

SMALL-SCALE SAWMILLS IN INDUSTRIAL AND SOCIAL DEVELOPMENT OF BACKWARD FORESTRY AREAS

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SELOSTE:

PIENSAHOJEN MERKITYS JÄLKEENJÄÄNEEN METSÄALUEEN TEOLLISESSA
JA SOSIAALISESSA KEHITTÄMISESSÄ
CASE STUDY ETELÄ-CHILEN PANGUIPULLISTA 1970—1973

This paper analyses the potentials of utilizing a previously existing infrastructure of small sawmills in a backward area to enhance planned social development, considering at the same time both social and economic objectives. The paper presents the case of a rural forest region of 352 000 ha in southern Chile in the period 1970—73. The paper concludes that meaningful contributions can be made by this traditional industry to such development.

1. INTRODUCTION

During the period 1970—73, in Chile, significant changes were initiated in the economy and social structures. This evolved and still evolving frame gave place to efforts for seeking and putting into practice new approaches to face the complex of problems usually called «underdevelopment».

A specific effort, carried out in a backward, large, rural forestry area, on the Southern Andes West flank, in *Panguipulli*, is described here. There, a pre-existing infrastructure of small sawmills, of various sizes, and a small plywood plant was chosen as the means for a comprehensive social and industrial development for the region.

A significant effort was made to adopt operative goals and to define a plan for

that process of social change aimed. The guideline of the effort was that an integrated, planned social and industrial development is possible and desirable, and that it can be attained through progressive stages implementing simultaneously, social and economic objectives.

This case-study approach aims to enhance the assessment how this approach was implemented in a backward reality. Some relevant aspects of the project and its social environment have been described in necessary detail.

An attempt is made to evaluate the possibilities of the small scale sawmill to be the economic basis for regional development in rural forestry areas. Possibilities to generalize conclusions are restricted because

of the lack of information on the results of the project and because the implementation period was only three years or less (1970—1973). The bulk of data was gathered in 1972.

The richness of the experience, though short, can not be fully summarized in this paper. It is, however, hoped that those elements shown in connection with the role assigned to the small scale sawmills in the project, may suggest relationships, limitations, and above all a field for the search

of creative new solutions in today's effort: small scale mills for development. This paper, because of the nature of the experience it refers to, will possibly rise more questions than provide answers. May it be considered, anyhow, a modest contribution to enlarge knowledge on one concrete attempt largely made by the inhabitants of *Panguipulli*, to make the small sawmills of the area to serve the needs of the community: development.

2. DESCRIPTION OF THE AREA

The project area comprises approx. 352 000 ha, located in the west slope of the Andean Mountains, between the latitudes 39°—40° South. The area comprises a total of approx. 20 000 inhabitants, — including an aboriginal minority of 1 500 people, — they are living principally in some 18 villages¹⁾ built around forest industries, mainly sawmills. The economically active population is about 3 500 persons, or 17 % of the population, composed practically only by men.

The scenery, of abrupt morphology, is structured around deep and narrow valleys of glacial origin, rivers, lakes and peaks up to 2 800 m, even though their average never exceeds 2 000 m. The border line of vegetation is found at 1 500 m high.

The general climate of the region is rainy and moderate, with a mean temperature of 15°—17° C during summer and of 6°—7° C in winter and an average annual rainfall of 2 500 mm, distributed along the year with a maximum rainfall during winter. The conditions change and turn significantly harder with the altitude. This is the case of the project area where it is registered an annual rainfall of 5 000 mm in some places and heavy snowfalls in winter with temperatures below 0° C.

The area has 177 000 ha covered with forests, of which some 90 000 ha are con-

sidered accessible. More than 90 % of the soils are of forest use capacity, existing a limited amount of arable land, around 8 000 ha. Most of the soils of the area have evolved from volcanic ashes which together with the steep slopes makes arosion a very real danger.

The forests are over-matured native forests with an average growing stock of 400 m³ per ha (COMITE de INDUSTRIAS FORESTALES DE LA MADERA, CELULOSA Y PAPEL 1972). The forest is generally formed by seven species, all of them suitable and used for sawmilling, and some for block-board and plywood. Possibilities for other uses are good. Tentative essays doing chipping blends of those species for mechanical pulping, were successful.

Besides the impressive natural sceneries, the lake fishing and the hydroelectric potential of the water courses are substantial but have not been prospected yet.

The forest is selectively exploited, only sawlog size in utilized species. The felling is done mainly by axe and the haulage of logs by oxen normally through steep slopes (more than 35°). The logs are accumulated at particular points along the main routes, and transported further by lorries to the plants.

In 1970, out of the estimated total number of 33 sawmills, 21 worked. The annual production of these units (INSTITUTO FORESTAL, DIVISION INDUSTRIAS 1973) is summarized in the following table:

¹⁾ 15 to 300 families.

Production (1970) m ³	Number of sawmills
A. 0 — 2 000	11
B. 2 001 — 4 000	4
C. 4 001 — 6 000	2
D. 6 001 — 8 000	2
E. 8 001 — 10 000	2

The units in the categories D and E work permanently, the rest only seasonally, between 5 to 8 months/year. The seasonal work depends on the possibility to supply, or not, logs during winter to that mill, eventually too isolated in high places.

Apart from the sawmills, there exist: a plywood plant with an annual capacity of 2 700 m³, of which approx. 80 % is utilized; a joinery producing about 90 000 door units/year and 7 000 window units/year; and a blockboard mill with a production of 640 m³/year (INSTITUTO FORESTAL, DIVISION INDUSTRIAS 1973). These three factories are integrated with one of the larger sawmills.

Without exceptions, all the main machinery and equipment at the existing mills is obsolete and has already been amortized. One of the most typical problems is the availability of imported spare parts for the equipments. The transport of finished products to the markets and raw materials to the mills is in general done by lorries, but primitive methods co-exist. With only one mill having kiln facilities, the drying of wood is done in the open air.

The access to the main villages of the region through land routes is provided by two principal gravelled roads: slow and difficult crossing; four hours in average by car to the nearest town. Most of the internal routes are only seasonal. There is no railroad available.

The lacustrine route is also used. It is relatively fast and safe, even though the means employed are primitive. Communications inside and out of the place are difficult and irregular. There is a short-wave radio-station at one mill.

There are in the area approx. 1 300 houses, with an average of 7 m² per person; without electricity, running water, nor

sewer; frequently even without floor. The figures only affect the active population (17 % of the total) and their families, gathered together mainly around the industrial plants. In the forest, up in the mountains a typical house can only be a *ruco*¹⁾. The estimated housing shortage was 515 houses in 1972.

About 66 % of the population was illiterate (1972). In the area there were 24 primary schools, no secondary school, neither technical nor vocational educational establishments. Teachers and didactic materials were very scarce. Over 40 % of the children had difficulties in attending school regularly, because they should help their parents with their work, already from the age of 8–9 years.

The infant mortality was around 40 % in the area (1972). About 40 % of the children suffered from malnutrition. The journey to the nearest hospital required from 3–4 hour-trip by car (lorry), or by boat, to 2 days by using various transport means, depending on the location inside the region. Work-accident-rates are very high. Eight fatal accidents at the work were controlled in the mills in a period of 18 months (INSTITUTO FORESTAL, DIVISION PRODUCTIVIDAD Y ESTUDIOS SOCIALES 1973).

In 1970 unemployment rated at least 30 % of the active population of the area (INSTITUTO FORESTAL, DIVISION PRODUCTIVIDAD Y ESTUDIOS SOCIALES 1973). Hidden unemployment, seasonal employment, some peculiar forms of work and payment, born in the extreme isolation and lack of work opportunities in the area, made difficult to assess the employment situation. At the start of the project, under a policy of full employment, only 3 500 permanent employments in the whole area could be provided.

In the area, man substituted machine as long as the costs allow it. Unemployment otherwise, made people be ready to take a job at the limits of their physical capacities and for a low payment. The nature

¹⁾ Minimal construction made of rejected timber, erected inter-crossing them and with a sackcloth for door.

of forestry work — well-known as rough — and the dangers of the sawmill operations — known as dangerous — increased by the obsolescence of the equipment, were among the elements which combined made of these jobs physically exhausting. Women of the area endure «underdevelopment» in an even worse way than men. Cultural hindrances were to be added to her worsened situation in every respect already mentioned.

The marginality of the area and the increasing poverty of the inhabitants limited the possibilities for cultural expression. The remainder of the aboriginal population, acculturized and compelled successively to migrate to isolated poorer

corners of the area, carried out a mainly survival activity. The other people, originally peasant population, pushed not long ago to the uninhabited forestry areas — or to towns — by the crisis of the Chilean agriculture; have not had enough time nor possibilities for cultural expressions of their own. They shared with the aboriginal population the intense acculturation pressure. Lacking own expressions, the access to external cultural life was also limited. An indicator could be the fact that, even though some people had experienced it, cinema was still unknown for the majority in 1972 (INSTITUTO FORESTAL, DIVISION PRODUCTIVIDAD Y ESTUDIOS SOCIALES 1973).

3. SELECTION OF A DEVELOPMENT STRATEGY FOR THE AREA

3.1. The National Policy¹⁾

The framework to select the development strategy had two components, the National Policy and within it the Forestry Policy, and some structural changes already occurred in the area and in the State administration, relevant to that policy making.

The National Policy (TOHA G., J. 1973) formulated a specified forestry policy which had among its objectives the following:

- Full utilization of the land, expanding the productive area, particularly in the indigenous forests, through investment, education and research, and through extensive reforestation.
- Full use of the installed production capacity of the forest industry, giving priority to products of primary necessity for the majority of the population.
- Full utilization of the employment capacity of the forestry sector, emphasizing the role of vocational professional training and education in this respect.
- Acquisition by the State of the forest industry of strategical importance to the

national economy, and building of a State owned forestry sector of the economy, including land, industries and marketing channels.

- Use of plans and development of the planning activity as utmost effective tools to achieve harmonic, diversified, socioeconomic development.
- Priority to forestry and forest industry activities for rural development in the country, under an integrated appraisal of development as a complex socioeconomic process, where social benefits must be an operative objective for the productive activities.
- Search for integrated models for development of the rural areas understanding the rural community as a whole in its social needs; agriculture and forestry as rationally and technically complementary in land use and consider forestry a renewable multiple use resource.
- Seek the highest possible participation of the workers in the decision making at all levels of the production process.
- Support the development of a national technology in forestry.
- Seek an intensive decentralization of the administrative and service structures of the State forestry.

¹⁾ Here are reviewed only some aspects of the forestry policy of Chile (1970–73). The aspects presented are considered sufficient to outline the conceptions on the role of forestry in the Chilean national economy, relevant to the project.

3.2. Structural Changes Occurred

The area of the development project, consisting of 18 units of private forest *latifundia* totalling 352 000 ha, was bought by the State in 1971/72, conforming one administrative unit with status of autonomous enterprise financed through a centrally approved budget.

The administration of the area was integrated under a Board of Administration established in the area. Directors were appointed by the State and the majority — or 60 % — elected by the workers among themselves.

4. THE SELECTED STRATEGY

The strategy adopted relied fundamentally on the internal potentials of the area for development, assigning:

- to the community an increasingly leading and conscious role in the development process;
- to the available technology — small sawmills of the area —, in the context of the existing natural resources and the characteristics of that industry, capacity to economically sustain the initial phases of the development process;
- to the change in the structures and to planning, capacity to increasingly enlarge and deepen the potentials of economic activities of the area, hence the type and degree of industrial and social goals possible to be settled for attainment simultaneously.

The forest resources through the forestry and forest industries development, would be the basis of the overall socio-economic development for the region, in accordance with its natural vocation. The forest resources utilization would support and be the basis for a suitable diversification of the regional economy, as well. The development of the region should proceed through plans.

Proper planning should take into account these aims and efforts should be made towards:

- the inventory of the existing comple-

The existing different independent bodies dealing with the State forestry affairs — research and technical assistance; forests and forest land; forest industries — were put under the central direction of the Committee for Forestry and Forest Industries.

A Division was added to the State Forestry Research central structure to support forestry and forest regions development by conducting socioeconomic operational research.

mentary and potential resources: water courses, agriculture, cattle breeding, education, handicraft, recreation, etc.

- the inclusion in the plans of concrete measures to enhance that diversification, based in the results of the inventory.

The economic-administrative integration of the area provided good opportunities for an optimal use of its resources. These opportunities should be taken full advantage by the planners.

The generation of social benefits for the community should start, from the beginning, through investments in an minimum infrastructure, giving priority to that of communal services, such as schools, first-aid posts, running water, etc. essentially using the local resources: labour force, wood, etc.

Social objectives should be explicit in the plans and operatively defined and weighed.

The participation of the local community in the decision-making process of the region's development should be sought and prepared.

In the formulation and putting into practice of a development project, forest research should play a decisive role:

- to provide necessary basic information;
- to collect feed-back data for successive evaluation of the plans and realize the trends of the process;
- to formulate standards and suggestions

- for the planning, development activity at its different levels;
- to supply technical assistance to the local staff through operational research and training of personnel.

The project should be «feasible» to be carried out as far as possible with national resources, independently from the interna-

tional assistance that might be obtained for its implementation. Local self-financing is an aim.

The development of the local forest industries should be coordinated and consistent with the short and long-term national plans for forest industries development under preparation, but start immediately, without delay.

5. THE PROJECT

5.1. Forest Industries

In accordance with this strategy — not always explicitly formulated — a project for the development of the region was prepared. (COMPLEJO FORESTAL Y MADERERO PANGUIPULLI LTDA., DIRECCION EJECUTIVA 1972). A summary of its presentation is attempted below, following what are considered its four major activities.

The plan of the project for the industrial development aimed first to implement industrial integration; to maintain the production of the mills¹⁾, to eliminate the seasonal employment, and to ensure the capacity of maintenance service for the industrial equipment.

The bulk of plans referred to the mills could be assorted in five fields:

- Administration
- the standardization of a minimum administrative and accounting system for all the mills. It involved an investment in minimum office equipment (typewriters, manual calculators);
- the establishment of an internal/external radio communications system.

Wood supply

- the major introduction of the chainsaw to the felling and limbing operations;
- the training of workers;
- the rationalization of the timber transportation to the mills and building stocks of logs.

¹⁾ At the first stage of the project implementation it was difficult to maintain the former levels of production, considering the deep change taking place in the area.

Industrial equipment maintenance and repair

- training of the existing personnel;
- centralization and acquisition of necessary tools and equipment to furnish a centralized workshop for mechanical/electrical repairs and maintenance;
- recruiting more technical personnel for that centralized workshop.

Other mill operations

The main plans considered: Replacing six dangerous steam-motors written off, by portable Diesel motors, involving the immediate put into functioning of four stopped sawing/resawing mills, and start two new ones, which will increase production in 12 000 m³/year, improve sawing quality and decrease wastes.

Rationalization steps

- re-distributing machinery, seeing that the main resawing centres operate with band sawmills;
- waste recovery programme, by equipping the mills with simple saw benches to resaw part of the wastes.

The estimated investment in the industrial plans was equivalent to approx. US\$ 160 000 (1972). The effect of the plans should rise the capacity in 80 %.

5.2. Education

In connection with education, the plan had three main lines:

The first, an educational complex of

multiple use that should carry out several functions:

- to offer a wide range of short vocational courses in several fields such as logging, saw doctoring, engine's maintenance, mechanics, electricity, agriculture, public hygiene, sewing, cooking, handicraft, etc. The courses of this Centre should recruit their pupils from the basic-school system of the area. Scholarships and places in the boarding houses would be provided for pupils from farther locations and/or special pupil cases.
- to open educational possibilities for the girls;
- to be a centre of maintenance and reparation for industrial equipments combining practical instruction with service work to the industries;
- to be a centre of cultural extension for the whole area and the whole community;
- to support the schools of the area in the preparation of didactic materials and in up-to-date training of their teachers;
- to constitute, together with the hospital, the central infrastructure for the programme of public health in the area;
- to be the local headquarters of an office for documentation, forest research and technical assistance of the national structure carrying out these functions.

The second line referred to capacitation and practical training of workers.

The third line referred to assistance for developing the basic-school system in the area.

The necessary educational buildings and their location, were regarded in the plans related to housing and social infrastructure. The installations of the boarding house and dependencies (kitchen, laundry) were seen to serve as a summer hostel, supporting recreational activities and tourism. The plan also included a «museum of wood», with purposes of extension and research.

5.3. Housing

The basic aim of the plan was to solve the dwelling problem of the community

working in the production process and in the services of the area: building of 515 houses, and of the buildings necessary for the basic services of the area, in due time, according to the order of priority: a twenty-bed hospital, an educational complex, schools, first aid posts, social premises.

The plan provided the basic policies that should regulate the urban development of the region, and a set of criteria to define types of inhabited centres; types of buildings and types of minimum basic services to be provided in dwellings and in the buildings for public use. It made clear where it was aimed to have settlements and increment of population, and their links with the regional economy. The internal migration towards the new sources of work, and its repercussions in the housing problem; summed up to the expected vegetative growth, were also foreseen in the plan.

The basic policies on urban growth could be summarized as:

- search for a planned, harmonic development of the area in urban terms, which will be function of development of the productive activities;
- preserve the rural characteristics of the area, hitherto equipped with the basic services for a rural community;
- keep a high degree of flexibility within the solutions chosen, to enable sequential corrections with other experience accountable.

Two types of inhabited centres (I.C.) were defined: permanent and transitory (permanent I.C. and transitory I.C., respectively).

Permanent Inhabited Centres were those which:

- in general, counted already with basic services and a population which would be difficult to remove.
- those centres which should be established to provide basic services to that sector, while keeping its rural characteristics, and
- those centres which were indispensable for the enhancing of the production activity.

Three types of permanent inhabited centres (Permanent I.C.) could be identified:

- permanent I.C. of Production, satisfied directly and almost exclusively the needs of industrial production.
- permanent I.C. — Urban, existed mainly in function of the needs of other activities than those of the area.
- permanent I.C. — Mixed, existed in function of the industrial activities belonging to the area and also due to activities and services alien to it.

Transitory Inhabited Centres were closely linked to the productive works, especially related to the extraction and transportation of wood in the mountains. Generally, they are composed of collective temporary lodges, but in some cases they can be maintained for longer periods, depending on the need. In those places, workers will live for a week or for longer periods, but their family will live in a permanent I.C.

The development of the living and social infrastructure should concentrate in the Permanent I.C.

The plan took into account the minimum requirements concerning hygiene and housing — locally defined, with the participation of the community.

Seven basic-service items were defined and they would be made available in a certain degree or type, in each place. Each item was offered in some types, from more to less developed. These types or concrete forms of service were taken from the real life in the area and improved to become the choices available in the plan.

For instance, the «collective» houses in the plan — barracks —, had been used since long ago at some of the larger mills. They became the model of the «collective» to be implemented by the plan, after their layout was improved reducing the number of people living in them to ten single men, and adding basic services (electric light, running water, WC).

The basic services provided at Inhabited Centres were: housing, sewer service, consumption goods supply, education, health, sports and electric energy. As an example of the options within an item, «consumption goods supply» could include: simple store, supply centre, supermarket; and «house» for an I.C. could be: family standard house, collective, mixed (collective and family standard houses).

The different types of I.C. could complement one another and this was considered in the planning. The plan defined the following I.C. for the area.

Permanent I.C.	Number	Observations
Permanent I.C. — production	2	Two existing workers' villages adjacent to larger mills, one close to the urban permanent I.C. and the other to a mixed I.C.
Permanent I.C. — urban	1	Existing village at the cross-roads of the international road to the Argentine, deep inside the area.
Permanent I.C. — mixed	4	Spread in the area, at the mouth of the valleys or banks of the lakes

It should be emphasized that the type of housing, the materials and the functional aspects of the houses projected, attempted to maintain what belonged to the culture of the area, though improved according to means, and the ideas are taken from the reality of the area.

The total estimated cost (1972) for the housing plan was equivalent to approx US \$ 270 000, which did not include the ground¹⁾. About 75 % of it could be ob-

¹⁾ the ground is now owned by the State.

tained locally (lumber, plywood, doors, windows). The labour cost for the construction was about 16 %, and most of the labour required was available in the area. This makes more than 90 % of the necessary investment possible to be produced locally.

The plan did not include the building of the educational complex, neither the hospital (see paragraph «health»), but established their possible locations: in a permanent I.C., mixed or urban; and their construction line, following the rural wooden type.¹⁾

5.4. Health

The emphasis of the plan lay on public health, and the public health problems were faced under the direction of the local health responsible officials, from the education plan, the housing plan, and, to some extent, from the communication plan, as well.

The plan comprehended mainly:

6. THE NATIONAL PLAN FOR FOREST INDUSTRIES DEVELOPMENT³⁾

In accordance with the country's policies adopted, a comprehensive, long-term plan for forest industries development was in preparation. Recommendations made in that plan (COMITE DE INDUSTRIAS FORESTALES DE LA MADERA, CELULOSA Y PAPEL 1972), affecting the area of the development project, were accepted. These decisions were:

— The replacement of the old plywood mill. The location suggested was in one

¹⁾ The materials considered for those buildings were of the kind produced locally in order to make the plan accomplishment feasible. The priorities in paragraph «health» and «education» postponed these types of facilities for the second stage of the housing plan. Meanwhile, they were suggested for international development cooperation.

²⁾ The plan and design of the hospital was

1. *Public Health*, with three main lines:
 - a) public health and hygiene at the community level;
 - b) professional illnesses at work places, and
 - c) accident prevention, at work places.
2. Direct attention of ill and/or injured people of the community; at all levels.
3. Research and technical assistance, connected with the local public health (paragraph 1, above).

The direct attention health service relied on the net of first-aid posts and polyclinics — some of them already exist —, and on a twenty-bed small hospital to be built.²⁾

The hospital would be in the neighbourhood of the polytechnic educational complex, with which its functions would be related in the public health programmes, in the use of infrastructure for conducting research and some in-common services (as laundry, kitchen, etc.).

Research was intended to assist mainly the public health questions of the area, including ergonomics.

of the Permanent I.C. — production (the same where the old mill is located). The new mill capacity would be 20 000 m³/year, about 7 times the capacity of the existing one.
— Building of a new particle-board mill — at a supply distance from the area, or within the area, with a capacity of 40 000 m³/year.

Both mills were due to start production within 3 to 4 years. Their wood consumption

done by the State Service for Hospital Building (Servicio Nacional de Construcciones Hospitalarias) following the requirements the project.

³⁾ The area of the development project should be affected by the National Plan for Forest Industries Development. The project from the beginning was coordinated in its planning with the national planning, in order to integrate both at the local level. The results were satisfactory.

would be 90 000 m³/year, all of it to be supplied by the area.

The development project did not suffer any major modification for this cause. Its

technical feasibility was increased, for its wastes could be used at the particleboard mill. The needs of the area considered in the project became even stronger.

7. AN EVALUATION ATTEMPT

7.1. On the Structure of the Industry

In the area, with the expropriation of the forest latifundia by the State, were created the conditions for a horizontal integration of the individual sawmill plants, which had already a degree of vertical integration between forest and industry. The tool of horizontal integration was a central management constituted *ad-hoc* with representatives designed by the mill workers and State appointed personnel.

This solution had some advantages: Information on costs and production became available from the past records and performance and the activities of individual mills could in general be maintained under the changing circumstances, which was a very difficult and complex task.

On the other hand, many of the potential benefits of horizontal integration could not be attained, such as rationalization of the wood supply, transportation, maintenance facilities, etc. This was largely due to the persistence of a fragmented and isolated structure of the regional community, which had traditionally prevented organization of the workers, and cooperation and collective responsibility in the community, beyond the borders of the individual mills, and even within them.

A second step was given: «Areas», grouping 3 to 4 neighbour single mills were formed. The «Area» administration was responsible that the mills under its management will attain the goals assigned to the Area by the Plan of the Central Administration (Central Plan). The Central Plan broke the borders of the former individual mills and assumed the resources free for allocation in the possible combinations, within the inherent restrictions of each case. Lack of technical personnel restricted this solution: the administrative model had to keep centralized technical departments

to make and control the Central Plan, therefore the «Area» management received orders from several central departments, sometimes contradictory or implicating contradictory priorities, preventing efficient functioning of the «Area».

A third step was attempted then, aiming at increasing the technical personnel of the complex and at decentralizing the technical departments to the «Area» level. This step proved to be extremely difficult as too few people would abandon the comfort of the town for the penury of the «underdeveloped» rural community. Serious difficulty arose in compatibilizing the participation of the workers' community in the decision making process, with the restrictions of the situation in each change of structure.

The type and size of the mills suited well to the horizontal integration. Several combinations could be tried, especially with fixed/mobile units ¹⁾ of circular/band sawmill.

Portable circular benches producing flitches, with the re-sawing operations carried out in stable band-mills serving as re-sawing centres for a group of portable mills, proved to be useful in the conditions of the place. The use of optimization models could be approached to take advantage of the new situation, reducing transportation costs, improving the quality of the lumber, reducing waste amounts, rising production.

Horizontal intergration provides also a good basis to stimulate diversification of the regional economy, rationalizing the use of land, among others. This is a particularly

¹⁾ This does not necessarily refer only to portable mills manufactured as such. Circular sawmill units with carriage and some light units band sawmill, were anchored considering their shift to another place later on.

important possibility when forestry and agriculture are already the main activities of the area, arable land is scarce and erosion a real danger.

The former land ownership structure produced an irrational use of the soils. The peasants — especially the aboriginal community, traditionally peasant — were pushed to poorer soils of the area, on the steep slopes of the mountains. Agriculture there leads only to hunger and the destruction of the soil, becoming a reason for migratory agriculture, a known problem.

The oxen, extensively used in the logging operations in the area, require pastures to be fed and these pastures should be situated close to the logging operations. Pastures are also necessary to maintain the cattle required to fulfill the population's milk/meat nutritional needs.

Agriculture, cattle raising, forestry, renewable resources conservation and improvement, multiple use of forest and landscape scenery, are activities closely susceptible of support — even within heavy financial restrictions — by horizontal integration, and adequate planning.

The vertical integration of the industry in the area, was not significant yet at this stage, though a substantial increase in the aggregate value of the production of the sawmills was considered as very badly needed.

Degrees of progressive vertical integration were being attained by adding to the mills some primitive equipment, for further processing of the materials — small, locally made or assembled, circular resawing machines, etc. — as provided in the «waste recovery programme».

Integration with a 40 000 m³/year particle board plant decided in the national long-term plan for Forest Industries Development, was to be achieved in a second stage of the project.

7.2. On the role of the small sawmill in the development project

The potential role of the sawmill industry as a pioneer industry is known. The relationship capital/manpower becomes decisive for a starting industrialization where

capital is a restrictive factor and unskilled manpower supply is in surplus. Sawmilling industry has, in relative terms, a low capital intensity and substantial employment effects. The substitution of two major production factors, labour and capital, with each other, is relatively flexible. Demand for labour can be varied extensively with regard to skilled labour, which is normally in short supply in rural areas. In forestry regions, therefore sawmills are a natural pioneer industry, empirically confirmed in most countries by the past or the present reality.

But modernization and expansion of sawmills does not seem stimulated under conditions where labour can be obtained to work for substantially low salaries. The cost of capital is too high and an improvement in the technology used is not often able to increase the production as much as to compensate the cost increase of the unit produced. This trend, which has been observed even in industrialized countries (EKLUND, R. 1972) is accentuated in developing countries, where the price of capital is higher and the markets, do not assure the capacity to absorb a large scale production of sawnwood either.

The capital formed at the pioneer mill then flows to other activities/regions and alternative investments. In the «underdeveloping» area remains the aging mill, a huge number of unemployed, and a numerous amount of employed at low wages. This population is attached to the place by a chain of multiple factors including socio-cultural ties, lack of qualification for jobs, isolation and marginality of the place, etc.

The sawmills depend for the bulk of their profitability on a heavy burden of ignored costs which the local and national community has to absorb, especially the mill workers: extreme low salaries (sometimes even none, only subsistence means). No forest management neither regeneration of the forest.

Heavy, dangerous regime of work. Financial and technical support from the State, on most convenient unexpensive basis (credit, loans, technical assistance, etc.). The minimum which could be said is that the mill structure of cost is very deformed with respect to industrial countries.

Furthermore, several local social insti-

tutions appear, called by the situation and to reinforce the system. In the case studied: a) the independent logger, who owns a pair of oxen and is skilled in felling and logging with the help of his children; b) the «pulperia» (grocer's store), a commercial appendix of the mill, which supplies the community with essential goods. Prices depend upon circumstances and it is not unusual that the mill pays with «fichas»¹⁾ which are only exchangeable for goods at its own «pulperia»; etc. these institutions have their correspondent in the different realities where the process may take place.

To ensure the sawmill production and sales level, the case suggests that some segments of the industrial process can be modernized. In this case, the transport of logs and the distribution of lumber to the markets, which became to be done by lorry, and by lorry/ferry-boat, respectively.

The potential capacity of small sawmill units for pioneering capital formation in backward rural forestry areas is in principle possible, the small sawmills are potentially suitable, but this generalization has to be confronted with the particular conditions of each case necessarily and at least two major factors considered: how big a capacity of forming capital does the mill operation have under those specific conditions; how large a part of it can be re-invested in the area — in its development. These questions could not be answered with the data available for the present case, but an assumption may be reasonable: On basis of past records of the mills performance in the area and in the fact that they were profitable until now, an adequate equation can be found to maintain the running with profit under the new conditions.

Two other factors, decisive for the potentials of the small scale sawmill to be the economic basis for a regional development as the one outlined in the project are thought to be:

- The existence of a decision making structure interested and empowered to decide on the use of the capital formed by the sawmills and in the allocation of

- the productive factors, as required by the area development; and
- The development of a set of relationships community/production process, able to maintain and increase the contribution of labour and other production factors, on wages and conditions which may be still unsatisfactory, but which shall allow the formation of the capital required for the development.

The first point implicates a different economic criterium to allocate the resources than the one in ordinary use. Therefore, also different social structure for decision making. As an authorized opinion stresses the results of technology for the different social groups, belonging to the structure of the society in which that technology is used (BARRACLOUGH, S. 1975).

Besides, it further implicates that the national community agrees on that, the resources of the area be used, under the lines of the project, in benefit of a part of the whole society; furthermore, that if necessary the national community shall contribute to that effort in different forms: research, technical assistance, outside capital, etc. These conditions can hardly be granted by local level decision makers, but demand a national policy for development. A development project of the nature of the referred one, depends on those conditions.

The second point implicates that relationships community/production process, maintaining and increasing the contribution from labour to the industrial work, have to be developed and, they should be essentially different from those prevailing in the situation which is aimed to be changed: underdevelopment, as shown, involves in backward rural forestry areas a complex net of socio-economic relationships — unemployment, illiteracy, isolation, low income, etc. — which act as a coercive force maintaining and eventually increasing labour participation in pioneer productive activities, as sawmilling.¹⁾

¹⁾ It could be even said that underdevelopment actually means rather that set of relationships — maintaining, reproducing in expanded scale and deepening those socially negative features, than the features themselves.

¹⁾ Metal plug or slip of paper.

That the workers community is required to continue intensely bringing its participation to the production, while that coercive net of socioeconomic negative features is under a purposive effort for its elimination, makes conclude that this participation, basic for the development effort, can be mostly expected from a community that knows the goals of its contribution, agrees and benefits of them and knows and agrees on how that effort for development is actually to be carried out. This demands knowledge, interest and specific possibilities for the local community to participate in the decision making related to the development process; demand which restricts and challenges the technical solutions, and may require changes in the overall structure of the national decision making to enable satisfaction.

The relatively short capacity to form capital, inherent to the small scale sawmill industry, makes desirable a prompt vertical progressive integration and expansion. Meanwhile, the small sawmill provides a relatively constrained frame for goals of social and industrial development, but they are quite possible.

Finally, a given infrastructure of small sawmills usually leaves room for significant technological and organizational improvements. Some of the fields which are fertile in this respect are: grading and

standardization of products and materials; tools and industrial equipment preventive maintenance and improvement; work methods, safety and hygiene; wood seasoning and drying; waste uses; simple field techniques to assist management; data collection and information; training and capacitation. In all these fields in a backward area like the one of the project, it is most badly needed to put into use what technology and research have achieved, though within the restrictions imposed by the situation. It is possible and necessary to take advantage of ingenious, unexpensive existing solutions or devise them — forced air drying systems can be implemented (THOMASSEN, T. 1969), significant improvements in open air drying can be done, mills layout modifications can be introduced with current available technical knowledge. Redesigning work, improving safety and work health, etc. may overall demand, at basic stages of development, determination, participation and organization of the working community, knowledge of the local conditions, common sense, as the main ingredients to approach improvement. Extension activity is certainly a strong tool for development in these circumstances. It can be said, in general and not being new, that research and technology have a clear role in enhancing development in processes like the one outlined in this case.

8. CONCLUSIONS

1. The approach for development outlined in the project appears to be possible and advantageous provided that the socioeconomic structure allows it. Its relative advantages are:
 - a) its reliance on internal means for its implementation with a minimum external input;
 - b) its stimulus to planning diversification of the economy and optimization of global resource uses;
 - c) its enhancement of attainment of social and industrial objectives at the same time;
 - d) the leading role that the community has in the planning, decisions and

implementation involved in that model.

2. The potentials of small scale sawmills as social and industrial development in a backward forestry area, are restricted by the relative limited capacity of that industry to form capital. As pioneer industry, however, under comprehensive planning and an adequate frame of relationships community/production process, it can be an effective means to enhance the first stages of that development.
3. Horizontal integration is recommendable to enhance overall optimization in the use of the available technology, in cases

as the one outlined. It will also support diversification of the region's economy and rational use of the land.

4. Research and technology have a clear role in supporting development in processes as the one outlined. In early stages a major contribution comes in the form of extensions. Local research is the

main responsible for producing the necessary knowledge of the local conditions as basis for technological improvement and planning. It is also responsible for following and feeding back information on the development model performance to the planning and decision-making structures.

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SELOSTE:

PIENSAHOJEN MERKITYS JÄLKEENJÄÄNEEN METSÄALUEEN TEOLLISESSA JA SOSIAALISESSA KEHITTÄMISESSÄ CASE STUDY ETELÄ CHILEN PANGUIPULLISTA 1970—1973

Tässä artikkelissa selostetaan suunnitelmaa, jolla oli tarkoitus samanaikaisesti uudistaa erään takapajuisen 352 000 ha:n metsäalueen sekä taloudellinen että sosiaalinen taso. Alue, joka sijaitsee Andien länsirinteellä Etelä-Chilessä on nimeltään Panguipulli ja Suomen valtion piti ottaa projekti

kehitysapunsa kohteeksi. Chilen vallankaappaus v. 1973 teki tyhjäksi sekä tämän suunnitelman toteuttamisen että Suomen sille tarkoitaman avun. Suunnitelman runkona olivat alueella ennestään olevat alkeelliset piensahat.

PALOSUO, V. J. (ed.)

O.D.C. 971

1979. Kehitysmaiden ongelmat metsäkongressin polttopisteessa. — 8. maailman metsäkongressin satoa. Summary: Forests for people. — SILVA FENNICA Vol. 13, N.o. 3, 87 p. Helsinki.

The article describes the 8th World Forestry Congress in October 1978. It is a background for the papers sent from Finland to the Congress and published in this issue of Silva Fennica. The article refers to the main points of the Jakarta Declaration, underlined by the forest and socio-economic problems of the developing countries, especially in the tropics.

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KIRJOITUSTEN LAATIMISOHJEET

Silva Fennica-sarjassa julkaistaan lyhyitä metsätieteellisiä tutkimuksia ja kirjoituksia kotimaisilla kielillä tai jollakin suurella tieteellisellä kielellä. Julkaistavaksi tarkoitettu käsikirjoitus on jätettävä Seuran sihteerille painatuskelpoisessa asussa. Seuran hallitus ratkaisee asiantuntijoita kuultuaan, hyväksytäänkö kirjoitus painettavaksi.

Kirjoitusten laadinnassa noudatetaan Silva Fennican numerossa Vol. 4, 1970, N:o 3 painettuja kansainvälisiä ohjeita. Suureissa, yksiköissä sekä symbolien ja kaavojen merkinnöissä noudatetaan ohjeita, jotka ovat suomalaisissa standardeissa SFS 2300, 3100 ja 3101. Oikoluvussa noudatetaan standardia SFS 2324.

Kirjoituksen alkuun tulee julkaisun kielellä lyhyt yhdistelmä tutkimuksen tuloksista. Samoin laaditaan tutkimuksen yhteyteen lyhyt englanninkielinen tiivistelmä, jonka lisäksi kunkin Silvan numeron loppuun painetaan irti leikattavan kortin muotoon kustakin tutkimuksesta englanninkielinen esittely. Sisällysluetteloa ei käytetä. Mahdolliset kiitokset esitetään lyhyesti johdannon lopussa ja merkitään painettavaksi petiitillä.

Kuvien ja piirrosten viivapaksuudet ja tekstikoko on valittava siten, että ne sallivat painatuksen vaatiman pienennyksen. Kuvien ja piirrosten painatuksesta on syytä neuvotella etukäteen toimittajan kanssa, sillä tarpeettomia kustannuksia aiheuttavaa painatuskokoa ei sallita. Valokuvien tulee olla teknisesti moitteettomia ja kiiltävälle valkealle paperille suurennettuja. Värikuvia ei yleensä hyväksytä painettavaksi. Kuvat ja taulukot numeroidaan kummatkin erikseen juoksevasti, ja niiden otsikoista laaditaan erillinen luettelo kirjapainoa varten.

Jos vieraskielisessä lyhennelmässä viitataan tiettyihin kuviin ja taulukoihin, on nämä varustettava vieraskielisin otsikoin ja selityksin. Muut kuvat ja taulukot voivat olla yksikielisiä.

Lähdeviittauksissa tekijänimet sijapäätteineen kirjoitetaan isoin kirjaimin mikäli tekijänimen vartalo on muuttunut. Muutoin taivutus pääte kirjoitetaan pienaakkosin. Esimerkkejä: KOSKISEN (1972) tutkimus ..., YLI-VAKKURIN (1972) tutkimus ... Milloin tekijöitä on kolme tai useampia, mainitaan tekstissä vain ensimmäinen (esim. HEIKURAINEN ym. 1961). Vieraskielisessä tekstissä ym. korvataan merkinnällä et al. Jos julkaisulla on kaksi tekijää viitteessä, pannaan tekijöiden nimien väliin ja-sana painatuskielellä. Esimerkki: KELTIKAN-GAS ja SEPPÄLÄ (1973, s. 222) osoittivat ...

Viitekirjallisuus luetteloidaan tekijännimien (kirjoitetaan isoin kirjaimin) mukaisessa aakosjärjestyksessä. Jos tekijöitä on useampia, nimet erotetaan pilkulla, paitsi kaksi viimeistä, jotka erotetaan &-merkillä. Tekijän etunimistä suositellaan käytettäväksi vain alkukirjaimia. Tutkimusten nimet kirjoitetaan lyhentämättä. Julkaisusarjoista käytetään niitä lyhenteitä, jotka on painettu Silva Fennican numerossa Vol. 5, 1971, N:o 2. Täydellisempi luettelo on nähtävissä Seuran toimistossa. Kirjoituksen löytämisen helpottamiseksi mainitaan aikakauslehdistä myös sivunumerot. Suomenkielisistä tutkimuksista otetaan mukaan vieraskielisen lyhennelmän nimi. Volyyymi merkitään julkaisusarjan nimen jälkeen. Jos kyseessä on aikakauslehti tai vastaava, numero merkitään volyymin jälkeen suluissa. Sivunumerot erotetaan kaksoispisteellä volyymistä tai suluissa olevasta numerosta. Jos samalla kertaa ilmestynyt volyyymi sisältää useita tutkimuksia, merkinnässä sovelletaan ko. julkaisussa noudatettua tapaa. Esimerkkejä:

ILVESSALO, Y. 1952. Metsikön kasvun ja poistuman välisestä suhteesta. Summary: On the relation between growth and removal in forest stands. — Commun. Inst. For. Fenn. 40.1.

WILCOX, W. W., PONG, W. Y. & PARMETER, J. R. 1972. Effects of mistletoe and other defects on lumber quality in white fir. Wood & Fiber 4 (4): 272–277.

Englanninkielisen lyhennelmän ja mahdollisten kuva- ja taulukkotekstien kääntämisestä ja pätevän kieliasiantuntijan tekemästä tarkastamisesta huolehtii kirjoittaja. Seura voi maksaa kustannukset valtiovarainministeriön antamien ohjeiden mukaan. Jos kääntäjän lasku on ohjeiden edellyttämää tasoa korkeampi, kirjoittaja vastaa ylittävistä osuudesta. Lähempiä tietoja antaa Seuran julkaisujen toimittaja.

KANNATTAJAJÄSENET — UNDERSTÖDANDE MEDLEMMAR

CENTRALSKOGSNÄMNDEN SKOGSKULTUR	VEITSILUOTO OSAKEYHTIÖ
SUOMEN METSÄTEOLLISUUDEN KESKUSLIITTO	OSUUSPANKKIEN KESKUSPANKKI OY
OSUUSKUNTA METSÄLIITTO	SUOMEN SAHANOMISTAJAYHDISTYS
KESKUSOSUUSLIIKE HANKKIJA	OY HACKMAN AB
SUNILA OSAKEYHTIÖ	YHTYNEET PAPERITEHTAAT OSAKEYHTIÖ
OY WILH. SCHAUMAN AB	RAUMA REPOLA OY
OY KAUKAS AB	OY NOKIA AB, PUUNJALOSTUS
KEMIRA OY	JAAKKO PÖYRY CONSULTING OY
G. A. SERLACHIUS OY	KANSALLIS-OSAKE-PANKKI
KYMI KYMMENE	OSUUSPUU
KESKUSMETSÄLAUTAKUNTA TAPIO	THOMESTO OY
KOIVUKESKUS	ASKO-UPO OY
A. AHLSTRÖM OSAKEYHTIÖ	SAASTAMOINEN YHTYMÄ OY
TEOLLISUUDEN PUUYHDISTYS	OY KESKUSLABORATORIO
OY TAMPELLA AB	METSÄNJALOSTUSSÄÄTIÖ
JOUTSENO-PULP OSAKEYHTIÖ	SUOMEN METSÄNHOITAJALIITTO R.Y.
KAJAANI OY	OY KYRO AB
KEMI OY	SUOMEN 4H-LIITTO
MAATALOUSTUOTTAJAIN KESKUSLIITTO	SUOMEN PUULEVYTEOLLISUUSLIITTO R.Y.
VAKUUTUSOSAKEYHTIÖ POHJOLA	OULU OSAKEYHTIÖ

SUOMEN METSÄTIETEELLISEN SEURAN TOIMINTAA OVAT, SEN JUHLAVUONNA 1979 TUKENEET SEURAAVAT:

A. AHLSTRÖM OY	OY NOKIA AB
OY HACKMAN AB	OSUUSPANKKIEN KESKUSOSAKEPANKKI OY
JOUTSENO PULP OY	OULU OY
KAJAANI OY	JAAKKO PÖYRY INTERNATIONAL OY
KANSALLIS-OSAKE-PANKKI	RAUMA-REPOLA OY
OY KAUKAS AB	OY ROSENLEW AB
KEMIRA OY	OY WILH. SCHAUMAN AB
KESKUSMETSÄLAUTAKUNTA TAPIO	G. A. SERLACHIUS OY
KOTVIO OY	AB STOCKFORS
KYMI KYMMENE	SUOMEN LUONNONVARAIN TUTKIMUSSÄÄTIÖ
KYTTÄLÄN SAHA	OY TAMPELLA AB
METSÄLIITTO	VEITSILUOTO OSAKEYHTIÖ
METSÄMIESTEN SÄÄTIÖ	YHTYNEET PAPERITEHTAAT OSAKEYHTIÖ