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APPARENT STRUCTURE
OF THE BASIC
FOREST PRODUCTS INDUSTRY
IN CHILE

THE PATTERN IN 1961 AND
SOME FORTHCOMING CHANGES

INSTITUTO FORESTAL
SANTIAGO - CHILE

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APPARENT STRUCTURE OF THE BASIC FOREST PRODUCTS INDUSTRY^{1/}
IN CHILE. THE PATTERN IN 1961 AND SOME FORTHCOMING CHANGES

INSTITUTO FORESTAL - CHILE.
PROYECTO DEL GOBIERNO DE CHILE Y EL
FONDO ESPECIAL Y LA FAO DE LAS NACIONES UNIDAS.
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Apparent Structure of the Basic Forest Products Industry^{1/}
in Chile. The Pattern in 1961 and some forthcoming changes

Much has been written about the forest products industry in Chile but no one description so far has been found which provides a broad overall view of its structure. That is to show in relative terms how large the industry apparently is and how it compares in size with other industrial activity in the country. To indicate how many people it provides direct employment for and what proportion they represent of the total manufacturing labour force in Chile at the present time. To denote the approximate order of magnitude of capital invested in the individual sectors such as sawmilling, pulp and paper, plywood etc., and the extent of the industry's earning power both in absolute values and in relation to the economy as a whole.

In trying to provide suitable orientation for its programme of work the Industries Section of the Instituto Forestal considered it important, among initial tasks, to take a broad look at the overall structure of the industry and to seek out answers to questions such as these. With assistance from CORFO, COMMA and from other organizations and companies in the various sectors of the industry, whose generous help is gratefully acknowledged here, it has been possible to gather together further useful data which help to bring to light a number of significant facts and information some of which, it is believed, have hitherto been insufficiently known or

^{1/} Excluding charcoal production, furniture manufacture, "reprocessing" by barracas, railway sleepers hewn by hand, and the pressure (preservative) treatment of poles.

inadequately appreciated. Undoubtedly there is a growing awareness but as yet unfortunately few, certainly not enough, people appear to realise or to recognize Chile's indebtedness to her forest resources.

The data that have been collected are shown in summary form in the tables included with this report. At the same time a word of warning is necessary. The data indicated should be interpreted with caution. They are only intended to show and they can only show the order of magnitude. In seeking answers to questions of the kind outlined above it soon became apparent that many of the basic data needed for the analysis did not yet exist. Such data as are available, frequently are not reliable; some are quite contradictory. If rational decisions are to be taken then there is urgent need for more and better basic information. Some better system of data reporting is also clearly needed. One major collection agency encompassing all forest products would be an immeasurable boon both to the suppliers and to the users of the statistics alike. Such a system, however, cannot be accomplished overnight. Meanwhile there is plainly an opportunity where the Instituto Forestal, as it gets into its proper stride, should be able to render very useful and impartial assistance.

Good planning is usually based on good research. To plan soundly, however, is rarely a straightforward or an easy task. But without reliable data it is inevitable that any programming, or analysis will be subject to a number of vexing limitations and shortcomings some of which may be unusually hard to bear. Nevertheless while some of the estimates shown in the tables included in this report may be imprecise their significance and their importance for planning should not be underestimated. They do help to provide an overall view of the industry; how extensive it was in 1961; the current order of its external earning power, and some indication of relative productivity in the individual sectors.

1. Number of Persons Employed

The data given in Table 1 demonstrate the apparent structure of the basic forest products industry in Chile at the end of 1961. In that year overall employment in the country's manufacturing industry is reported to have been in the neighbourhood of 250.000 persons. From the estimates shown in the table it will be observed that basic forest products manufacture gave direct employment to between 12.000 and 15.000 persons. (If those persons engaged in forestry operations, in furniture manufacture, "reprocessing" by barracas etc. are also included, then the total would be a great deal higher, possibly more than ~~double~~). Between eight and ten thousand (65 to 75 percent) of this estimated total were engaged in sawmilling^{1/}; around three thousand (20 to 25 percent) in the manufacture of pulp and paper; and about one thousand (7 to 8 percent) on the production of sheet materials such as plywood, veneer, fibreboard and particle board. For every person engaged in pulp and paper manufacture no fewer than three were working in sawmills. And Chile's pulp and paper industry gave direct employment to some three times the number engaged in the production of plywood, veneer and allied products.

How does the overall total compare with employment in other Chilean industry? The answer will be apparent by comparison with the data given in Table 2.

2. Amount of Capital Invested

According to Table 1 the total capital investment in Chile's basic forest products industry in 1961 is estimated to have been the equivalent of around 70 to 75 million U.S. dollars.

^{1/} The Servicio Nacional de Estadísticas y Censo put the number of active sawmills at about 700 during 1958/59, and the number of persons working in them, at that time, at about 8,200.

Table 1. Apparent Structure of Basic

Industry Sector	Number of mills	Estimated number of ^{2/} persons employed		Estimated Capital Investment			m ³
		Total	Per cent	Total millions US\$	Per cent	Per person employed US\$	
Pulp and paper	6 ^{2/}	3200	20 to 25	4.5	60 to 65	14000 to 15000	-
Sawmilling	(700)	8000 to 10000	65 to 75	20 to 25	30 to 35	2000 to 3000	750000
a) Softwood	(-)	(-)	(-)	(-)	(-)	(-)	(400000)
b) Hardwood	(-)	(-)	(-)	(-)	(-)	(-)	(350000)
Plywood	2.	600	4 to 5)	1.9	2.5 to 3)	3000 to 3500	8000
Veneer ^{4/}	4	150	- } 7 to 8	0.6	- } 8 to 9	4000	4800
Fibreboard	1	190	-)	3.0	4 to 4.5)	15000 to 16000	-
Particle board	1.	100	-)	0.5	-)	5000	-

(Total) (12000 to 15000) (100) 70 to 75 (100)

/ Excluding charcoal production, furniture manufacture, "reprocessing" by barracas, railway sleepers hewn by hand, and the pressure (preservative) treatment of poles.

/ Excluding forestry operations.

/ Excluding paper converting plants and small paper mills producing less than 10 tons. per day.

/ Including production of veneer for matches.

/ Production 1960.

Source: Instituto Forestal.

Forest Products Industry ^{1/} in Chile, 1961.

Production			Export				Estimated export earnings per person employed (US\$)
tons	Per year per person employed	Estimated Gross value	Volume		Value millions US\$	Per cent	
			m ³	tons			
	m ³	tons					
180000	-	55 to 56	-	-	64000	8.5	74
-	75 to 90	-	-	63000	-	3.0	26
(-)	(-)	(-)	(-)	(30000)	(-)	(1.3)	(11.5)
(-)	(-)	(-)	(-)	(38000)	(-)	(1.7)	(14.5)
-	12 to 14	-	-	-	=	-	-
-	(-)	-	-	-	-	-	-
10200	-	53 to 54	-	-	-	-	-
3500 5/	-	35	-	-	-	-	-

(42 to 45
millions
US\$)

(11.5
million
US\$)

(100)

(US\$ 750 to 950)



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Table 2. Estimated Number of Persons Employed in Chilean Manufacturing Industry in 1957.^{1/}

<u>Industry Sector</u>	<u>Estimated Number of Persons Employed (thousands)</u>
Food, Beverages and Tobacco	50.9
Textiles	48.1
Metal Products and Machinery	28.7
Clothing and Shoes	26.5
Wood, Cork and Furniture	19.8
Non-metallic Minerals	16.1
Basic Metals	14.6
Chemicals	13.9
Pulp, Paper and Printing	13.2
Leather and Rubber	7.4
Sundry Industries	<u>5.4</u>
	<u>244.6</u>

^{1/} According to 1957 census.

Investment in pulp and paper operations^{1/} is reckoned to have accounted for about 45 million dollars (60 to 65 percent) of this total, and that in sawmills for a further 20 to 25 million dollars^{2/} (30 to 35 percent). Plywood, veneer and board products combined accounted for the equivalent of about 6 million dollars, or from around 8 to 9 percent, of which approximately half the amount invested was in facilities to manufacture fibreboard.

The gross value of the industry's output during this same period is estimated to have been the equivalent of between 42 and 45 million dollars, or a sum roughly equal to three fifths of the total capital investment. This value represents slightly less than one percent of the Gross Domestic Product for 1961 which according to reported estimates was expected to have been around 5044 million E° (calculated at 1960 prices); and between 6 and 7 percent of the Gross Domestic Investment (E° 659 million^{3/} at 1960 prices) predicated for 1961 in the Ten Year National Development Programme.

3. Export Earnings

Export earnings equalled some 11.5 million dollars or around fifteen percent of the amount of capital estimated to have been invested in the industry. Pulp and paper exports accounted for practically three quarters (8.5 million dollars) of the total, and

1/ Excluding paper converting plants and small paper mills producing less than ten tons per day.

2/ Information published by the Servicio Nacional de Estadísticas y Censos indicate that investment in sawmills, in 1956, was of the order of 16 million dollars. It would seem doubtful if additional sawmilling capacity installed since then exceeds a value of much, if anything, over a further six million dollars.

3/ Manufacturing Industry's share of this estimated investment for 1961 was reckoned at E° 64 million. See p. 105 "Programa Nacional de Desarrollo Económico 1961 to 1970".

overseas shipments of sawn lumber for the remainder (26 percent). There were no exports of plywood^{1/}. Exports of other forest products were negligible. A fact of no small significance is that export earnings per person estimated to have been employed were no less than eight to nine times higher in the pulp and paper sector (US\$ 2,700) than they were in sawmilling (US\$ 300 to 375).

4. Estimated Wood Consumption

The above figures provide a fair indication of the size of the basic forest products industry in Chile in 1961 and of the relative strength of the individual sectors comprising the whole. What about the raw material the industry consumed? How much roundwood did it swallow up during that year? What proportion of this total was coniferous timber (and how much of this was Pino insigne) and what proportion was broadleaved species? Answers to these questions will be evident from the data given in Table 3.

Total consumption of roundwood is estimated to have been rather more than two million cubic metres. Of this almost 60 percent (1.30 million m³) is reckoned to have been Pino insigne. Other softwood species (Pino Araucaria, Alerce, Mañío, etc.) accounted for a further 6 percent (0.18 million m³). In other words in 1961 softwood species are estimated to have made up **very nearly seven tenths** of the total volume of roundwood consumed by Chile's basic forest product industry.

Sawmilling absorbed **practically** two thirds

^{1/} Nearly 65 percent of the plywood produced in Chile in 1943 and an estimated 50 percent in 1944 were exported. See page 117 "Forest Resources of Chile as a Basis for Industrial Expansion". I.T. Haig and others, 1946.

Table 3. Estimated Consumption of Roundwood by Basic
Forest Products Industry ^{c)} in Chile, 1961.

	<u>Softwood</u>			<u>(2)</u>		<u>Hardwood</u>		<u>Total</u>	
	<u>(1)</u> Pino insigne			Others		<u>(3)</u>		<u>(4)</u>	
	1000 m ³	(Per cent)	% Col.4	1000 m ³	% Col.4	1000 m ³	% Col.4	1000 m ³	Per cent
Pulp and Paper	660	(50.4)	97.5	-	-	17 ^{d)}	2.5	677	30.8
Sawmilling ^{b)}	610	(46.6)	42.5	150	10	680	47.5	1440	65.5
Plywood	-	-	-	20	80	5	20	25	1.1
Veneer ^{c)}	-	-	-	1.5	13.5	9.5	86.5	11	0.5
Fibreboard	38	(3)	100	-	-	-	-	38	1.7
Particle Board	-	-	-	8	100	-	-	8	0.4
Total	1308	(100)	59.5	179.5	8.2	711.5	32.3	2199	100

a) Excluding charcoal production, furniture manufacture, "reprocessing" by barracas, railway sleepers hewn by hand, and the pressure (preservative) treatment of poles.

b) Estimated from reported production of sawnwood (average 1960/61) and converted to roundwood on the basis of a fifty-percent conversion loss for both softwood and hardwood.

c) Including veneer for matches.

d) Eucalyptus globulus.

Source: Instituto Forestal.

(1.44 million m³)^{1/} of the estimated input of all roundwood and rather less than half (0.61 million m³) of the estimated consumption of Pino insigne. Pulp and paper manufacture accounted for a little under one third (0.67 million m³) of total roundwood input^{2/} and for half of all the Pino insigne consumed. In the case of fibreboard, which like the preeminent part of Chile's pulp and paper output is based wholly on Pino insigne, the corresponding figures were about 2 percent and 3 percent respectively.

Finally the data show that in 1961 around 80 percent of Chile's output of plywood, and all her production of particle board at that time, were based on softwood (Pino Araucaria).

5. Current Development Plans

This then reflects the apparent structure and the pattern of roundwood consumption of the basic forest products industry in Chile at the end of last year. What of the future? How is the structure of this industry -an industry of great present and future importance to Chile- likely to change within the country over the next few years? What expansions are taking place in the individual sectors of the industry? To what extent is Chile's capacity to manufacture pulp and paper being increased? Will any more plywood be made? What is the effect of present development plans likely to be say three years from now?

Though firm answers to all these questions are not yet available nevertheless information gleaned so far by the Instituto Forestal does help in providing reasonable indications for most of them, with the present exception of expansion in sawmilling activity.

^{1/} In the case of sawmilling there are not recorded figures of actual input of roundwood. The data shown against this head in Table 3, therefore, have been estimated from reported sawnwood production (average 1960/61) converted to roundwood on the basis of a fifty percent conversion loss both for softwood and for hardwood. It will be apparent that this can only be a very approximate estimation.

^{2/} In the United States, in 1952, pulpwood accounted for 27 percent and lumber for 62 percent of all wood consumed there for industrial purposes. See "Timber Resources for America's Future" U.S.D.A, Washington 1958.

The relevant data are summarized in Table 4 and briefly discussed in ^{the} paragraphs which follow.

a) Pulp and Paper

Extensive expansion plans are actively in hand in the pulp and paper sector of which at least one, the Industrias Forestales project at Nacimiento some 75 kms. from Concepción, should be operational by the end of 1963. Based wholly on Pino insigne, the first stage of this new development visualises the installation of capacity to produce 60,000 tons of newsprint per annum ^{1/}. Output is expected to reach about two thirds of this capacity in 1964. The second stage (expected maturity 1966) envisages increasing the capacity to 80,000 tons of newsprint per annum. The plant will employ around three hundred persons. Capital investment to the end of 1965 is estimated at around U.S. dollars 23 million.

Another major development concerns expansion of the sulphate pulp mill of Papelera at Laja. Present plans envisage an increase from the existing annual capacity of around 70,000 tons to no less than 220,000 tons per annum by the end of 1965. Capital investment to cover this development is estimated at around 26 million dollars. Some small increase in output ^{2/} may also be anticipated from the same company's newsprint mill at Bfo-Bfo.

A further project, that of Celulosa Cholguán S.A. is slated to manufacture sulphate pulp of which about half is expected to be bleached and half unbleached grade. Total planned capacity of this mill is figured at 100,000 tons per annum, though it appears unlikely that any of this capacity will become effective until after the end of 1965.

^{1/} The mill will manufacture all its own needs of groundwood and its requirements of chemical pulp (sulphite) from Pino insigne.

^{2/} Newsprint output in 1961 amounted to 62,500 tons.

Table 4. Probable Structure of Basic Forest Products Industry^{1/} in Chile by the end of 1965.

Industry Sector	Probable N° of mills	Estimated N° of persons employed ^{2/}	Estimated annual production capacity		Estimated Capital Investment				
			m ³	tons	Total millions US\$	Per cent	Per annual unit of capacity installed, US\$		Per person employed, US\$
							m ³	tons	
Pulp and Paper	^{3/}	4000	-	410000	95	70 to 75	- -	230 to 235	23000 to 24000
Sawmilling	(-)	(10000)	(15 to 2 millions)	-	(25 to 30)	(20 to 25)	(15 to 20)	-	(2500 to 3000)
Plywood	3	350	21000	-	3	2 to 25	140 to 145	-	3500
Veneer ^{5/}	4	150	7000	-	0,6	- } to	85 to 90	-	4000
Fibreboard	1	190	-	12000	3	2 to 25	-	250	15000 to 16000
Particle Board	4	300	-	28000	5	3,5 to 4	-	175 to 180	16000 to 17000
(15000 to 16000)			(130 to 135)			(100)			

^{1/} Excluding charcoal production, furniture manufacture, "reprocessing" by barrocas, railway sleepers hewn by hand, and the pressure (preservative) treatment of poles.

^{2/} Excluding forestry operations.

^{3/} Excluding paper converting plants and small paper mills producing less than 10 tons. per day.

^{4/} Estimated on the basis of 230.000 tons of installed capacity to manufacture chemical pulp and 130.000 tons of installed capacity to manufacture newsprint.

^{5/} Including production of veneer for matches.

Source: Instituto Forestal.

These expansions mean that investment in pulp and paper operations (without including the Celulosas Cholguán project) are in the process of being more than doubled. By the end of 1965, it is estimated that capital invested in this particular sector will be in the neighbourhood of 95 million dollars, and account for practically three quarters of the total expected capital investment (130 to 135 million dollars) in all forest products industry in the country at that time.

b) Sawmilling

Chile now has an excess of sawmill productive capacity as compared with present or probable future markets over the next five or more years. There is little doubt that if markets could be improved present mills could put out two to three times the current volume of lumber. This is not to say that new or improved mills are not needed and that further investments in sawmill machinery will not be made. The majority of the existing mills are time-worn and lacking in efficiency. The results are that they get too little lumber out of the log volume received, conversion costs are high and are increasing, and the products of these mills are of lower quality than necessary.

Over the past five years at least six new and more efficient large mills (more than one million board feet capacity) have been put into production in the pine plantation areas. During the next five years it is expected that at least a similar number of new large mills will be erected, perhaps three in the pine region and three in the native hardwood zone. In addition there undoubtedly will be a substantial and urgently needed improvement program at existing mills, including the installation of new power units, new or re-built head and re-saw outfits, conveyors and dry kilns. This program is already underway and by far the major part of it will take place in the pine plantation region.

In terms of capital investment the total involved in these improvement and development plans for domestic sawmilling facilities may easily exceed five million dollars by the end of 1965.

c) Wood-Based Sheet Materials^{1/}

i) Plywood

A new mill with a capacity of about 8,000 m³ of plywood per year^{2/} is currently being installed at Puerto Montt. This plant is scheduled to be in operation during 1963 and will rely on Tepa (Laurelia serrata) as its primary source of raw material.

ii) Particle Board

Three new plants (Masisa, Pinihue and Parfo) are in process of installation, of which two are designed to produce flat-pressed particle board from Pino insigne. The third (Parfo) is not expected to rely on any one variety of timber but to use a single species or mixtures of species, as required. All three plants are scheduled to be in operation before the end of 1963. The estimates given in Table 4 show that the installed capacity^{3/} of the four mills, which by that time are expected to comprise Chile's particle board industry, will be of the order of 28,000 tons per annum (cf. an actual production of about 3,500 tons of particle board^{4/} during 1960).

Thus, according to the estimates indicated in Table 4, investment in particle board operations will show a tenfold increase by the end of 1963 on the amount of capital invested in this particular sector at the end of 1961. Moreover particle board's share, in terms of the total investment in facilities to manufacture plywood, ~~veneer~~

1/ The Instituto Forestal is currently preparing a review dealing with the wood-based sheet materials industry in Chile.

2/ On the basis of three-shift operation, 250 days per year.

3/ On the basis of three-shift operation, 250 days per year.

4/ Extruded-type.

and other wood-based sheet materials combined, represents expansion from a modest 8 percent in 1961 (see Table 1) to more than 40 percent some two years later.

6. Some key questions and general observations

Such is the pattern of change foreseen in the basic forest products industry in Chile over the next few years. Extensive development plans are in hand which mean substantial increases in production in almost every sector of the industry in the very near future. Chile has the raw material required, the technical skills, and the manpower. The question is can she find the markets? With a current population something short of eight million people, and with real purchasing power at present vested in a minority and not the majority, there is obviously a limit to how much of the output from this expansion in manufacturing capacity can be absorbed internally within the country itself. Development of pulp and paper output is aimed almost entirely at finding outlets overseas. This also is the case with much of the additional capacity planned for plywood. What is the situation in the case of lumber? And with other forest products such as particle board for instance? The data shown in Table 4 disclose a spectacular increase in local capacity to produce particle board. Can all this potential production be placed on the domestic market? If not how much of the new prospective output may it be possible to export? It is easy to speculate about the chances but uncertain how firm they may be.

Well informed sources have urged the need for a complete study of the export market for all major types of lumber and allied products.^{1/} Until such time as this has been done and there has been opportunity to study and assess the information obtained, opinions may be ventured but it is not possible to base them upon reliably established data. This much, however, can be said.

There are opportunities for increasing Chilean exports

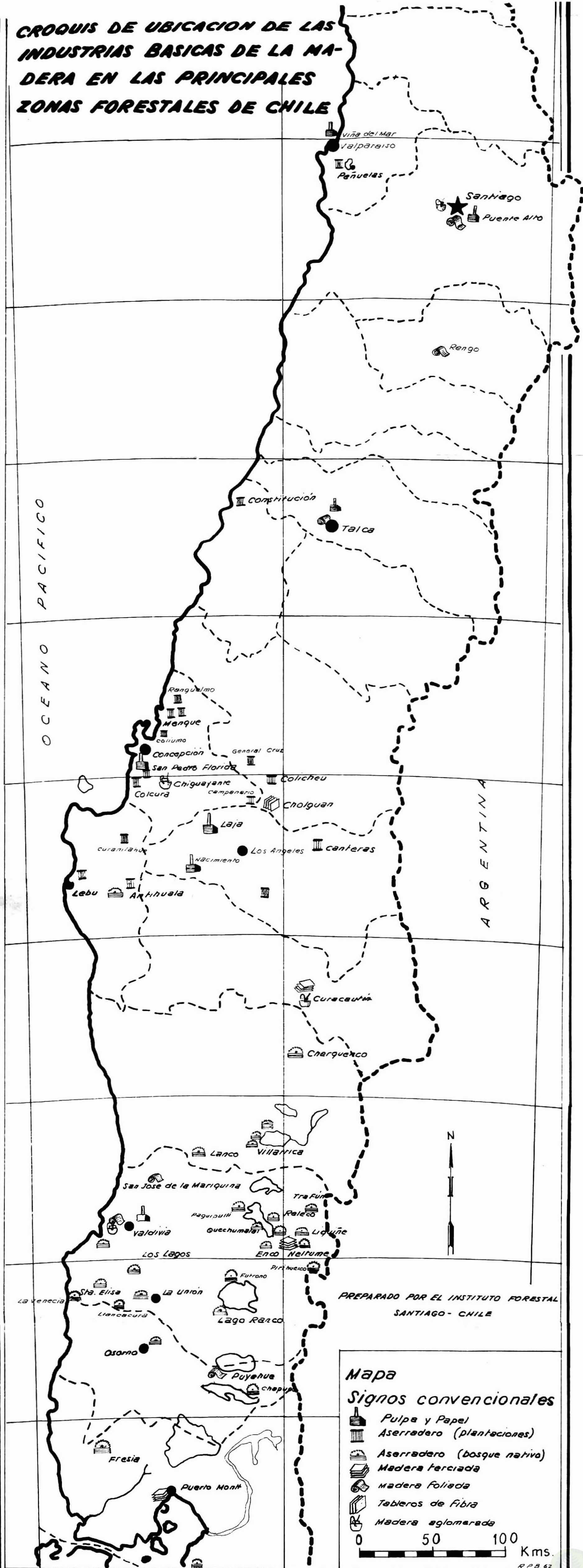
^{1/} This is in the process of being carried out by the Marketing Section of the Institute.

of forest products and in fields other than pulp and paper. It is abundantly clear that there will have to be if the real potential of new capital that is being invested in Chile's forest products industry is to be realized to the full, as it should be, and if the amount of timber which is becoming available in ever increasing volume from the vast acreage under pine plantations is to be valorized to anything like the extent that is so sorely needed. But these opportunities will certainly not be gained unless a good quality product is made available, which it undoubtedly can be, at an economically attractive price.

At the same time if the future prosperity of Chile's forest products industry, and hence the ultimate welfare of her forests, seem destined to become increasingly dependant upon further major export outlets being found, then fiscal and monetary policies must be framed to provide more vigorous stimulation and the proper incentive. This can scarcely be claimed under currently prevailing conditions which regrettably serve to curb rather than encourage sales to overseas markets.

W.E.W.

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