



Featured Topics

The European Union's Eastward Enlargement and the Forest Industry

Raija-Riitta Enroth and Ritva Toivonen

Ten Central and Eastern European countries have applied for membership of the European Union: Latvia, Lithuania, Estonia, Poland, Hungary, the Czech Republic, Slovakia, Slovenia, Bulgaria and Romania. The European Commission has proposed that, with the exception of Bulgaria and Romania, the candidate countries could be approved for membership in 2004. Bulgarian and Romanian membership could be approved in 2007.

The candidate countries have a combined total of 34 million hectares of forest. The most forested of them are Poland, Romania, Bulgaria, Latvia and the Czech Republic. Enlargement will bring approximately 30 million hectares of additional commercial forest into the EU, raising the current 95 million hectares by 31.5 per cent. The percentage increase in roundwood reserves will be even greater than this, as the candidate countries' forests generally have a high density of trees and removal is considerably less than the annual increment. In contrast to existing EU members, many of the candidate countries are net exporters of roundwood. Their stumpage prices have risen throughout the 1990s and are today only an estimated 20 per cent lower than those in Finland.

Major Wood Product and Furniture Industries

The candidate countries differ from each other not only in regard to their forests but also their forest industries.

The forest-based sector as a whole is very important to these countries: at the end of the 1990s the value of production totalled approximately EUR 22 billion, and the forest industry together with the printing, publishing and furniture industries employed about one million people. The forest-based sector is particularly important in Latvia and Estonia, whose forest industries account for around one quarter of all industrial production by value. Labour costs in the candidate countries are relatively low; in Poland, for example, forest industry workers' earnings are roughly one fifth of the level in Finland. Moreover, the forest industry in these countries has specialised in fields that are labour intensive and have low capital costs: the wood products and furniture industries. The number of companies in these industries is estimated at 16 000. The number of pulp and paper mills is just under 200.

Exports to the EU Have Grown

The transition from a planned to a market economy in the early 1990s was a painful process for all the candidate countries. This is also evident from the forest industry production figures: between 1985 and 1993 sawmilling output fell by 40 per cent, and production of wood-based panels, pulp and paper by about 30 per cent. Domestic consumption dropped even further. However, both production and exports, especially to the EU, have grown since the early 1990s, in some

cases substantially. Today, about half of the candidate countries' sawmill production goes for export. There are considerable differences between the countries, however. The Baltic countries and Poland, for example, have increased their exports tremendously. It is also significant that a high proportion of export value, especially exports to the EU, consists of highly processed wood products of the furniture industry rather than basic sawnwood and wood-based panels. By contrast, production of pulp and paper is relatively minor; indeed, the candidate countries are net importers of paper.

Forest Industry Attracts Investors

The main problems facing the forest industry in the candidate countries are centred on the need to raise the level of technology and expertise and on the fragmented nature of the industry. Production technology and environmental protection have to be improved in the elderly production plants. Competitiveness is hampered by the small size of the companies, although they do have a competitive advantage in their low costs, which will probably remain so for some time to come, even after accession to the EU. This has undoubtedly been a factor in the growing level of direct foreign investment in Eastern European countries. Finnish companies have been involved in setting up wood products manufacturing facilities in a number of the candidate countries, and this is likely to continue in the future too.

EU membership will mean that all investment projects will be required to conform with the relevant EU legislation. This is likely to increase the level of foreign investment, which will bring changes to the structure of the forest industry and help raise productivity. In the longer term, production capacity may also be transferred from existing EU members to the new member countries.

Consumption of Forest Industry Products Still Low

Consumption of forest industry products per capita in the candidate countries is low. Average annual con-

sumption of sawnwood is in the region of 0.1 cubic metres per capita, which is less than half the present EU average, and average annual consumption of paper is about 50–60 kg per capita, only one third of the present EU average.

If EU membership brings higher economic growth, the consumption of wood products, paper and paperboard is likely to increase many times over in the longer term. A doubling of sawnwood consumption in the new member countries would mean about another 10–11 million cubic metres of sawnwood. Paper consumption could even rise to triple its current level, increasing by an estimated 10–15 million tonnes; this is equivalent to the annual production of 25–35 modern paper machines.

Is Enlargement Good or Bad for Finland?

In the long term, the EU's eastward enlargement will probably increase Finland's export potential for forest industry products, expertise and technology, and bring profitable investment opportunities. In the short term, however, the presence of new member countries will bring tougher competition, especially in wood product markets, because EU membership will improve the operating potential of the new members' wood products industries. This has already started to happen.

The candidate countries have already integrated well into the EU market, with growing exports of wood products and significant levels of direct foreign investment. Rising living standards will not necessarily translate into higher domestic consumption of wood products, however, as consumption patterns are very deep-rooted and change only slowly. It is even possible that rising living standards will lead instead to higher market shares for competing materials, such as plastic, steel and concrete. In any event, a major increase in consumption could take years if not decades. To succeed in a tougher competitive environment, the wood products industry in Finland will need to be efficient and to produce even higher quality products. The industry would no doubt also benefit from launching various campaigns to promote the use of wood, for instance.

For paper industry products, the link between growing living standards and product demand is much

clearer. In the long term, the outlook for the paper industry is therefore considerably more certain than for the wood products industry. Although electronic media could slow growth in the demand for some paper grades, the demand for others such as packaging paper and paperboard will grow. The domestic paper industry in the candidate countries is only small, and so the EU's eastward enlargement will at least provide the Finnish paper industry with opportunities to increase its exports.

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Restructuring Forest Ownership in the Forest Industry

Jussi Leppänen and Pekka Ollonqvist

The listed Finnish forest industry companies own about two million hectares of forest in Finland, representing a growing stock of 170 million cubic metres and an annual increment of 7.9 million cubic metres. In 1990–2001 these companies harvested an annual average of 3.5 million cubic metres of roundwood from their forests; in 2001 this amounted to about five per cent of the industry's total roundwood procurement.

Traditionally, the major forest industry companies have owned forest land themselves in order to safeguard their roundwood procurement. The procurement situation, however, is not likely to change significantly even if the companies corporatise their forests and sell off part of their shareholding. The industry's continuity of supply will be safeguarded by long-term supply agreements and by retaining minority shareholdings in corporatised forests.

Restructuring of forest ownership has been prompted by the changes taking place in the wider world. These changes include the application of International Accounting Standards (IAS) for asset measurement, which will become mandatory for listed companies in Finland in 2005, and the pressure for good returns on capital invested. For forest industry companies today, 100 per cent ownership of their forest assets is no longer considered essential if a smaller percentage holding can improve the consolidated balance sheet and release investment capital for expansion.

IAS Will Focus Attention on the Hidden Value of Forest Assets

In forest industry company accounts, forests have been recorded as fixed assets whose book value, based on historical acquisition cost, is altered only in excep-

tional cases. Balance sheets show a relatively satisfactory return on forest assets because most forests were acquired decades before, and their book value has been low in comparison with the value determined by the market. Companies have publicly reported the market values of their forests to be EUR 800–1000 per hectare, which is considerably lower than the median price paid in forest land sales throughout the country, which was EUR 1340 per hectare in 2001.

Although application of the International Accounting Standards will not become mandatory for listed companies until 2005, IAS accounting practices can be applied in advance of this. The IAS 41 (Agriculture) standard will be effective from January 1, 2003, and represents an important change for the forestry sector. The IAS 41 standard concerns agriculture and the biological transformation of biological assets. According to this standard, the biological assets of listed companies must be measured at their 'fair value' according to a market-determined price, less the point-of-sale costs at the point of harvest. Accordingly, the measure of fair value in forestry could be the harvest value, less point-of-sale costs.

Measurement of biological assets must not, however, be made at fair value if the value cannot be reliably measured. In addition, if the available market prices do not correspond to the current condition of the biological assets, the measurement of fair value must be based on discounted present value of expected net cash flow from the assets. The current market-determined pre-tax rate at the time of calculation should be used as the discount rate. A significant proportion of forestry assets, for example seedling and thinning stands, will not be realisable at the time of valuation.

The possible effects of applying the new accounting model are examined here with the aid of examples.

The data used is from the *Finnish Statistical Yearbook of Forestry* and is also based on calculated estimates of growing stock composition and development. It should, however, be emphasized that the IAS 41 guidelines for calculating the fair value of forest assets are yet to be finalised.

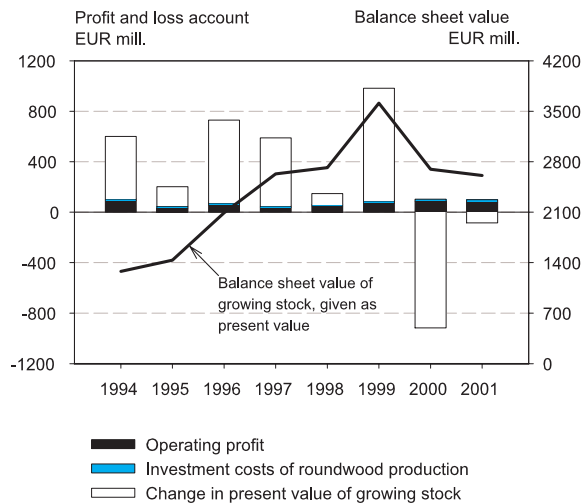
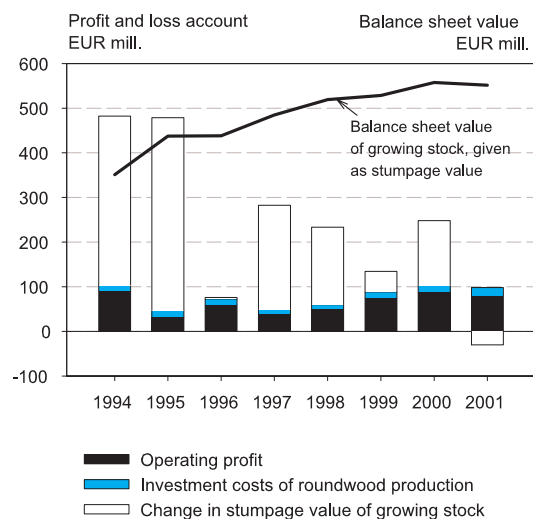
Fair value balance sheet calculations for the years 1994–2001 have been made for the forest industry companies' Finnish forest assets of two million hectares. A simplified representation of the realised profit and loss account is shown as a stumpage earnings calculation, where estimated gross stumpage earnings represent turnover, which is divided into investment costs of roundwood production and operating profit. Expected future turnover is also estimated in the form of expected gross stumpage earnings.

A calculation of fair value based on the harvest value of the growing stock is made by multiplying the volume of standing stock by the corresponding stumpage price for the roundwood grade (thus known as the stumpage value), and then deducting from this the roundwood sales revenue tax of 25–29 per cent. The fluctuation in the calculated balance sheet values

of the growing stock is very considerable on account of the movements in stumpage prices.

The other measurement of fair value, using net present value, is based on the expected net cash flow (= expected gross stumpage earnings – present investment costs of roundwood production – roundwood sales tax). The discount rate used in the calculation is the industry's nominal total interest rate on new credit for each year (in the example period, 3.7–7.4 per cent). Again the fluctuation in the calculated balance sheet values of the growing stock is very considerable, on account of the variation in interest rates. Interpretation of the calculation is hampered, however, by the fact that the discount rate includes inflation.

Determining forestry balance sheet values using harvest value or net present value under the IAS 41 standard thus produces an extremely wide variation in asset values. Due to the large volume of forest assets, the changes in value can be many dozen times greater than the realised annual turnover, depending on the method of calculation. The new accounting model will at least highlight the fact that forests are not a risk-free or even low-risk investment, as is often asserted.



Examples of IAS 41 profit and loss account and balance sheet calculations for the forest companies' Finnish forests. On the left is the calculation of fair value less sales revenue taxes, based on harvest value (stumpage value). On the right is the calculation of fair value based on net present value, calculated using market-determined interest rates.

In financial statements based on fair values, the change in the value of biological assets will be entered as a profit (or loss) for the financial year and transferred to the balance sheet as an increase (or decrease) in the company's equity. As seen from the examples in the diagrams, the changes in the value of forest assets can be as large as the entire company's profits if it is a major forest owner.

Corporatised Forest Assets and Consolidated Financial Statements

Corporatising forest assets is of benefit both to forest industry companies, who are interested in securing a steady flow of roundwood, and investors, who are looking for a steady return on capital. The benefits for forest industry companies occur not only in the form of capital released in the sale, but also in the streamlining of their accounting. The group relationship of a parent company to another group company is based on control (either by voting or by management), as laid down in the Finnish Accounting Act. If the party legally obliged to keep the accounts has a holding of less than 50 per cent in a corporatised forest asset (e.g. if more than 50 per cent is held by outside investors), the corporatised forest asset is no longer a group subsidiary company but an associated company or participating interest undertaking.

The Finnish Accounting Act definition of an associated company is based on the group having a permanent connection with it and maintaining a holding that promotes the group's operations, as well as exercising considerable authority. A participating interest undertaking is an associated company if the party legally obliged to keep the accounts holds at least 20 per cent

and no more than 50 per cent of the votes conferred by the undertaking's shares.

The IAS model of fair value balance sheet entries will not be mandatory for companies that are not listed on the stock market. Even where the IAS 41 standard is applied in an associated company's (corporatised) forest assets, the balance sheet value of these assets in the group's financial statements will be determined on the basis of the market value of the associated company's shares. Only that part of the associated company's profit or loss and change in equity that is equivalent to the group's holding will appear in the consolidated financial statements. If consolidation of the associated company's financial statement information is not necessary to provide a true and fair view of the group's performance and financial position, this information may be left unconsolidated.

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New Tools for Improving the Profitability of Roundwood Production

Kari Hyytiäinen and Olli Tahvonen

The profitability of roundwood production is a key issue for forest owners and for silviculture. Studies have shown that harvesting and silvicultural activities producing the highest financial return can be different from the forestry guidelines issued by Forestry Development Centre Tapio and the provisions of the Forest Act. It seems that Finnish silvicultural traditions and the Tapio guidelines may be based on a belief that the maximum possible roundwood yield will automatically mean a good financial return. Recent research, however, suggests that this belief may not be soundly based. Loss of earnings, for example, can be quite considerable if forest owners omit to take account of interest rates or adopt practices aimed only at achieving maximum roundwood yield.

The profitability of roundwood production can be analysed using mathematical models that combine economic optimisation with descriptions of forest growth, prices of different roundwood categories, silvicultural practices and roundwood harvesting technology. The output of the model is a sequence of silvicultural actions designed to produce the best financial return both for the forest owner and the national economy.

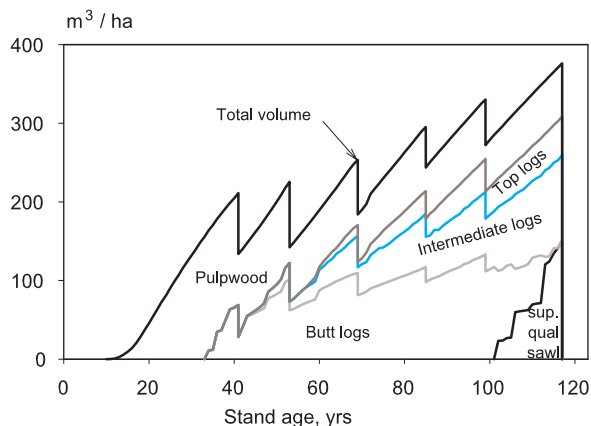
Descriptions of forest growth in economic analyses have so far relied on statistical models based on information from inventories and monitoring, such as the MELA growth models. Statistical models are reliable as long as they are used for examining cases that correspond with the silvicultural practices of the sample plot data on which the model is based. If the case being examined features aspects that differ from the conventional practices, then the model's reliability may come into question; such uncommon practices may include thinning from above. A problem with economic analyses has been that the practices required

to achieve maximum profit in roundwood production often fall outside or barely within the limits of reliability of the statistical models, thus adding further uncertainty to the results.

Growth models based on forest ecophysiology and life processes of individual trees offer an alternative to the statistical models. The development of such models began some 30 years ago, and in Finland one of the main participants in this research has been the University of Helsinki's Department of Forest Ecology. Growth models are not subject to the same type of reliability limitations as the statistical models. Forest ecophysiology models are based on the best existing theory of tree growth and the factors affecting it. The models are expected to provide competent forecasts of tree growth even in situations for which no empirical sample-plot data yet exists. It must be stated, however, that these models do also include many uncertainty factors. Nevertheless, there is growing interest in forest ecophysiology growth models in international research. No optimisation studies on the profitability of roundwood production using these models have yet been published, however, mainly due to the computational demands and complexities involved.

Integration of a forest ecophysiology growth model with an economic optimisation model is the subject of a joint study by forest ecologists at the University of Helsinki and economists at the Finnish Forest Research Institute, funded by the Academy of Finland. After two years' work, it is clear that the growth model developed by the University is well suited for use with an economic optimisation model. The growth model divides the assimilation growth into needles, branches, roots and the different parts of the stem on the basis of the state and competition circumstances of the trees being

(a) Growth of stand volume as a function of age and by roundwood category



(b) Removal by roundwood category and net stumpage earnings (EUR/ha)

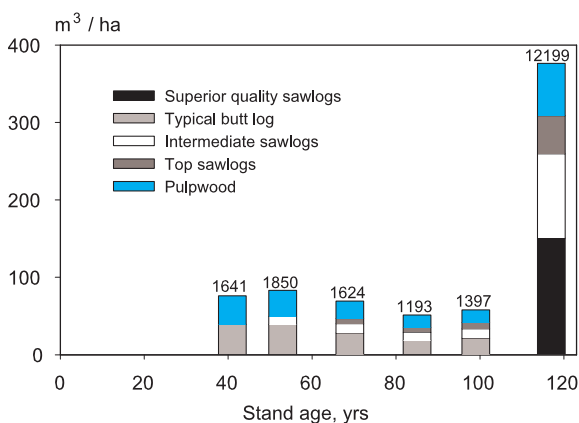


Figure 1. Optimum solution for a *Vaccinium*-type pine stand at an interest rate of one per cent

studied. This enables a more detailed description of stem taper and various quality factors such as branchiness.

The results of combining the growth model with the optimisation model are illustrated in Figure 1. This illustrates the case of an optimum harvesting programme for a *Vaccinium*-type cultivated pine stand using a low interest rate of one per cent. The starting point is a five-year-old even-aged seedling stand, with an initial density of 2000 seedlings per hectare. Figure 1a shows the growth in the volume of usable wood in the stand as a function of stand age, while Figure 1b shows the removal by roundwood category and the net (post-tax) stumpage earnings from thinnings and final cutting.

In the course of forest rotation the stand is thinned five times in all, and each thinning is light. Generally the biggest trees are removed in the thinnings (provided that they have attained the necessary sawlog dimensions), because there is a substantial price differential between pine sawlogs and pine pulpwood. Besides butt logs and pulpwood, the later thinnings also remove lower value sawlogs.

The stand is final cut when the remaining trees have attained the dimensions and quality required of

the most valuable roundwood category: superior quality butt logs. Since thinnings have removed the largest trees, the final cutting stand will comprise chiefly those trees that were smallest in the initial stand. For these trees, their slow diameter growth and competition with the dominant trees at a young age will have produced good quality characteristics: thin branches at the butt, rapid growth of the crown base and early shedding of dry branches. Repeated and light thinnings from above will also lead to improved diameter growth of the smallest trees in an even-aged stand at a later age.

If higher interest rates are applied in the model, optimal thinnings will no longer be as light and the stand will be final cut at an earlier age. For example, at an interest rate of three per cent the optimum forest rotation period is 70–75 years. Preliminary calculations indicate that if an interest rate of three per cent or higher is applied, the production of superior quality butt logs will no longer be profitable, given the current price differentials between roundwood categories.

The general understanding is that thinning from above is especially suitable as a thinning method for norway spruce stands. Scots pine is less tolerant of shade than norway spruce, and so conventional thinning in pine stands removes the smallest trees from

the stand. However, the preliminary results presented above, together with the majority of earlier economic analyses based on statistical growth models, and a number of yield studies, indicate that thinning from above may also produce the best financial return in even-aged Scots pine stands, provided the thinnings are timely and carefully conducted.

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The System of Forecasting Business Cycles in the Forest Sector

A research project of the Finnish Forest Research Institute (METLA)

Project tasks

- To produce the *Finnish Forest Sector Economic Outlook*
- To develop models for forecasting exports of Finnish forest industry products
- To develop forecasting models for roundwood markets
- To produce market reviews on the forest sector
- To develop and maintain the MESU database

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Further information: <http://www.metla.fi/julkaisut/suhdannekatsaus/index-en.htm>

Finnish Forest Sector Economic Outlook

The Finnish Forest Sector Economic Outlook is an annual publication on the business cycles of the Finnish forest industry and forestry sector. It gives an overview of the development of the entire forest sector and includes forecasts for the export volumes and prices of Finnish forest industry products, roundwood consumption and prices, employment in the sector, and investment in private forestry. In addition, the Economic Outlook contains several short articles on topical matters in the forest sector.

The Economic Outlook has been published in Finnish since 1991, and in English since 1998. The English version is published in PDF format on the Internet. It is produced at the Vantaa Research Centre of the Finnish Forest Research Institute (METLA). The Institute, established in 1918, is an independent research organisation under the Ministry of Agriculture and Forestry. It produces research-based information on the forest environment, multiple use of forests, forestry practices and the forest industry. It is Europe's largest forest research institute and has a permanent staff of 750, including almost 200 researchers.



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