FACTORS WHICH INFLUENCE COMPANIES IN FOREST MANAGEMENT DECISIONS

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ABSTRACT

Factors which generally influence companies in making forest management decisions include company strategy, policy and objectives, anticipated wood demand-supply situation, financial considerations and Government incentives. Decisions regarding production thinnings will also be affected by the cost and value of the thinnings, the long term forest management strategy particularly with respect to stand parameters and the wood properties and quality of thinnings.

Responses to these factors largely depend on the nature of the forest growing companies. Three types are recognised, based upon the relationship between annual sales and the value of the fixed assets. Most sawmilling companies are in the first group where annual sales are greater than the value of the fixed assets. The second group, where annual sales are comparable with fixed assets value, is exemplified by pulp and paper companies. The final group, with annual sales less than the value of the fixed assets includes the purely forest growing companies with no processing interests.

INTRODUCTION

Companies engaged in forest management range from forest growers who sell stumpage to integrated organisations manufacturing a wide range of wood based products. Legally the entities will be both private and public companies. The private companies are comparatively small, less than 25 shareholders in New Zealand, and often family-owned or subsidiaries of larger public companies, including international companies. Public companies have a diverse and numerous shareholding, enjoy listing on one or more stock exchanges and are usually the larger units in the industry.

A System of Company Classification

Before considering the factors which influence companies in making forest management decisions, it is useful to recognise different types of companies. In this paper it is suggested that companies are of three types. The basis for classification is financial, since this has proved to be a good indicator of commitment to forest management. This should not be surprising, since the majority of companies owning forests use financial indicators in managing their assets, including forest assets.

The classification is based upon the relationship between annual sales and the fixed assets employed during that year. The fixed assets include the land, forest, buildings, plant and machinery, equipment and vehicles from which the sales have been generated.

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In general, for a company within a particular category, the relationship is reasonbly stable from year to year.

1. The first group of companies have annual sales greater than the value of their fixed assets; in the New Zealand forest industry commonly in the ratio 4 : 1. The companies are sawmillers, timber processors and merchants who largely rely on other organisations (e.g. State forests) to provide the saw log input. Their entry into forest ownership and management can be associated with a desire for some independence in raw material supply and also as a demonstration of intention. Most of the assets are comparatively simple and can be readily dismantled, reassembled, sold, written off and destroyed. This means that long-term policies are not imperative and consequently forest management is often accorded low priority.
2. The second group of companies make annual sales similar to, or slightly less than, the value of their fixed assets. Again from New Zealand examples, this ratio is about 2 : 3. Companies in this group are the integrated, capital intensive, pulp and paper and panel product companies. Compared with companies of the first group, larger asset values of a sophisticated and less readily transferred kind are at risk. The security of wood supply is consequently of greater importance, increasing the organisation's interest in forest ownership and management.
3. In the third group are the forest owning companies that have no processing facilities and whose revenue comes from stumpage and log sales. Annual sales are only a small proportion of the value of the fixed assets even when the forest growing stock is included at the cost of establishment and management, the traditional historic cost approach to asset valuation. The annual sales of $1 will be generated from $5- to $15-worth of fixed assets, depending upon the average age of the forest and the length of the growing cycle. For instance, forest with a regular cut equalling the annual growth will generate $1 of stumpage sales for each $5 of asset value, whereas forest with a predominance of young age-classes will have a lower sales-to-assets relationship. A forest managed on a short growing cycle, with efficiency of capital use a dominant consideration, will have a higher sales-to-assets relationship than a forest managed on a longer growing cycle.

FACTORS WHICH INFLUENCE COMPANIES IN DECISIONS:

a. On Forest Ownership and Management

1. Company strategy and policy. This can be expected to show markedly different attitudes towards forest growing and management, depending upon the type of company concerned.

In the first group are companies that tend to grow only sufficient forest to provide an alternative short term supply and demonstrate sound intentions, particularly in dealings with Government. It might be argued that to describe their policy in this way is to be unduly simplistic. However, it is likely to be the dominant consideration with many companies in this group. This contention is confirmed by noting the change in forest management thinking as companies, by development and diversification, move from the first to the second group.

In the second group, where the processing capital is more substantial and sophisticated, the forest programme will be based upon longer term policy considerations. Also

because these assets depend for their value on secure wood supplies, forest management is likely to emphasise improving the wood yield per unit area and reducing the risk of loss from fire and pathogen.

Forest growing companies of the third group are not amenable to the same generalisations. Unless particularly well located or well served managerially, companies in this group are selling out to processing organisations of both the first and second groups. If there is no special commitment to forest management on the part of the major shareholders, strategy and policy is likely to be dominated by the possibilities of a profitable sale of the company.

2. Company objectives. These will also vary between the three groups of forest-owning companies. One of the most common manifestations of differing objectives will be variations in silvicultural regimes for the same species in a given locality. These differences should not cause surprise, since it indicates that at least some thought has been given to best meeting the raw material requirements of the organisation.

Because the companies of the first group are predominantly sawmillers, the production of acceptable sawlogs will have high priority in the forest management objectives. Silvicultural regimes will be devised accordingly.

Companies in the second group are going to be more concerned about gross fibre production, from which sawlogs and peelers can be obtained, if needed, by selection.

The third group of forest-owning companies have no commitment to a specific utilisation process. Well managed, they will seek to "play the market" and continually look for more profitable opportunities. Forest management will be comparatively simple and flexible to take prompt advantage of these new market situations.

3. Anticipated wood demand-supply situation. When wood is abundantly available, either from indigenous forests or plantation forests created in an earlier period, forest management is likely to be minimal unless the forest manager is a particularly persuasive individual. Once a more balanced demand-supply situation can be anticipated, management is likely to assume greater importance. If demand looks like outstripping supply, real prices for wood will increase and this fact, linked with expected deficits, will give a further boost to forest expansion and management. In this situation the larger companies of the second group will lead the way since they have more to lose if wood is in short supply.

The companies in the first and third groups will be influenced by the confidence shown in forest investment and decide to invest also. They may even be encouraged in this by log marketing agreements with the integrated organisations.

Government responses to anticipated wood deficits also influence company thinking. Shortages may be officially predicted, resulting in Government investment in forest expansion and management. The demonstration effect is likely to encourage company investment as happened during the 1920s in New Zealand. Government incentives through grants, subsidies or preferential tax treatment will also aid this tendency.

4. Financial considerations and *5. Government incentives.* The latter commonly have financial implications, and these can be discussed together. Companies in the first two groups look to current earnings to provide the cash necessary for creating and managing forests. When the forest programme is accorded low priority the cash available is likely

to fluctuate and the programme consequently suffer. As forest management attains greater importance due to impending wood shortages or enlarged processing units or a combination of both, the budgetary constraints will be less severe. A further stage is reached when loan money is raised specifically for forest expansion and management. One New Zealand company has recently announced the arrangement of a loan which will be partly used for forest expansion. By this stage the commitment to forest management is substantial and practices are intensive and sophisticated.

The provision of Government incentives by way of tax write-offs, grants or subsidies will cause companies to move into forest management sooner, particularly those in the first group, and undertake a greater volume of forest expansion and management work.

Companies in the third group who are established forest growers will also make use of current earnings for management work. However, the effect of well-conceived Government incentives will also be to encourage the entry of new companies into forest growing and management. These new companies will include existing land owners interested in placing at least part of their property in forest as well as companies formed for investment purposes by urban dwellers, trusts or private superannuation funds.

b. On Production Thinning

The factors which influence decision-making are:

1. *The cost of production thinnings*
2. *The demand-supply situation for wood*
3. *The long-term forest management strategy, particularly with respect to stand parameters*
4. *The wood properties and quality of thinnings*

1. Those companies of the first two groups who grow wood for their own processing units will firstly consider production thinning on the basis of delivered wood costs. While wood sources from clearfelling give cheaper on-site wood costs, and sufficient is available to meet processing needs, there is unlikely to be more than academic interest in production thinning.

It is therefore important to be familiar with the comparative costs of harvesting and transporting wood from the potential sources. The harvesting cost diagram can be generalised as in Fig. 1. Both thinning and clearfelling costs per unit volume are likely to be strongly influenced by piece volume, which is usually the best indicator of piece size. Increasing piece size results in declining costs per unit volume, although at a decreasing rate. The magnitude of the cost per unit volume will be influenced by a combination of the following factors: the logging method and equipment used, labour productivity, topography and volume per unit area. Volume per unit area is also the principal factor influencing the degree of displacement between the thinning and clearfelling cost curves.

The transport cost diagram can be generalised as in Fig. 2, where it is assumed that the prime mover operates for approximately the same number of hours each day, irrespective of the lead distance. Multiple trips are achieved over the shorter leads. Smaller average piece sizes will result in the cost curve being displaced upwards as

FIGURE 1 SCHEMATIC LOG HARVESTING COSTS FOR THINNINGS AND CLEARFELLINGS

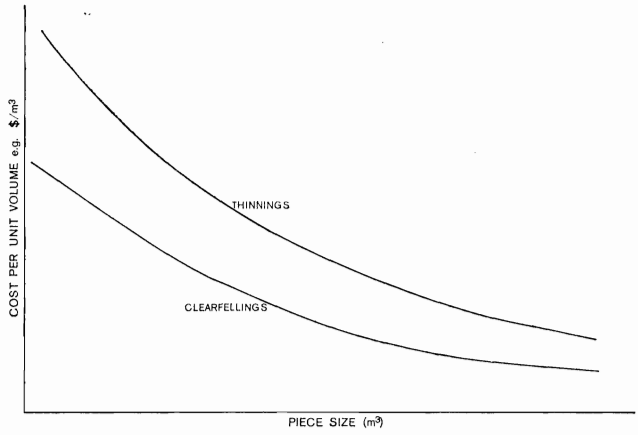
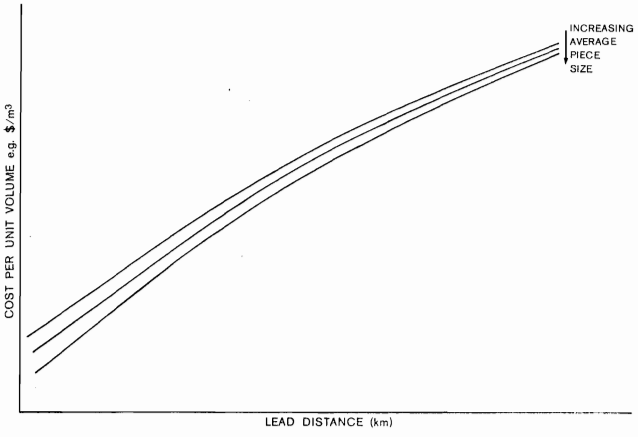


FIGURE 2 SCHEMATIC LOG TRANSPORT COSTS FOR DIFFERENT AVERAGE PIECE SIZES



more time is spent in loading and unloading. This indicates that thinnings cost slightly more to transport a given distance than clearfellings.

Delivered costs will be determined by the interaction of the harvesting and transport costs. The treatment of stumpage costs is likely to be from an accounting stance, with taxation requirements often obscuring other considerations. For this reason the delivered cost used for decision making often excludes stumpage and concentrates entirely on harvesting and transport costs.

Considering the delivered cost of wood alone, thinnings from forest close to the mill site will be a cheaper wood source than clearfellings from a more distant location. Where wood fibre is required (as in the case of second group companies) rather than logs of particular dimensions, thinnings will be sought when the total yield per growing cycle is increased and the delivered cost is less than the next best source of wood. Where logs of particular dimensions are required, as by sawmilling companies, the choice of wood source is constrained by a minimum acceptable log size. The desire

to have the lowest possible delivered cost still applies, but the lower limit to log size excludes certain thinning options unless sales to other processors can be made or specialised uses can be developed. Failing that, forest management will be geared to produce the required log sizes without production thinnings of unwanted material.

The forest growing companies with no associated processing units will be influenced by market opportunities rather than delivered wood costs. Initially, profitable outlets will be sought for the range of log types and sizes capable of being produced. If successful, production thinning will become an accepted part of the forest management. When a particular type of output, frequently production thinnings of small piece size, proves to be unwanted, then good forest management will seek to reduce or eliminate that type of wood.

2. In discussing the cost of production thinnings in the previous section nothing has been said of the value of such material.

A simple generalisation, from the context of the theory of supply and demand, states that when wood is abundant the value is low since many alternatives offering cheaper delivered costs are available. As the forest resource within a company and a region is subjected to demand pressures, the value of wood increases and the more costly wood sources are accepted. Production thinnings initially close to the mill site, then become viable. In the first instance the thinnings giving large piece sizes are likely to be favoured, but if the pressure continues smaller piece size thinnings will also be sought. Where a lower technical limit to piece size exists, as in the case of a sawmilling operation, the process of moving to more costly wood sources will be interrupted. If no other outlet exists then again forest management will seek to avoid the production of that material.

Increasing wood values will be reflected in the actual stumpage payments received by the forest growing company. It is also likely to open new markets for the smaller piece size thinnings that had previously proved difficult to sell. The way in which changing wood values will affect the management policy of the forest growing company is well illustrated by the growth of the Japanese log trade. Suitable management regimes have been devised and applied, which will produce a high out-turn of the required material. In this instance production thinnings are not usually part of the policy.

3. While the out-turn of a forest can cover a wide range of sizes and qualities, even for a single species, most processing options can only accept a narrower range of sizes and qualities. The most restrictive requirements are for certain telegraph and electric power poles and rotary peeled veneers, followed by sawlogs in general and smaller diameter roundwood such as fence posts. Wood pulping for paper making can commonly accept a wide range of piece sizes and qualities, although there is invariably an optimum set by equipment dimensions and the particular pulping process employed. The least restrictive are the reconstituted panel products where, especially in the more recent developments, a range of piece sizes and qualities, both of single species and groups of species, can be used. In addition waste such as planer shavings, sawdust and bark can also be utilised in varying amounts.

This means that a company managing a forest for its own use will approach the question of production thinning not only on the basis of costs of production and value of wood, but also with the final stand parameters sought at the end of the growing

cycle in mind. Thinning may be imperative to produce peeler logs and saw logs within an acceptable time, even although the value of the thinnings is very low and the cost of the operation high. The value being added to the remaining trees is, however, substantial and is reckoned to compensate for the losses on the thinning operation.

Where the end product requirements are not so exacting, as for a predominantly pulpwood use, the attainment of a specified piece size is unlikely to be an important management consideration. There are exceptions as in the case of stone groundwood pulping, where the optimum packing of the grinder pockets will require material of a specified diameter. Again large piece size may indicate a higher proportion of heartwood and this is less acceptable in most pulping processes.

Generally, decisions on whether production thinnings will be undertaken are based upon an immediate consideration, the value of wood produced, and a longer term objective, the type of tree to be attained in the future.

4. The comparative value of thinnings to a processor will also be affected by the properties of the material as well as its dimensions. This is particularly true of the smaller dimension thinnings to be used in pulp and panel products.

Commenting with radiata pine primarily in mind, density increases during the first 12-14 years by as much as 40%. Since density is associated with changes in cell wall thickness not only is yield in chemical pulping affected, but also such pulp and paper properties as tear factor, which is lower when younger wood is used, and breaking length and burst factor, which are higher for younger wood. Although the pulp yield is generally lower when younger wood is used, the cooking time can be reduced giving savings in the cost of pulping. The proportion of extractives associated with heartwood formation will also increase with age, a factor which favours wood from younger clearfellings or thinnings.

Mechanical pulping, and in particular stone groundwood pulping, is sensitive to a number of factors which can be more readily obtained in younger wood. These factors include diameters within a certain range, e.g. 20-35 cm, as small a taper as possible, knots less than 5 cm in diameter, low heartwood content, and uniform moisture content. The physical size of the pulpwood billets is less critical in refiner groundwood pulping, but the wood properties are still significant.

While wood properties are less critical when producing panel products such as particle board and fibreboard, density is still of some significance. For instance, in particleboard manufacture there is a limiting relationship between wood density and board density. Wood above a certain density cannot be used in a particleboard where the limiting density is 15-25% above the wood density. Where the raw material is defibred or flaked into smaller dimension pieces the difficulty may be eliminated.

The use of thinnings for producing sawn timber will be affected by the dimensions of the logs used. Also lower density wood that makes up a higher proportion of the log will give rise to strength and often seasoning deficiencies.

From a few generalised examples, it can be seen that the range of potential uses for thinnings is likely to be reduced. Small piece sizes and higher proportions of lower density, young wood are likely to be the principal problems. However, there are applications which can make better use of this material and thinnings then would take on a greater value for particular organisations.