labor. At the same time, it is necessary to create a modern environment for labor by improving spur roads to enable cars to gain access to the working places – most of forests in Japan is located in the steep mountainous region – and by emancipating forest workers from risky and hard labor through mechanization.

5. TOWARDS THE DOMESTIC PRODUCTION AGE

The Japanese economy is now changing from rapid growth to stagnant growth, and many industries are standing at the turning point of structural reform. Forestry is by no means an exception to this trend. Forests planted after the War have been increased and the area of private forests is almost reaching 8 million ha, and entering into the final cutting age after the period of thinning of the past years.

Even though the demand for logs has been 100 million cubic meters or so since the 1970's, the log supply structure is constructed with the main emphasis placed on imported foreign logs which is only supplemented by domestic logs. As a result, the domestic market for logs has shrunk and the decrease in logging has accelerated.

The auction market for logs was expanded during the 1950’s and 1960’s, mainly for the following two reasons. One was that lumberman could not gain sufficient profit out of the marketing of standing trees due to the acute competition between sawmills triggered by the rapid increase in the demand for logs for reconstruction purposes after the War. Lumbermen had no alternative but to convert their businesses to the purchase of logs. Another was that dams were constructed in many rivers for the generation of electric power and for flood control, making rafting impossible. However, the road transportation has been increasing rapidly which enabled the demand for specific assortment and volume to be met at any time and at any place.

The marketing of logs by the federations of Forest Cooperatives was expanded between second half of the 1950’s and the first half of the 1960’s. However, in the second half of the 1960’s, turnover decreased. This was caused by a shock impact on the log market operated in various parts of Japan by federations of Forest Cooperatives when the volume of imports of logs from the U.S.A. and U.S.S.R. was increased rapidly and handling facilities for imported logs were opened at ports throughout Japan. After this period, up to the 1970’s, log marketing by the federations has been on the gradual increase as the government assistance to the structural improvement of construction or rebuilding of joint marketing facilities was given to the federations.

Log marketing by the federations will be expanded in the future, but the Forest Cooperatives will not be able to perform their function fully as nucleus of private forest if their activities only concern an extension of the activities conducted so far, because log production from the forests planted after the War is increasing gradually. It is strongly urged that the reorganization and strengthening of the functions of the Forest Cooperatives, such as silviculture, logging, processing and distribution, be carried out on the basis of the newly organized forest labor force.

1. SITUATION OF FORESTRY CO-OPERATIVES IN THE FEDERAL REPUBLIC OF GERMANY

Private forestry in the Federal Republic of Germany mainly consists of small holdings. Out of 354,000 proprietors 97 % own between 0,01 and 10,00 hectare. This category covers 46 % (= 1.4 million hectare) of private woodlands in total.

During the last decades co-operation increased and has been even intensified by recent forest legislation. So nowadays about fifty percent of the small woodland area is managed by voluntary co-operatives.

The main aim of these co-operatives is the improvement of management by trying to overcome the disadvantages arising from small size, from unfavourable location and splitting up as well as from insufficient accessibility and other structural difficulties.

In the smallest properties with extreme unfavourable location even using the potential of the site may be impossible. In general, however, structural difficulties occur in mechanization and economic problems of capacity. In each part of production the combination of input factors has a different optimum. Due to this fact, structural disadvantages are most important in the smallest holdings. Quite obviously there is, however, no exact size of property beyond which structural disadvantages and thereby needs of co-operation will not occur.

The owners interest in co-operation is, last not least, determined by the relative economic importance of the forest revenue within his enterprise. This interest will often be very little, if forestry contributes to his total income only on a very small scale.

In the Federal Republic of Germany the vast majority of forestry co-operatives is organized as self-regulating association under civil law. This type of co-operation is not a forest enterprise itself, but provides different services for the members and coordinates owners activities. The co-operative therefore gains no profit. The benefits of co-operation are directly earned by each proprietor, who uses the offered facilities according to his own management purposes.

Size of co-operatives differs in a wide range between 800 and 10,000 hectare. Sometimes small community forests join the co-operative, membership of state forests occurs only by exception.

Government forest policy uses co-operatives as a tool to improve the different effects of woodland to the public in general. Therefore special additional grants are given, which may cover parts of the costs of mechanization (up to 40 % of investment) and management. The management grants are at present given in decreasing shares up to 15 years after foundation and may reach between 40 % and 20 % of total overheads.

From 1970 to 1978 the average sum of grants was 2.7 mill. DM per year. With 1.5 mill. hectare of co-operative forests this was less than 2 DM per hectare and year.

In most cases professional advice is given to co-operatives by the staff of state forest
services. This advice is free of charge. When the state forester takes over actual forest operations, normally certain fees are charged, which, however, will by no means cover the real costs. This indirect subvention by giving "technical help" varies a great deal in the different states ("Länder") of the Federal Republic. In all of them, however, the benefit of this indirect subvention exceeds the relatively small direct grants many times.

2. ECONOMIC ANALYSIS OF FORESTRY CO-OPERATIVES

2.1. Methods

In order to get informations on the efficiency of a forestry co-operative, as a first step one could try to compare the situation before the foundation and afterwards. This attempt, however, has to meet several difficulties. The greatest difficulty of an empirical investigation causes the fact, that the benefits of the co-operative do not occur in its own accounts, but in the balances of the members, who used its services. These members, however, normally do not ordinary book-keeping. In addition to that there are so many of them, that it becomes impossible to judge the success of a co-operative by using the individual results of each members economic activities. Far more, many of the positive effects of co-operation on the actual conditions of the stands will only pay off after several decades. With these longer periods of investigation problems of exact measurement grow, too. In co-operatives running over a longer period already, there may have been changes in objectives, areas and memberships.

Instead of doing this analysis of development, a second method can be used. Here one compares certain characteristics of woodlands belonging to a co-operative with those of non-members. From this comparison conclusions may be drawn on the benefits of co-operation. Doing this, one must keep in mind, however, that co-operatives may influence their surroundings as well. This has been shown in the effects on timber price development, for instance.

Finally, it is very difficult to generalize results gained from existing co-operatives by empirical investigations, as each of them can be regarded as a singular individual with very specific attitudes.

Quite another approach to estimate efficiency of co-operation can be done by using model calculations. These should be based on results of empirical investigations, but should only include the main influencing factors. The risk of this method is, that the number of variables may be much too much and that the underlying assumptions may be too general.

The research project, some major results of which are reported below, has used a combination of model calculations and field investigations of 20 forestry co-operatives which represented different types of co-operation in all regions of the Federal Republic of Germany.

2.2. Results of Model Calculations

Possibilities to improve economic efficiency in small woodlands by means of co-operation depend on starting-conditions (e.g. size of holdings, tree species, age-class, distribution, accessibility and site). The intensity of professional advice is very important, too.

Theoretical calculations on expected improvements in the average property by joining a co-operative comprise both influences on income and expenditure. Three starting-conditions (Type A, B and C) were defined, which differed mainly in average size of holdings as well as actual and potential growth of stands. Efficiency of co-operation was measured by comparison between starting-condition (1), short-term improvement (2) and long-term improvement (3) after foundation of a forestry co-operative.

The most important factor of economic improvement was the increase in revenue. This was reached after a short time by rises of timber prices due to better marketing. In longer terms improvement of timber quality standards and enlargement of supply could be achieved as well. In a co-operative of type B, which represented an average potential of sites and species (annual cutting rate: 4 m³/ha/year) short-term improvements (2) resulted in an increase of annual revenue of + 32 DM/ha (= + 11 %). Long-term improvements (3) led to a better revenue of + 110 DM/ha/year (= + 38 %, see Table 1, 1.6). Changes in expenditure resulted from additional costs due to intensified silviculture, road construction and management as well as from cost reduction due to rationalized production. Thus in type B there was only little change in expenditure in total.

Table 1. Improvement of Economic Efficiency in Small Woodlands by Foundation of a Co-operative, Type B (*)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Starting- Conditions</th>
<th>Short-term Improvements</th>
<th>Long-term Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DM/m³</td>
<td>DM/ha</td>
<td>DM/m³</td>
</tr>
<tr>
<td>Revenue:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Annual Cutting Rate (m³/ha)</td>
<td>4.0</td>
<td>4.0</td>
<td>4.5</td>
</tr>
<tr>
<td>2) Price of Saw Logs</td>
<td>85</td>
<td>95</td>
<td>105</td>
</tr>
<tr>
<td>3) Price of Pulpwood</td>
<td>50</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>4) Gross Revenue of Timber Production</td>
<td>288</td>
<td>320</td>
<td>398</td>
</tr>
<tr>
<td>5) By-Products</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>6) Total Revenue</td>
<td>288</td>
<td>320</td>
<td>398</td>
</tr>
<tr>
<td>Expenditure:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7) Felling and Logging</td>
<td>162</td>
<td>151</td>
<td>126</td>
</tr>
<tr>
<td>8) Afforestation</td>
<td>46</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>9) Weeding, Cleaning and Protection</td>
<td>12</td>
<td>24</td>
<td>19</td>
</tr>
<tr>
<td>10) Maintenance of Roads</td>
<td>6</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>11) Miscellaneous</td>
<td>72</td>
<td>80</td>
<td>84</td>
</tr>
<tr>
<td>12) Management of Co-operative</td>
<td>–</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>13) Total Expenditure</td>
<td>299</td>
<td>296</td>
<td>296</td>
</tr>
<tr>
<td>14) Net Yiel (L. 6 ./. 13)</td>
<td>–</td>
<td>+ 11</td>
<td>+ 24</td>
</tr>
<tr>
<td>15) Subsidies</td>
<td>–</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

(*): Characteristics of Type B: Size of holdings between 5 and 20 ha.; mainly farmers: 2/3 soft woods of mostly younger age-classes and with poor thinnings; 1/3 old hard woods of bad quality; annual cutting rate 4 m³/ha; most of the timber is sold; insufficient accessibility. Aims of co-operative: road construction, improvement of thinnings, rationalization of production by mechanization, coordinated marketing.
and more attractive as time goes on and investments pay off. In the beginning, however, there will always be a shortage of capital, as the first improvements in timber prices are too small to balance the necessary financial input.

Results of theoretical calculations showed the amplitude of efficiency improvement in small holdings by means of co-operative. In contradiction to the very optimistic prognosis sometimes read, it could be shown, that there were relatively poor results in the beginning. Really evident success could be achieved only in the long-term view by improving quality of stands. Due to this it makes sense, if co-operatives sometimes are not very fond of great investment programs and employment of life-time personal. All these expenditures will pay off not before a very long period.

2.3. Investigation of 20 Forestry Co-operatives

The analysis of 20 co-operatives included 63,800 ha and 5,400 owners. 53% of all holdings were smaller than 5 ha, 34% had between 5 and 20 ha of woodland. Size of co-operatives varied from 800 ha to 10,000 ha. Number of members per co-operative was between 50 and 650. At a rate of 54% members were farmers. The possible annual cutting rate was 4.1 m³/ha, whereas the actual cutting rate reached only 3.7 m³/ha due to bad accessibility. Aims of the co-operatives, defined by statutes, mainly concerned coordination of production, mechanization, material acquisition and timber sales.

The actual activities of the co-operatives were among others measured by means of intensity of professional advice, provided by the state forest services. The staff input per area, which was quite a good indicator of activities, differed considerably due to different emphasis on forest policy in the federal states.

A direct comparison between the results of model calculation and field investigation proved to be difficult. As some of the analyzed co-operatives did not fully use coordinated marketing, their actual economic efficiency was slightly lower than it was supposed to be according to model calculations.

The presidents of the co-operatives were also interviewed on advantages and disadvantages of co-operation. Table 2 shows, that the advantages prevailed. Presidents apparently gave special significance to improvements by subsidies (Table 2, line 5), although the actual sum of all grants was only 1 DM/ha/year. Quite obviously, forest policy effects of these grants are far greater than their actual contribution to the income of the owners.

In general, subsidization of forestry co-operatives proved to be insufficient. Limitation of grants for first mechanization for instance and decreasing shares in management grants do not take into account long-term production in forestry. Hence, improvements can only be achieved by permanent subsidies on a higher level.

A discussion of different ways of subsidization showed, that from the micro-economic point of view direct product subsidies of timber production may be more favourable than area-based grants. In addition to that, public investment funds should be given in any case.

3. Problems of Macro-Economic Cost-Benefit Analysis of Subsidies

For several reasons a cost-benefit-analysis of subsidies to forestry co-operatives is very difficult. Using this instrument, development of revenues and costs with subsidization and without it has to be found out and net costs of subsidies had to be calculated. This would only be useful, however, if after certain subsidizations direct changes in revenues and/or costs could be expected. This again could only happen, if there would be a significant influence of subsidization on decision making of individual proprietors. As the total sum of public subventions to forestry co-operatives is very low and a prognosis of timber price development is very uncertain, the computed efficiency improvement on a macro-economic scale would probably be less than the statistical error of the calculations.

A second difficulty occurs, when the situation of small woodlands has to be analyzed as it would be without any subventions. Most probably there would have been no foundation of co-operatives at all without public subsidies. Therefore it would be almost impossible to estimate the theoretical economic development of a single small holding without subvention.

Public funds for forestry co-operatives are not identical with national economic costs. These are rather defined as quantified changes in factor inputs caused by the subventions. The small amount of subvention, however, will probably not show such effects. Therefore the statement may be justified, that subvention mainly causes changes in income-distribution for the benefit of proprietors in co-operatives, but does not produce national economic costs.

Reductions of expenditure, calculated in the micro-economic analysis, can mainly be regarded as consequences of the existence of co-operatives, but not of their subsidization. Due to this, it can be postulated to subsidize first of all the foundation of co-operatives in particular.

In chapter two of this paper the improvement of timber prices was discussed. This must not be defined, however, as increase of overall national rentability in any case. Increase in timber price will probably result from different influencing factors, which are mixed up. But there is no doubt, that some of them can be regarded to be just changes in distributions of costs between producers and buyers. From this the final conclusion may be drawn that public subvention of forestry co-operatives mainly causes changes of income-distributions and less changes of factor allocations.

Finally, it seems necessary to check up the instruments of forest policy, wether they meet the special requirements of forestry in general.

There is a number of reasons, why in forestry market mechanism does not guarantee optimal area of woodlands and timber production on its own. Therefore active public influence by means of forest policy is necessary. Whereas in other parts of industry economic policy uses a system of economic incentives and pressures, forest owners are forced to act in accordance to national economy goals by legal restrictions.

If this is regarded to be preferable, the economic disadvantages of these restrictions must be compensated.

As result of a discussion of different forest policy instruments a combined system of area-based and product-based subsidies can be recommended. Within this concept, very much higher grants for afforestation are requested. Subvention of co-operatives has
proved to be a very useful tool of forest policy. It should be altered according to the recommendations described above and should concentrate on really heavy financial incentives to foundations of new forestry co-operatives.

REFERENCE:


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FOREST AS A CAPITAL ASSET

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INTRODUCTION

In this article we will discuss certain aspects of the capital management of forest assets. These aspects are of importance when one wants to consider what means to use to influence the capital management on both small and big forest properties.

When quantifying the effects of different uses of capital, one must necessarily have a scale. The rate of return is for this purpose the usual measure of profitability. We will first discuss the differences between nominal and real rate of return, and point out the assumptions which are often implicit in analyses of the profitability of investments in forestry. We will then discuss certain liquidity and risk aspects of capital investments in forestry, and at the end deal with certain consequences of taxation.

The author gratefully acknowledges the advise received from John Høsteland and Asbjørn Sveinsrud at the Department of Forest Economics.

CAPITAL YIELD

It is a common opinion that the return on invested capital in forestry is low. Especially calculations of the rate of return on investments in silviculture give rather low values.

NOMINAL AND REAL RATE OF RETURN

We will in this paragraph analyse the concepts 'nominal and real rate of return' and show the connection between these two concepts in a biennial investment calculation. We will first go through a more technical description. The following symbols will be used:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>cost price at point</td>
</tr>
<tr>
<td>a₁</td>
<td>cash flow at the end of year 1</td>
</tr>
<tr>
<td>a₂</td>
<td>cash flow at the end of year 2</td>
</tr>
<tr>
<td>p</td>
<td>nominal rate of return</td>
</tr>
<tr>
<td>p_r</td>
<td>real rate of return</td>
</tr>
<tr>
<td>j</td>
<td>price increase</td>
</tr>
</tbody>
</table>