

one to something which is far more widespread and understood in the industry. All parts of the production process will be by default part of the quality product that lies

behind that brand name, yet at this stage, only the secondary manufacturing end of the forest products industry is involved. Let's bring the "New Zealand Pine" story

down to the forest and make sure that everyone is part of the same process.

Hugh Bigsby

The importance of wood quality

Piers Maclaren

Which is more profitable, a diamond mine or a coal mine? Diamonds are undoubtedly worth more per tonne. So the answer must definitely be diamonds, right? Those who bemoan the poor product issuing from modern radiata pine regimes seem to follow this simplistic philosophy. They appear to argue that price per cubic metre, at mill-door, should be the paramount determinant of regime choice.

There's an alternative viewpoint: namely that wood quality is important, very important, but it is only one component of profitability. The other factors – recoverable volume, cost, timing and risk – are equally important, and debate is trivialised by emphasising one of these at the expense of the others.

Let's compare two radiata pine regimes, A and B, and look at each of the five factors in turn.

Regime A:

Fertile farm site, plant 800 s/ha, prune to 6 m, thin to 200 s/ha at age five, fell at age 23

Regime B:

Traditional forest site, plant 1600 s/ha, prune to 6 m, thin at ages five and eight down to 400 s/ha, fell at age 35

Wood quality

In all respects, Regime B produces wood of superior quality. Although the trees will have approximately the same diameter at breast height, the trees in Regime B are much taller, with less taper. Branches are much smaller and there is less likely to be wind damage. External characteristics such as these are regularly analysed with MARVL analysis, and the differences are no surprise to most foresters. Internal characteristics are also superior in Regime B. The proportion of corewood is lower, with its associated problems of spiral grain, checking, etc. Whole-tree wood density, and therefore strength and hardness, is greater for the older trees.

None of this means much to the grower unless it is reflected in stumpage prices. Processors can rage and curse about inferior wood, but growers are unlikely to listen unless quality is expressed as premiums or penalties. Qual-

ity gradients, such as currently exist, are extremely crude. Two consignments of pruned export logs, similar in all other respects except small-end diameter, will often fetch the same price. The domestic market separates unpruned logs into 'S' (branches up to 6 or 7 cm) and 'L' (larger branches but less than 14 cm), but modern silvicultural knowledge is sufficiently advanced to design regimes that produce branch sizes to much tighter specifications. Moderately swept logs are often priced the same as logs that are as straight as gun-barrels. Canterbury sawmillers sometimes pay higher prices for low-density logs than Northland buyers for high-density logs.

Wood volume

The recoverable volume in Regime B is significantly greater than Regime A, for two reasons. Firstly, the stocking is higher, and secondly the stand is older. MAI does not peak for radiata pine until at least age 35. Whereas Regime B yields approximately 24, Regime A produces less than 17 m³/ha/yr.

When making this comparison, it is essential to take account of the relative rotation ages. Douglas-fir may yield a stupendous 935 m³/ha of recoverable volume at age 60, whereas radiata pine may produce only 577 at age 30. It is embarrassing to have to point out to some commentators that two harvests of radiata pine can be obtained in 60 years, giving an equivalent production of 1154 m³/ha. The MAI approach provides a fair comparison, and once again Regime B is superior to Regime A.

Costs

A diamond mine may be less profitable than a coal mine for the simple reason that extraction costs may be higher. Regime B is likely to have higher growing costs. The land may be cheaper, but there are twice as many tree seedlings to purchase, to plant, and to release. Pruning costs are almost twice as high. Thinning costs are also much higher. Harvesting and transport costs are lower per m³, but higher on a per-hectare basis.

These cost differences may not seem particularly large relative to the huge dif-

ferences in revenue that result from the superior quantity and quality of wood in Regime B. The important point to note, however, is that the growing costs are *up front*. This leads us to the fourth factor, which is arguably the most misunderstood feature of commercial forestry.

Timing

The timing of cost and revenue streams is critical to the profitability of forestry. Is there any other investment, any other human activity, where no benefit is expected to be obtained for two to three decades after the initial cost? When new power stations, undersea tunnels, or lunar landings are conceived, the initial payback usually occurs in less than a decade. Economists and accountants whose experience is based on short-term investments need to rethink their ideas when they enter the forestry profession. For example, if an accountant is assessing the profitability of wheat production, choice of interest rate may be a minor consideration. The cost of land preparation, seed, fertiliser, etc., has to be carried for only one year. Changes in interest rate of a few per cent may make little difference.

The enormous power of compounding, at high rates of interest taken over many years, can be gauged from the following examples:

- A dollar invested at 5% today is worth \$3.07 in year 23, but \$5.52 in year 35;
- A dollar invested at 10% today is worth \$8.95 in year 23, but \$28.10 in year 35;
- A dollar invested at 15% today is worth \$24.89 in year 23, but \$133.18 in year 35.

In recent years, high real interest rates have been obtainable from New Zealand lending agencies. Forestry investors are not necessarily committed to trees; they want to make money they best way they can. If Regime A is to compete with alternative investments, it must yield a high revenue at the harvest age of 23, but Regime B must yield a revenue several times higher again.

Some commentators argue that when "normality" is reached, timing becomes unimportant. Once a forest with an even

representation of age-classes has been obtained there is no need, they say, to consider rotation length. Every year a forest company spends money on tree-planting, silviculture, etc. and every year it receives income from the sale of wood. Why not determine profit by subtracting yearly costs from yearly income?

The answer is that the standing crop of trees is a capital asset that has an opportunity cost. The crop could be liquidated (i.e. felled) and the revenue invested elsewhere. A forest comprising stands of very old trees carries a high opportunity cost. If it were possible to replace this forest with younger stands without greatly affecting revenue, this frees up capital. Which is the most profitable forest, one which is worth \$10 m and yields \$1 m a year, or one which is worth \$20 m and yields \$1 m a year? Obviously the former, because the latter could be sold to buy two forests like the former. The new enterprise would yield \$2 m, using the capital twice as efficiently as before.

Risk

Forestry is associated with all sorts of risk: physical, biological, legal, management and market risk. Any comparative evaluation of profitability must take these into

account. There are no uncontroversial ways of quantifying most types of risk, so some subjective element is necessary. One approach is to select a discount rate that is a composite of the risk-free opportunity cost of capital and an additional risk component. Given this thinking, interest rates such as 15% are not unreasonable. This places even greater emphasis on regimes which postpone costs and bring forward revenues. With any discount rate higher than 10%, Regime B is at a considerable disadvantage.

Rotation length affects risk in yet another way. To use a simplistic example, let us suppose that randomly, but averaging once in every 60 years – a major cyclone hits New Zealand and renders a crop unharvestable. A forest grower with three 20-year rotations will harvest two crops and fail to harvest the third. In contrast, a forest grower who insists on 60-year rotations will never harvest anything. The use of real data would not dilute the message that shorter rotations reduce risk.

With regard to markets, it may be possible to predict (dimly) the future in 20 years. Trees which will compete with New Zealand forestry products are already in the ground. The market situa-

tion in 40 years is considerably more uncertain. Current high prices for wood could result in a rash of new plantings that increase supply and lower price. There is a greater lead-in time for non-wood substitutes to be developed, and so forth. Longer rotations have to be considered a greater market risk.

Summary

The conventional way to bring together all the five components of profitability – price, volume, cost, timing and risk – is to use discounted cash flow analysis. There are two methods of doing this. One is to use Internal Rate of Return (IRR), and the other is to use Net Present Value at a predetermined discount rate. The methods will give the same answer if the discount rate is equivalent to the IRR (which, in typical regimes, is 8-10%). Use of IRR or NPV with high discount rates will invariably favour Regime A over Regime B. Longer rotations will become more profitable only if premiums for quality increase substantially, or low discount rates come into vogue. The latter is unlikely to happen unless prevailing real interest rates fall to very low levels.

'A sustainable future for forestry'

The two-day New Zealand Forest Industries International Conference "A Sustainable Future for Forestry" being held in Rotorua in February 1998 will examine major sustainability issues in terms of critical industry input, including the resource, energy, forest management, human resources, transportation, research, processing and investment.

Keynote addresses will include presentations on the global wood market, Asia and the Pacific Rim, and the power of the marketplace. Delegates will hear first-hand how a firm commitment to the environment can have major market pay-backs. In a keynote presentation Alan Knight, quality and environmental controller for B & Q, the largest DIY chain in Europe, will outline why and how B & Q demands environmentally certified wood and wood products from its suppliers. (At present the company sources all timber products from well-managed resources, but has set a target that these products will only come from independently-certified sources by the turn of the century.)

Conference organiser Toni Myers says

forest-based industries around the world can no longer ignore the growing importance of sustainability and environmental issues or the impact of environmental "image" on marketplace and consumer behaviour. Case studies and panel sessions will provide delegates with the opportunity to pursue these issues in greater depth.

Exhibition

"A Sustainable Future for Forestry" is being held at the Rotorua Convention Centre, Rotorua, on February 18-19 and will be followed by the FI98 Exhibition which runs from February 20 to 22. A showcase for New Zealand forestry, this exhibition is now one of the leading events on the international forestry calendar, with an exhibition area covering around 60,000 square metres of outdoor space and 3500 square metres of covered pavilion space, including one of the largest marquees ever erected in New Zealand for trade exhibition.

In-forest demonstrations of more than 40 machines, working in tree sizes ranging from 0.5m³ to 3 m³, will be held in the

nearby Kaingaroa Forest, one of the Southern Hemisphere's largest plantations forests.

Harvesting systems on view will include cable logging operations, as well as full tree harvesting to the roadside, mechanised cut-to-length and small wood thinning operations. These demonstrations always attract keen interest from visitors wanting to evaluate the performance of different machines and different systems. Live demonstrations at the main venue will include a large range of working portable sawmills.

As well as exhibits covering more than 300 sites, a number of special events and seminars will be held during the course of FI98. The New Zealand Institute of Forestry will be coordinating a series of seminars during the Exhibition, with seminar presenters including the NZIF, the Ministry of Forestry, the Farm Forestry Association and the Forest Industries Training & Education Council. On a more competitive note, FI98 Exhibition will also feature chainsaw carving and the national final of the Husqvarna Mobil Loggers Sports.