

# SILVA FENNICA

1982 Vol. 16 N:o 4

Sisällys  
Contents

PÄIVIÖ RIIHINEN: Roundwood market: A source of stagnation of the forest industries	335
<i>Seloste: Raakapuumarkkinat ja metsäteollisuuden kasvun pysähtyminen</i>	342
RIHKO HAARLAA & MATTI KÄRKKÄINEN: Tervalepän kuitujen pituus	343
<i>Summary: Fibre length in black alder</i>	350
KARI LÖYTTYNIEMI, RIITTA LÖYTTYNIEMI, RAIMO HILTUNEN & SEPPO RÄISÄNEN: Monoterpene composition of needle oil of <i>Pinus oocarpa</i> and <i>Pinus caribaea</i>	351
<i>Seloste: Pinus oocarpa- ja Pinus caribaea-mäntyjen neulasöljyn monoterpeenikoostumus</i>	355
KARI HELIÖVAARA: The pine bark bug, <i>Aradus cinnamomeus</i> (Heteroptera, Aradidae) and the height growth rate of young Scots pines	357
<i>Seloste: Punalatikka, Aradus cinnamomeus (Heteroptera, Aradidae) ja männytaimien pituuskasvu</i>	361
SEPPO KELLOMÄKI, PASI PUTTONEN, HEIKKI TAMMINEN & CARL JOHAN WESTMAN: Effect of nitrogen fertilization on photosynthesis and growth in young Scots pines. – Preliminary results	363
<i>Seloste: Alustavia tuloksia typpilannoituksen vaikutuksesta nuorten mäntyjen fotosynteesiin ja kasvuun</i>	371
MATTI KÄRKKÄINEN: Näkökohta sisäisen korkokannan laskeumisesta	373
<i>Summary: Note on the calculation of the internal rate of return</i>	375

## Silva Fennica

A QUARTERLY JOURNAL FOR FOREST SCIENCE

**PUBLISHER:** THE SOCIETY OF FORESTRY IN FINLAND

**OFFICE:** Unioninkatu 40 B, SF-00170 HELSINKI 17, Finland

**EDITOR:** SEPPO OJA

**EDITORIAL BOARD:**

TAUNO KALLIO (Chairman), EEVA KORPILAHTI, MATTI KÄRKKÄINEN, OLAVI LUUKKANEN, V. J. PALOSUO, AARNE REUNALA and EINO MÄLKÖNEN (Secretary).

*Silva Fennica* is published quarterly. It is sequel to the Series, vols. 1 (1926) – 120 (1966). Its annual subscription price is 120 Finnish marks. The Society of Forestry in Finland also publishes *Acta Forestalia Fennica*. This series appears at irregular intervals since the year 1913 (vol. 1).

Orders for back issues of the Society, and exchange inquiries can be addressed to the office. The subscriptions should be addressed to: Academic Bookstore, Keskuskatu 1, SF-00100 Helsinki 10, Finland.

## Silva Fennica

NELJÄNNESVUOSITTAIN ILMESTYVÄ METSÄTIETEELLINEN AIKA-  
KAUSKIRJA

**JULKAISIJA:** SUOMEN METSÄTIETEELLINEN SEURA

**TOIMISTO:** Unioninkatu 40 B, 00170 Helsinki 17

**VASTAAVA TOIMITTAJA:**

SEPPO OJA

**TOIMITUSKUNTA:**

TAUNO KALLIO (Puheenjohtaja), EEVA KORPILAHTI, MATTI KÄRKKÄINEN, OLAVI LUUKKANEN, V. J. PALOSUO, AARNE REUNALA ja EINO MÄLKÖNEN (Sihtteri).

*Silva Fennica*, joka vuosina 1926-66 ilmestyi sarjajulkaisuna (niteet 1-120), on vuoden 1967 alusta lähtien neljännesvuosittain ilmestyvä aikakauskirja. Suomen Metsätieteellinen Seura julkaisee myös *Acta Forestalia Fennica*-sarjaa vuodesta 1913 (nide 1) lähtien.

Tilauksia ja julkaisuja koskevat tiedustelut osoitetaan seuran toimistolle. *Silva Fennican* tilaushinta on 80 mk kotimaassa, ulkomaille 120 mk.

## ROUNDWOOD MARKET: A SOURCE OF STAGNATION OF THE FOREST INDUSTRIES

PÄIVIÖ RIIHINEN

*Seloste*

RAAKAPUUMARKKINAT JA METSÄTEOLLISUUDEN KASVUN PYSÄHTYMINEN

Saapunut toimitukselle 30. 8. 1982

Certain trends in the sales behaviour of private non-industrial forest owners suggest that the forest industries will have to rely on a raw material supply much less than the allowable cut. This paper deals with several factors responsible for the change in sales behaviour during the last 20-25 years. These changes are caused by social change, a multi-face process which is led by industrialization. It is manifested in the increasing division of labour, more pronounced strive for efficiency, change in social values for the benefit of the adoption of innovations and thus of further changes.

It has become more common than previously to borrow money instead of selling timber. An incentive for doing so is provided by the increased progression of income tax scales which makes it more profitable than earlier to substitute a loan for timber sales with a view to reduce the amount of taxes. Indeed, in 1977, the real value of the farmers' debts was 1.7 times as large as in 1970. Inflation provides a further incentive to borrow money rather than to sell timber, because it tends to reduce debts, whereas a growing stock keeps increasing without affecting the property taxation, maintaining its real unit value.

Certain forest policy measures conducive to increasing the forest owners' willingness to sell timber are suggested. Among the most promising seems to be an adjustment of the present area-based yield taxation so as to take into account the age class distribution of the growing stock.

### 1. TRENDS IN NON-INDUSTRIAL PRIVATE FORESTRY

Certain universal trends in the sales behaviour of private non-industrial forest owners suggest that, given no changes in forest policy, the forest industries may have to rely on a raw material source much less than the allowable cut. Such parallels in roundwood supply during the last few decades have been observed at least in Germany, Norway, Sweden, Finland, the United States and Japan. It

is beyond the capacity of this paper to compare the mechanisms in the different countries which have led to this state of affairs. It is perhaps sufficient for the purpose of this paper to illustrate the change in sales behaviour in Finland and leave it up to the intelligent observers to infer to what extent the major reasons for the change are similar.



## 2. NON-INDUSTRIAL SOCIETY

In general, when we speak of the willingness to sell timber, we pay attention to its cyclical variation and fail to realize that more important major changes take place in the long-term. And even when this major change is recorded, there is not much insight on its causes. It does not fall within the traditional training of a forester.

The long-term change in sales behaviour is due to social change. Social change, a multi-face process, is led by industrialization, which refers to the increasing division of labour making the strive for efficiency more common, urbanization, change in social values for the benefit of adoption of innovations and thus of further changes.

The society in which timber was readily sold was essentially different from the present. Up to the beginning of this century the woodland owners had been waiting for an improved outlet for their timber, although certain regions had suffered from overcutting. In the regions with no market for timber, notably in northern and northeastern Fin-

land, the opening roundwood market was welcomed as a relief for the heavily indebted farm economies. In the relatively primitive society there were no prerequisites for a strong interest in the organization of the different industries. Agriculture and forestry remained rather weakly organized for some time. The timber trade had no uniform standards. Roundwood sales were evidently found as a much more interesting venture than nowadays.

The first three decades of national independence (since 1917) were characterized by land settlement programs which were aimed at settling the tenant farmers and nearly half a million people who lost their homes as a result of the Second World War. Roundwood sales from woodlots established in connection with this activity, were limited by the terms of the government loan obtained for financing the land purchase. Otherwise the holders of these woodlots were willing to sell timber. A farm thus established could be sold only after a fixed number of years.

## 3. CONSEQUENCES OF INDUSTRIALIZATION

### 31. Pressure toward change

Since the elapse of the years mentioned earlier, certain changes in society have taken place which made many farmers choose a new principal occupation. This happened at first in northern Finland, then on a large scale in the remote frontier regions of southern Finland and, finally, in the more industrialized regions. This change is still going on. A large number of non-farm woodland owners are coming into existence. Their proportion of the total number of private non-industrial woodland owners is approaching 50 per cent. The relative area of private forests in their possession is nearly of the same magnitude.

At the same time, the labour which had suffered from disguised underemployment disappeared from the rural seasonal industries. The wages and other costs of the re-

maining labour increased. It was necessary – and soon it was also profitable – to substitute capital for labour: more machines and labour saving equipment and buildings were acquired. In agriculture, means of financing these investments were needed. It was common at first to sell timber. Soon, however, the woodland owners learned to borrow money. A rough lesson in taking a loan was given by the slump in the 1970's when timber did not sell. It was discovered that borrowing pays if society inadvertently or purposely provides favorable conditions for it. This picture was supplemented by inflation which was strengthened by the universal energy crisis. Many forest owners found indebtedness more profitable than timber sales. Indeed, in 1977, the real value of farmers' debts was 1.7 times as large as in 1970.

This phenomenon is part of the social change which at the end of the 1950's initi-

ated the systematic programming of the national economy. Awakened by the unemployment experienced slightly earlier, it was found that maintaining high employment in the future would be difficult unless the national product was increased under certain conditions. It was then decided to recommend expansion of the forest industries because of their favorable balance-of-payment effect. In addition to a given growth of gross national product, full employment, balanced international payments, stable money value and an agreed distribution of income were sought for.

### 32. Change attracts more change

While earlier there was primarily a pressure toward changing the industrial structure, i.e. a tendency to shift away from the rural seasonal industries, it now provided an attractive power. Industry and the service occupations offered more employment and business opportunities. The national product grew in the expected manner. However, taking care of employment, balance of payments and income distribution, which are partly interlinked, has proven to be more complicated.

Economic growth, especially in boom periods, has attracted the politicians to compete in expanding the expenditure on social welfare services, education, geographical decentralization, etc. This has resulted in a high average taxation rate and steeply progressive tax scales. As a result, it is more profitable than earlier to borrow money and thus reduce the amount of both income and property tax.

This can be illustrated with reference to Fig. 1. Suppose we had a rather mildly sloping tax scale (F) a couple of decades ago. The interest on a loan of a given size at that time produced a reduction of the taxable income of  $Y-Y'$ . The tax reduction thus obtained was equal to the shaded area  $RUY'VR'$ . Nowadays, the income tax scale having become steeper (F'), assuming that the borrowing rate of interest has remained as earlier, an income reduction of the same size ( $Z-Z'$ ) reduces one's taxes by the shaded area  $PSZZ'TP'$ .

Avoiding inflation has succeeded only to a certain extent. Since it continues at a rate of

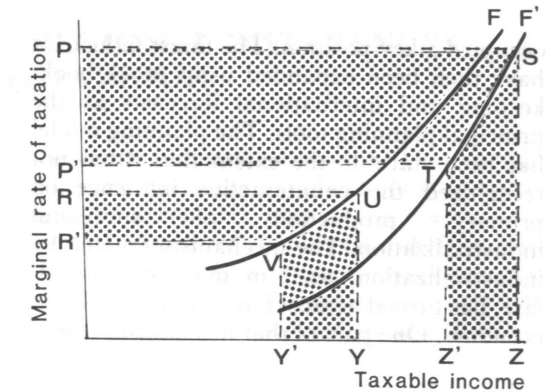


Figure 1. An illustration of the effect on taxation of an interest sum ( $Y-Y' = Z-Z'$ ) paid on a loan assuming differences in taxable income and in the progression of tax scale.

Kuva 1. Lainan korkojen ( $Y-Y' = Z-Z'$ ) vaikutus verotukseen verotettavan tulon ja verotuksen progression vaihdella.

more, rather than less, than ten per cent per year, it is realistic to consider refraining from selling the growing stock unless there is an urgent need to sell it. In agriculture, there is frequently something which must be replaced. For such a replacement a loan can be obtained, which in turn enables certain amounts to be written off in bookkeeping. Part of the reason for taking a loan may, however, be the willingness to reduce the amount of income and property taxes. The compulsory bookkeeping required for agricultural taxation has emphasized the farmers' need and possibility of following the course of his economy and of considering alternative decisions. In addition, social values have changed. Debt is no longer frightening, nor is it shameful. On the contrary, it is an evidence of business-skillfulness.

As a result, a loan is frequently substituted for timber sales. Refraining from timber sales safeguards cash income against inflation, but maintains the possibility of a quick liquidation of the growing stock.

### 33. A consequence: forestry and the wood economy produce a long-term feed-back for itself

To summarize what has been said above, it is conceivable that, in building up a welfare society, forestry and the wood economy have

occupied a key position. The forest industries have then been expanded using stock book-keeping and international forecasts as the principal planning tools. The planning model has been static to the extent that it has not recognized the counteractive influence on primary production of successful industrialization. The mechanism created by industrialization, used in maintaining welfare, has turned against forestry and the wood economy. One part of that mechanism would

#### 4. VALUING PROPERTY, ETC.

Also among the incentives of borrowing money and of refraining from timber sales is the difference in valuing different objects of taxation. In this sense the area-based yield taxation (as well as the taxation of actual income applied in several countries) tends to spur the conservation of mature growing stock. While the valuation of property in taxation is generally based on current prices, in forestry, with the taxation of area-based yield, it is valued on the basis of estimated yield. It is therefore possible to increase the growing stock without affecting the property tax. If the forest owner would sell timber and invest the income thus obtained into a rented flat, the possible increase in value of the

seem to be the progression of income and property tax. Another is the relationship between the taxation of forestry income and other income, as well as between the taxation of forest property and other property: both are conducive to conserving the growing stock. The effect of these factors is strengthened by inflation. In addition, these factors are supplemented by the welfare society itself, since one can afford to keep a large stock of mature timber.

property (assessed value) would not avoid taxation. Moreover, the owner of the rented flat is taxed according to a high marginal rate and maintains the flat with the rent which has been reduced by the amount of the tax paid. The growing stock can be increased without affecting the taxation and a given percentage of the forestry income can be deducted when calculating the taxable income. The tax reductions of dwelling construction in the 1950's and 1960's were likely to induce investment into rented flats. Now that these reductions are no longer available, less money is invested into rental dwellings and the money is rather kept in increasing growing stock.

#### 5. PLANNING THE FOREST INDUSTRIES

Some part of the roundwood shortage of the forest industries may be due to its way of planning expansions in the primary forest industries. For a long time these expansions

have taken place under the supervision of the Bank of Finland. Certain experts were consulted as to whether there was a sufficient surplus of timber in a region's allowable cut to warrant an expansion of a given size. This kind of stock bookkeeping is not an adequate planning tool in a situation where the roundwood supply from private non-industrial forests is likely to be inelastic.<sup>1)</sup> The demand for roundwood becomes keener as a result of these expansions and the price rises, but the quantity of timber sold does not increase much. On the contrary, the relative deficit of raw material increases. It is worth noting that the real stumpage prices during the last 15-20 years have increased.

#### 6. EMPIRICAL EVIDENCE: REGIONAL DIFFERENCES IN SALES BEHAVIOUR

The reduced willingness to sell during the last few years has been noted especially in western Finland, despite stumpage prices for sawlogs which have slid considerably over the prices recommended in the price agreements. What can be inferred from Veli-Pekka Järveläinen's (1981) recent study is in agreement with the above-mentioned theoretical conclusions.

In northern Finland timber is seldom sold, but it is sold in larger batch sizes than in the southern half of Finland. Considering the southern half of the country separately, timber is sold least frequently in western and southern Finland; in each of them, less often than in central and in eastern Finland. Also, the amount of timber sales per hectare was smallest in western Finland, second smallest in southern Finland, and largest in central and in eastern Finland. These observations coincide, in a general way, with the degree of regional industrialization of the country: western and southern Finland are the most industrialized, and the commercial fellings there are also the smallest.

The non-farm forest owners sell less often than the farmers, but their average sales are larger. The absentee forest owners are particularly enigmatic as far as timber sales are concerned. The same is true for owners with large arable land areas and female owners. The latter may often be absentee owners, having married outside their hereditary possessions.

The opinion polls carried out by Järveläinen (1977) have revealed a feature characteristic of western Finland: in this region the views held by professional foresters largely coincide with those typical of forest owners. One could say that the forest owners do not "believe" foresters, but the foresters "believe" forest owners, adopt their line of thought and are thus empathic. There is no need to try to conclude whose opinions are "better". Western Finland represents more industrial views than most other parts of Finland. The trends in development elsewhere are likely to take the way pointed by western Finland. The views held by foresters will sooner or later also have to be adapted to

the more industrial attitudes. This complicates the interpretation of opinions: extension may be acceptable because its norms come from the forest owner himself. Likewise, participation in extension may demonstrate general forestry activity as much as an one-way effect of extension on forest owners. Forestry is responsible for attitudes characteristic of an industrial society to the extent that it has contributed to industrialization, but not directly. It is obvious, then, that forestry does not have a means to cancel these attitudes.

It is advisable here to pay attention to the fact that timber sales and several silvicultural measures are interlinked. If little is sold, the silvicultural measures also remain small and the possibilities of cutting in the long-term are reduced.

Extension and, hence, raising the level of knowledge, is significant from the standpoint of increasing sales of timber and of improving the silvicultural state. Extension has most likely been intensified and the level of knowledge increased during the past twenty years. Yet they have been unable to check the fact that the willingness to sell timber in Finland has declined in the same way as in the United States, Germany, Norway and Sweden. (It is easy to see that a well trained and knowledgeable forest owner sells timber more often and adheres to established silvicultural standards more closely than someone less informed. This can even be expressed in the form of a function. But a variable representing industrialization can be substituted as a shifter in the same function. Its significance is decisive: the frequency of timber sales is determined by the location of that function, which largely depends on the degree of industrialization.) In other words, at the society level, interest in selling timber and in silviculture becomes weaker with advancing industrialization, independent of the signs of correlation at the individual level. And yet in other words, forest owners may rank in whatever way in respect of their knowledge, but their attitudes on an average becomes more negative as society as a whole becomes more industrialized.

The conclusions drawn on the effect of

<sup>1)</sup> 'Inelastic' means less than unit elasticity. Different results have been obtained from highly multicollinear stock-supply models assuming that demand is perfectly inelastic. Thus, Seppälä (1974) and Tervo (1981) offer supply elasticities of the order of unit elasticity. Historical evidence during the last 15-20 years suggests that demand could not have been perfectly inelastic. The trend of real stumpage prices during this period was upward, while that of the quantities of roundwood was downward. In another study by Palo et al (1979) the authors failed to identify the supply function. Korpinen (1980) developed a demand-supply model for sawlogs. The price elasticity of demand was estimated at -0.8 and that of supply at 1.5. These estimates, however, were obtained from nominal data, i.e. from time series containing the inflation. A check with deflated series suggests that the monetary variables had a common linear trend which provided the apparent explanation obtained by Korpinen. The entire model collapses when estimated from deflated series.



industrialization conform to Tikkanen's finding (1978). He compared the behaviour of forest owners in two rather small geographical areas (communes), one of which (Vihti)

is industrialized and the other (Nilsjö) is not. The differences in the behaviour of these two groups were in agreement with the "general theory" of the effect of industrialization.

## 7. POSSIBILITIES OF CONTROL

### 71. Summary of the effect of and trends in social change

Willingness to sell timber seems to decline as industrialization advances. Industrialization is a continuous process and has to be understood largely. It is characterized in the first place by increasing division of labour and urbanization, by substitution of capital inputs for labour and change in social values. The process of this change as a whole is called social change and it proceeds in a cumulative fashion. In other words, the variables participating in the change correlate positively with each other. From the standpoint of forestry, several European countries previously mentioned and the United States are some kind of "final products" of the process of change.

Industrialization has changed the motives for timber sales as its fruits have been used to achieve the objectives of economic growth and of income distribution. The change from labour-intensive to capital-intensive agriculture, steep progression of taxation scales, inflation and differences in the valuation and treatment in taxation of different property items, may be the most tangible reasons for a relatively small willingness to sell timber.

It may be noted here that we are dealing all the time with a long-term change in the willingness to sell timber and not with a cyclical change. In this context, exceeding or falling below the allowable cut during a short period has little significance. Since the average interval between two sales is 4.5–6.7 years, the comparison of sales amounts and allowable cuts are meaningful only if they cover lengthy time periods. Such long periods in turn, include effects on timber sales which have hardly anything to do with the willingness to sell.

### 72. Means of control

The logic of economic policy does not require that the reasons for failure in achieving certain partial goals be eliminated. Hence, it is not possible to think of the possibility of reducing industrialization or of retarding its progress. In principle, there are still means to promote more sales of timber. Instead, considering the political realities in society, only a few means of economic policy are practically applicable. And this is the case despite the fact that forestry and the wood economy are recognized as important fields from the standpoint of certain essential development aims of the national economy.

A reduction of the progression of tax scales would most likely increase timber sales to some degree, but it would hardly solve the problem. Raising the limit for taxable minimum income would also possibly make the forest owners reduce their financing of expenditures through loans and thus increase financing by timber selling. Lowering the value of the coefficient used in calculating the taxable forestry property ("net yield" multiplied by 10, nowadays) would have the same type of effect.

In connection with these means one might note, however, that it would still be more profitable for the forest owner to sell timber and take a loan at the same time. That he does not necessarily do this may be because of expectations of inflation. Stabilizing the value of money as a means of forest policy would be desirable, but its motives and success depend on objectives other than those of forestry and the wood economy. These fields employ no more than 6–7 per cent of all employed people. Yet the collective agreements in these industries would have an inflationary effect if

they were signed before the agreements in the other industries on such terms that the increase in wages exceeded the growth of productivity. Measures reducing time variation of sales and of stumpage prices would be conducive to curb inflation, because large stumpage income in a boom may increase the purchasing power of a large section of the population faster than the availability of consumer goods increases. Price agreements and improvements in the storage of raw materials for and products of the forest industries, would lend themselves to smooth the time distribution of income. Concrete measures would deserve special consideration. For example, the existing investment fund, investment reserve and business cycle deposit systems could be developed in order that the forest industries could obtain considerable tax reductions while using these funds for the above-mentioned levelling of cycles.

Different valuation and treatment of different types of property in taxation are partly technical and partly economic policy problems. For technical reasons, the determination of taxable forestry property can hardly be changed so as to take into account the growing stock, although a logical way to increase the willingness to sell would be to change the valuation of taxable property in such a way as to make its conservation unprofitable. One should perhaps proceed in the other direction: change the taxation of investment alternatives competing with the conservation of growing stock with a view to make the liquidation of growing stock profitable. The investment alternatives of a forest owner have in the recent past been few. The principal alternative has been agriculture, its buildings, machines, equipment and basic improvements. When the taxation of actual income in agriculture was introduced in 1968, it was perhaps taken advantage of by liquidating stumpage and investing the income thus obtained into agricultural investment objects in such a way as to enable considerable depreciations and thus tax reductions. In this way, however, taxable property was increased, which in turn led to the desirability to obtain items which would lighten property taxation in agriculture. This was made possible by increasing the amount of debts which obviously were substituted for timber sales.

It would thus seem that forestry income needs other investment objects apart from agriculture. The non-farm forest owners would hardly invest into agriculture in any case. The above-mentioned study by Tikkanen (1978) suggests that the non-farm forest owners were willing to invest forestry income into objects other than agriculture if they were available. High-interest deposit accounts, industrial shares, government bonds and rental flats are realistic alternatives for a forest owner. The development of all these for the purpose of promoting timber sales could be considered. High-interest deposit accounts and the purchase of government bonds could be made more attractive by awarding prizes. The danger one can sense here is that government bonds would be used to get more loan.

The passing of laws on tax reductions for dwelling construction could be considered once again, while also taking into account objectives other than those of dwelling production. If the aim is to limit the migration of people within the country, it would be possible to experiment with tax reductions for dwelling production with regional constraints mainly in favour of rural areas. These investments might interest forest owners.

The efficient means of controlling timber sales fall outside traditional forest policy; they are part of general economic policy. A possibly defensible means within forestry would be such a reform of forest taxation as would motivate regeneration still stronger than the present Law on the Amendment of the Law on Taxation of Farm Income (975/1979) which exempts regeneration areas with established seedling stands from taxation. One way of making the conservation of mature growing stocks unprofitable would be to exempt seedling stands and young-growth stands from taxation and direct taxation to the remaining three treatment classes (open areas, old-growth stands, mature stands). The forest owner would then have incentives to afforest open areas (possibly using state subsidies), to speed up the growth of old-growth stands, and to regenerate mature stands.

This tax reform may be met with opposition on the grounds that it is at first sight laborious. It would perhaps require a management plan for every woodlot. While it is generally believed that planning as such in-

creases sales, there is all the more reason to believe that an amendment of the area-based yield taxation, in the manner suggested above, would leave a great net benefit. The benefits and costs of any reform should be considered simultaneously.

The extreme possibility of avoiding timber

shortage would be to reduce the capacity of the forest industries either by refraining from the planned expansions or from replacements or both. Then, however, one must bear in mind that a ten per cent reduction in the output would mean a FIM 5–6 billion decrease in the gross national product.

## LITERATURE

- JÄRVELÄINEN, V-P. 1977. Mielipiteet yksityismetsätaloudessa. Metsänomistajien ja metsäammattimiesten käsityksiä metsätaloudesta ja sen edistämistä. Summary: Opinions in Finnish private forestry. *Folia For.* 334.
- 1981. Hakkuukäyttäytyminen yksityismetsälöillä. Summary: Cutting behaviour in Finnish private woodlots. *Folia For.* 499: 1–54.
- KORPINEN, P. 1980. Tukkipuun kysyntä ja tarjonta 1950–1978. Työväen taloudellinen tutkimuslaitos. Tutkimuslauseita 11/1980. Helsinki.
- PALO, M., LEHIKOINEN, T., NISSILÄ, O. & TER-

- VO, M. 1979. Raakapuumarkkinoiden toiminta. Summary: The roundwood market in Finland. *Kansantaloudellinen aikakauskirja* 1979/4.
- SEPPÄLÄ, R. 1974. Raakapuun tarjonnasta Suomessa. Summary: On the supply of roundwood in Finland. *Folia For.* 124: 1–28.
- TERVO, M. 1981. Raakapuun kysyntä ja metsänomistajaryhmittäinen tarjonta. Mimeographed.
- TIKKANEN, I. 1978. Metsänomistajien muuttuvat tavoitteet ja puunmyyntikäyttäytyminen. *Metsä ja Puu* 1/1978: 14–17.

## SELOSTE

### RAAKAPUUMARKKINAT JA METSÄTEOLLISUUDEN KASVUN PYSÄHTYMINEN

Yksityismetsänomistajien myyntihalukkuuden kehityksestä voidaan päätellä, että metsäteollisuuden on pakko tulevaisuudessa tyytyä huomattavasti hakkuusuunnitetta pienempään määrään raakapuuta. Tässä artikkelissa käsitellään useita myyntikäyttäytymisen muutokseen 20–25 viime vuoden aikana vaikuttaneita tekijöitä. Myyntikäyttäytymistä muuttaa lähinnä yhteiskunnan muutos, moni-ilmeinen tapahtumasarja, jota ohjaa teollistuminen. Se ilmenee työnjaon ja tehokkuuspyrkimyksen lisääntymisenä sekä sosiaalisten arvojen muutoksena siten, että innovaatioiden omaksumisen ja muutoksen todennäköisyys kasvavat.

On tullut entistä yleisemmäksi lainata rahaa puunmyynnin sijasta. Tähän kannustaa tuloveron progression jyrkentyminen, mikä tekee entistä edullisemmaksi korvata puunmyyntiä velanotolla verojen vähentämiseksi. Vuosina 1970–1977 maanviljelijöiden velat kasvoivat reaaliarvoisesti 1.7-kertaisiksi. Inflaatio edelleen kannustaa ottamaan velkaa, kun taas puusto kasvaa varallisuusverotukseen vaikuttamatta, reaaliarvonsa säilyttäen.

Joitakin myyntihalukkuutta lisääviä metsäpolitiikan keinoja esitellään. Lupaavimpiin kuuluu nykyisen pinta-alaverotuksen painottaminen siten, että se ottaa huomioon puuston kehitysluokkajakauman.