

Wood Processing In New Zealand : Current Trends

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뉴질랜드 林産工業의 現況

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要 約

뉴질랜드 임산공업은 1800년대 중반에 캘리포니아로부터 도입된 라디아타 소나무를 중심으로 이루어지고 있으며 이 라디아타 소나무는 전체 식재림의 90% 이상을 차지하는 뉴질랜드의 대표수종이다. 뉴질랜드의 식재림 면적은 매년 신장되고 있으며 현재 전국토의 약 5%인 130만ha에 달한다.

생산품인 제재목, 판상제품, 펄프와 종이 등은 주로 오스트레일리아, 일본 등에 수출하고 있으며, 수출상대국은 중국, 대만, 싱가포르 등으로 다변화되고 있다.

또한, 우리나라도 1993년기준 원목 333백만NZ\$, 제재목 7백만NZ\$, 펄프 36백만NZ\$, 판재 8백만NZ\$ 등 총 387백만 NZ\$을 수입하고 있는 실정이나 대부분 저부가가치의 용도에 한정되어있어 앞으로 용도개발에 많은 관심을 가져야 할것으로 생각된다.

1. INTRODUCTION

The New Zealand forestry sector has developed from being based entirely on natural indigenous forests in the nineteenth century to a position where it now relies almost totally on exotic plantation forests. These plantations are moreover dominated by one species - *Pinus radiata*. The New Zealand industry has also changed from being a domestically oriented industry to one with a major focus on exports.

Governmental and industry reforms have had, and will continue to have, major effects on the forestry sector. State involvement in forestry has been significantly reduced. Two companies, Fletcher Challenge and Carter Holt Harvey, have increased their importance within the New Zealand forest growing and processing

industry, while at the same time becoming significant international forestry companies. Overseas shareholders have major holdings in both companies, with International Paper being especially significant for Carter Holt Harvey.

New Zealand already exports over sixty five percent of its timber harvest in a wide variety of commodities and products. With a relatively young forest estate, the harvest is expected to nearly double over the next 20 years. Exports are likely to almost treble. At present the major markets for New Zealand's wood are the New Zealand domestic market, Australia and Japan. While these markets will continue to be important it is likely that new markets will develop, particularly Korea and China.

New Zealand has in radiata pine, not only

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a versatile species, but one whose strengths and weaknesses are perhaps better understood than those of most other conifers. The ability to recognise different quality features within the species, to segregate these, and to manufacture products where these features can be seen to best advantage offers New Zealand the chance of a competitive edge in the world of the future.

2. FOREST STATUS IN NEW ZEALAND

Forests cover about 27%, or 7.4 million hectares, of New Zealand's land area. Of this, 6.1 million hectares are in indigenous forest, with the remaining 1.3 million hectares in exotic plantations. About 79% of New Zealand's indigenous forest is owned by the Crown and 76 % is protected as part of the conservation estate and managed by the Department of Conservation. The logging of indigenous trees in the conservation estate is illegal. Around 150,000 hectares of indigenous forest are managed by State-owned companies that have been created out of the remains of New Zealand Forestry Corporation. Other major areas of indigenous forest are on privately owned land, with about half of this in Maori ownership. Privately owned forests contain only relatively small areas of harvestable sawlogs and many have already been partially harvested. The

Table 1. Forest plantation ownership as at November 1990.

Owner	Estate (%)
Corwn : Forestry Corporation of New Zealand	14.3
Crown: Timberlands West Coast	2.0
Crown: Unsold	9.1
TOTAL CROWN	25.4
Carter Holt Harvey	26.8
Fletcher Challenge	15.7
Crown Leases	4.6
Ernslaw One	2.0
Wenita Forestry	1.8
Juken Nissho	3.6
Others	20.0

Source: New Zealand Forestry Corporation (1990).

bulk of the wood harvested in New Zealand comes from plantations of exotic trees.

The ownership of the New Zealand plantation estate has undergone considerable change since 1990, with the sale of Crown forests and with various subsequent changes in corporate ownership. The Crown used to own around half of the estate, differing planting rates causing the exact proportion to fluctuate. In October 1989, just before the asset sale, the Crown through the New Zealand Forestry Corporation owned 47.3% of the plantation resource (New Zealand Forestry Corporation, 1990). By November 1990 the ownership of New Zealand's forests was as shown in Table 1. The change in ownership since 1990 has been small being a further transference from crown to private company ownership.

The silvicultural regimes used for radiata pine have varied. In the past a distinction was often drawn between "old crop" (those stands planted in the first planting boom) and "new crop" (those planted since the mid-1960s). Stands planted between the Second World War and the mid-1960s (usually second-rotation stands) are often termed "transition crop". These stands received more silvicultural tending than old crop but less than new crop.

The old crop is the raw material upon which the existing exotic forest industries have been built. These stands of radiata pine were planted during a 12-year planting boom prior to the Second World War, but harvesting of the resulting crop was spread over 30 years which meant that harvest ages in the 1970s and early 1980s were well in excess of the normal 25 to 35 year rotation. These stands received very little silvicultural tending. In the 1980s the harvest age of old crop was greater than 40 years, piece size was large and the volume on a unit area was high. The first planting boom was concentrated in the Central North Island and in this region the industry is now harvesting transition and new crops.

Since the Second World War much effort has gone into refining silvicultural regimes and improving economic returns from forestry.

The returns for different log grades vary markedly in terms of both price and the physical recovery of sawn timber, and so do the costs of harvesting different sized trees. In general the work on regimes has led to the use of lower final stockings, earlier thinning to final crop stockings, and pruning to produce pruned butt logs. Improved tree stocks and better planting techniques have, when coupled with the lower final crop stockings, allowed lower planting densities than in the past. Stands planted since the Second World War have mostly received tending to some degree and the average age at harvest has dropped as young new crop stands are harvested in place of old crop stands. In future, rotations will generally be between 25 and 35 years. Planting since the Second World War has been more dispersed than earlier, with plantings being through out the country. Many of these plantations are situated in remote areas and on steep sites. These are unlikely to be as intensively managed as those on easier sites.

3. ROUNDWOOD PRODUCTION

99% of New Zealand's total harvest of roundwood comes from exotic plantations. Table 2 gives the makeup of this harvest.

With 1.3 million hectares in exotic plantations and a typical productivity of 23 m³/ha / year, a sustainable yield of at least 25 million cubic metres per year is expected by the year 2000. The current rate of new plantings is about 50,000 hectare per annum so this estimate of yield will be conservative.

4. WOOD PROCESSING INDUSTRY

4.1 Sawn Timber

New Zealand's sawmilling industry produced, provisionally, 2,157,000m³ of rough sawn timber in the year to 31 March 1991. This compares with 2,119,000m³ for the March 1990 year. For that year(1990), 1,735,306m³(81.8 % of the production) was radiata pine, 211,994m³(10%) was Douglas fir, 86,967m³(4.1%)

Table 2. Estimated exotic roundwood removals from New Zealand forests .

Year ended 31March	(units:1,000 cubic metres of roundwood)						Total
	Exotic Removals						
	Saw Logs	Peeler Logs	Small Logs	Pulp Logs	Exprot Chips	Exprot Logs	
1985	4.646	133	548	3,201	69	354	8,951
1986	4.981	146	532	3,080	410	403	9,552
1987	4.327	158	511	3,161	509	384	9,050
1988	3.819	164	500	3,574	380	681	9,118
1989	3.692	159	521	3,878	352	1,370	10,242
1990	4.475	174	515	3,906	494	1,947	11,511
1991	4.838	137	510	4,152	425	3,064	13,126
1992	4.924	159	520	4,224	803	3,578	14,208
1993	5.606	225	526	3,943	526	4,540	15,366

Table 3. New Zealand sawmill production 1990*1.

Size Category by annual output	Number of mills	Total Output (m ³ sawn)
<20,000m ³ sawn timber	229	619,024
20,000m ³ to 40,000m ³	11	280,860
40,000m ³ to 80,000m ³	6	369,919
>80,000m ³	7	851,483
Total	253	2,121,286

*1 Year ended March 1990.

Source: Ministry of Forestry, Statistics Section.

was of other exotic species and 87,019 m³(4.1 %) was of indigenous species. The number of mills and their size distribution are shown in Table 3.

A feature of New Zealand solid wood processing is the high volume of wood which is preserved with chemicals. Framing timber is used green with treatment by boron. Large volumes are treated with copper-chrome-arsenic (CCA) compounds for exterior and ground contact use.

Sawn timber production and market statistics are given in Table 4. Of note is the rapid increase in the significance of export markets to the sawmilling industry.

4.2 Panel Products

Five mills produce plywood in New Zealand. The total output of plywood for the year ended 31 March 1992 was 59,496m³, down from 60,726m³ in 1991 and 68,479m³ in 1990. Veneer production was 82,810m³ (1992), up

Table 4. New Zealand sawn timber products on 1990 to 1992*¹.

	1990	1991	1992	1990	1991	1992
	(1,000m ³)			(%domestic production)		
Produced	2,119	2,157	2,276	100	100	100
Exported						
Australia	375	362	429	18	17	19
Other	189	284	389	9	13	17
Total	563	646	818	27	30	36
Imports	44	44	32			
Domestic Consumption(2)	1,604	1,536	1,436	-	-	-
Change in Stocks	+13	+19	-54	-	-	-

*1 Year ended March.

*2 Estimated.

Source: Ministry of Forestry, Statistics Section.

from 74,179m³ in 1991 but still a reduction from the 1990 level of 89,373m³. Radiata pine has increasingly dominated plywood production, partly because of its suitability for the production of industrial plywood and constitutes about 96% of total peeler log production.

Fibreboard (hardboard, softboard and medium density fibreboard) production started in 1943 and has increased since then. Growth has been particularly rapid recently due to increased production of medium density fibreboard (MDF). Production of MDF began in 1976 with the opening of Canterbury Timber Products plant, now owned by Carter Holt Harvey, in Rangiora. Other MDF plants include Nelson Pine

Industries plant at Nelson (now wholly owned by Sumitomo Forestry), an MDF line at Fletcher Wood Panels (a Fletcher Challenge subsidiary) Taupo mill and the Northern Pulp (Juken Nissho) mill at Kaitaia. Hardboard and insulation board is produced by Fletcher Wood Panels at Penrose in Auckland. Production of all fibreboard was 509,683 m³ (or 354,873 tonnes) in the year to 31 March 1992, an increase of 9.1% on the year before.

Three mills produce particleboard. Production in the year ended 31 March 1992 was 155,428 m³, which is a decline on 1991 and is less than production in 1985. Table 5 summarises the production of panel products.

A new plant at Kaitaia, in Northland, began producing triboard in 1988. Triboard is a composite board and consists of a layer of strand board sandwiched between two layers of MDF. The plant also produces some strandboard. The plant was part of the Equiticorp group which went into receivership. The receivers announced their intention of closing the plant late in 1990 but then managed to sell the mill to Juken Nissho (who now also have the cutting rights to former State forests near the mill).

4.3. Pulp and Paper

The New Zealand pulp and paper industry is dominated by two large companies, both of

Table 5. New Zealand production and exports of panel products 1990 and 1992*⁽¹⁾.

Year	Product	Production (m ³)	Exports* ²		Domestic Consumption* ³ of NZ production (m ³)
			Volume (m ³)	Value (NZ\$1000)	
1990	Veneer* ⁴	95,554	1,532* ⁵	2,410	88,673
	Plywood	67,651	15,912	19,276	51,002
	Particleboard	170,788	51,907	20,831	120,493
	Fibreboard	446,983	236,450	108,193	205,143
1992	Veneer* ⁴	90,949	2,264	3,052	87,439
	Plywood	64,928	26,739	24,850	36,879
	Particleboard	152,103	70,835	28,840	80,677
	Fibreboard	504,768	336,127	161,514	179,849

*1 Year ended June

*2 Provisional

*3 Calculated by deducting exports and changes of stocks from production.

*4 Includes veneer used in plywood manufacture.

*5 Volume may be understated in the export statistics as not all veneer and plywood items have volume quantities declared.

Source: Ministry of Forestry, Statistics Section.

Table 6. New Zealand pulp and paper production.

	(Unit : Tonnes)		
	1990* ¹	1991* ¹	1992* ¹
Mechanical Pulp ^{2,3}	575,579	615,520	668,637
Chemical Pulp* ³	658,230	733,240	674,311
Sulphate (Bleached + Semi-bleached)	323,514	379,541	359,418
Sulphate (Unbleached)	334,716	353,699	314,531
Total Wood Pulp* ³	1,233,809	1,348,760	1,342,948
Market Pulp	552,146		
Newsprint	294,881	321,286	365,351
Other Printing and Writing Paper	37,802	35,178	19,949
Other Paper and Paperboard	424,688	465,876	403,716
Total Paper And Paperboard	757,371	822,340	797,187

*1 Year ended 31 March.

*2 Mechanical pulp includes stone and refiner groundwood, thermomechanical pulps and chemithermomechanical pulps. Semi-chemical pulp is included with sulphate pulp.

*3 Air dry tonnes.

Source: Ministry of Forestry, Statistics Section.

which own substantial forest assets. Fletcher Challenge Ltd owns the large Tasman mill at Kawerau and Carter Holt Harvey owns the Whakatane Board Mill at Whakatane, Caxton at Kawerau, Matura, Te Papapa and a mill at Kinleith. Carter Holt Harvey is also a joint venture partner (now owning only a 10% shareholding) with Japanese interests (the Oji Paper Company Ltd and Sanyo-Kokusaku Pulp Company Ltd) in the Whirinaki pulp mill near Napier. Carter Holt Harvey acquired Caxton in 1989 and the former NZ Forest Products mills (Matura, Te Papapa and Kinleith) in 1990. The 85,000 tonne per year Karioi mill was built by Winstones (a New Zealand company)

but after financial difficulties and a number of ownership changes it is now owned by Winstone Pulp International Ltd, a company owned by Indonesian interest. The processes and products of the pulp and paper industry are outlined below.

Production by the sector is given in Tables 6 and 7.

5. IMPORTS

The main imports are of speciality papers, small quantities of sawn timber, and manufactured paper products. Sawn timber imports are principally western red cedar from Canada.

Table 7. New Zealand production, consumption and exports of pulp and paper 1992*¹

Product	Production (Tonnes)	Exports ³		Domestic Consumption ² (Tonnes)
		Volume (Tonnes)	Value (NZ\$1,000)	
Wood Pulp				
Chemical	690,527	314,832	277,028	
Mechanical	677,695	341,256	152,139	
Paper				
Newsprint	370,269	271,484	234,520	98,785
Other paper & paperboard	421,145	108,089	122,521	325,659

*1 Year ended June 1992.

*2 Calculated by deducting exports from production (stock changes have been ignored as they are small).

*3 Provisional

Source: Ministry of Forestry, Statistics Section.

(In 1991, New Zealand imported 22,315m³ of western red cedar out of total softwood imports of 25,351m³). The volume of sawn hardwoods imported is smaller, totalling only 13,871m³ in 1991. Tropical hardwoods, mostly from Malaysia, comprised 3,288m³ while other hardwoods, most of which are also tropical, comprised 10,025m³ coming mainly from Malaysia, Indonesia and Fiji. Future imports are likely to follow the same trend, although there are likely to be more imports of particular lines of paper products, as the pulp and paper plants have specialised in fewer products in an attempt to become more cost competitive.

6. EXPORTS

Exports of forest products from New Zealand are summarised in Table 8.

In the year ended 30 June 1990 the total value of New Zealand's forest products exports was NZ\$14,591 million. By June 1992, forestry exports had risen to NZ\$1,817 million or 10.6% of merchandise exports.

Of the total harvest of 14,555,000m³ in the year June 1992 year an estimated 9,444,600 m³ (or 65%) was exported (Ministry of Forestry, Statistics Section). The only significant export of indigenous timber was 74,000m³ of roundwood as woodchips. The total harvest of exotic wood was 14,321,000m³ for the year and of that 9,370,000m³ (or 65%) was exported. The proportion of the total harvest being exported has increased rapidly in the last few years. In the year ended 30 June 1987 it was only 40%. With the exception of paper products the exports of forest products are increasing as a consequence of the increased round wood availability.

7. PROSPECTS FOR GROWTH

The increase in the future level of the harvest means that the prospects for growth in the output of the forest sector are good. There are, however, a number of obstacles that must

be overcome before the full potential increase in processing can take place.

7.1. Sawn Timber

The industry has been relatively inefficient. It is now becoming more export oriented and efficiencies are improving.

In the past the industry produced largely for the New Zealand market and foreign trade was only a minor component of the total. Exports have increased and are now (1992) 36 % of total production : up from 27% only 2 years ago. Transport costs, and in the past a number of other restrictions, effectively limited imports of sawn timber to species not grown in New Zealand and not in direct market competition with (mainly) radiata pine in the structural/building sector. As long as domestic demand was increasing the New Zealand sawmilling industry had scope for growth.

Initial sawn timber exports were mainly large squares (at least 175mm×175mm but usually larger) to Japan.

Although other markets are being developed, the sawn timber industry is currently heavily dependent on only two - Australia and Japan. Both are relatively high priced markets and are sheltered from competition by high transport costs. In the case of Australia, New Zealand has the advantage of close cultural and commercial links and the CER (Australia New Zealand Closer Economic Relations Trade Agreement). There is no such advantage with Japan and in addition New Zealand's distance from this market puts it at a disadvantage when compared to suppliers and competitors such as Canada, the USA, the ASEAN group and Russia. New Zealand is, however, closer to Japan than Chile - the other major radiata pine producer within the Pacific Basin.

Growth in the New Zealand sawmilling sector is going to require continued free access to Australia, and no increase in the extent of subsidy to the Australian forest or sawmilling industry or below cost log sales in Australia (Australia has announced a policy of domestic self sufficiency by year 2000). In the Australian

market New Zealand faces competition from a number of countries, including Canada and the United States. During a drop in building activity in Australia between 1985 and 1987 total Australian consumption dropped 9.5% from 4,387,000m³ in 1984~85 to 3,972,000m³ in 1986~87. At the same time the United States increased its sawn timber exports to Australia by 7% (from 344,000m³ to 369,000m³) increasing its share of Australian imports to 34.6%. During the downturn New Zealand's exports to Australia dropped by a larger proportion than the market and New Zealand lost market share. Exchange rate movements contributed but the period illustrates that the New Zealand industry does face competition in the market.

The industry must also improve its efficiency. This is occurring, but the relatively poor returns from sawmilling, industry over-capacity, and uncertainties over resource access have in the last few years limited investment to the larger companies that have access to forests. Investment is required to gain the improvements in productivity and product quality that are necessary to compete internationally outside of Australia and New Zealand.

The development of new markets is going to be slow. Investment in new plant will take time. The Japanese market could be one in which New Zealand makes gains. For example, the Japanese owned mill, Tachikawa sawmill, at Rotorua is cutting packaging material specifically for this market. With rising real labour costs in Japan and falling labour costs in New Zealand the economics of sawing in New Zealand by firms with Japanese links is improving. Incremental improvements in sawmilling and new mill investment will increase sales to most existing markets. The improvements are, however, unlikely to keep pace with the increase in log availability without massive improvement in sawmilling efficiency and a major reduction in transport costs for sawn timber.

Even if these were to occur, it is questionable that New Zealand sawmilling would be

cost competitive with the Canadian industry, in Northern Hemisphere markets, for building timber.

7.2. Panel Products

The panel products sector is one in which there is considerable potential for New Zealand to increase output. In the early 1980s this potential was seen to be in plywood which was reflected in the emphasis given to this product in some studies (Anon, 1981). More recently the growth potential of this product has been limited by lack of markets and the costs of producing in New Zealand.

The 1985 production of plywood was estimated to be 79% of the industry's 82,000m³ capacity (Theron, 1988). The FOB prices received by the industry between 1979 and 1983 were also less than the full cost of production. As a result the potential for new investment in plywood plant was seen to be limited. Production of plywood increased to 68,479m³ for 31 March 1990 year but since then it has fallen and for the March 1992 year it was only some 57,864m³. Current production is still below the Theron estimate of capacity. Plywood exports have dropped in the 1990s. Potential is therefore limited to increases in local demand, unless the costs of producing in New Zealand are reduced markedly.

The current view is that MDF is the product with the greatest potential for growth. Radiata pine makes a particularly good, light coloured MDF and production and exports have increased dramatically over the last decade. Potential is seen in Asian markets for further substitution of MDF for solid wood and for penetration of hardboard and some plywood markets.

7.3. Pulp and Paper

The New Zealand pulp and paper industry has undergone major change in the last 5 years. The two largest plants, Tasman's Kawerau mill and the Kinleith mill, have had to replace much equipment. In doing so both mills have responded to the need to be more competitive

Table 8. Exports of forestry products from New Zealand for the year ended 31 December 1992 by main countries of destination.

Country of destination	Log & poles		Softwood Timber		Wood Pulp		Paper & Paperboard		Panel Products		All Other Forestry Products		All Forestry Products			
	Quantity m ³ (r)	Value (\$1,000)	Quantity m ³ (r)	Value (\$1,000)	Quantity (Tonnes)	Value (\$1,000)	Quantity (Tonnes)	Value (\$1,000)	Quantity m ² (r)	Value (\$1,000)	Quantity m ² (r)	Value (\$1,000)	Quantity m ³ (r)	Value (\$1,000)	Quantity m ³ (r)	Value (\$1,000)
American Samoa	-	-	23	13	-	-	100	112	244	185	-	-	-	-	-	-
Australia	836	398	510,913	213,834	78,109	62,460	172,047	191,050	142,291	88,903	142,291	88,903	142,291	88,903	653,721	653,721
Belgium	-	-	-	-	9,752	7,014	997	381	-	-	-	-	-	-	70	7,404
Canada	-	-	236	273	-	-	2	5	-	-	-	-	-	-	889	1,170
China, PR	630,064	55,069	355	134	19,000	10,420	4,543	2,007	961	392	961	392	961	392	73	68,095
Cook Islands	13	3	3,212	1,735	-	-	86	258	845	820	845	820	845	820	2,605	5,521
Ecuador	-	-	-	-	1,044	622	-	-	-	-	-	-	-	-	-	622
Egypt	-	-	8,929	1,901	-	-	-	-	-	-	-	-	-	-	-	1,901
Fiji	-	-	57	69	99	143	10,103	13,096	2,088	1,136	2,088	1,136	2,088	1,136	2,001	16,444
French Polynesia	94	8	269	215	-	-	1,965	2,806	1,278	907	1,278	907	1,278	907	2,359	6,295
Germany	23	3	18	46	249	269	-	2	3	20	3	20	3	20	276	615
Hong Kong	6,084	755	3,493	1,497	355	363	50,852	35,923	26,139	11,207	26,139	11,207	26,139	11,207	1,834	51,580
India	-	-	-	-	13,948	5,969	20,958	153,388	-	-	-	-	-	-	149	21,456
Indonesia	-	-	-	-	89,971	55,846	2,470	2,280	6,770	2,566	6,770	2,566	6,770	2,566	4,437	65,129
Japan	1,785,313	193,572	241,571	61,146	232,751	105,823	2,229	1,201	112,523	60,138	112,523	60,138	112,523	60,138	58,667	480,561
Korea	1,608,416	147,863	14,519	3,359	29,275	19,593	8,040	5,043	13,930	4,890	13,930	4,890	13,930	4,890	449	181,197
Malaysia	181	13	2,076	724	9,024	7,497	33,815	24,333	5,509	2,516	5,509	2,516	5,509	2,516	37	35,120
Netherlands	-	-	35	23	-	-	-	-	1,205	579	1,205	579	1,205	579	316	917
New Caledonia	560	199	15,027	4,969	-	-	1,612	2,112	1,204	1,138	1,204	1,138	1,204	1,138	1,875	10,293
Papua New Guinea	-	-	16	11	-	-	2,933	4,467	247	488	247	488	247	488	3,364	8,331
Philippines	6,215	954	3,742	1,364	4,849	4,517	4,235	3,592	2,888	1,349	2,888	1,349	2,888	1,349	403	12,179
Portugal	-	-	-	-	-	-	-	-	453	863	453	863	453	863	-	863
Singapore	127	31	3,451	1,465	58	64	19,579	14,328	45,128	16,342	45,128	16,342	45,128	16,342	983	33,213
Solomon Islands	-	-	24	5	-	-	170	481	381	270	381	270	381	270	612	1,968
Taiwan	77,644	9,389	58,466	16,855	77,520	52,728	1,981	1,167	90,128	37,986	90,128	37,986	90,128	37,986	250	118,374
Thailand	-	-	1,542	693	23,745	17,711	31,415	18,756	1,670	931	1,670	931	1,670	931	182	38,274
Tonga	84	17	1,982	1,129	-	-	160	454	403	403	403	403	403	403	1,396	3,399
United Kingdom	277	241	2,545	2,337	24	8	-	1	173	213	173	213	173	213	2,035	4,835
USA	19	15	32,555	22,969	2,029	1,691	393	567	1,511	986	1,511	986	1,511	986	11,002	37,229
Western Samoa	322	105	5,268	3,172	-	-	187	609	1,402	1,080	1,402	1,080	1,402	1,080	4,427	9,393
Others	588	103	3,746	1,742	151	127	6,029	9,150	2,435	1,915	2,435	1,915	2,435	1,915	8,814	21,851
Total	4,116,861	406,739	914,970	341,783	591,053	352,880	376,890	349,521	461,669	238,222	461,669	238,222	461,669	238,222	210,248	1,901,394

Table 9. Structure of the New Zealand wood processing industry as at 1 April 1992.

Type of plant	Number	Output for March 1992 year
Sawmills	253 (approx.)	2.4 Million m ³ (Sawn Timber)
Plywood mills	5	58,000 m ³ (Plywood) 83,000 m ³ (Veneer)
Fibreboard	5	513,877 m ³
Particleboard	3	155,428 m ³
Pulp & Paper	8	669,371 ADT (Mechanical Pulp) 673,949 ADT (Chemical Pulp) 780,016 t (Paper & Paperboard)

by reducing costs and also by downsizing the labour force. The Kinleith mill has also greatly reduced the number of product lines being produced.

There is increasing integration of the New Zealand pulp and paper sector into international, and especially Australian markets. Fletcher Challenge has interests in the Australian newsprint industry, through its 50% ownership in Australian Newsprint Mills Ltd and has a large stake in the Canadian industry as well as the Tasman mill at Kawerau.

There is potential for smaller pulp mills in several new regions. Large greenfield chemical pulp mills are less likely owing to the large volume of wood required in one locality and constraints to water supply and effluent disposal.

The future for the smaller, older mill at Mataura is less certain. Whakatane has undergone considerable restructuring and parts of the mill have been upgraded. In summary:

1. The New Zealand processing industry at present is as in Table 9.
2. The forest industry is restructuring and

becoming more competitive. Productivity is improving, and despite a drop of 28% in numbers employed in the forest industry between 1987 and 1990, there has been an increase in output.

3. New Zealand's forest products imports are relatively minor and are of speciality timbers and products. For 1992 (June year), the total value of forest products imports was NZ\$543.

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