

FUTURE DEVELOPMENTS IN NEW ZEALAND'S PULP AND PAPER INDUSTRY

A. P. THOMSON*

New Zealand's pulp and paper industry is not large by Australian standards; our production of pulp is much the same as Australia's but we make less than half the tonnage of paper that Australia does. Both countries' industries are minute by world standards; New Zealand ranks 20th in pulp production and 26th in paper, the corresponding percentage figures being only 0.6% and 0.3%. We are scarcely a world force.

Nor can it be said that the pulp and paper industry in New Zealand is yet a major factor in New Zealand's internal economy or of its export trade. The annual value of pulp and paper production is NZ\$87 million compared with NZ\$3149 million for all products. The value of New Zealand pulp and paper exports is NZ\$29.5 million compared with a total export value of NZ\$1172.5 million. The corresponding percentage figures are 2.75% and 2.5%.

Let it not be thought from these facts and figures that the pulp and paper industry is in any way unimportant to New Zealand. On the contrary, I believe it is of the greatest importance. It is important first because, although its exports are low in proportion to the total of all products, they represent a much higher proportion, 15.2%, of manufactured exports. It should not be necessary for me to stress the desirability of New Zealand expanding its manufacturing base and of increasing its exports of highly processed products as well as of relatively unprocessed farm products. Pulp and paper exports do just this.

And it is important, secondly, because of its very great potential for future expansion. It is this potential which I wish to stress in the present paper. I will be concerned particularly with the potential of the land, the soil and the climate to supply increasing quantities of cellulose at prices which should be competitive on world markets. I do not intend to dwell on possible technological developments or likely market prospects; indeed I am not competent to speak with authority on either of these fields. Nevertheless in the course of the paper I must make one or two technological and marketing assumptions.

New Zealand's pulp and paper industry has two interesting and unusual features which are significant to my theme. One

*Director-General of Forests, N.Z. Forest Service, Wellington.

is that, unlike most other countries, the industry is based on planted and not natural forests. The only other countries which obtain raw material for their pulp industries largely from planted exotics are Brazil, Spain and Portugal, using eucalypts; and Chile, South Africa and Swaziland, using predominantly radiata pine and the Mexican pine, *Pinus patula*.

The other unusual feature is that, again unlike most other countries, the industry has been based on plantation-grown wood containing a high proportion of logs of sawtimber dimension and quality, rather than, as in most parts of the world, on industrial or forest residues, or on small diameter pulpwood logs, or both.

You will also here all be aware that New Zealand's pulp and paper industry has had a very rapid growth since its inception some 30 years ago. For practical purposes I am omitting the real beginning of New Zealand's paper industry, which was in Maitua in the South Island way back in 1878 making a variety of papers out of imported pulp. New Zealand made a modest start in the use of local woods in 1940 with the commencement of mechanical pulping of radiata pine and the manufacture of fibre board; but it was not until the mid-1950s when the Kinleith and Tasman industries were launched that the real expansion came. Since then it has been rapid to the point of being exponential; 73 000 tonnes of pulp in 1956 to 580 000 tonnes in 1971; 40 000 tonnes of paper in 1956 to 466 000 tonnes in 1971.

You will also be aware that New Zealand is in the throes of a further wave of rapid expansion in both pulp and paper capacity. The major developments are as follows:

- N.Z. Forest Products' new pulp mill with a capacity of 210 000 tonnes per annum and its No. 6 paper machine producing 100 000 tonnes per annum, both on stream or coming on stream in the near future.
- Tasman's new kraft pulp mill with a capacity of 129 000 tonnes due to come on stream later this year, and its No. 3 128 000 tonnes per annum newsprint machine scheduled to commence in 1975, together with the additional 111 000 tonnes of mechanical pulp required for its groundwood furnish.
- The New Zealand-Japanese joint venture (Carter-Oji-Kokusaku) in Hawke's Bay consisting of a refiner groundwood pulp mill with an initial annual capacity of 118 000 tonnes to be increased to 177 000 tonnes per annum in a few years' time.
- Caxton's new 25 000 tonnes per annum paper machine making tissues and lightweight wrappings from refiner groundwood pulp, New Zealand kraft and some imported sulphite pulp.
- The 40 000 tonnes per annum neutral sulphite semi-chemical plant being installed by N.Z. Forest Products. This will come on stream this year and for its raw material will use the native hardwood tawa and, hopefully, other secondary hardwood species at present being left in log-

ging operations, as well as sawdust. The development is of particular interest since for the first time New Zealand is making a short-fibre hardwood pulp, for the first time it is using indigenous species, and for the first time it is using sawdust on a major commercial scale.

These expansions should boost New Zealand's production of pulp from the 1971 level of 562 000 tonnes to 1 228 000 tonnes by the end of 1975, and of paper from 454 000 tonnes to 749 000 tonnes at the same date. The rapid rate of expansion from the beginning of New Zealand's pulp and paper industry through to 1971 will have been maintained and indeed increased; pulp production will have multiplied over five times in the last 20 years and paper production seven times.

With the exception of tawa, all these expansions have been made possible by the great softwood resource which was created through the massive plantings, by both the State and private sector, in the 1920s and 1930s. The enormous forest areas then established are now almost fully committed — to a very wide range of forest industries — and they can no longer sustain any major expansions in the pulp and paper field. The era of rapid growth based on old crop exotics is wellnigh over. True, there could be some expansion in pulp capacity through the installation of more barkers and chip-pers in exotic sawmills and the greater use of sawmill residues, including sawdust; and I certainly hope that this takes place. Likewise, there could and should be additional and not inconsiderable expansions arising from the greater use of forest residues.

Here I make the first technological assumption. It is that within a few years it will be found technically possible and economically feasible to pulp smallwood with the bark on and to use the pulp so produced for certain types of papers and boards. If this happens it will remove the need for the prohibitively expensive de-barking of small diameter logs, thus immeasurably improving the economics of recovering and using what is now logging waste. The second technological assumption I make is that there will be significant improvements in the techniques of producing high yield pulp.

In the next few years there could also be changes in the further processing of pulpwood produced in New Zealand. Perhaps the most dramatic one which may occur could result from the announced intention of Carter-Oji-Kokusaku to install a newsprint machine as soon as possible and to export to Japan newsprint, which is a relatively high value per tonne product by comparison with the low unit value of flash-dried groundwood pulp. In exporting r.g.p. we are of course exporting not only cellulose but considerable quantities of electric power, and cheap hydro-electric power is a commodity which New Zealand no longer has to spare. It would be most desirable to obtain the added value of newsprint to justify the electricity consumed.

It should be apparent from what I have said so far that after 1975 or 1976 the industry's only opportunity for expansion based on old crop exotic forest resources will be by

making better use of these resources and perhaps by some technological improvements in pulping. Further major leaps forward in the long-fibred pulp and paper industry must await the maturing of forests planted since World War 2.

There is only one other major source of raw material available and it is in the form of native hardwoods, not softwoods. The interest which the world pulp and paper industry has shown in hardwoods as a raw material has led to an examination of the possibilities of pulp or pulp and paper industries based on the South Island's very extensive beech forests. Most of these forests are on high, steep, mountain country and must be reserved permanently for their vital protection functions; other large areas have over-riding values by reason of their scenic and recreational importance and their role as habitats for wildlife. For these reasons the forests have been carefully zoned and classified in the two regions containing the greatest concentration of beech forests, Westland and Southland. The permanently reserved areas have been delineated and defined, and by deduction the areas which could be justifiably utilized and could form the basis for forest industries. The volumes in these areas potentially available for logging have been carefully assessed. Simultaneously studies have been made of the pulp and paper-making properties of the New Zealand beech species. The results have generally been favourable, showing that paper-making pulps are obtainable in economic yields using kraft, neutral sulphite semi-chemical, and cold soda processes. Beech pulp seems to be particularly suitable for the manufacture of corrugating medium, and being readily bleachable could make high quality writing and printing papers.

Beech forests can be regenerated by natural methods and grown on rotations of 80 to 120 years or more. It would be technically possible to plan a sustained yield operation, growing beech in perpetuity, but the volumes available with a cutting cycle of over 100 years could be insufficient for industries of economic size. Thus in Westland the concept has arisen of adopting for a substantial part of the area a cutting cycle of some 30 years, which is a normal radiata rotation, of restocking, predominantly with natural regeneration, about two-thirds of the beech forests worked, and of replanting the other third to radiata pine so that an alternative wood supply would be available in some 30 years' time for any industries which may be launched. If this were done, more than 23 million m³ of pulpwood could become available in Westland, enough for a 500 tonnes per day kraft pulp mill. In Southland the resources are smaller and it would appear that they could sustain a unit of only half this size, or less.

The environmental implications of possible beech utilization schemes have been the subject of the most intensive scrutiny by many agencies and authorities. The results of these investigations are still being studied by Government and no decision has yet been taken whether to proceed with inviting proposals for utilizing the forests in question. If the decision is taken, it will then be necessary to establish whether any pulp and paper industry based on South Island beech forests

is economically viable; the necessary feasibility studies have not yet been undertaken. If both decisions are favourable — *i.e.*, if the proposals are acceptable to New Zealand on environmental grounds and are attractive to industry on economic grounds — then the possibility opens up of New Zealand launching at least one further major pulp and paper industry in the decade of 1975 to 1985. It is virtually the only possibility.

Rapid though the growth of New Zealand's softwood-based pulp and paper industry up to 1975 will have been, it could have been faster still if the availability of wood had been the only consideration. In fact, raw material resources have not been the constraint. The limiting factors have been other ones — markets, capital for development, technological and management skills in sufficient quantity to move more rapidly; or perhaps in summary the inability of a new industry in a new country to double itself more often than once every 4 to 6 years. In this situation, with a temporary surplus of maturing exotic forests, New Zealand has grasped with gratitude the other market opportunity open to it — the sale of logs to Japan. It has been a lucrative market and one which I believe has been of benefit to the economy of both countries. It certainly has been an advantage to forest managers in New Zealand since it has enabled them to liquidate mature or over-mature crops becoming increasingly vulnerable to the hazards of old age, and to replace them with more vigorous younger ones. And equally certainly it has been a financial bonanza to forest-owning pulp and paper companies, providing them with a cash flow which they could not otherwise have expected.

Now a most interesting and significant thing has happened. The pulp and paper and other forest products industries have chosen to use part or all of these moneys for re-investment in forests. Every pulp and paper company in New Zealand, and many others have been active in acquiring land and in stepping up their planting programmes. Individual farmers have been doing the same, as have other companies not previously connected with forestry, new companies especially formed for this purpose, local bodies, and a variety of other persons and organizations, including, as a matter of interest, a university students' association, a freezing worker's association, and a previous Governor-General. As a result there has been a quite dramatic increase in the rate of planting by the private sector, from 7 000 ha in 1968 to 14 000 ha in 1972.

Nothing could illustrate more vividly the faith which industry and the public at large have in the future of forestry in New Zealand, not only as a desirable form of land use but also as a desirable source of raw material for New Zealand's inevitable move towards industrialization and hence away from its over-dependence on farm products.

The Forest Service, of course, has shared this faith and has itself been far from inactive in encouraging expansion by the private sector and in increasing its own planting programme. In 1960 departmental studies suggested that an export target based on raw material to the extent of 4 million

m³ per annum could be achieved by the end of the century. To attain this it was proposed that a further 400 000 ha of exotic forest be established by the year 2000. The State's contribution to this expanded afforestation programme gave regional priorities to the Bay of Plenty, Nelson and South Otago.

By 1969 there had been so great a change in export opportunities as well as in estimates of potential yields that the targets were substantially reviewed. New targets prepared for and approved by the Forestry Development Conference indicated that the export target of 4 million m³ per annum would be attained 20 years earlier — *i.e.*, by the 1976-80 period. Owing to an imbalance in age-class distribution, however, it appeared that there would then be little capacity for further growth until past the end of the century, and even this was dependent upon an expansion of national planting targets to 23 000 ha per annum of new planting. At this time, too, the potential for the establishment of major forest units upon which large, integrated, exporting industries could be supported, was re-examined. Major project areas recognized as worthy of concentrated planting effort were Rotorua, Hawke's Bay, Nelson-Marlborough and Otago-Southland. In addition, two special-case areas were recognized as having great possibility, Northland and Poverty Bay.

This reappraisal of all aspects of forest management, silviculture and resource potential, given recognition to or generated by the Forestry Development Conference, led to a further examination of export potential in a planning model presented to the NDC Conference in 1972. The further potential for an increase in wood supply over the levels suggested in 1969 could be accounted for by the increased utilization of minor species for pulping and log and chip exports, the acceptance by forest managers of short rotations, and the greatly increased proportion of radiata pine to be used in both restocking and in new planting. This model indicated that the availability of wood for export could exceed 4 million m³ per annum before 1975, and reach a massive 9.7 million m³ by the end of the century.

In assessing what these probable developments mean in terms of the long-term prospects of the pulp and paper industry, it is necessary to make further technological assumptions as follows:

- (1) Because of improvements in high yield pulping, industries of a given size will be able to operate with less wood than they need today.
- (2) Chemical pulping with full recovery of chemicals by kraft or a similar process will continue to be the major pulp manufacturing technique.
- (3) Although the recent trend towards 700 and 900 or even 1100 tonnes per day as the minimum size for an economic chemical pulp mill may be halted or even reversed, it is unlikely that future kraft mills will be built with a capacity of less than 500 tonnes per day.

- (4) Mechanical pulping, whether by grinding or disc refining, although economically feasible on a much smaller scale than chemical pulping, will continue to be so power-intensive in its requirements as to be limited in its development for market pulp.
- (5) Technology will beat effluent and air pollution problems.

Some other assumptions must be made. One concerns the average rate at which forests in different parts of New Zealand will grow; this can be done with no great difficulty and with reasonable precision by the forestry profession. Another one, which has to do with rotations and forest management regimes, poses much more difficult problems. I suggested earlier that the New Zealand industry is unusual in that it pulps large quantities of logs of sawtimber dimensions and quality. This practice is unlikely to continue. For future pulpwood supplies, forest managers have the alternatives of growing pure pulpwood crops on a short rotation, or, as is more usual, of managing their forests on a longer rotation for the production of sawlogs with the supply of pulpwood coming from thinnings, toplogs from clearfelling, and from industrial residues. The first alternative could bring forward the date at which new pulp mills could start, but it would not produce the cheap pulpwood which so far New Zealand has been fortunate enough to obtain. The second alternative would provide far cheaper pulpwood but would mean that future expansions of the industry would be delayed. I believe that New Zealand forest managers, in both the public and private sector, will opt for a mixture of both.

One cannot prophesy what the mixture will be. However, assuming a continuation of current planting rates with some forests managed on a rotation of 15 to 18 years, it should be possible to plan the regional development of forests in such a manner as to provide, in the 1990s, several further concentrations of wood, all large enough to support major integrated forest industries including 500 tonnes per day pulp and paper complexes. The regions where this could occur together with possible (but highly conjectural) start-up dates are as follows: Nelson in 1990; Otago and Hawke's Bay (local supply) in 1995; Taupo basin in 2000; and Northland and North Island east coast in 2005. Marlborough and Southland could follow soon afterwards, or, with a change in regional planting priorities, earlier than 2005 and ahead of some of the other regions. In addition, the current planting boom in the Bay of Plenty should enable substantial expansions of existing industries during much the same period, or perhaps, if large areas of short rotation forest are grown, somewhat earlier, in the mid-1980s.

It will be apparent from what I have said that, apart from the possibility of beech pulping on the West Coast, there must be a development pause of some 15 years after 1975 or 1976. On the other hand, after the end of the pause, in 1990 or so, the prospects open up of a new Kawerau or a new Kineleith coming on stream every three to four years for the

next two or three decades. It is, to me, a most exciting prospect, as it should be to all New Zealanders. The pulp and paper industry will then rightly take its place as the major manufacturing industry in New Zealand processing a major land-based resource.

If I am wrong in one of my basic assumptions — *i.e.*, if it proves technically and economically feasible for bi-sulphite or NSSC or some other as yet undeveloped or unproved chemical pulping process to operate at a level of 100 or 200 tonnes per day — New Zealand's potential will be even greater still. It would then be possible for smaller concentrations of forests and the industries dependent on them to support pulp and paper mills in many other districts of New Zealand. On balance it can be expected that one's technical assumptions and prognostications will prove to be unimaginative and conservative. My prophesies for future developments are therefore likely to err on the side of pessimism.

The final assumption, of course, is that markets will exist. As a personal opinion I have no worries. First the question of substitutes. Despite the rapid technological advances in the plastics industry, whose products in so many ways can take the place of paper, the fact is that the *per capita* consumption of pulp and paper products continues to rise in developed, developing and underdeveloped countries, and there is no sign of this trend being reversed. I believe that a reversal is most unlikely, for the two simple but basic environmental reasons that wood products are biodegradable and plastics are not and that in the long run plastics derive mainly from finite non-renewable resources, whereas cellulose is perpetually renewable.

If there is a technological threat it could come from the electronics industry. It is possible that at some future point in time not only will most of the world's accumulated knowledge and literature be recorded on tapes or discs rather than on paper, retrieveable on demand by far more advanced EDP systems than we can imagine today, but also that the news and publicity media will be able to reach the average citizen by video displays or other devices and hence that newspapers and magazines will be a far less important feature of advertising and of news dissemination. But I take heart from the consideration that we are talking only about some and not all printing papers, and that electronic technology will never make writing papers or tissues, nor will it ever package consumer or industrial goods.

I would also guess that it will be many decades before either New Zealand or our other markets, Australia and Japan, reach this stage, and that it will be several decades later before our further long-term main future markets, South-east Asia and China, have caught up with these sophisticated technological developments.

Let us now examine briefly quantitative market considerations. I have no doubts myself about the sheer size of the markets which will open up, a view which was shared by the Markets Working Party of the Forestry Development Conference. Its opinion, in effect, was that in the long term the

market was virtually open-ended. In this context perhaps the more pertinent question to be asked is not where we can sell all the wood we can grow, but instead where in the Asian-Pacific Region can sufficient softwood fibres be found to satisfy the needs of the millions of Asians who in a few decades' time are going to be increasingly better educated and increasingly more industrialized. On present knowledge only New Zealand and Chile have the potential to grow a salable surplus of long-fibred softwoods in large enough quantities to help satisfy this need.

Finally there is the question of costs. Time does not permit me to dwell on this, but for a variety of reasons it is logical to assume that, despite its relative geographic isolation, there are so many climatic, biological, economic, social and political factors favouring New Zealand that its wood products should continue to be highly competitive in comparison with other potential suppliers.

I thus come to the conclusion that there is no reason for the New Zealand pulp and paper industry to do anything but look forward to large expansions and to an exciting future for as far ahead as we can plan it. I believe the same conclusion to be true for Australia, which has a much greater potential for hardwood pulping than has New Zealand and whose industry in many ways is complementary to ours.

I suggest finally that the main role and the continuing strength of APPITA is to ensure that we work together for what I am sure is a joint common good, and that we continue to develop our complementary industries in harmony and not in unnecessary competition.