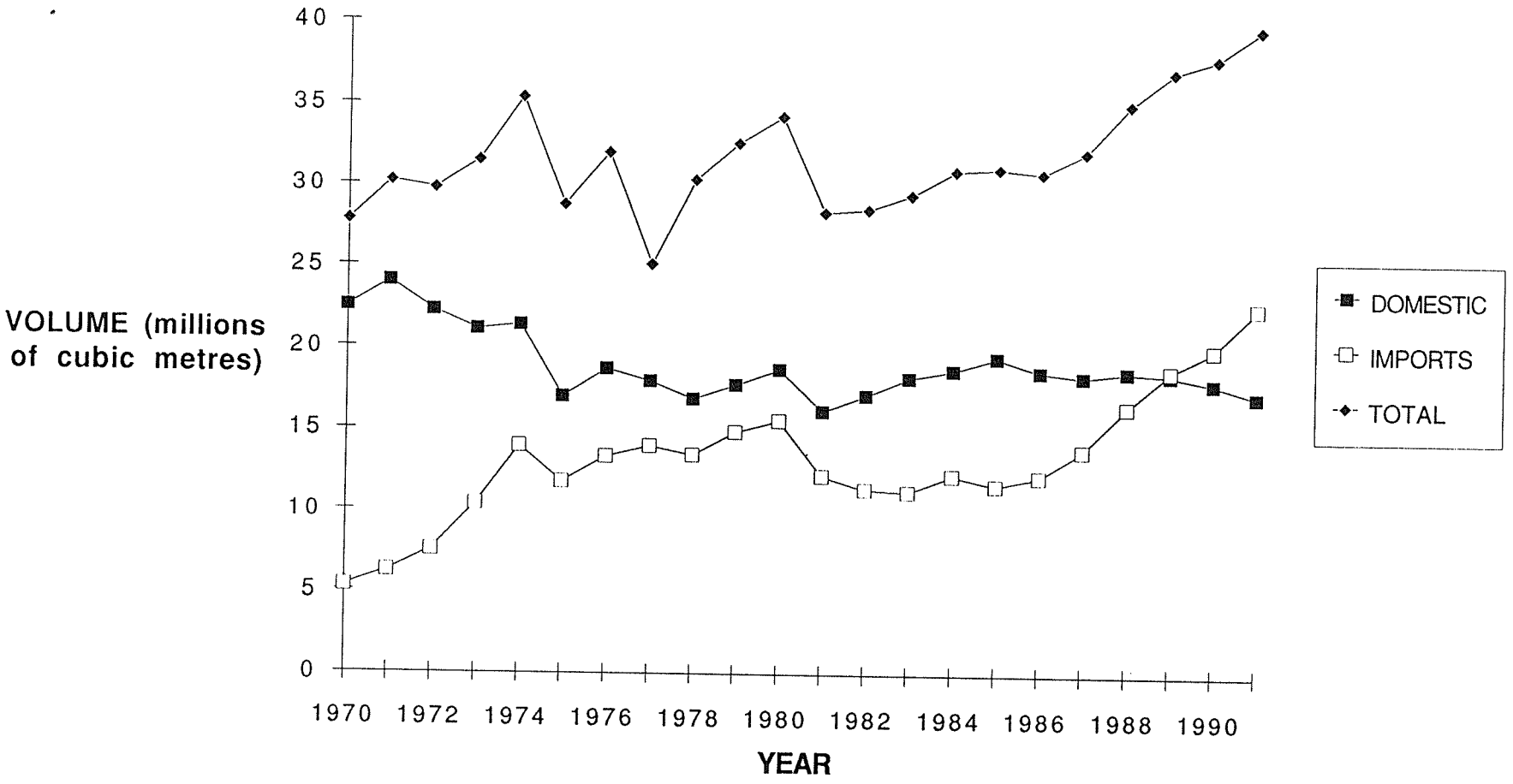


FIGURE 10

PULPWOOD CONSUMED BY JAPANESE PULP AND PAPER INDUSTRY - FROM DOMESTIC SOURCES ONLY

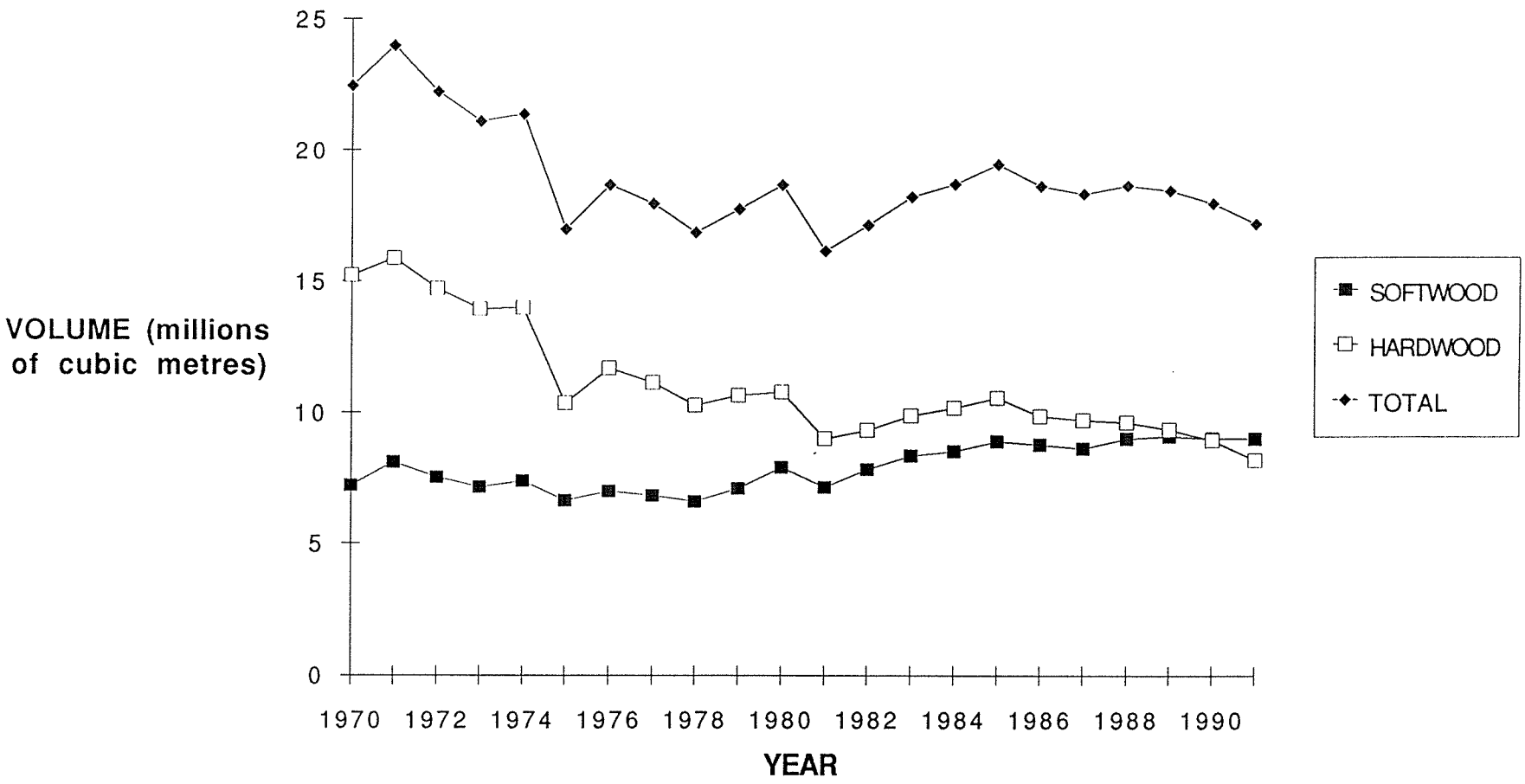
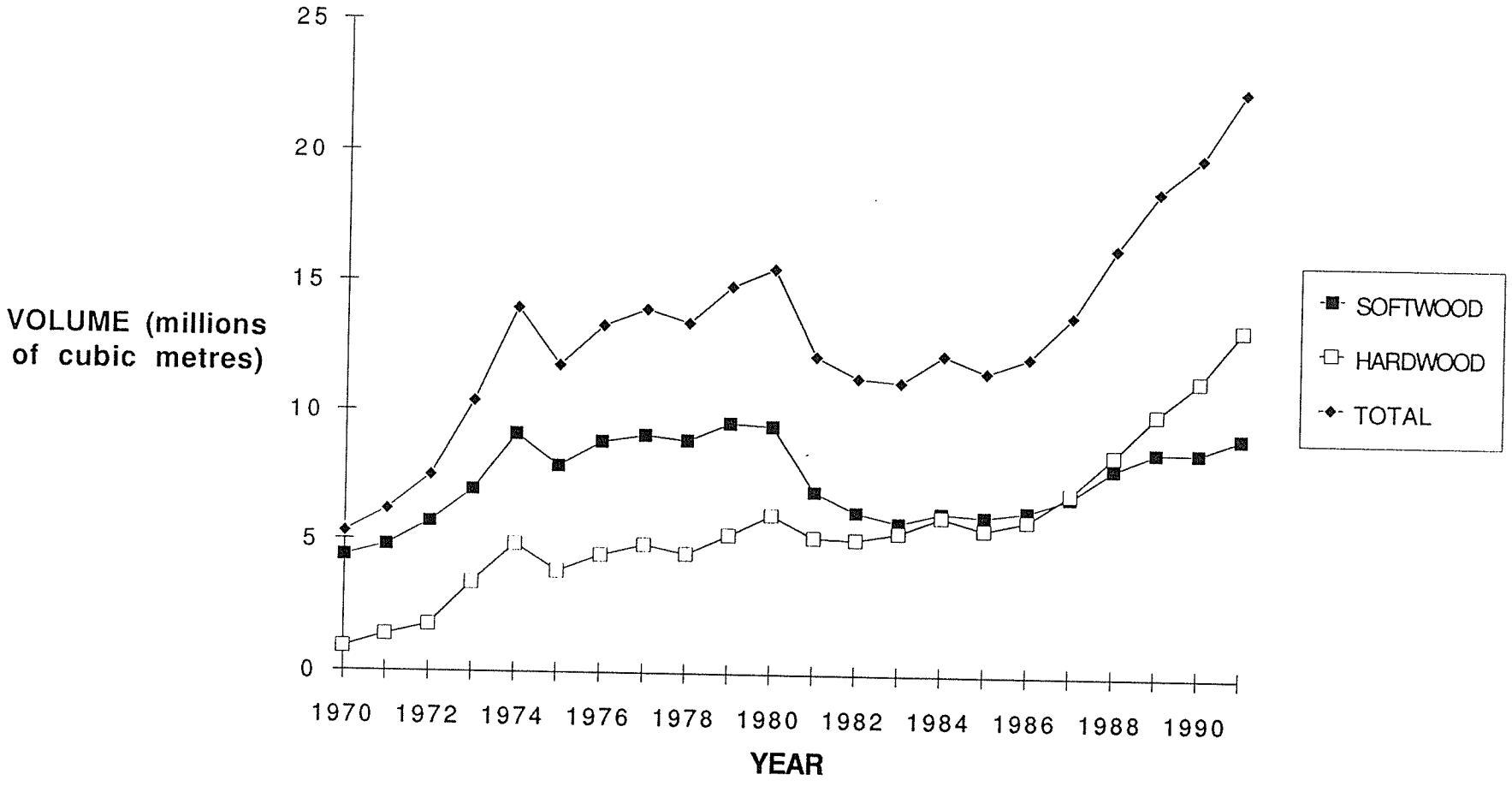


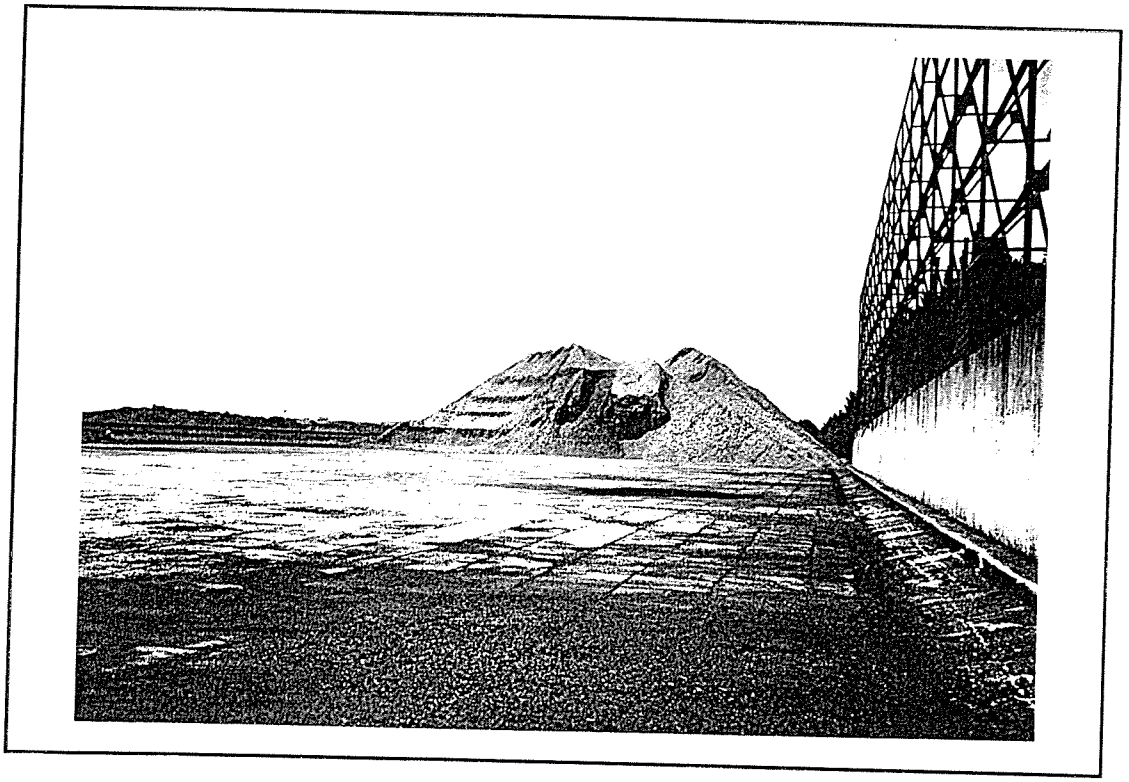
FIGURE 11

PULPWOOD CONSUMED BY JAPANESE PULP AND PAPER INDUSTRY - IMPORT SOURCES ONLY



CHAPTER FOUR

Australia's Position in the International Woodchip Trade



Australian woodchips in a port woodyard; Japan

4 AUSTRALIANS POSITION IN THE INTERNATIONAL WOODCHIP TRADE

INTRODUCTION

In the mid to late 1960s, after the logistics and economics of oceanic woodchip transportation had been proven, the hardwood chip procurement interests of the Japanese pulp and paper industry became focussed upon the Australian native forest resources. At the time the New South Wales Forestry Commission was interested in regenerating or converting the remote forests of the Eden/Bombala region from a perceived depauperate state to that of maximum production. These forests had a long history of selection harvesting and burning, thus, they were considered degraded and/or depauperate by the foresters of the day. As these forests, consisting of the dry stringy bark forest types with moist sclerophyll gullies, were remote from major markets there were few economically viable silvicultural options available to convert their current status to that of reaching true site potential. It was from this history of a depauperate forest with a perceived need for harvest on one hand and a new potential industry on the other, that in 1967 an agreement was made between the Government of the day and Harris-Daishowa for the harvest, processing and export of woodchips from the region. The agreement required the company to establish a chipmill and port loading facilities on the southern entrance to Twofold Bay on the southern coast of New South Wales, opposite the town of Eden.

Logging and chipping began in 1969 and the chipmill and loading facilities were officially opened in May of 1971. By this time the company was totally owned by Japanese interests. The first ship load of hardwood woodchips was dispatched in January 1971. The company currently has an export licence for 850 000 tonnes a^{-1} valid until 31 December 2004. In May 1978 the New South Wales Government approved a second proposal for the export of woodchips, derived from sawmill waste or logging waste only, out of the port of Newcastle. The company, Sawmillers Exports, is licensed to export 500 000 tonnes a^{-1} valid until 31 December 1996.

At the time interest was being expressed at Eden in NSW, Tasmania was also entertaining the proposition of a woodchip export industry. In 1968 Tasmanian Pulp and Forest Holdings Ltd extracted contracts of sale with the Japanese pulp and paper industry and an export licence from the Commonwealth Government. The State Pulpwood Products Industry Act gave the company pulpwood supply rights from a crown concession of c. 300 000 hectares from which it could harvest 500 000 tonnes of pulpwood per annum for eighteen years. The company now holds an export licence for 813 000 tonnes a^{-1} valid until 31 December 2003 and began exporting hardwood woodchips from its mill at Triabunna on the east coast in April 1971. In 1979 Australian Pulp and Paper mills (APPM) acquired Tasmanian Pulp and Forest Holdings. APPM itself was given approval to export woodchips from its concessions under the Wesley Vale Pulp and Paper Industry Act of 1961. The company began exporting chips from its mill at Longreach on the Tamar River in 1972 and now holds a Commonwealth export licence for the export of 1 065 000 tonnes a^{-1} until 31 December 2003.

A company, which is now called Forest Resources after a series of reforms, was originally formed in mid-1970 and received approval for the export of 700 000 tonnes a^{-1} of woodchips for a period of 15 years from its plant, also at Longreach on the Tamar River. All of the supply for this operation comes from private property or sawmilling waste. It currently holds an export licence for 947 000 tonnes a^{-1} which is valid until the end of December 2003.

In the wake of the interest shown on the eastern seaboard, Western Australia also examined its prospects for woodchip export. In June 1969 the Government of the day signed an agreement with Western Australian Chip and Pulp Co. (WACAP) and Bunnings Timber Holdings Ltd. to establish a woodchip export industry with Bunbury as its exit port and its chipping facilities in Manjimup, which is c. 108 kilometres to the south. The companies have agreements and a Commonwealth export licence for 700 000 tonnes a^{-1} for 15 years utilising logs deemed unsuitable for sawlogs, sawmill residue and thinnings. The current licence is for 750 000 tonnes a^{-1} valid until 31 December 1998.

Two other companies hold Commonwealth export licences. The first is Midway Forest Products exporting from Geelong in Victoria with a licence for 170 000 tonnes a^{-1}, and the second is Brisbane Forest Products with a licence for 180 000 tonnes a^{-1} valid until 31 December 1996. The percentage of the total export licence allocations controlled by each company is shown in Figure 12.

Australia has failed to keep pace with the increased demand for woodchips throughout the 1980s and early 1990s, particularly after 1986. Recently, however, the Federal Minister for Resources has announced the 'in principle' approval of two new woodchip export projects in Queensland. The first involves a Hyne-Sumitomo joint venture exporting softwood chips out of Gladstone Queensland. The second involves Queensland Commodity Exports Pty. Ltd. also exporting out of Queensland. Both projects involved exporting softwood chips. The lack of Australia's ability to capitalise on the rapid escalation in the demand for hardwood chips during the second half of the 1980s is striking, and any increments in the quantities exported from Australia is mainly attributable to softwood suppliers. This is particularly evident after 1986 coinciding with the Wesley Vale incident.

Australia's Market Share of Pulpwood Trade

While Australian companies export pulpwood to Taiwan and Korea, Japan is by far the dominant buyer of the commodity, accounting for c. 97 percent of our pulpwood exports. This is hardly surprising given the large demand and stringent controls over the oceanic transportation mechanisms exhibited by this nation.

Except for a 4609 cubic metre consignment of roundwood shipped in 1987 all pulpwood exported from Australia bound for Japan have been in the form of woodchips. For the reasons discussed previously this is the more common form of the pulpwood commodity. For example, only 1.5 percent of all pulpwood imports received by Japan during 1991 were in roundwood form and mainly consisted of softwood pulp logs exported from Chile and the Commonwealth of Independent States.

Softwood woodchips have accounted for very little of the total Australian volumes exported until very recently. In 1985 softwoods accounted for only 2.2 percent of the total volume of woodchips exported to Japan, but by 1991 this figure had increased to 9.6 percent (Figure 13). As Figure 13 shows, volumes of hardwood woodchips exported to Japan increased during the early 1980s, but quantities have remained relatively stagnant in the second half of the 1980s, when demand was at its highest. Only the volumes of softwood exports increased during this critical time. For example, in 1979 Australia possessed 64.8 percent of Japan's hardwood woodchip market. This position was slowly eroded until 1985 where a 61.6 percent market share remained. By 1991 our position had been diminished in spectacular fashion where only a 33 percent market share was retained, further decreasing to c. 30 percent in 1992. Softwoods on the other hand have increased their market position from a 1.3 percent share of all softwood woodchips imported by Japan in 1985 to 7.7 percent in 1991.

The erosion of Australia's market share for hardwood woodchips is clearly evident in Figure 14. Australia demonstrated an inability and/or lack of desire to increase its production and exports of hardwood woodchips in line with the marked increase in demand exhibited since 1987. This has enabled other countries to enter the market or expand their existing operations at the expense of Australia's market share.

The most spectacular market entry was exhibited by Chile, who began hardwood exports as recently as 1988, with a consignment of 304 075 m^3 of hardwood woodchips and 40 347 m^3 of hardwood roundwood. At this time Chile gained a market share of 4.1 percent of all hardwood imported into Japan. By 1991 Chile had increased its exports to 66 139 m^3 of hardwood roundwood and 2 599 933 m^3 of hardwood woodchips, and captured 19.9 percent of the market.

At the time that Chile's hardwood sources began to come on-stream, attention was being focussed on the sources located in the Gulf States of the USA. At this time the USA supplied 1 103 319 m^3 of hardwood woodchips (1987 base) mainly from the pacific north-west region. In 1988 this volume had increased to 1 998 378 m^3 and the increment in volumes exported is attributable to the commencement of hardwood woodchip exports out of the Gulf States of the USA, predominantly Georgia, Alabama, Louisiana and Texas. By 1991 the USA had expanded its hardwood woodchip export levels to 4 316 470 m^3 to occupy 32.2 percent of the market. The rapid growth in the volumes exported is solely due to the commencement of exports from the Gulf States and not an expansion of the operations centred in the pacific north-west region. By 1991 the two new sources of supply, namely Chile and the Gulf States, had captured 52.1 percent of the existing market and significantly eroded Australia's position.

Other countries have also capitalised, by either expanding their current operations or entering the market to capitalise on the increased demand, but not at the same scale of Chile and the Gulf States. For example, the People's Republic of China began exporting hardwood woodchips in 1987 with a consignment of 5190 m^3. By 1991 China was exporting 442 686 m^3a^{-1} to gain a 3.3 percent share of the market. Indonesia also increased production of hardwood woodchips, and in 1991 exported 310 919 m^3 to capture a 2.3 percent share. Thailand entered the market in 1988 with a modest 18 130 m^3 consignment of hardwood woodchips, and by 1991 had increased production to 50 079 m^3. While Thailand has a modest industry in comparison to the other major sources of supply it is set to capture a larger share of the market in the future.

The loss of market share may largely be attributed to Australia's institutional inability to response to the rapid increase in demand experienced from 1986 onward. However, this comment, although largely correct, is too simplistic and must be qualified in the context of the recent history of the trade. As described above the Japanese experience in the USA during the chipshock incident, an experience compounded by the debacle which was the Wesley Vale pulpmill proposal, had altered the Japanese industry's raw resource procurement strategies to favour diversification. One only needs to study Figures 9 and 11 to witness the implications of this strategy and observe that the importation of woodchips became more ordered with the magnitude of year to year fluctuations in importations decreasing markedly. Under such a situation Australia may have faced some buyer resistance to any proposal to increase the volume of hardwood woodchip exports as the Japanese industry actively pursued alternative sources of hardwood supply. As Australia was not a major supplier of softwood woodchips this buyer resistance would have been absent. In fact, any proposal to increase softwood woodchip exports from Australia would meet the Japanese industry's strategy of diversification.

FIGURE 12

THE PROPORTION OF THE TOTAL VOLUME UNDER COMMONWEALTH LICENCE CONTROLLED BY EIGHT COMPANIES

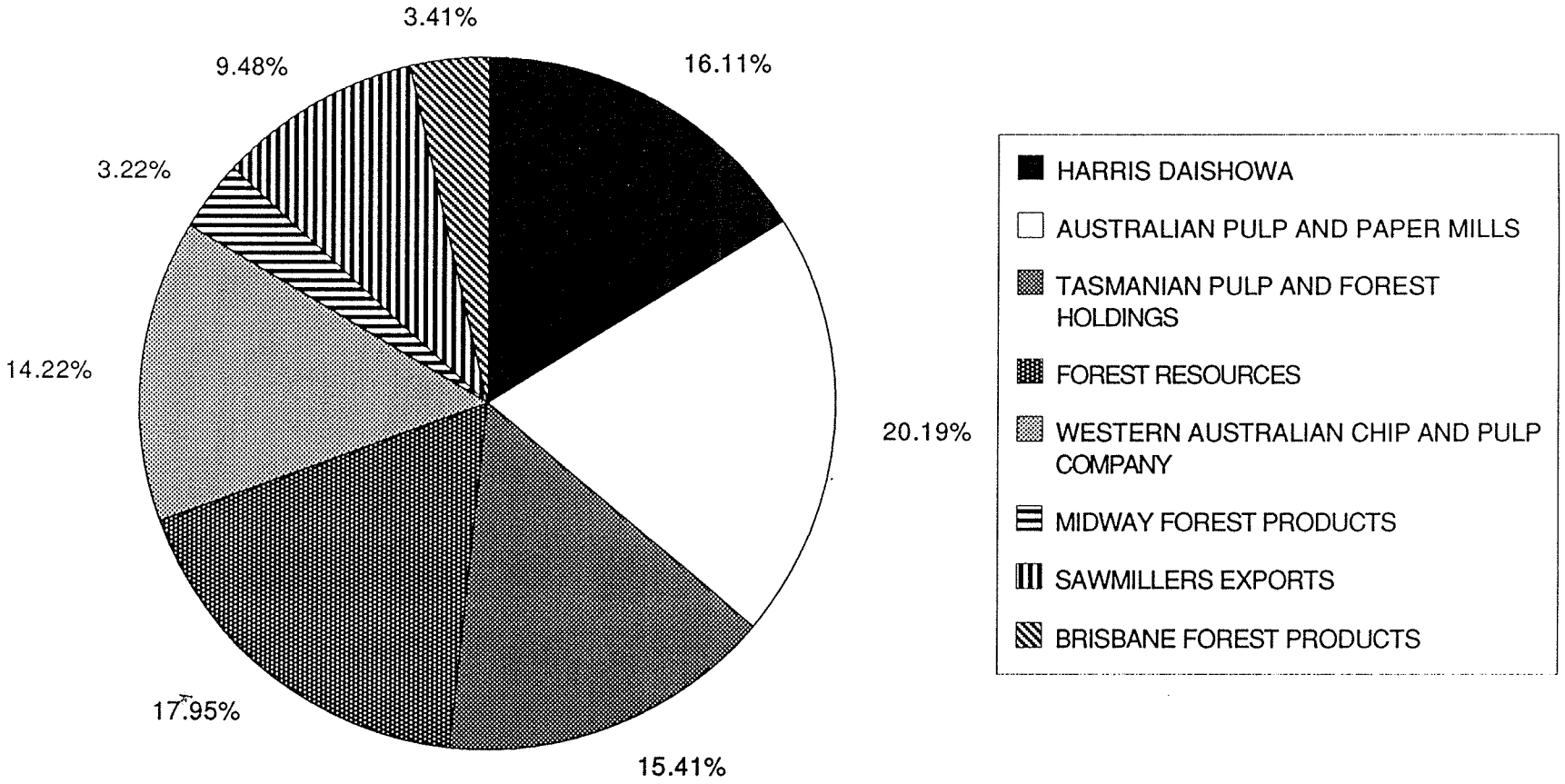


FIGURE 13

WOODCHIPS EXPORTED FROM AUSTRALIA TO JAPAN

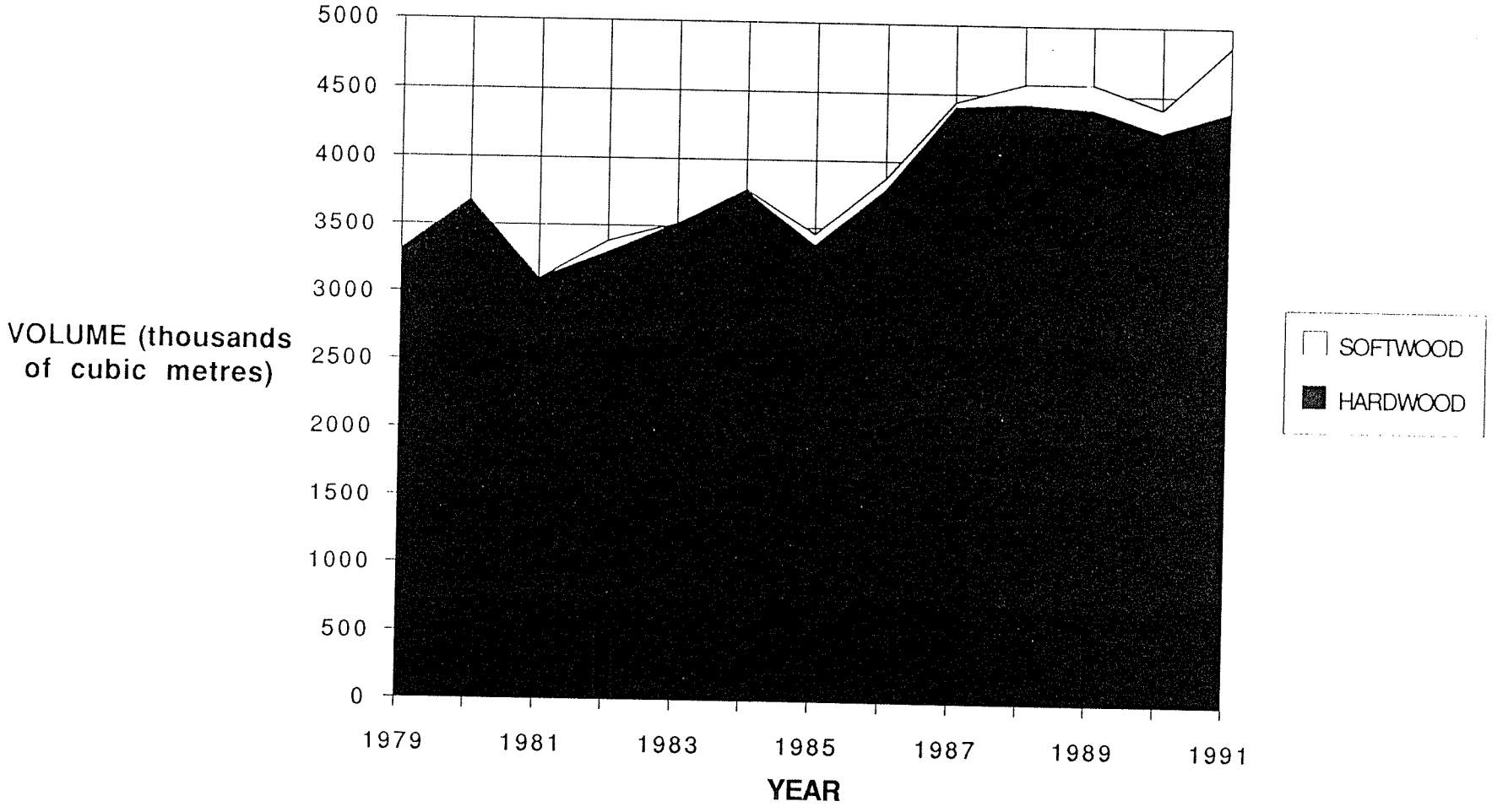
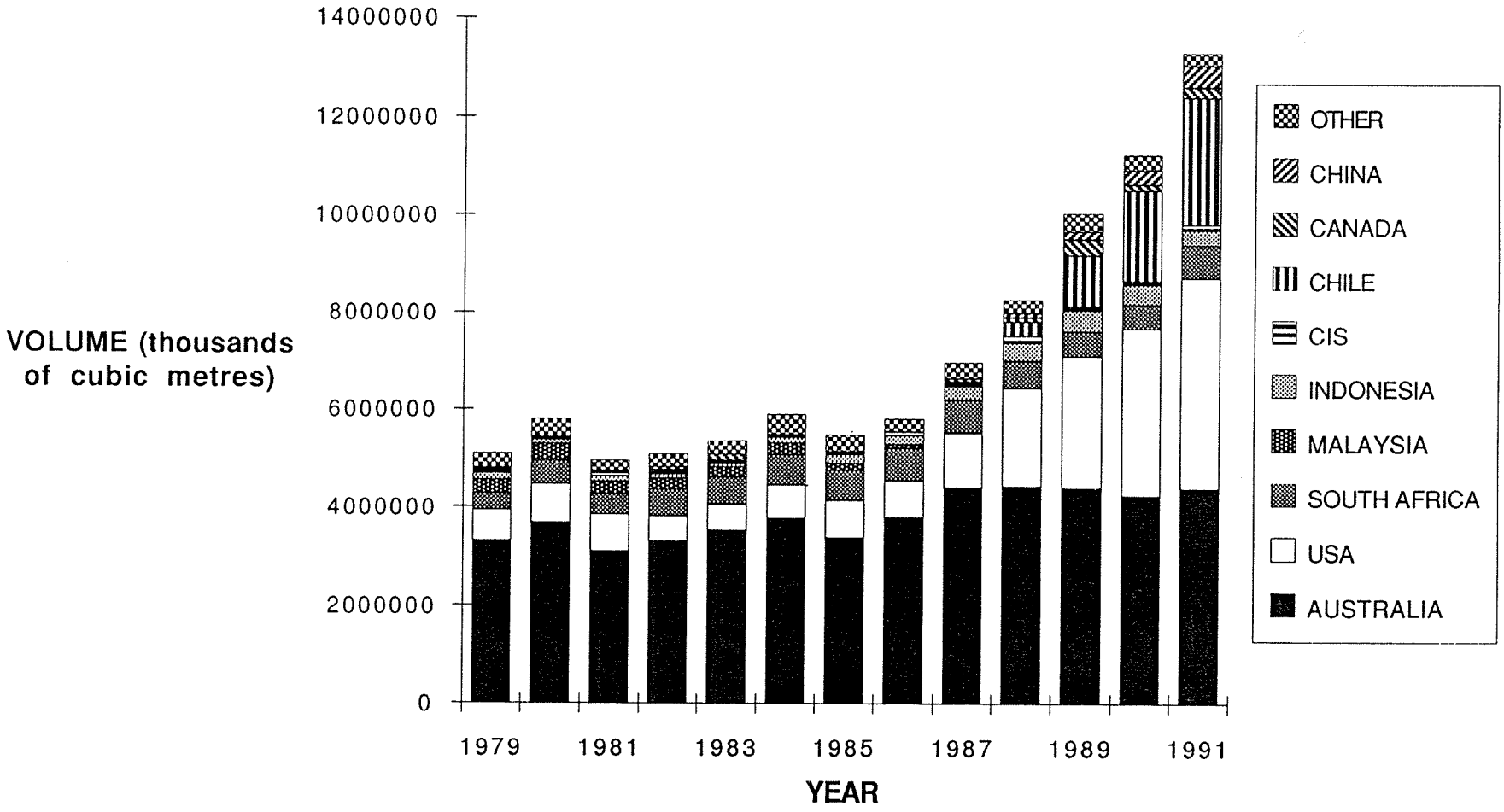


FIGURE 14

IMPORTS OF HARDWOOD PULPWOOD TO JAPAN - BY SUPPLY SOURCE



THE COMPETITIVENESS OF AUSTRALIAN WOODCHIPS ON A CIF BASIS

There are many factors which influence the buyer's perception of attractiveness as far as woodchips are concerned. The reliability of supply, the volumes available, the potential for the disruption of supply through political or industrial intervention, wood quality factors such as the basic density, pulp yield and the paper making characteristics of the product, chip uniformity, degree of contaminants and stowage factors are but a few. Of course price is a major factor, but unlike other internationally traded commodities the factors listed above have a disproportionate influence on the concept of attractiveness.

For the purposes of comparison Table 15 lists the landed CIF price of Australian woodchips with that of our major competitors. The CIF price takes into account the FOB price and the cost of oceanic transportation, which is a factor of vessel characteristics, port costs, storage and distance to Japan etc. I have purposely refrained from such a comparison using FOB prices. In 1987 the landed price of Australian hardwood chips was comparatively cheap, while the landed price of softwood chips was cheaper than the three major softwood exporters. By 1990 this position had dramatically altered. Australian hardwood chips had become the fourth most expensive, while Australia's softwood chips had become the second most expensive.

Table 15: The landed price (Japan) of woodchips from various source countries for 1987 and 1990 (Yen/bone dry metric ton)

Country	*1987*		*1990*	
	Hardwood	*Softwood*	*Hardwood*	*Softwood*
USA	19 119	16 785	20 332	20 825
Canada	17 824	17 071	22 944	21 569
CIS	16 172	13 158	21 315	16 940
Australia	16 864	15 952	20 570	21 000
New Zealand	18 508	14 679	19 884	19 633
PNG	18 810	-	18 214	16 540
Malaysia	-	-	-	-
Indonesia	14 298	-	16 640	-
Singapore	14 839	-	17 153	-
Taiwan	-	11 752	-	14 824
China	15 435	-	20 195	-
South Africa	15 753	-	18 280	-
Chile	-	16 008	20 253	19 476
Fiji	-	15 824	-	20 203
Thailand	-	-	21 447	-
Vietnam	-	-	-	-

Source: (JETRO)

This crude comparison should not be interpreted as an indication of the uncompetitiveness of the Australian producers or even as an indication of increased efficiencies exhibited by competing countries. The relative increase in CIF price of Australian chips is most likely attributable to the negotiating abilities of the Australian companies concerned whose objective it is to maximise FOB prices. The relative expense of Australian chips on a CIF basis is even more striking when the sailing times between Australian and Japanese ports are taken into account. For example, if the sailing times from our major hardwood chip competitors, US South, Chile and South Africa are compared to Australia (Table 16) it can be seen that these sources will bear approximately twice the transportation cost of the that of Australia. Even so, the CIF prices of these countries are approximately equal to that of our own.

Table 16: Sailing days and landed CIF prices for hardwood woodchips from major suppliers

Source	*Sailing day between ports* (days)*	*1990 CIF price (Yen/ODMT)*
US South	c. 35	20332
Chile	c. 35	20253
South Africa	c. 25	18280
Australia	c. 17	21000

* Number of days depends on vessel type and from which ports the vessel operates.

Given that Australia has an attraction because of its proximity to Japanese ports, one could assume that the high CIF price may be due to a quality premium estimated by the seller at the FOB point of sale. However, the Japanese buyer's preference for source has been stated as follows:

1. Domestic (Japan) hardwood species
2. Red Alder from North America
3. *E. globulus* from Chile
4. Old growth eucalypt from Tasmania, Australia
5. Plantation eucalypt from China
6. Old growth eucalypt from New South Wales, Australia
7. Old growth eucalypt from Western Australia
8 Mixed species from Indonesia and Malaysia

Source: JPA

This preference lends no weight to the assumption that the high Australian CIF price is attributed to any quality or preference premium extracted at the FOB point of sale.

In summary, I suggest that the comparatively high CIF price of Australian hardwood chips is due to comparatively high FOB prices, which are not a function of premiums paid for preference. The high FOB prices are extracted through the negotiating parties concerned with the use of total volumes controlled as a negotiating lever. However, as Australia's market share of the trade is eroded this factor will become less significant. Australia's ability to maintain a high price structure should also be questioned in the light of the diverse alternative sources of high quality hardwood chips currently on or about to come onto the market.

It may be assumed from this basic commentary that Australia's market share of the hardwood chip market is being eroded due to its high price structure, however, the reasons are complex and price is only one small factor. A discussion on Australia's future position in regard to market share and future possibilities is best left to the final chapter.

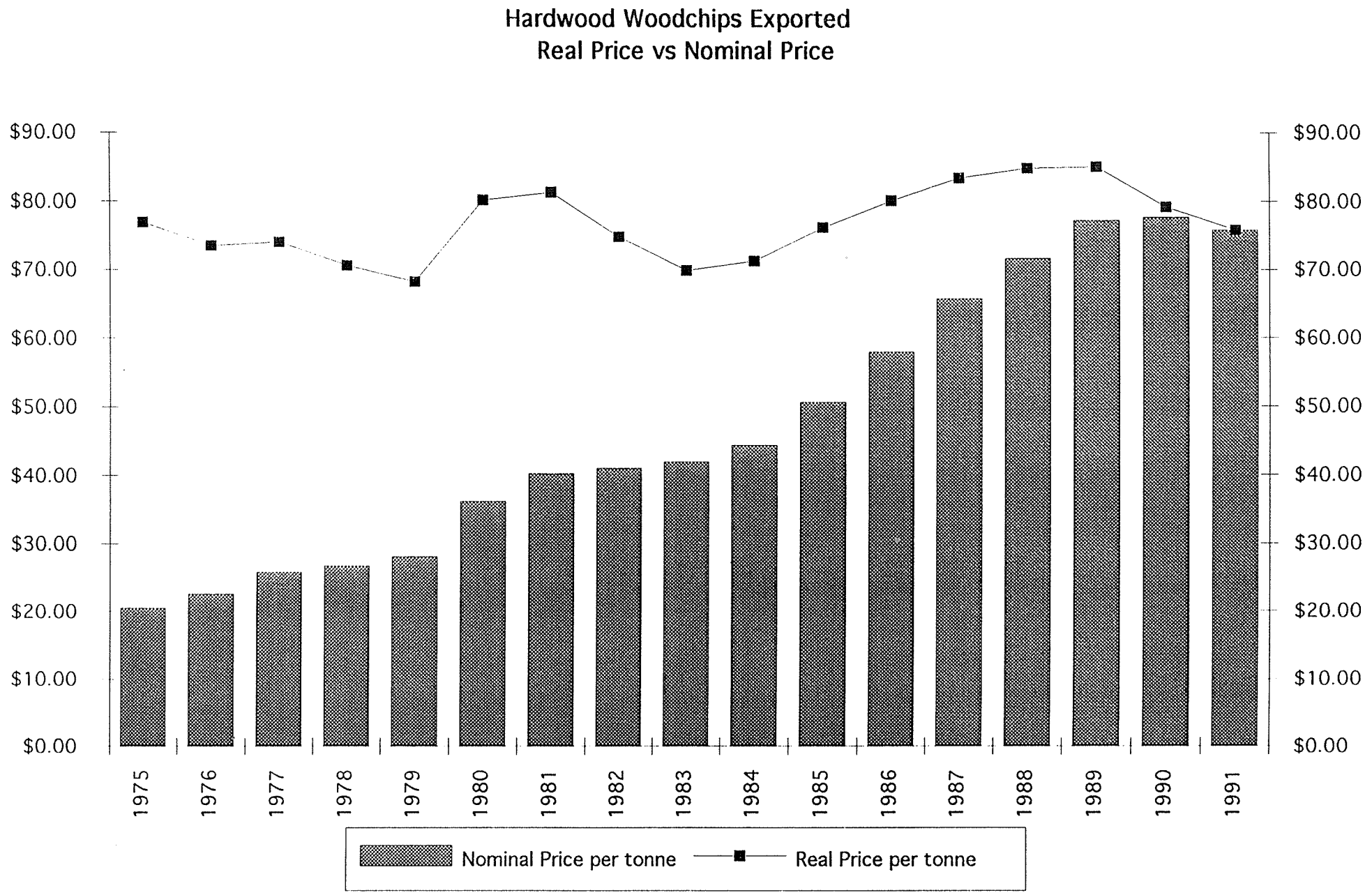
THE VALUE OF AUSTRALIA'S HARDWOOD WOODCHIPS

It is obvious from Table 3 that Australia incurs a large deficit in forest products, which includes pulp, paper and paperboards. It can also be ascertained from Table 3 that woodchips are our major export in forest products. However, it is interesting to examine the real value of this product.

If Figure 15 is examined it is obvious that the nominal price of woodchips, on a green metric tonne basis, has increased in a reality steady fashion. The two periods of greatest increase occurred in 1980/81 during the chipshock incident and during the late 1980s when maximum demand occurred. However, if the real price of chips is examined the pattern is quite different. The real price of chips in 1991 Australian dollars was calculated using Perth's CPI. Clearly, the price has not undergone large annual or periodic fluctuations and has displayed a

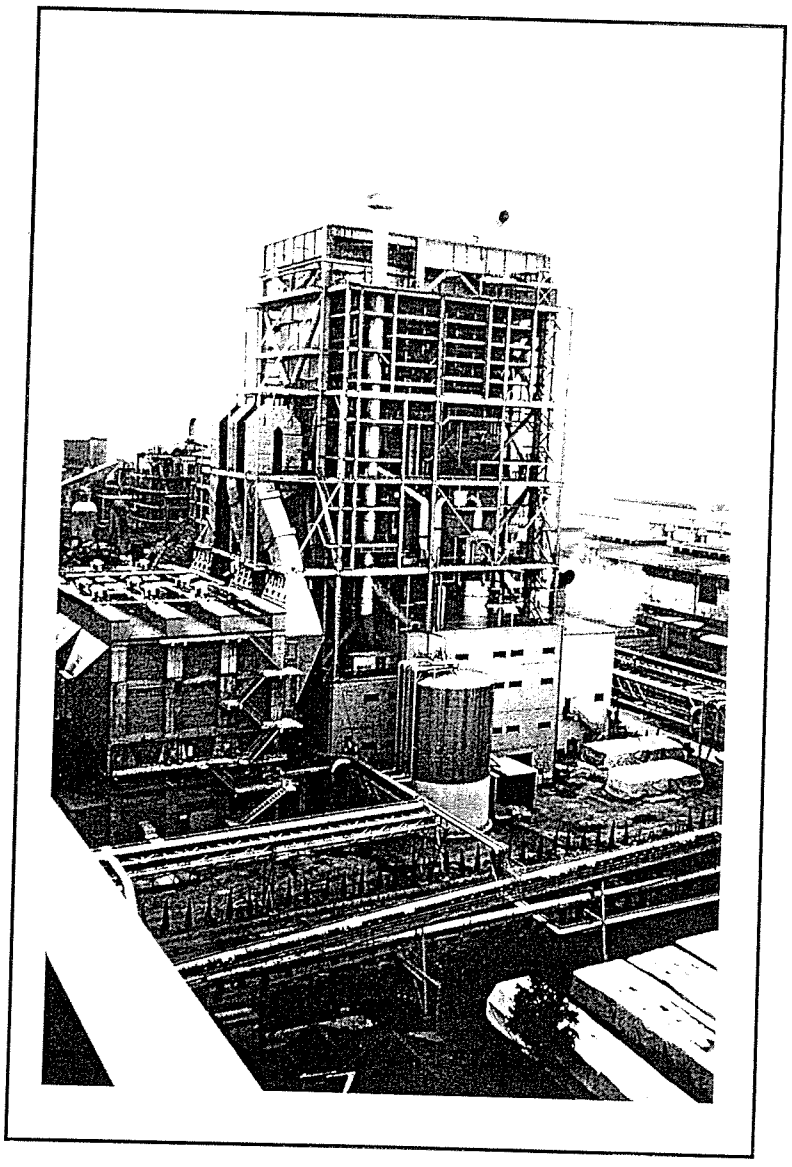
stability inconsistent with standard low value commodities. This is due to the structure and long-term nature of the international trade in chips. The effect of chipshock and the current recession is clearly evident. In the next five years Australia's strong negotiating position, due to market share, will be severely eroded and I suspect that the real price of Australian hardwood chip will fall.

Eucalyptus globulus plantations in Western Australia


Hardwood Woodchips Exported
Real Price vs Nominal Price
$90.00
$80.00
$70.00
$60.00
$50.00
$40.00
$30.00
$20.00
$10.00
$0.00
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
Nominal Price per tonne
Real Price per tonne

CHAPTER FIVE

A Comparison of Supply Sources



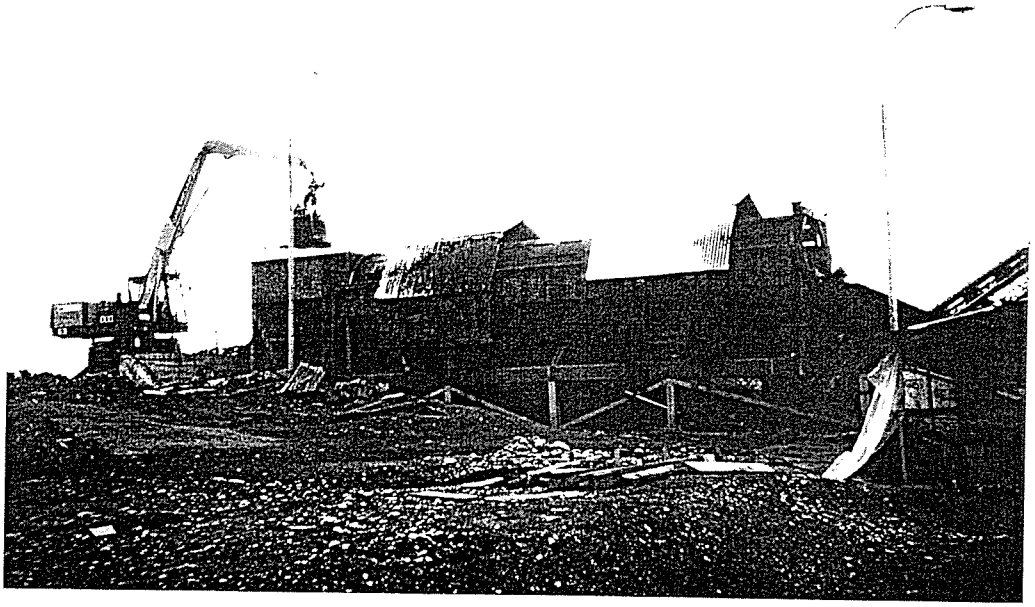
Pulpmill's recovery boiler; Japan

5 A COMPARISON OF SUPPLY SOURCES

INTRODUCTION

The mechanics of producing woodchips displays considerable variation between geographic regions. The variation stems from differences in supply source, for example, plantation versus native forest sources, the degree of mechanisation, transport mechanisms, chipping machinery and port facilities. A seemingly infinite array of combinations are possible, all of which produce a surprisingly standard and uniform produce; the woodchip.

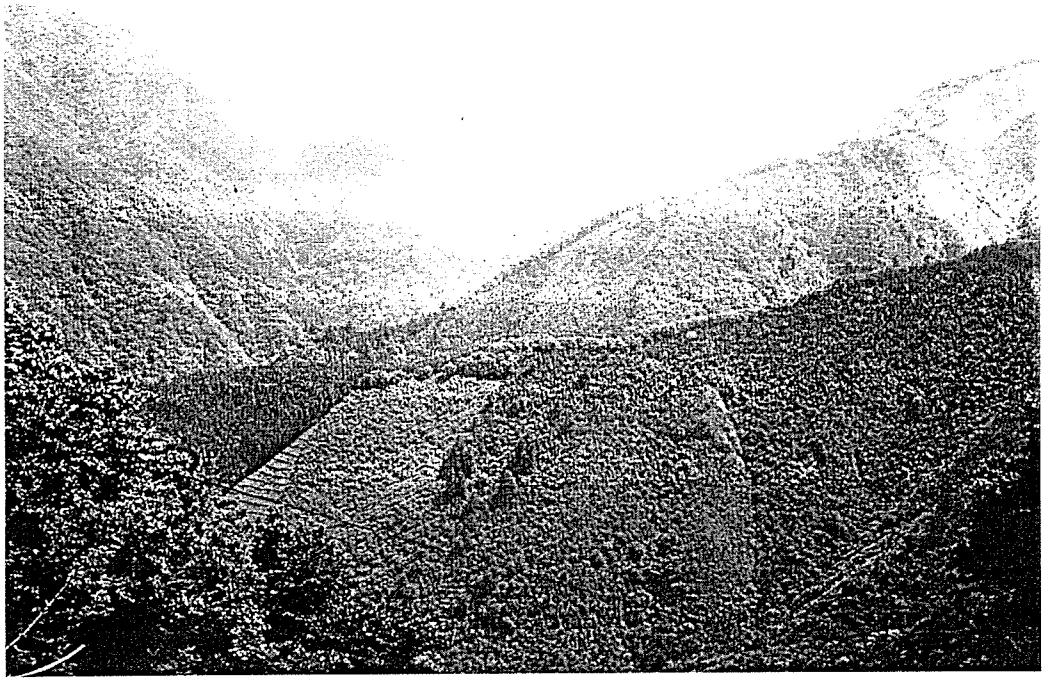
In this chapter some of the major hardwood chip supply sources are described with a commentary on their future prospects and the influence of their success or otherwise on Australian suppliers.



Drum debarker, chip mill in Chile

JAPAN

Mountainous forested terrain in Japan



Cutting coupes in the background in mountainous terrain; Japan

JAPAN

Introduction

The single largest supplier of woodchips to the Japanese pulp and paper industry is Japan itself. During 1991 c. 17 213 000 m^3 of pulpwood was supplied to the industry from domestic sources. During 1992 this figure had decreased to 15 919 000 m^3 due to the recession which exists within the industry at present. During 1992, 7 543 000 m^3 of softwood chip and 7 128 000 m^3 of hardwood chip were supplied from Japanese domestic forests. A further 1 160 000 m^3 of softwood and 88 000 m^3 of hardwood were supplied in roundwood form. Clearly, and contrary to popular belief, the forest industries of Japan are the major supplier of pulpwood to the Japanese pulp and paper industry.

Japan's forest estate

The Japanese archipelago extends 3000 kilometres from north to south and consequently displays considerable variation in vegetation from subtropical forests in the south to sub-alpine in the north. About 25 000 000 hectares of forests, or c. 70 percent of the land mass, exists in Japan, predominantly on mountainous terrain. Forty-one percent of these forests (c. 10 000 000 hectares) are plantations while the remainder are natural forest.

The plantations consist of mainly softwood of such species Sugi (Cedar) and Hinoki (Cypress spp.) planted during the post war afforestation programs. Consequently, the age distribution of these plantations is skewed with much of the resource maturing during the 1990s.

Most of the forest estate (58 percent) is in private ownership, including c. 6 percent in communal ownership. About 30 percent of the estate is national forest and c. 11 percent is owned by other public entities. Many of the pulp and paper companies are forest owners but rely heavily upon the open market for most of their pulpwood supply. Typically a pulp mill will draw from a wide variety of sources both domestic and imported as shown in Table 17.

Current estimates of the standing volume of the Japanese domestic resource are about 100 m^3 ha^{-1} or about 2.5 billion cubic metres in total. By 2010 this figure is expected to increase to approximately 3.25 billion cubic metres, a substantial resource to say the least, and the figure may be roughly divided into 60 percent softwood and 40 percent hardwood. A cursory study of these figures may suggest that the Japanese domestic supply sources may become more prominent in future supply scenarios, especially for softwoods. While it is a fact that the volume of softwoods from domestic sources supplied to pulp mills has increased (Figure 10), the increase has not matched the rise in demand. This is because supply from domestic forests is a function of economics and costs rather than availability.

Table 17: Pulpwood procurement for a Japanese pulp mill*; 1991 base

Supply	*ODMT*	*%*
Domestic Softwood		
roundwood	26 080	12.7
sawmill residue	181 010	18.6
Cedar, Cypress chips	5 510	0.6
Lawaan	5 960	0.6
Imported Softwood		
Douglas fir - PNW, USA	1 56 530	16.1
Larch - CIS	15 040	1.5
Radiata pine - NZ	50 580	5.2
Slash pine - Australia	59 650	6.1
Domestic Hardwood		
chips	153 880	15.8
Imported Hardwoods		
Alder - PNW, USA	15 000	1.5
Beech - Chile, NZ	31 690	3.3
Eucalypt - Australia (Tasmania), China	67 930	7.0
Eucalypt - Australia (NSW)	37 440	3.8
Oak - US South	71 890	7.4
Birch - CIS	9 050	0.9
Oak - US, PNW	84 160	8.7
	971 400	

* Name and company of the mill withheld.

Industry Characteristics

The Japanese pulp industry is geared for the use and receipt of woodchips rather than roundwood. Very few pulp mills have chip mills on-site or own chip mills off-site. Instead a pulp mill will receive chips either from imported sources or from designated chip mills, of which there are approximately 580 in Japan. A number of chip mills are contracted to supply any one particular mill, and the mill used in Table 17 had contracts with c. 20 different chip mills. Chip mills in Japan are small by world standards and supply between 500 to 2000 ODMT per month. Transportation of logs to the chip mill, chips to the pulp mill or chips from the port wood yard to the pulp mill is by road only. Consequently, the coordination of the arrival of woodchip vessels and the supply of woodchips from many domestic supply sources is a major planning exercise for the pulp and paper companies due to the heavy traffic congestion experienced on Japanese roads.

Harvesting

A pulp mill usually secures chips through contractual arrangements with chipping companies. These companies in turn may:

(i) buy logs from independent contractors;
(ii) purchase resource on a stumpage basis and harvest themselves; and/or
(iii) cut from their own forest owned outright, owned by the pulp mill or leased by some external arrangement from other groups including community organisations.

In practically all cases the harvesting occurs on steep terrain (c. >18°). The timber is cut by hand (chainsaws) and is essentially a low quality product. Because of the nature of the terrain most extraction is by cable, predominantly skyline systems. Once the material has been landed it is cut into 2.8 metre lengths for loading onto trucks. The trucks used to transport the logs are small by Australian standards and are not articulated. This is a necessity due to the

mountainous terrain and poor state of the mountain roads. Logs are transported in this manner from an average of 50 kilometres to the chip mill.

Chipping

Chipping operations in Japan are unlike those elsewhere in the world. With c. 580 chip mills operating in Japan the scale of each mill is small by world standards. A typical operation would draw logs from an average 50 kilometre radius. The chip mill would carry a stockpile of roundwood of about 2000-3000 m^3 and produce about 500-2000 ODMT of chips per month on a contractual basis to a single pulp mill.

The chip mill itself would consist of a single drum debarker fed by a forklift type vehicle. The larger chippers consist of 22, 5 inch knives sharpened twice daily. Chip mills operate five days a week plus every second Saturday for 7 1/2 hours per day.

Usually there are no chip stockpiles at the mills, with chips being loaded directly from the screens into hoppers directly into trucks.

Transportation

On average the chips are transported 100 kilometres from the chip mill to the pulp mill. Each truck has a load capacity of c. 10 ODMT. Transportation in Japan is expensive with such a journey costing between 2800 and 3000 Yen/ODMT. Transportation of chips from the chip mill to the pulp mill's weigh station is undertaken by the chip mill's transportation company or independent companies under contractual arrangements.

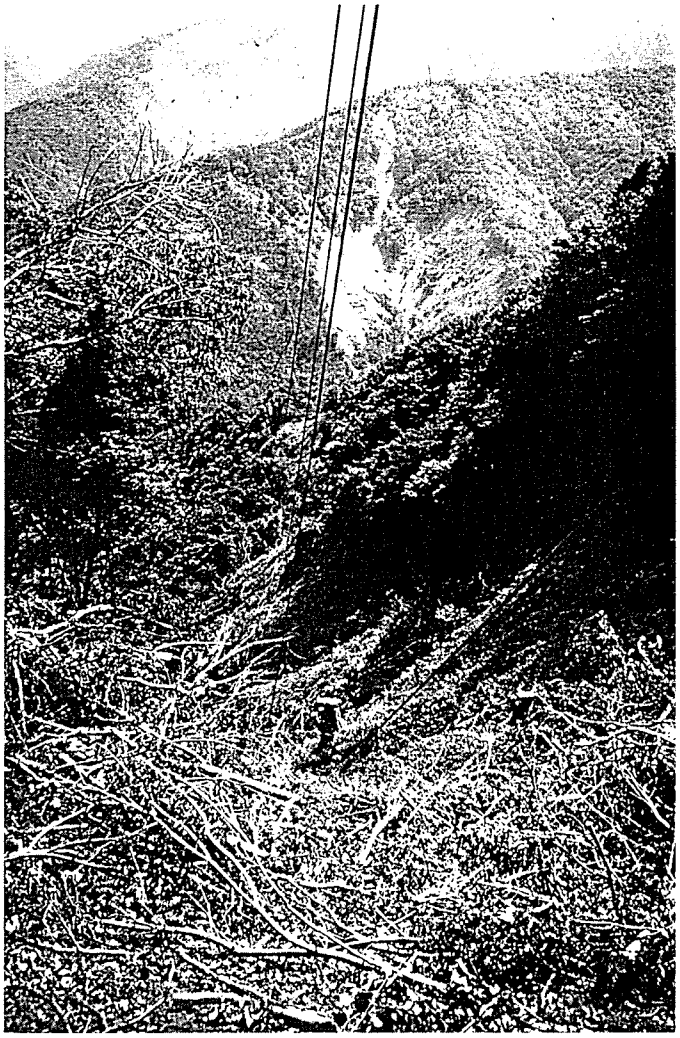
The movement of imported chips from the port's stockpile to the pulp mill's weight station is also by 10-12 ODMT capacity trucks. The trucks are loaded by automatic driver controlled hoppers. In this case it is common for the receiving pulp mill to own the truck fleet responsible for the transportation of imported chips.

Wood yard management and chip receipts

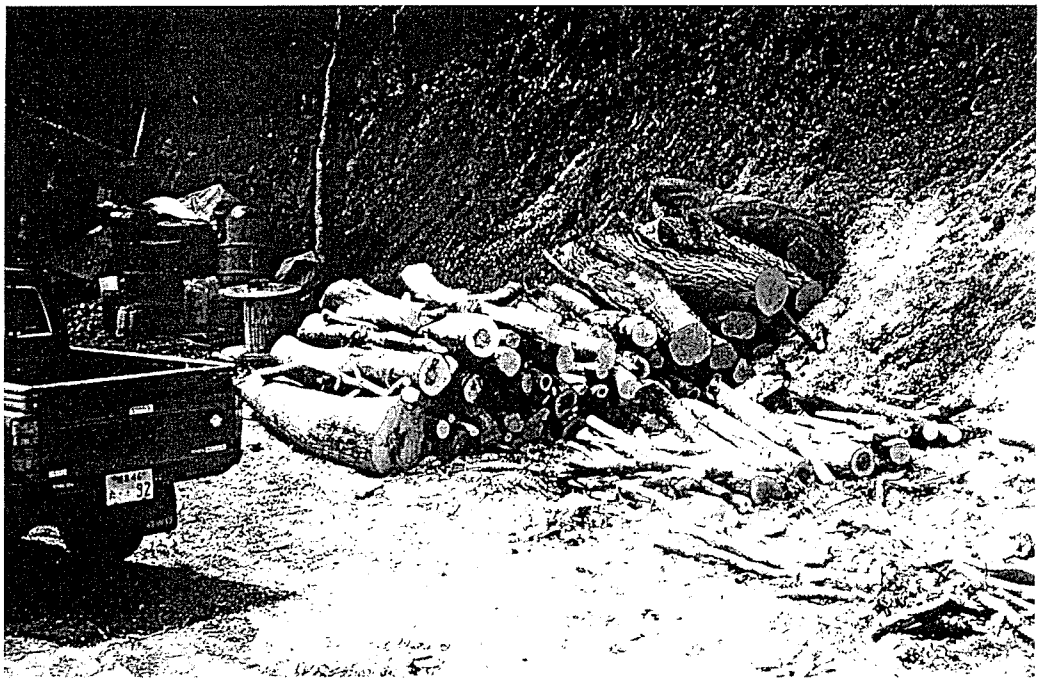
Japanese pulp and paper companies manage their receipt of chips and their wood yard stockpiles with clockwork precision. This is totally understandable given the shortage of land in Japan and the consequent reluctance to carry large stockpile inventories. As a result, the pulp and paper industry has adopted the "just in time" approach to handling inventories of chips.

For example, the receipt of imported chips is generally smooth and consistent without large irregular port stockpiles. At the port stockpiles are carefully managed and kept separated based on quality criteria. A consistent quantity of product is transported from the port to the pulp mill each day. Shipping is carefully orchestrated, not only to minimise shipping costs, but also to maintain a smooth supply of chips to the wood yard and pulp mill. Shipping visits are planned many ports in advance and a seemingly random shipping schedule is usually planned in minute detail. Under such a system the large inventory stockpiles of chips that one would expect for such an industry are carried by the offshore seller rather than the buyer.

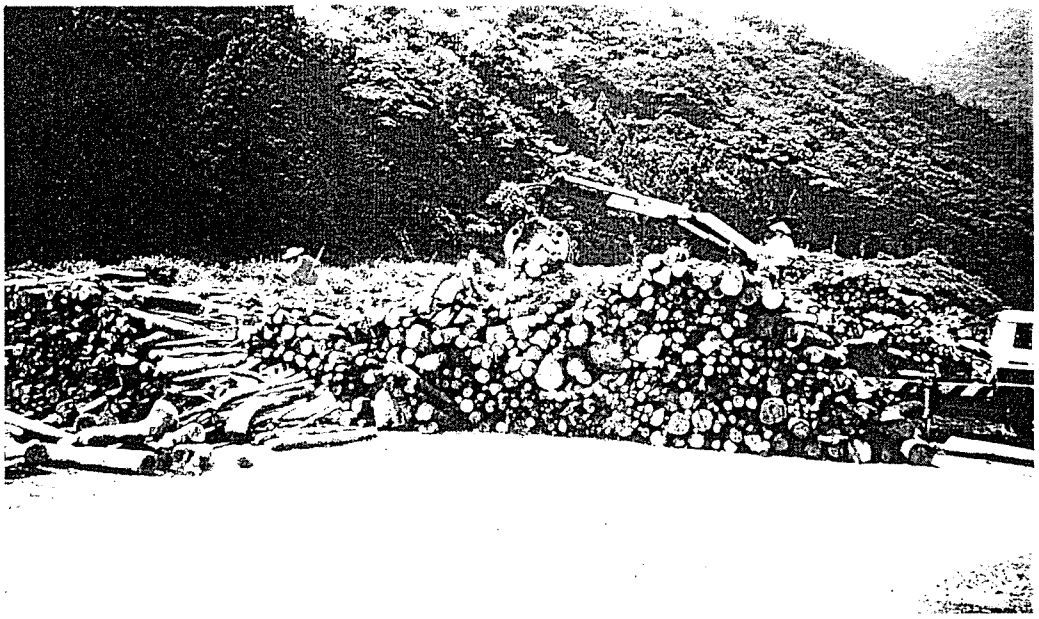
The receipt of chips at the pulp mill from both the port wood yards and the domestic Chip mills is also carefully planned and coordinated. Trucks from each source are designated an allotment of time during which the mill will receive their chips. Trucks arriving at a mill are received at the mill's weigh station before assignment to one of a number of dumping bins. Each mill will have between five and 12 dumping bins. The bins are connected by underground conveyors which move the chips to silos or wood yards prior to moving to the pulp mill's digestors. Chips are carefully separated and stored according to product type and origin, consequently the timing and bin allocation for incoming trucks is carefully controlled and scheduled. Chips received are continually tested for product quality.



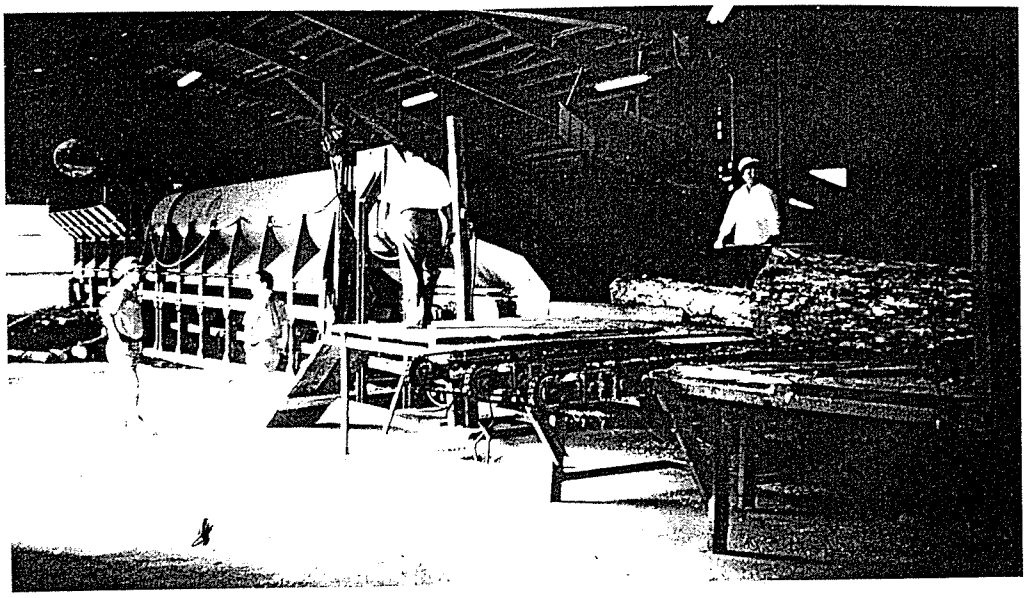
Cable logging in Japan's domestic forests



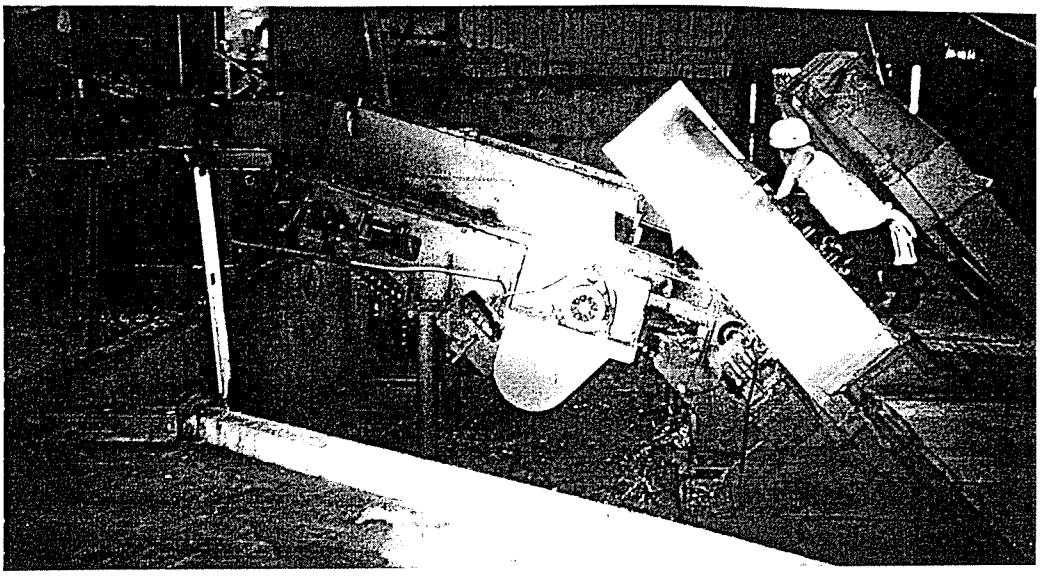
The size and dimensions of roundwood on a roadside landing in mountainous terrain, prior to transportation to the chip mill; Japan



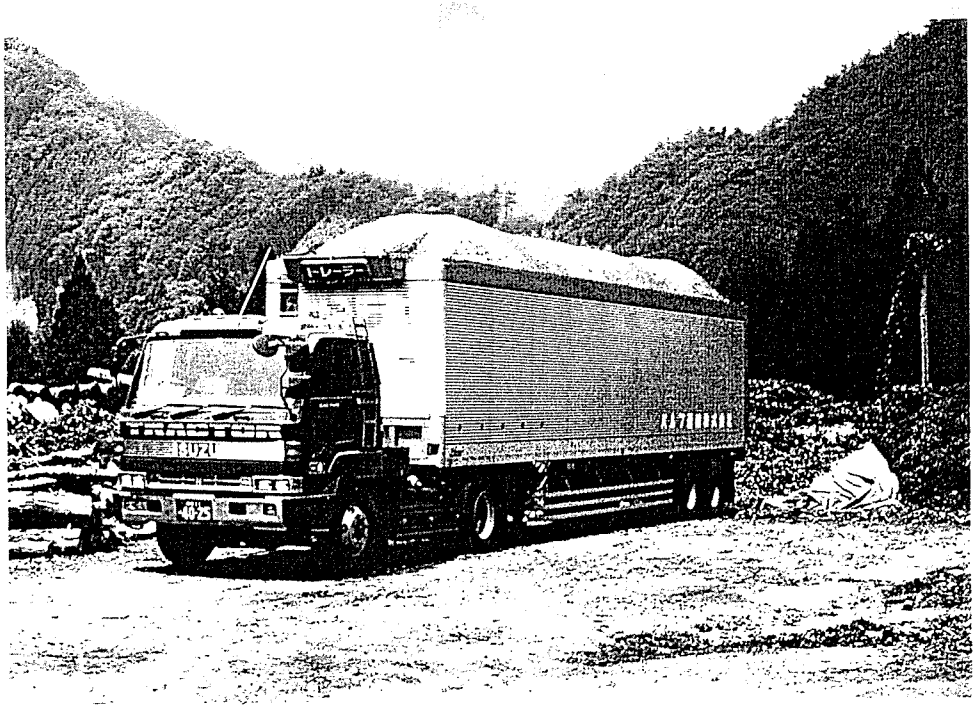
Domestically produced roundwood in a chip mill woodyard; Japan



Drum debarker in a domestic chip mill; Japan

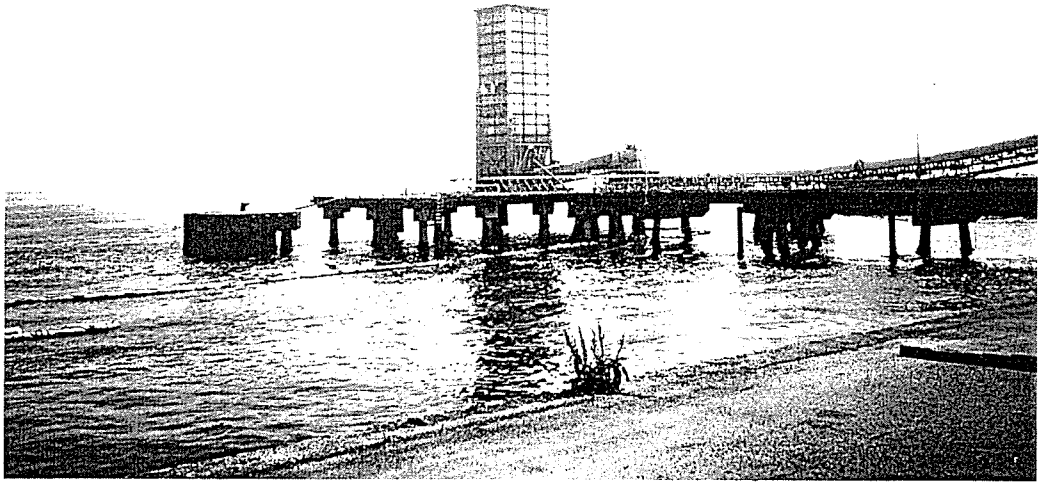


One of the larger chippers

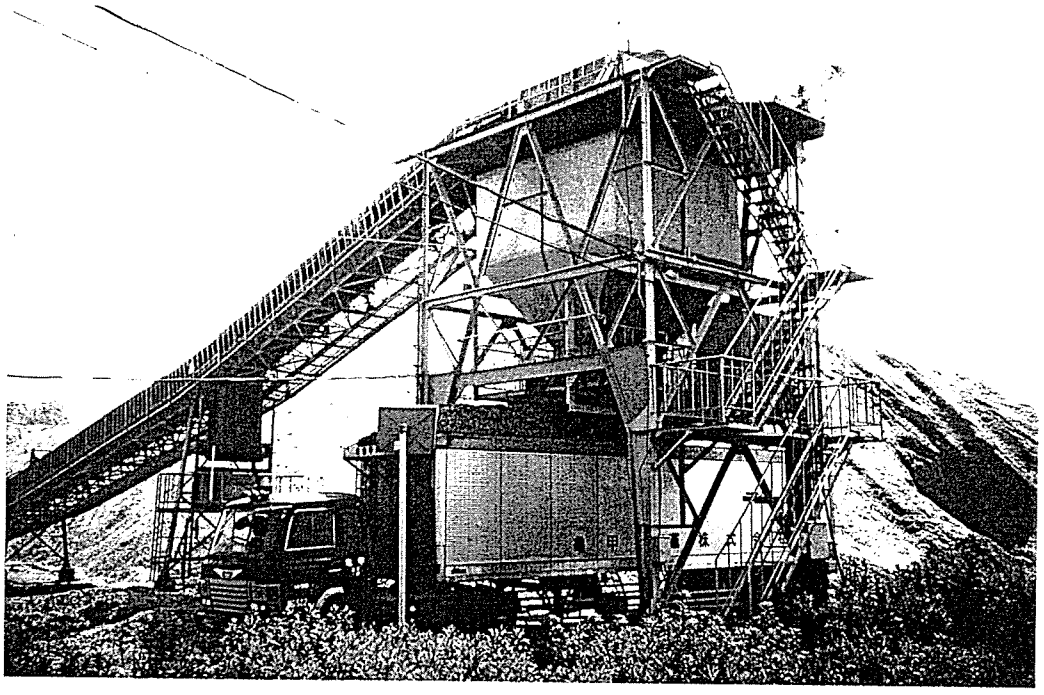


Woodchip transportation from chip mill to pulp mill; Japan

Woodchip receipt at the pulp mill; Japan



Woodchip vessel unloading facilities for imported chip; Japan



Automatic woodchip loading facilities at the port. Truck being loaded and imported chips for transport to the pulp mill; Japan

Future trends for Japanese domestic supply sources

Because of its large volume of standing stock and its substantial contribution to the total chip supply scenario for the Japanese industry, the future of the domestic resource will have a large and significant effect on future pulpwood markets. Rather than hypothesize as to its future I shall rely upon an analysis by the pulpwood department of the Japanese Paper Association. The JPA assumes that the demand for paper and board will grow at c. 3% a^{-1} in line with real GNP, and as such Japan will produce 36 000 000 tonne of paper and board in the year 2000. This will require 16 200 000 tonne of pulp of which 12 600 000 tonne will be produced domestically. Waste paper will account for 57 percent of the furnish. Therefore, to produce 12 600 000 tonne of pulp 42 500 000 m^3 of pulpwood is required. The JPA assumes in its analysis that the domestic supply of pulpwood will remain approximately as it is today, at approximately 18 000 000 m^3, 9 000 000 m^3 of softwoods and 9 000 000 m^3 of hardwoods (Table 18).

At first glance it may seem unusual for an industry with such a large capital investment, consuming so much pulpwood and with large volumes of raw material practically at its door step, to rely heavily on imported sources of pulpwood and to increase this reliance in the future. However, there are two major reasons for this trend.

Table 18: Predicted pulpwood supply in the year 2000 (m^3 a^{-1})

Source	*Domestic Supply*	*Imported Supply*	*Total*
Softwoods	9 000 000 (48.1%)	9 700 000	18 700 000
Hardwoods	9 000 000 (37.8%)	14 800 000	23 800 000
Total	18 000 000 (42.4%)	24 500 000 (57.%)	42 500 000

Source: JPA

Firstly, and most simply, the economics of chip supply from the domestic forests are not attractive. In fact, chips can be imported at less cost than the delivered price of chips supplied domestically. This is due to the high cost of labour together with the large expense associated with harvesting, skidding, loading and transporting in extremely mountainous terrain. Also, because chip mills are small by world standards, the cost of chipping is also very high because the benefits associated with the economies of scale are not suitable. As mentioned above all chip transportation is by road, and any road transportation in Japan is expensive, especially over such haulage distances as described. All these factors combine to render the domestic supply source expensive.

Finally, social factors play a major role in this strategy. At present the average age of forestry workers in Japan is in the mid-fifties. Most younger people prefer to work in urban environments rather than in the timber industry and this has created a labour shortage in the sector. To attract labour to the labour intensive harvesting and tending operations, high wages and salaries must be made available. The age structure of the labour force and the problem of lack of labour is a serious concern of the industry itself when considering the future role of the domestic forests in the overall pulpwood supply scenario.

REPUBLIC OF SOUTH AFRICA

Two year old E. grandis X; Republic of South Africa

REPUBLIC OF SOUTH AFRICA

Introduction

The Republic of South Africa has been a supplier of woodchips to the Japanese pulp and paper industry since the mid-1970s. Exports began with an agreement between a Japanese trading house and Central Timber Cooperative (CTC) in the 1970s where 250 000 m^3 of Wattle (*Acacia mearnsii*) were shipped from Durban. Volumes increased to about 400 000 m^3 a^{-1} during the late 1970s and early 1980s until chipping operations were moved to Richards Bay in 1982. Since that time exports of woodchips from the CTC facilities has averaged 600 000 m^3 a^{-1} (Figure 14) and eucalypt chips were blended into the furnish from 1978.

In 1993 Silvacel, a 100 percent subsidiary of Hunt, Leuchars and Hepburn Timber Holdings Limited, began exporting eucalypt and wattle chips, also from Richards Bay, to Japan. The chip mill and chip handling equipment, which was built from greenfields, is capable of producing 1 000 000 m^3 a^{-1}. This volume, together with the current CTC export volumes, could easily establish South Africa as a major supplier of hardwood chips to Japan, and in 1993 could capture 12 percent of the total hardwood woodchip market. This will establish the Republic of South Africa as the fourth largest supplier of hardwood chips to Japan behind the USA, Chile and Australia.

South Africa's forest estate

One of the most striking features of the timber industry in South Africa is that it is almost solely based upon plantation grown resources. South Africa's native forests are limited in extent, and total about 300 000 hectares.

Only salvage logging occurs in this estate for the highly valuable yellow wood and Stinkwood used in the furniture industry, and totals <5000 m^3 a^{-1}. In contrast South Africa's plantation estate totals 1 295 531 hectares, which is equal to 1.1 percent of the total land mass of the country. This establishes the South African estate as one of the largest and most concentrated in the world. Significant plantation estate also exists in the homelands of Transkei, Ciskei and Venda, and together total 75 902 hectares. The plantation estate which exists within the Republic of South Africa is concentrated in the eastern side of the country throughout the highlands where rainfall exceeds 800 mm a^{-1}. This essentially restricts the estate to the east and south-east Transvaal, and to the Zululand, Midlands and southern areas in the Natal, although some plantations also exist in the Cape. A breakdown of estate by geographic area is given in Table 19.

Table 19: Geographic distribution of plantation estates in the Republic of South Africa (1991 base)

Geographical Area	*PLANTATION AREA Softwood (ha)*	*Hardwood (ha)*	*Total (ha)*
TRANSVAAL			
North Transvaal	24 968	34 588	59 556
East Transvaal	173 851	99 479	273 330
Central Transvaal and OFS	11 113	7 186	18 299
South-east Transvaal	114 687	169 226	283 913
NATAL			
Maputaland	14 939	8 418	23 357
Zululand	48 450	93 698	142 148
Midlands	80 751	116 628	197 379
North Natal	11 521	49 324	60 845
South Natal	43 254	58 606	101 860
CAPE			
East Cape	28 936	2 946	31 882
South Cape	70 318	5 462	75 780
West Cape	25 780	1 402	27 182
Total	648 568	646 963	1 295 531

Source: RSA Forestry Council

The Republic of South Africa has been steadily increasing its plantation estate since the turn of the century. The period of maximum expansion occurred after World War II and the area of estate doubled by early 1970.

Species composition

The plantation estate basically consists of softwood species (pines), eucalypt and acacia. In recent years the contribution of eucalypts to the total estate has escalated rapidly, increasing in total area as well as replacing some of the older acacia plantations (Table 20).

Table 20: Plantation area by species

Species	*AREA (ha) 1988/89*	*1989/90*	*1990/91*
Softwoods	597 725	611 011	648 568
E. grandis	361 040	383 411	394 006
Other eucalypts	115 730	129 809	137 003
Wattle	116 532	110 001	107 379
Other	6 823	7 067	8 578
Total	1 197 850	1 241 299	1 295 531

Source: RSA Forestry Council

Like Brazil, the Republic of South Africa relies on eucalypt hybrids for much of its hardwood estate. Most hybrids are based on *E. grandis* which is crossed with *E. nitens*, *E. camaldulensis* and *E. urophyla*. Not all forest growers have decided to pursue hybrids, however, the obvious gains demonstrated by the leading growers such as H, L and H Timber Holdings and Silvacel, has prompted many growers to convert to this route. The decision to follow the hybrid system assumes the grower is able to vegetatively propagate, which in the

past has been voiced as an argument against using hybrids of eucalyptus. However, the successful hybrid and clone system employed by the companies yields recordable increases in yield of c. 60 percent over the standard seedling approach (see section on industry characteristics).

Plantation estate ownership

Unlike many other countries attempting to develop plantations, the majority of the estate in South Africa was established by private parties and entities with the minimum of public input. Today 73.5 percent of the estate is privately owned. This factor is particularly evident for hardwood species where 91 percent of all hardwoods are in private ownership (Table 21).

Table 21: Plantation area by ownership

Species	*OWNERSHIP*			
	Private (ha)	*Public (ha)*	*Private (%)*	*Public (%)*
Softwoods	363 821	284 747	56.1	43.9
E. globulus	362 947	31 059	92.1	7.9
Other eucalypts	120 320	16 683	87.8	12.2
Wattle	100 819	6 557	93.9	6.1
Other	4 463	4 115	52.0	48.0
Total	952 370	343 161	73.5	26.5

Source: RSA Forestry Council

An interesting aside to the topic of ownership is the South African concept of cooperatives in forestry. While the concept of cooperatives for primary produce is not unique *per se*, it is unique as far as woodchip export is concerned, and the South African model must be the most successful example. The Republic of South Africa's House of Assembly passed a Cooperatives Act in 1981 which governs the formation, incorporation and functioning of cooperatives. About 200 000 hectares of forests are owned by individual farmers and most hold membership in cooperatives. The cooperative's main role is in marketing and pricing, and as a collective increases the leverage during negotiation due to the volumes controlled.

As far as woodchip exports are concerned, the Central Timber Cooperative is a fine model for any collective wishing to export chips, to follow.

Industry characteristics

One interesting characteristic of the South African timber industry is that in the majority of cases each plantation is managed for a specific product. This has probably evolved due to the high proportion of private ownership with each entity exchanged in specific business. Significant gains in efficiency are achieved by concentrating efforts towards a specific pursuit with specific objectives. Table 22 lists the plantation area by management objectives and it is obvious from the table that the production of pulpwood is the major objective. Fortunately not all of this product is for export as South Africa supports nine pulp mills. The production of sawlogs is the next largest management objective and significant quantity of residual material is used as pulpwood from this industry by product. Finally, the production of mining timbers is the third largest management objective. The management of plantations for mining timbers is similar to the management of plantations for the production of pulpwood and often the respective plantations are interchangeable. However, buyers of mining timbers require strong light wood, while the optimum pulpwood material is heavy (i.e. of high basic density). At present pulpwood is cut from mining timber plantations due to the down-turn in the mining timber market. In the future I believe the firms will clearly

separate the two management objectives because of their inconsistent requirements with regard to density.

Table 22: Plantation area by management objective (1990/91 base)

Objective	*Hectares*	*Percent*
Sawlogs	455 187	35.1
Pulpwood	494 070	38.2
Mining timbers	286 098	22.2
Poles	27 160	2.1
Matchwood	3 732	0.2
Other	29 284	2.2
Total	1 295 531	100

Source: RSA Forestry Council

Growing stock

An impressive characteristic of pulpwood production in the Republic is the adoption by leading timber companies of a 100 percent clonal approach to planting stock. All stock clonally propagated are hybrids of *E. grandis*. Historically this approach has met with criticism such as the dangers of monocultures, poor form, disease susceptibility etc, however, the advantages of this approach are becoming more and more evident. Apart from an increase in productivity of c. 60 percent over standard stock, the matching of clones to sites yields other significant advantages such a drought tolerance. For example, during the severe drought being experienced in the Republic at the time of writing, it has been reported that selected *E. grandis* x *E. camaldulensis* clones are far more tolerant of drought than standard *E. grandis* seedlings. Other advantages gained include a cold tolerance for cold upland sites and insect and pest resistance.

At present much of the pulpwood being exported comes from mining timber plantations. As such, the wood quality attributes are sub-optimum because of the divergence in wood quality requirements between the pulpwood and mining timber products. However, once the clonal and hybrid systems are clearly focussed on the production of pulpwood, it is my belief that much larger gains will be recorded than simply the c. 60 percent increase in volume production. Using these techniques the basic density of the product can be moved significantly from the current c. 500 kg m^{-3}, which together with the increased volume production, significantly affects the productivity of the estate in terms of oven dry metric tonnes produced per hectare.

Once hybrids are produced they are planted out in trials or operational plantations over the range of sites of interest. At the end of the rotation the best individuals are selected on that site. As such, hybrid site matching is achieved within one rotation. Such results are also confirmed by formal trials. After testing etc. a clone is labelled a "commercial clone" and sent to clonal nurseries for propagation.

At a clonal nursery clones are grown in clone banks. From the clone banks cuttings are taken, cut to specific dimensions in specific timeframes, dipped in rooting powder and placed in a vermiculite filled container. The cutting and striking phase of the propagation is undertaken under tightly controlled and regulated environments. The success rate of this system (strike rate) is c. 80 to 85 percent. Companies are able to produce 10 000 000 seedlings per year using this method. The method itself is relatively labour intensive but not excessively so.

Clonal systems pertain predominantly to eucalypt plantation. Acacia operations are restricted to direct seeding methods for propagation.

Planting and permits

Prior to establishment a permit is required from the Department of Water Affairs and Forestry. The permits are granted on a catchment by catchment basis. Unlike many areas of the world, afforestation in the Republic of South Africa is not on cleared forest land but on lands which have never supported significant forest. As such, there is a concern in the country that plantations are diverting and using significant quantities of water and altering water balances. Under such a system the total plantation estate of the country is finite and the total hectares established to date is approximately the total allowed under the permit system.

Productivity

Official statistics of growth rates are given in Table 23. The figures represent the average of the estate but growth rates vary widely. Some of the more productive sites are capable of producing 40 m^3 ha^{-1} a^{-1}. The pulpwood figures may be increased by 60 percent due to the clonal forestry strategies.

Table 23: Weighted mean annual increments by species and product

Product	*PRODUCTIVITY (m^3 ha^{-1} a^{-1})*			
	Softwood	*E. grandis*	*Other Eucalypt*	*Wattle*
Sawlog	14.8	31.6	15.4	-
Pulpwood	14.8	21.3	15.7	8.8
Mining timber	-	21.3	15.7	8.8
Poles	9.9	21.3	15.7	8.8

Source: RSA Forestry Council

Harvesting and extraction

The harvesting of pulpwood in the Republic generally follows a motor manual method. That is, trees are felled by chainsaw and stacked by hand. The operations are labour intensive, for example, in the acacia operations each faller is followed by a team of 12 people who debark and two people to stack the 2.4 metre lengths into orderly piles. The eucalypt operations are undertaken in the same manner, the difference being that in the acacia operation the stripped bark is also collected and stacked.

A unique characteristic of the harvesting operations in the Republic is that all stacks of docked pulpwood are left on the ground for a period of six weeks for moisture removal reasons. All pulpwood traded is done so on a six week "air-dried tonne" basis. This yields significant advantages when transporting pulpwood over long distances.

After six weeks has lapsed since felling, the stacks are loaded onto trucks for transportation. Loading is undertaken by a small forwarder in general.

Transportation

The Republic of South Africa possesses two distinguishing characteristics with regard to pulpwood transportation. Firstly, all wood is traded on a six week air dried tonne basis, and because of the influence of the mining timber industry is cut to 2.4 metre lengths. Secondly, the transportation of pulpwood is over distances considered by most countries uneconomical, with haulage distances of 600 kilometres achievable.

The unit of trade (six week air dried tonnes) yields significant advantages with respect to transportation. Over the six week period that the pulpwood is left on the ground significant moisture is lost from the log, especially in the hot climate of South Africa. This in turn

translates to proportionally more wood being transported per tonne than if "wet" or "green" material were being moved. Generally, if the plantations are within 180 to 200 kilometres from the chip mill transportation is by truck. If longer distances occur transportation is by rail.

The movement of pulpwood by rail is via the "block train". These vehicles consist of about 48 trucks powered by eight engines. During the train's route trucks are picked up at various points along the track until capacity is reached (48 trucks). The size of such trains renders the movement of pulpwood economical over long distances. The fact that a large proportion of the moisture (weight) of the wood is removed prior to transportation also helps the economies of such a system.

The only disadvantage of such a methodology results from the influence of the mining timber industry, coupled with the high use of manual labour, dictating that the piece size should be 2.4 metres in length. As such, the efficiency of loading and moving such pieces is reduced over the tree length or longer length methodologies. Nonetheless the method of block trains and using six week air-dried material has enabled South African chip mills to draw on material from distances which would render the operation uneconomical elsewhere.

Chip processing

Unlike the situation in Japan, South Africa has few designated chip mills. The two main facilities are the CTC chip mill at Richards Bay and the Silvacel facility also at Richards Bay. The two mills are capable of processing 600 000 $m^3 a^{-1}$ and 1 000 000 $m^3 a^{-1}$ respectively. The CTC facility was commissioned in 1982 while the Silvacel facility was commissioned in 1993.

All log receipts are by road and rail and all are debarked prior to delivery. Both mills hold a significant stockpile of logs in the wood yards. An interesting characteristic of the processing phase in South Africa is the use of 2.4 metre length, six week air dried material. While this system undoubtedly has significant benefit during harvesting and extraction, and especially during transportation, it is questionable whether it is the optimal system for processing, especially when the scale of the plant is taken into account. While tree length material would more than likely suit such a processing system the advantages gained by a short wood system elsewhere must be considered.

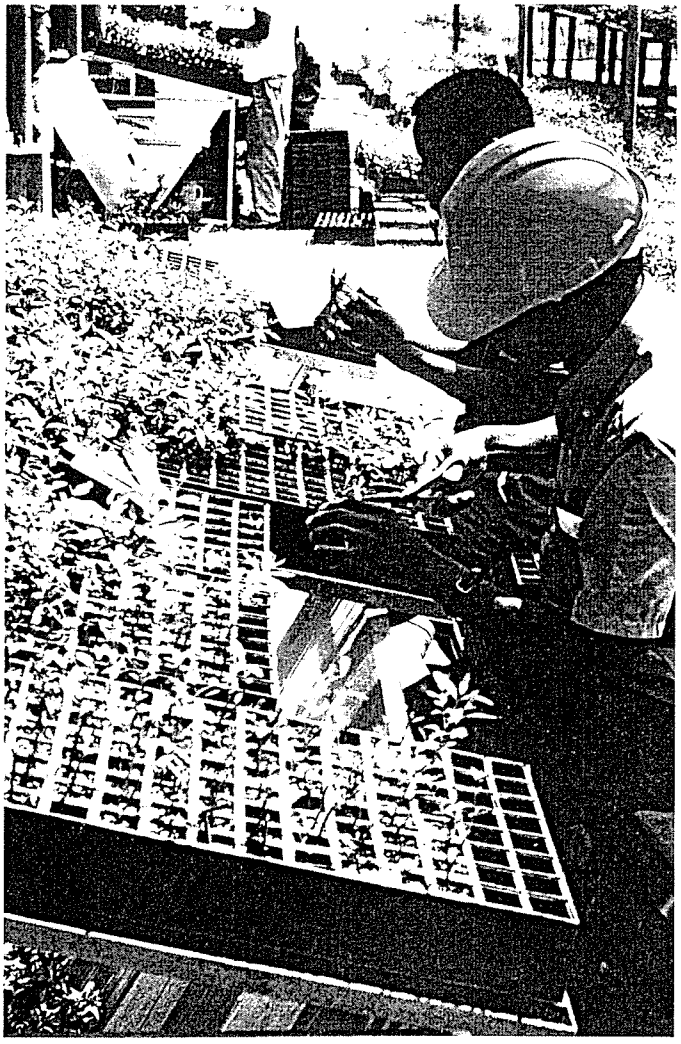
Both chip mills consist of a chipper and screens which feed chips onto conveyors for delivery to the chip stockpile and both stockpiles are c. 800 metres from the port. As both mills receive debarked material there is no need to use flail or drum debarkers on-site.

Apart from the two world scale chip mills a significant quantity of chips are produced as a by-product of producing mining timbers. The mining industry has a demand for "stacks" which are basically squared logs of c. 1 metre length wired together in mat form. The short lengths are squared via a chipping process. The chips are loaded directly to trucks and most of this material is sold to pulp mills rather than used as export material.

From the chip mill's stockpile chips are moved to the port for loading. The loading facilities at the port in Richards Bay are not owned by either group but are collectively shared with other commodities.

E. grandis X clone banks for production of cuttings; Republic of South Africa

Preparing the cuttings for strike; Republic of South Africa

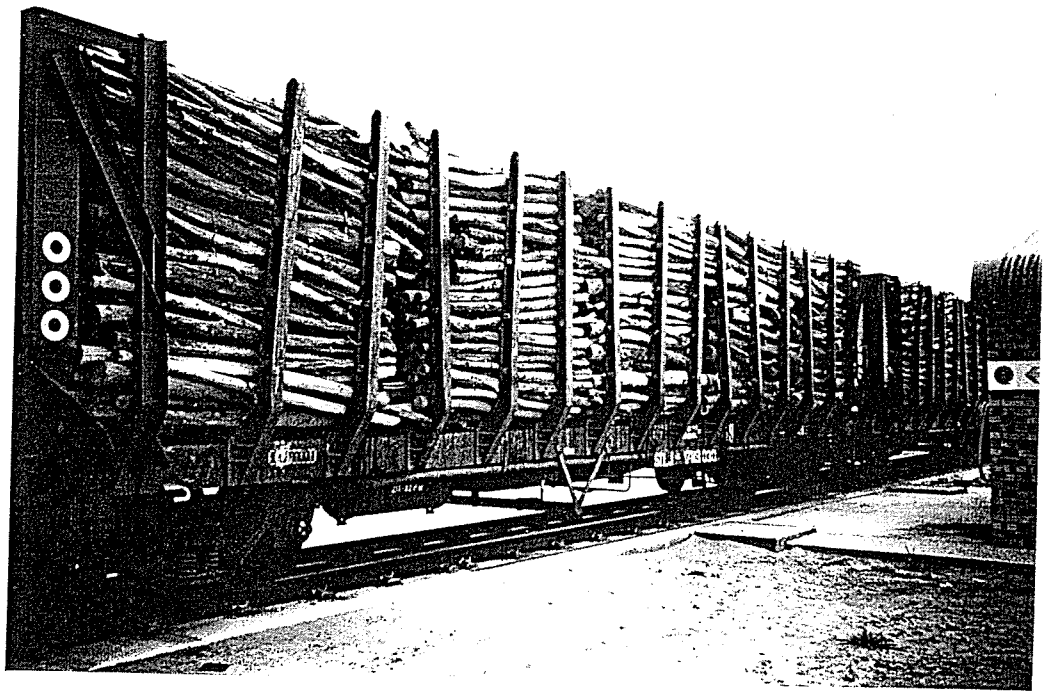


Trimming the clonal plant; Republic of South Africa

Clonal hybrid nursery; Republic of South Africa

Hybrid clonal trials; Republic of South Africa

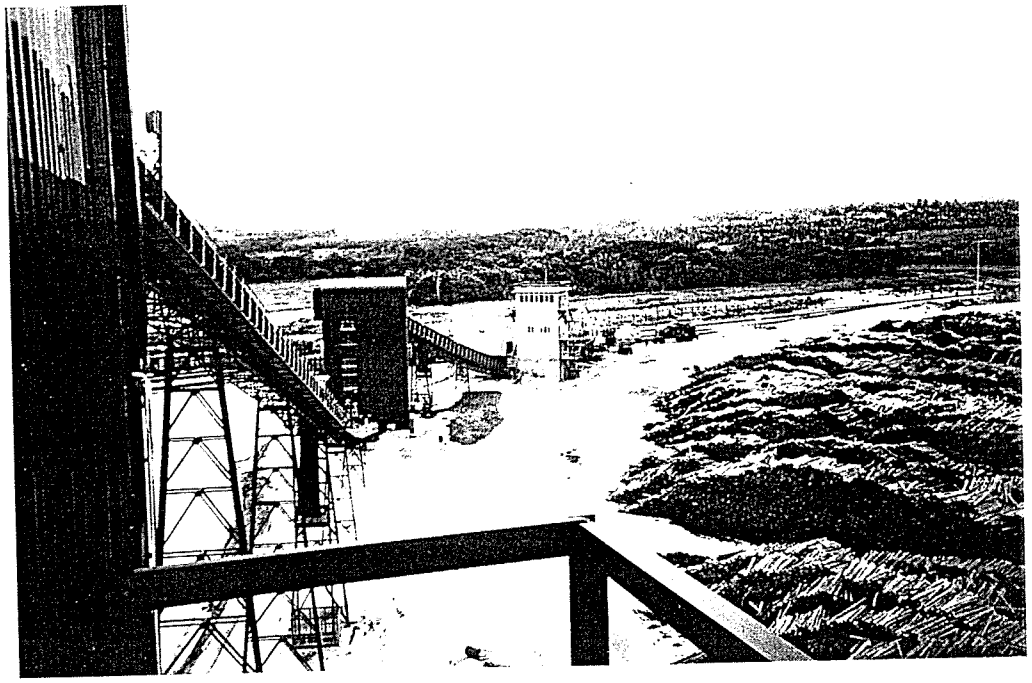
Acacia harvesting operations; Republic of South Africa



Six week air dried short wood in roundwood form in transit by rail to chip mills in Richards Bay; Republic of South Africa

Stockpile of six week air dried roundwood in the chip mill's wood yard; Richards Bay, Republic of South Africa

Silvacel chipper; Richards Bay, Republic of South Africa



Silvacel chip mill; Richards Bay, Republic of South Africa

Future trends for the Republic of South Africa to supply chips to Japan

South Africa is in the process of capturing a significant market share of the trade in hardwood chips. The professionalism and attention to detail displayed by the companies concerned, together with the skill in which plantations are managed, leaves little doubt in my mind that the Republic could be set to become a major supplier of high quality hardwood woodchips in the future. However, a number of factors will impinge on the realisation of this hypotheses, the first of which is the size of the estate available.

While the estate is significant, to say the least. its expansion may be restricted through the afforestation permits system which has been in operation since 1972. The aim of the system is to address the perception that indiscriminate afforestation restricts water availability. While the estate may be reaching its upper limit, substitution of eucalypt for wattle may see the availability of pulpwood increase.

There is little doubt that through the clonal and management systems employed by the companies the productivity of pulpwood plantations will increase over the next decade by c. 60 percent. Therefore, even if there is no nett expansion of the estate (which is unlikely), the total wood yield available will still increase significantly.

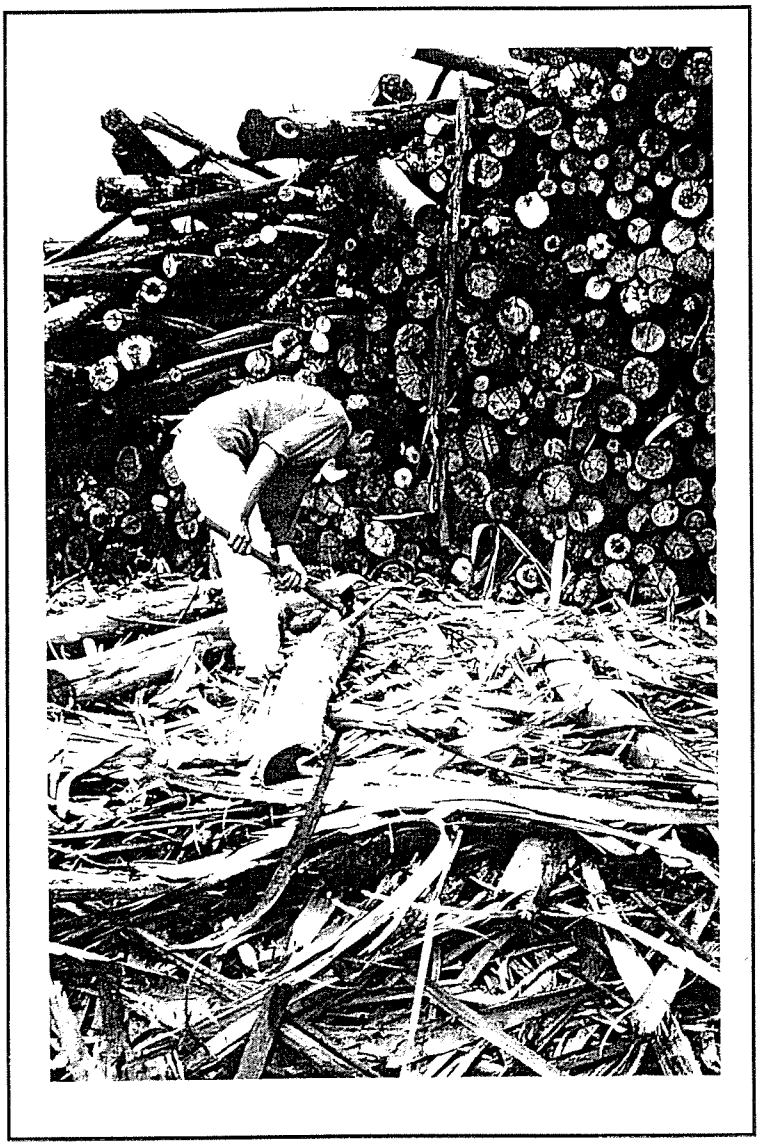
Within the region significant areas of eucalypt plantation exist which may have the potential to add to the supply in the future. The estate which exists in the homelands is substantial, and together with the significant unallocated estate which exists in Mocambique, may bolster the supply scenario significantly in the next decade without the need for the existing estate to expand. The resource in Mocambique has of course been unavailable due to the 15 years of war in that country. While it is premature to suggest that this resource will find its way to the pulpwood supply scenario, it is nonetheless a real possibility.

While the above factors suggest that the Republic of South Africa will be a large supplier of pulpwood in the future, how large will depend on three critical issues. Firstly, the degree to which current and future resource will be diverted from the pulpwood export market to domestic processing is unknown. Should the demand for mining timbers escalate and/or a new pulp mill be built, pressure would be exerted on the current pulpwood export supply. However, at the time of writing none of these scenarios seems likely due to the uncertain political situation in the country at present and the focus of the companies concerned to be a significant supplier of woodchips. Also the increased yields expected from the existing estate would more than likely compensate in the unlikely event of increased domestic demand.

Secondly, the issue of labour costs requires addressing. The growing, harvesting, loading etc of pulpwood is labour intensive. As such, the piece size used is such that it is easily moved manually and as the price of labour increases the systems employed become less efficient. This is, however, a logistical problem which I am sure can be overcome by the personnel involved. The social implications of solving such a logistical problem, by converting to mechanisation, is related to the third and most significant of the problems faced by the Republic in its pursuit of becoming a large supplier.

Finally, the degree to which the country remains stable in its transmission to a shared system of Government will impinge on the country's ability to gain market share of the export pulpwood market over that which it currently controls. However. if the country can weather the transition smoothly I am of the belief that the Republic. and to a lesser extent its neighbour, is poised to become a major supplier to the world's pulpwood market. It is currently the only consistent significant supplier of plantation grown eucalypt to Japan, and in my view will capitalise on this fact and its significant expertise to become a major, if not the major, exporter of hardwood chips to Japan in the future.

CHILE



Debarking eucalyptus roundwood; Chile

CHILE

Introduction

Chile is a comparatively new entrant to the pulpwood market commencing export as recently as 1987. At this time Chile supplied Japan with c. 6000 cubic metres of softwood roundwood and 96 700 cubic metres of softwood chips. Only 569 cubic metres of hardwood roundwood was imported by Japan at this time. However, during 1988 Chile supplied Japan with 118 000 cubic metres of softwood roundwood, 204 000 cubic metres of softwood chips, 40 347 cubic metres of hardwood roundwood and 304 000 cubic metres of hardwood chip to capture 4.1 percent of the total softwood pulpwood supply and 4.1 percent of the total hardwood pulpwood supply to Japan.

By 1991 Chile had increased its supply to Japan such that it provided 682 000 cubic metres of softwood pulpwood and 2 666 000 cubic metres of hardwood pulpwood to capture 7.4 percent and 19.9 percent of the market respectively. This rapid escalation has established Chile as a major supplier of pulpwood and has earned the country the status of the third largest supplier of hardwood chips behind only Australia and the USA. Considering the short timeframe over which this has been achieved, Chile's entry to the market has been spectacular to say the least.

There are three sources of woodchips from which the woodchip export industry draws. Softwood chips from pine plantations, hardwood chips from *E. globulus* plantations or hardwood chips from Chile's native notofagus forests. Each supply source supports a number of chipping companies, however, most draw upon all three sources (Table 24).

Table 24: Chilean chip companies by source and size

Size	*Softwood Plantations*	*Hardwood Plantations*	*Native Forest*
0 - 50 000 tonnes	9	-	-
50 000 - 100 000 tonnes	-	2	-
over 100 000	1	3	-
no data	-	-	14

Source: Chilean Forestry News, 1991

Chile's forest estate

Chile has a native forest estate of 7.6 million hectares. Because of the geography of the country considerable variation exists and the native forest covers climatic ranges from tropical to cool temperate. Most native forests harvested for pulpwood production are the cool temperate notofagus forests. Exact hectareages of this estate are hard to come by. Chile also supports a plantation estate of some 1 500 000 hectares, of which 1 300 000 hectares are mainly *P. radiata* and c. 100 000 hectares are *E. globulus* with some *E. nitens* and *E. delegatensis*.

Plantation development began in Chile with the aim of supplying mining timbers in the 1930s and in 1931, Supreme Decree No. 4363 was passed for the purpose of supporting afforestation. However, afforestation underwent a resurgence after Legislative Decree DL 701 was enacted in 1934 and later amended in 1979 to promote afforestation on selected lands with an aim to ensuring the reafforestation of exploited forests, rationalise exploitation processes and stimulate optimum management. DL 701 encouraged afforestation through a subsidy amounting to 75 percent of the cost of establishment and management (Anon. 1991). DL 701 is due to expire in 1994 after which the subsidy will be directed more towards the small individual grower than towards the larger companies which in the past have captured 80 percent of the c. A$6.5 million spent annually under the decree. Another incentive for

afforestation investment is the fact that foreign companies are able to repatriate company profits. This is an attractive proposition for companies wishing to develop estates offshore.

Under such a scenario afforestation has been rapid, though Chile does not posses the scale of estate the Republic of South Africa does, it is nonetheless significant. Plantings have increased from 60 000 ha a^{-1} in 1985 to 100 000 ha a^{-1} in 1990. In the future Corporation Nacional Forestal (CONAF) predict that approximately 30 000 ha a^{-1} of eucalyptus plantations will be established.

Industry Characteristics

Wood supply

Since woodchip export began the composition of the hardwood chip resource has dramatically altered. For example, in one chip mill visited the supply ratio of eucalyptus to native notofagus was 80 percent to 20 percent in 1988. By 1990 the mill was exporting equal quantities of eucalyptus and native stock, and by 1992 only 20 percent of material was eucalyptus. There are two reasons for this pattern, the first stems from the fact that a bleached kraft hardwood pulp mill was opened in 1991, which placed large demands upon the eucalyptus resource. Secondly, much of the eucalypt plantations were planted as shelterbelts and small lots for mining timbers etc and this resource was approximately 20 years of age at the time pulpwood was first exported to Japan and this resource is now largely depleted. There will undoubtedly be a deficit of eucalyptus in Chile for the next five to eight years while the eucalyptus plantations mature.

A chip mill will receive wood from either:

(i) mill door purchase (debarked);

(ii) remote wood yard purchases where the wood yard is specifically located and operated with wood purchase as its major aim;

(iii) purchases at the roadside from small growers;

(iv) purchases of standing timber from private owners and harvests and transports the wood itself; and/or

(v) its own estate.

All wood received by the chip mills is debarked before entering the mill gate. Wood is traded on a metroruma basis with one metroruma equivalent to the volume of timber stacked in a 2.44m x 1m x 1m space inclusive of air. Taking into account the difference in basic density of the various sources of pulpwood a metroruma of -

E. globulus = 1.83 bone dry units
Native beech = 1.55 bone dry units
Softwoods = 1.18 bone dry units

While a seemingly difficult unit to deal in all wood sales up to and including mill gate purchases are in metroruma units, sale of chips from Chilean chip mills is on the standard oven dry metric tonne or bone dry unit basis.

Harvesting and transport

The harvesting of eucalyptus and native beech is labour intensive and essentially unmechanised. Trees are felled by chainsaw and snigged to the roadside by oxen. Only in intensively managed larger operations do the standard mechanised harvesting operations take place. At the roadside the logs may be debarked by hand or moved with the bark on. In the later case debarking occurs at a standard wood yard. All logs are docked to 2.44 metre

lengths (8 ft) to comply with the unit of sale (metroruma) and loaded onto trucks of unstandardised form for transport by road to the purchasing wood yard or chip mill. All log transport in the pulpwood industry is by road.

Chipping and loading

Chip mills in Chile are moderate in size in comparison to South African or Australian mills. Most mills encountered process 300 000 to 400 000 GMT a^{-1} and are located on or close to the port facilities. Most mills will process eucalyptus, native timbers and pine but will maintain separate stockpiles in the wood yards.

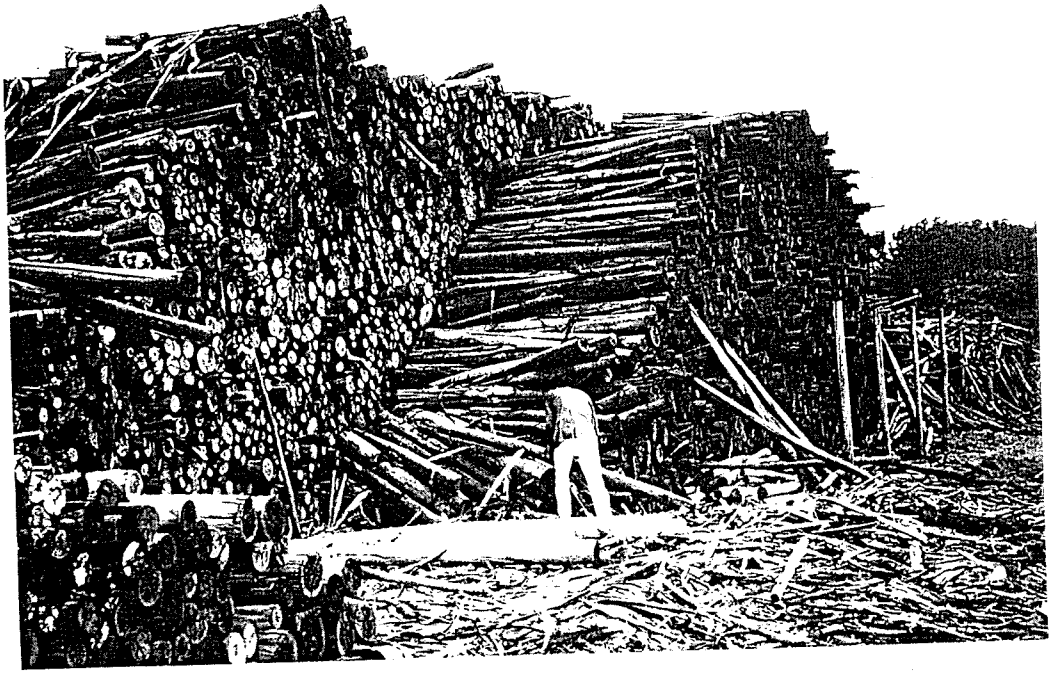
A typical chipping operation will receive logs at the mill gate and larger logs are split using an excavator with a cutting blade before being stacked in the wood yard. From the wood yard logs are moved by tractor and trailer to a drum debarker (if required) and loaded by an excavator fitted with a grab. From the debarker logs are moved by conveyor to the chipper. The chipper is typically nine knifes and operates on two shifts.

From the chipper head chips move via conveyor to a set of screens before being conveyed to the wood yard. Chips are simply "dropped" on to the wood yard before being pushed by two cat 930s onto the stockpile. Separate stockpiles are kept and managed for each chip source (i.e. eucalyptus, beech or pine).

The process of loading has proposed some problems for chip companies in the past. Most forest products are exported out of the three ports in the Concepcion area (Region 8) and the problem of ship traffic and port space has been a significant impediment. The ports concerned, Talcahuano, San Vicente and Lirquen, have, for their part, presented high demurrage charges to the chip companies. As a result some companies have opted to build designated chip loading facilities, complete with designated dolphin berths specifically for the loading of woodchips. Typical loading rates in Chile at this time range from 400 to 600 ton/hr. Most operations of the type described can expect between 10 to 13 ship visits per year.

Beech forests; Chile

Snigging during logging operations in beech forest; Chile



Chip mill stockpile being debarked by hand; Chile

Chip mill in Chile

Stockpile of beech and eucalypt chip in a woodyard prior to loading a chip vessel; Chile

Future trends for Chile to supply chips to Japan

In assessing Chile's ability to compete for market share, with regard to supplying chips to Japan, the fact that Chile also supplies pulpwood to Italy, Finland, Sweden, Norway and India must be considered. While Japan accounts for c. 99 percent of hardwood woodchip exports, significant hardwood roundwood is exported to Europe, thus affording Chile some options in supply and the ability to respond to increased demands in these countries. Another factor exerting influence is the effect of the Santa Fe pulp mill, which provides a large domestic market for eucalyptus and competes directly with the chip companies for the now limited domestic resource. This factor, coupled with the depletion of the existing eucalyptus resource, has forced the price of eucalyptus pulpwood up by 40 percent in the last 18 months.

Currently, a deficit in the supply of eucalyptus pulpwood exists, however, many local commentators believe that a surplus of eucalyptus will eventuate in about five to eight years when the new plantations come on stream. There is little doubt that Chile has experienced a rapid expansion of its eucalyptus plantation estate under the incentives provided by DL 701. However, what must be assessed is how much of this future resource will be diverted to domestic processing and how much of this "estate" will actually mature to harvest. There is little doubt that the existing pulp mills will continue to exert significant influence upon the eucalyptus resource and will continue to account for a major proportion of the product harvested. The fact that other companies are considering constructing pulp mills must raise questions in respect of any future surplus. Secondly, although a large eucalyptus afforestation program has been underway in Chile for sometime now I have concern in respect of site selection, species matching, genetic stock and the establishment techniques employed in these programs to such an extent as to cause doubt upon the future viability of many of the hectares appearing in the area statistics. There is little question that Chile has the correct edaphic and climatic conditions and the land base to support a large and highly productive eucalyptus estate, however, the correct techniques essential to produce eucalyptus plantations are not yet commonplace in Chile.

Another factor which will influence Chile's ability to gain or maintain market share is the degree to which environmental pressures restrict the level of harvest in the native forest. The level of cut in Chile's native forest has been tempered of late and before the Chilean Congress at present is a Bill (The Native Forest Law) which threatens to severely restrict the level of cut from this estate in the future.

A final restriction faced by Chile is the shipping distance from its ports in Region 8 to the ports in Japan. While shipping and delivery of the product is not the concern of the seller, as previously explained, this factor does influence the price paid by the buyer.

In summary because of:

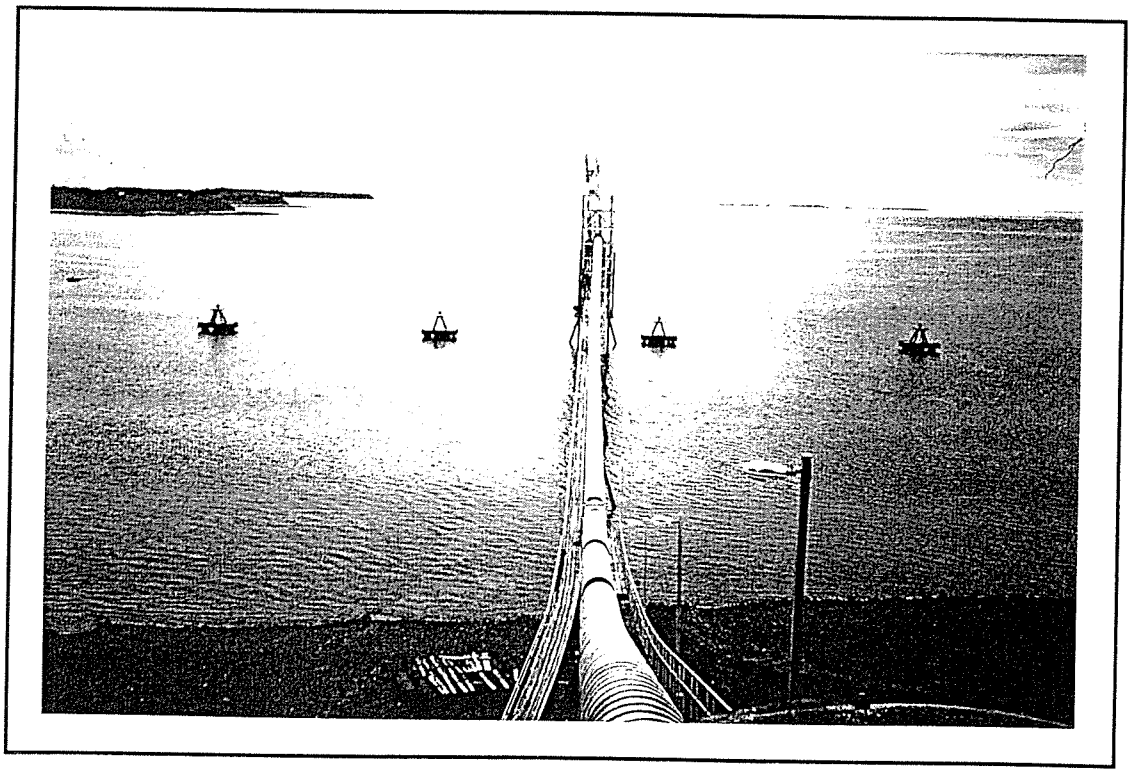
(i) the domestic supply of eucalyptus has been depleted;
(ii) the domestic demand for eucalyptus remains high;
(iii) the possibility of increased domestic demand;
(iv) the poor state of many of the eucalyptus plantations; and
(v) the possibility of a reduced cut in the native forest;

I believe that Chile will not maintain its current market share over the next decade. However, because:

(i) Chile has the option of diverting pulpwood from the European market to Japan; and
(ii) that the problems facing plantation growers in Chile can be overcome;

I believe that Chile may increase its market share in the longer time. However, in the interim other emerging suppliers, such as the Republic of South Africa, have the opportunity to establish themselves.

OTHER SUPPLY SOURCES; CURRENT AND FUTURE



Chip vessel loading facilities; Chile

Introduction

In this section I will discuss other supply sources currently holding market share or who I expect will gain market share in the future. While these countries were not visited during this study I have visited some of them during other travels. Countries not visited will be identified with an asterisk.

There is little doubt that the attitude of the world's citizens towards conservation issues has had a vast affect and will continue to influence the nature and form of the trade in the forest products, particularly in the Pacific Rim Regions. The supply of pulpwood to Japan, like most forest products, is undergoing large and rapid change in form, supply scale and origin. Presently, while environmental pressures are cited as the major driver for the current change, other factors such as Government intervention, product availability, levels of domestic processing and the rapidly emerging preference for plantation timbers, also exert significant influence. It is because of these factors that the current supply trends and market shares of the Japanese hardwood pulpwood market will bear little resemblance to the same market share and trend patterns that will exist in the year 2000. Nowhere can these influences be demonstrated better than the hardwood supply trends of North America.

United States of America

As previously discussed the first shipment of woodchips was from the Pacific North West (PNW) of the USA in the mid 1960s. From these beginnings the USA rapidly became the largest supplier of woodchips to Japan. Most of this supply was of course softwood, however, a significant proportion c. 500 000 - 800 000 m^3 a^{-1} were hardwood chips. In this area pulpwood is a residual product from the region's solid wood industry. Presently the forest industry of the PNW is moving from "old growth" to second rotation sites, nonetheless environmental pressure groups and the area's complex litigation laws cast doubt on the future of this supply source. For example, the spotted owl controversy could well result in the removal of c. 1 200 000 hectares from the supply areas. It should be pointed out that the spotted owl is not, in my view, the real issue and if the spotted owl was not used to debate the topic, another organism could just as easily be substituted in its place.

Regardless of the outcome of the spotted owl debate the future for this supply source is bleak with the projected downturn in the solid wood industry, increased prices and a continuing strong domestic demand for pulpwood rendering the proposition of supplying chips to Japan less certain and less attractive.

The Gulf States of the USA entered the hardwood pulpwood supply market to Japan in 1986/87. The "US south" entered the market at the same time and at the same rate as did Chile and its entry increased the supply of hardwood chips to Japan from the USA from c. 700 000 m^3 in 1986 to 4 300 000 m^3 in 1991. While there is little doubt that the quantities of pulpwood are available to continue these levels of export or to increase them (Vissage 1990, Kuppold and Thomas 1991), again doubt is cast upon the area's ability to maintain market share for a number of reasons.

Firstly, the environmental pressure to reduce or remove harvesting in wetland areas is strong. Approximately 10 percent of the land mass of the US south is classified as either inland or tidal wetlands. Most of the timber harvested is "bottom land" forest among the wetlands and new legislation influencing harvesting in these areas is currently, or is coming into, effect. The fact that the wetlands contain 15 species of endangered animals and 10 endangered plants leaves plenty of scope for a "southern" spotted owl scenario.

Secondly, the pulp and paper industry in the southern states (which is substantial) has altered its feed stock intake to favour hardwood species in recent times. This fact, coupled with the announced increased capacity in the region, will significantly increase the domestic demand for hardwood pulpwood.

Finally, due to the expected increase in demand and the possibility of reduced supply areas, costs are expected to increase which will have a significant effect on the attractiveness of the US south's produce in the light of the fact that shipping distances are long and chip vessels must pass through the Panama Canal on their passage to and from Japan. The US south also has the options of supplying European sources rather than Japan should the attractiveness of this source of supply lessen.

Thailand* and Vietnam*

Both Thailand and Vietnam are new entrants to the hardwood chip market. Thailand began supplying Japan in 1988 with a shipment of 18 000 cubic metres and has steadily increased its supply to c. 50 000 m^3 ha^{-1} by 1991. Vietnam on the other hand entered the market as recently as 1991 with a consignment of 8629 cubic metres. While both countries are currently modest suppliers they both display the characteristics which could see them, and countries exhibiting similar characteristics, become significant market share holders in the near future. These two countries are examples of the shift in emphasis from large scale harvesting of native forests practised by traditional suppliers such as the Pacific North West of the USA and Australia, to the plantation grown, product specific operations in countries with short shipping distances to Japan.

Thailand's remaining forest area is c. 14 900 000 hectares, while the plantation estate of mainly eucalyptus spp. totals 669 100 hectares, of which approximately 25 percent is in private ownership. The production from the plantation estate totals c. 840 000 m^3 a^{-1}, however, most is used in ply, particleboard and MDF. Nonetheless, the country has been successful in attracting significant investment into hardwood chip infrastructure and eucalyptus plantation development. This investment highlights the lack of emphasis on, and swing from, traditional large scale suppliers drawing from native forests, to countries growing plantations often in conjunction with the Japanese buyers themselves. For example, fourteen Japanese companies have formed Thai eucalyptus Resources, who, together with Thai-Japan Reafforestation, is planting c. 200 000 hectares mainly of *E. camaldulensis*. Exports of chips from such operations commenced in 1992. Such an investment by the buyers themselves certainly places Thailand in a position whereby significant market share can be gained in the near future.

Whether Thailand achieves a large market share is dependent on a number of influences. Firstly, Thailand's pulp and paper industry is developing very rapidly, expanding at between 12 to 15 percent per annum during the late 1980s. This industry, together with the also expanding ply, MDF and sawmilling plants, could see a significant amount of potentially exportable material delivered to domestic processing.

Secondly, and perhaps most importantly, the attitude of the Government and local communities towards the establishment of eucalyptus plantations is currently unfavourable. Many of the arguments generally directed towards eucalyptus plantations (i.e. land degradation, land owner displacement etc.) have begun to surface in Thailand. Such a factor can seriously influence the investment decisions of the companies concerned, and jeopardise the longer term ability of the country to become a large scale supplier of hardwood to Japan.

Vietnam has also found itself the subject of investment in hardwood plantations, also of *E. camaldulensis*, and also for hardwood woodchip production to supply Japan. A number of companies are now investing or studying the feasibility of investing in the country to produce pulpwood. As the pulp and paper industry in this country is fledgling there is little threat of diversion of the product to domestic processing.

As with Thailand, if the plantations which have been established or are planned grow at the rates predicted these two countries will become significant suppliers of hardwood woodchips in the future.

Indonesia*

Indonesia has a long history of hardwood supply to Japan. From a relatively modest supply throughout the late 1970s and early 1980s, Indonesia has increased supply to c.300 000 m^3a^{-1} since 1988. The country possesses 143 000 000 hectares of forest, 70 000 000 hectares of which is tropical rainforest. These forests are divided into four categories according to the pattern of use; protection forests (30 300 000 hectares), native reserves and recreational forests (18 700 000 hectares), production forests (64 100 000 hectares) and conservation forests (30 500 000 hectares). Like Malaysia, Indonesia has followed a policy of restricting log exports with the aim of protecting forest and promoting domestic value adding.

As well as a substantial native forest resource the country has been pursuing a vigorous afforestation program with the aim of producing pulpwood among other things. Fourteen companies have licenses for planting plantations, four of which have been developing full scale plantation estates, particularly in Sumatra, with an aim to establish 900 000 hectares, 150 000 hectares of which is pine and 750 000 hectares of which is eucalyptus and acacia. At present 230 000 hectares has been established. The Government of Indonesia plans that by 2000 there will be 3 000 000 hectares of pulpwood plantations established, mainly in Sumatra and Kalimantan, with an expected increment of 30 m^3 ha^{-1} a^{-1} (Soetikar and Shaw 1991).

Such a resource must surely suggest that Indonesia will become a prominent supplier of hardwood pulpwood in the future. If the targets of the Government are achieved Indonesia will possess the largest estate of hardwood plantations in the Pacific Rim and will place Indonesia in a very good strategic position in terms of supplying the Japanese industry, or any other industry, such as China, Korea or Taiwan, that requires pulpwood.

However, the rate of growth of the Indonesian pulp and paper industry has increased on an average of 26 percent per annum over the 1980s. Further expansions are planned and will, together with developing MDF, ply and particleboard facilities, account for much of the increasing plantation resource.

Whether Indonesia will meet its potential with respect to becoming a large supplier of hardwood pulpwood to Japan, will depend upon the rate at which supply is diverted towards domestic processing, which has been a significant influence in the past and, in my view, will increasingly affect supply in the future. Secondly, although there is little doubt that large hectarages of plantations are being established throughout Indonesia, the quality and productivity of the estate must be assessed.

Papua New Guinea*

Papua New Guinea (PNG) has been a stable supply source over the long-term. In the late 1970s PNG supplied c. 150 000 m^3 a^{-1} of hardwood chips to Japan, while during the 1980s this figure fluctuated between 150 000 m^3 a^{-1} to 231 000 m^3 a^{-1}, however, by the 1990s the figure had settled to 103 000 m^3 a^{-1} in 1991. PNG supplied only 0.8 percent of the hardwood chips to Japan in 1991, however, because of its history of supply and the short and direct ocean freight distance PNG has the potential to increase supply in the future.

The hardwood chips from PNG are from native sources and in my view any increased supply will need to be derived from plantation sources due to the low quality chip produced from the native forests of PNG. The companies concerned have been harvesting plantation hardwood to supplement the native stock recently and this trend is likely to increase in the near future. Afforestation by the buyers themselves has been progressing, and in the future a significant proportion of hardwood chip exports from this country will be from plantation sources established by the buyers themselves. This country has attracted the attention of many of the buyers who are investing in afforestation projects with the aim of supplying hardwood chips to Japan.

As a result PNG, like Thailand and Vietnam, many become prominent in the hardwood chip market in the middle to longer term depending upon the success of the afforestation projects.

China*

Perhaps one of the largest unknowns in the future supply scenario is the future role of the Peoples' Republic of China (PRC). PRC began exporting hardwood chips to Japan in 1987 with a consignment of 5190 cubic metres, and by 1991 PRC had increased this figure to 442 686 cubic metres to capture a 3.3 percent market share in five years.

There is little doubt that PRC have significant quantities of hardwood (eucalyptus) plantations, however, whether they will be used as hardwood chips to supply Japan is subject to two main factors. The first is the political future of PRC and whether they are perceived by the buyer as a long-term supplier or whether the threat of political disruption to supply is real. It would be difficult for a country to supply significant volumes if the purchasers considered the supply source unstable.

Secondly, PRC's pulp and paper industry, not to mention their economy, is growing at an exceptional rate. At the same time the per capita consumption of paper is only 13.7 kilograms per person. Even so, with a population of 1 158 230 000 this is a significant consumption of paper. Given that GDP is averaging c. 10 percent at present, it is a reasonable assumption that the per capita consumption of paper will increase. The per capita consumption of paper need only increase by 10 kilograms per capita to increase the consumption of paper by 11 582 300 tonne a^{-1}. As a result the pulp and paper industry in the PRC should continue to expand, and as such will more than likely account for the plantation sources within the country. It is unlikely, in my view, that PRC will obtain a large market share of the pulpwood marked in spite of their proximity to Japan. On the other hand, if the PRC continues its exceptional growth, PRC may in fact become a significant buyer themselves in the decades to come.

Peru*

Peru is, like the Republic of South Africa, a new entrant to the hardwood chip supply market. Like many South American countries Peru has planted eucalyptus for mining timbers as well as for soil conservation reasons and has created a significant resource as a result.

Peru will supply c. 180 000 GMT a^{-1} for the next decade, and while not supplying large quantities of chip, will be supplying the high quality *E. globulus* chip. It is noteworthy that the two new entrants to the hardwood chip market (RSA and Peru) are both supplying plantation grown eucalyptus chips, while there are no new entrants supplying from native forest sources.

TRENDS IN SUPPLY SOURCES

Like the Japanese pulp and paper industry itself the hardwood chip supply scenario is undergoing rapid change. There are four major trends evident when supply sources are compared.

Firstly, there is a distinct move from large suppliers, such as Australia, to a diversity of smaller suppliers in a variety of countries (Figure 14). Even within a particular country chipping companies tend to be smaller now than those of the mid-1970s. The notable exception is the RSA.

Secondly, there is a move from the traditional native forest sources to the more favoured plantation grown resources. At present c. 10 percent of supply is from plantation sources but this proportion is expected to rapidly increase towards the end of the century. Suppliers offering plantation grown resource will have a competitive advantage over suppliers of native

pulpwood. Significant advantages in market entry and price could be expected for suppliers of plantation eucalyptus.

Thirdly, there is a move from countries, such as the USA and Australia, towards countries closer to Japan itself. Countries in South East Asia are entering or increasing their prominence in the overall supply scenario. While these countries have added to the diversity of supplying countries, they are also providing the base from which hardwood chip supply from South East Asian countries is expected to expand over the coming decades as afforestation programs continue.

Finally, and concurrently with point three, plantations are being established throughout our region with the specific purpose of supplying hardwood woodchips to the Japanese industry. Not only are they being established for this purpose, many of them are being established by the buyers themselves. Investment by the Japanese pulp and paper industry itself into hardwood pulpwood plantations is becoming increasingly popular. Countries such as Malaysia, PNG, Fiji, the Solomon Islands, New Zealand, Thailand and Vietnam will enter the market, or increase their market share, as these afforestation projects or planned afforestation projects bear fruit.

As a consequence, the current supply scenario will, I suspect, bear little resemblance to that which will exist around the turn of the century, and suppliers of plantation grown produce, particularly those in close proximity to Japan, gain market share. The larger traditional suppliers, based on native forest resources, are expected to lose market share (and probably gross volumes) as a result.

It should be pointed out at this stage that the rate and degree to which this trend will exert itself will depend on the quality of the plantations being established currently. In many of the countries where afforestation programs are being implemented there are obvious problems related to species selection, genetic quality, poor establishment techniques and specially lack of adequate weed control. However, this in itself will not alter the trend but only delay its influence as these logistic problems are solvable in the longer term. It does suggest, however, that those countries (such as Australia) with the appropriate technology to grow short rotation eucalyptus pulpwood plantations, will be able to capture market share in the shorter term before the trends suggested exert significant influence.

CHAPTER SIX

Australia's Future in the International Woodchip Trade

Eucalyptus globulus plantations in south-west Western Australia

6 AUSTRALIA'S FUTURE IN THE INTERNATIONAL WOODCHIP TRADE

If the conclusions of this brief analysis of supply trends are correct the question of the long-term future of Australia's market share in the hardwood chip trade must be questioned. If Australia continues to concentrate on supplying native forest residues as woodchips we must surely continue to lose market share as the product loses favour in the longer term. While the origin of Australia's hardwood chips has not been the only cause of our loss of market share from c. 65 percent of c. 30 percent today, it is nonetheless a significant factor.

Another factor which will influence the attractiveness of Australia's pulpwood resources in the eyes of the buyers, is the potential for disrupted supply through public or political intervention. So long as the possibility of such actions exist the status of the supplier of these resources will be decreased. The threat of disruption and the existence of copious case histories where supply has actually been disrupted through public or political interference, has taken its toll on both the market share of Australia and the PNW of the USA where such interventions are common. In fact many buyers consider that Chile has a higher degree of political stability than Australia. While the right of the public to influence the management and use of the public forests, through the political system is beyond reproach, the effect of such action has become obvious and is reflected in our decreased market share. Whether such actions affect supply or not is not the real issue; it is the perception of the potential for a disrupted supply which is of importance. To emphasise my point the announcement by senior political leaders that woodchipping in native forests will be phased out by a particular date can do nothing to enhance the credibility of Australian suppliers. Quite the contrary, such statements can only encourage buyers to seek alternative suppliers.

It is my belief and conclusion that if we, as a nation, are to maintain and regain our market share of our major forest product export, an emphasis towards hardwood plantations is required. Not only must we develop hardwood plantations, an opportunity exists to marry such an aim with traditional agricultural practise. While the above statement sounds simplistically like statements put forward by various lobby groups, I would distance myself from such other statements and emphasise the trends evident in the supply scenario today.

Briefly recapping, there is a trend towards plantation establishment in countries of short ocean freight distance to Japan. In the future it is my belief that these countries will become significant suppliers of hardwood woodchips to Japan. In the interim Australia is gazing through a window of opportunity to build its own eucalyptus plantation estate while these countries solve some of the logistical constraints currently facing them which are not, or should not be facing Australian growers.

I do not see that the establishment of plantations or the supply of plantation grown products as mutually exclusive to the continued supply of native forest product. In fact, the longer term viability of supplying pulpwood of native forest origin could be enhanced by concurrently supplying plantation product because of the stability, or perceived stability, in the eyes of the buyers, that such an industry would bring.

However, it is undesirable to blend high quality young plantation chips with the older, poorer quality native forest chip. They must be sold as separate produces so that the price difference between the products is captured.

While Australia has the opportunity to follow the trend in pulpwood plantation development in the region, we are also faced with the opportunity to set a new pattern and trend in

plantation development. There is little doubt that Australia's agricultural industries are among the most efficient in the world, and by tapping such efficiency, via introducing pulpwood as a new "agricultural" crop, significant advantages would be obtained by both the seller and rural community alike. For example, in two instances in south-west Western Australia CALM has been successful in attracting venture capital from the buyers to establish pulpwood plantations on cleared agricultural land in cooperation with the rural community. Under such a model the plantations, of approximately 20 hectares each, are integrated into the farm such that no agricultural productivity is lost and significant land care advantages are achieved. The farmer plays an active role in the estate and benefits via cash returns and on-farm advantages such as increased shelter for stock and the control of erosion and salinity that tree crops bring.

Two large buyer companies, one based around the port of Albany and one based around the port of Bunbury, have joined CALM in these projects. Together both companies plan to establish a minimum of 30 000 hectares over the next decade, all of which will be in conjunction with the rural community. The announcement of such projects and the presence of two large buyers of pulpwood, has given confidence to private companies and individuals who have begun to establish such plantations in their own right. Collectively, approximately 10 000 hectares of *E. globulus* pulpwood plantation will be established in south-west Western Australia during 1993.

This developing industry is not intended to simply displace or remove pulpwood of native forest origin from the supply scenario but rather complement it. It is becoming increasingly clear that south-west Western Australia has followed the new trend in pulpwood supply by establishing hardwood plantations to complement its native forest resource. However, it has added an extra dimension to the scenario by introducing farming systems and the agricultural community to the pulpwood industry and vice versa. In the next decade it will be common place, I believe, to see farmers tending the firebreaks around their "tree crops" with a similar ease display when tending sheep or cattle.

I hasten to point out the confidence to undertake individual plantations by companies or by the individual farmers results from the presence of and having access to the buyers themselves, which enables entry into the otherwise restricted market (see Chapters 3 and 4). I see no reason why the Western Australian model can not be replicated in a number of other areas and regions of Australia. I also see no reasons why Australian venture capital could not play a larger role in pulpwood plantation development. While such a statement should be accompanied by a discussion on the institutional and logistical impediments to such industries as well as fiscal commentary they are beyond the scope of this particular work and its terms of reference. However, such discussion can be found in NPAC (1991) and elsewhere.

It is my belief that this particular model is capable of being replicated in a number or regions throughout Australia. The development of such regional industry brings with it significant fiscal inputs to the rural community concerned, significant environmental and land care advantages while profitably supplying high quality pulpwood to the market. Such industry development, concurrently with the present pulpwood supply scenarios from native forests, could see Australia regain its position as the major market share holder of the Japanese hardwood pulpwood market.

In summary this work has established that the world trade in paper and paper products is intra regional while the world trade in pulp is truly international. On the other hand the world trade in woodchips is dominated by the Japanese pulp industry. This fact, in conjunction with the requirement to use specially constructed chip carriers for the oceanic transportation of the chips, and the contractual nature of the chip market, renders the trade in woodchips a very tightly controlled enterprise. As such, the woodchip market displays none of the characteristics of standard commodity markets. As such factors influencing market success, usually reserved for trade in high cost value added products, exert a significant effect on the market success of sellers of woodchips. Factors such as quality, consistency, and particularly reliability, have considerable importance unlike other commodities where unit cost is king. In recent times the supply scenario has altered significantly, particularly after the chipshock and

Wesley Vale debacles. The trend now is towards diversification of supply sources and the buyers themselves are investing in afforestation projects throughout the Pacific Rim region.

In light of the fact that pulpwood afforestation projects elsewhere in the region are becoming increasingly popular, the window of opportunity to establish ourselves as credible and reliable suppliers of plantation pulpwood is becoming narrower. If significant movement is not made towards the integrated model briefly described, we as a nation, can expect to continue to lose market share of a significant forest product export and relegate ourselves to remain sleeping giants in the plantation hardwood supply scenario.

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