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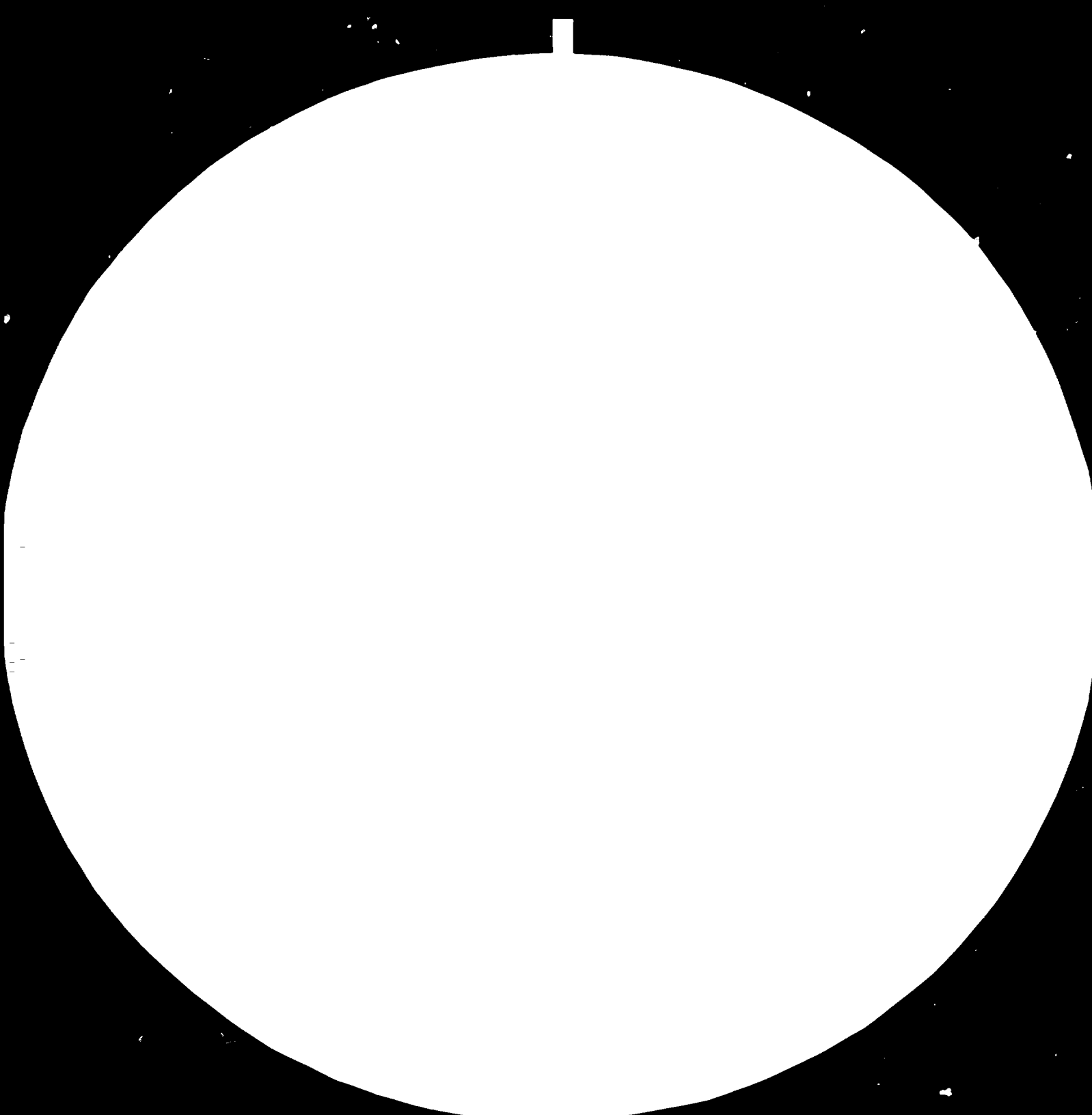
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ENGLISH

ASSISTANCE IN THE ESTABLISHMENT OF
A TECHNOLOGY CENTRE FOR WOOD INDUSTRIES

DP/PER/78/009

PERU

Mission Report*

Prepared for the Government of Peru
by the United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

by

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1. Introduction

The project entitled "Asistencia al Establecimiento de un Centro Tecnológico de la Industria Maderera" (DP/PER/78/009/A/01/37) originated from the request made by the Government of Peru through its organization INDUPERU on 1 October 1978 for assistance by the United Nations Development Programme (UNDP) in establishing a Technology Centre for Wood Processing Industries in identifying the stages to develop this centre. The request was approved by UNDP on 6 October 1978 and a ten-day exploratory mission by Mr. Eldag, Industrial Development Officer, took place from 5 August to 19 August 1979.

The second mission followed in co-ordination with Mr. W. Kauman, Chef du Service des Recherches et Essais, Centre Technique du Bois, Paris from 11 to 17 November 1979. During this time the consultants traveled to Iquitos and Pucallpa. Factories, institutes and universities have been visited in both of these cities as well as in Lima during this mission.

2. Background information

Peru with its 128,552 million hectares of which 74,106 million hectares (58 per cent) are covered with forests.

The main forest regions are:

<u>Region</u>	<u>hectares</u>
Selva	73,000,000
Sierra	50,000
Costa	<u>950,000</u>
Total:	<u>74,000,000</u>

About sixty-six million hectares are tropical and sub-tropical forests east of the Andes (Selva) and five million hectares covering the dry-to-humid low mountain area. Compared to conditions in Brazil with 3,04 ha of forest area per inhabitant, the value in Peru reads 5.16 ha per inhabitant.

Production, import, export and consumption of timber products

Year	Product	Production	Import	Export	Consumption	
		m3	m3	m3	m3	m3/1000 capita
1966	Sawn lumber	185,900	88,300	3,200	271,000	22,4
1976	Sawn lumber	602,000	23,600	8,800	616,800	37,7
1966	Plywood	5,305	5,574	-	10,879	0,934
1976	Plywood	49,100	2	29	49,073	2,999

Increase of per capita consumption within ten years

1966	23,334	Increase 57 per cent.
1976	40,699	

There is no statistics showing the break down of "agricultural and forestry" products, but within the overall production of industrial goods in 1977 the sector "wood" covers 1.1 % and "furniture" 0.9 %.

Location and number of primary wood processing industries

Location	Sawmills	Parquetry production	Plywood production	Peeled veneer product.	Sliced veneer product.	Particle board production	Box manufacturing
Piura		6					19
Lambayeque		4					11
Chachapoyas	22						
Cajamarca	2						2
Jaen	6	6					6
Trujillo	10						
Lima	1			1	2		
Iquitos	34	2	2	3			
Pucallpa	40	11	4		1		
Yurimaguas	4						
Tingo María	34					1	
Moyobamba	13	1					
Huancayo	48						
Oxapampa	12	2					11
San Ramón	16	6	1		1		14
Satipo	32	3					
Villa Rica	16						15
Cuzco	22						
Puerto Maldonado	11		1				
La Convención	3						
Ayacucho	10						
Apurimac	4						
Tarapoto	4	2					
Total	344	43	8	4	4	1	78

* Source: Oficina de Patrimonio y Estadística, DGFF.

Size of sawmills according to the production of bft or m³ per day in 1977.

Sawmill sizes and location according to breakdown capacity per day

Area	bft. m ³	Small-scale Medium to Large-scale			Sub-total	Grand total		
		below 1000 2.72	1-3000 2.72-8.16	3-8000 8000 and above 27.76		1978	1976	
1. Iquitos		1	20	8	1	29	30	31
2. Pucallpa		-	16	23	10	49	49	45
3. Tingo Maria		15	4	12	4	20	35	34
4. Valla del Montaro		8	30	7	-	37	45	49
5. Salva Central		9	37	21	1	59	68	81
Total:		33	107	71	16	194	227	240

Source: Vademecum Forestal 1977

* The statistics of the CIDA study show for 1972, 269 sawmills while the number of sawmills decreased by 16 per cent. The sawn lumber production increased from 1972 (294,000 m³) to 1977 (483,000 m³) by 64 per cent.

Wood Species for the Different Industries and Annual Production in m³ in 1973 and 1977

Products wood species	Botanic name	Production	
		1973	1977
Sawn lumber		388,431	474,205
1. Cedro	Cedrela sp.	84,408	70,761
2. Eucalipto	Eucalipto sp.	78,651	86,324
3. Roble corriente	Ocotea sp.	45,812	51,908
4. Tormillo	Cedrelinga Catenaeformis	37,313	68,472
5. Caoba	Swietenia macrophylla	22,207	27,247
6. Moena	Nectandra sp.	14,150	37,500
7. Roble amarillo	Terminalia tarapotensis	6,727	2,274
8. Alfaro	Calophyllum brasiliense	6,330	5,908
9. Ulcumano	Podocarpus utilior	5,551	1,043
10. Copaiba	Sclerolobium sp.	5,057	13,500
11. Otras maderas		82,229	109,268
Parquetry		11,571	7,057
1. Haltaco	Loxopterigium huasango	4,385	462
2. Orejo de león	Tabebuia sp.	3,922	182
3. Guayacán	Tecoma grandiceps	1,110	469
4. Balsamo	Myroxylon balsamum	123	---
5. Chonta	Iriarteia sp.	108	---
6. Otras maderas		1,453	5,944

Products wood species	Botanic name	Production	
		1973	1977
Veneer		25,659	25,000*
1. Lupuna	Chorisia sp.	21,774	2
2. Otras maderas		1,668	
Plywood		25,717	72,000
1. Lupuna	Chorisa sp.	21,774	
2. Copaiba	Selerolobium sp.	1,819	
3. Otras maderas		2,124	

* Estimated

Source: Oficina de Patrimonio y Estadístico, DGFF

The main areas of forest exploitation (Annex I) Iquitos - Pucallpa - Ancayacu - Oxapampa - Satipo are also preferred areas of sawmill location. The distribution of the primary wood processing industry is shown in Annex II.

The new Directorio de Empresas de Transformación y Comercialización de Productos Forestales (1979 issued by the Ministerio de Agricultura y Alimentación, Dirección General Forestal y de Fauna, Dirección de Transformación Primaria y Comercialización) includes the following wood-processing and related industries numbered according to the thirteen agro-regions (Annex III).

I Piura	VIII Huancayo
II Lambayegue	IX Cusco
III Trujillo	X Puno
IV Ancash	XI Moyobamba
V Lima	XII Iquitos
VI Arequipa	XIII Tacna
VII Huanuco	

Analysis of wood product manufacturing and wood product sales companies

The strongest potential of wood manufacturing is the region VIII (Huancayo) with 160 sawmills, 5 resawmills, 5 box mills, 11 parquetry mills and 28 factories for prefab housing, joinery and furniture production followed by the region XII (Iquitos) with 93 sawmills, 9 resawmills, 2 veneer mills, 17 parquetry mills, 8 plywood mills and 3 prefab housing, joinery and furniture mills. So the most dense manufacturing activities in wood processing are east of the Lima region while in the coastal regions II (Lambayegue) (35), III (Trujillo) (14), IV (Ancash) (15), V (Lima) (35) most lumber and wood product dealers are concentrated (150 companies): the other 116 lumber dealers are located in the regions, VII (Huanuco), VIII (Huancayo) IX (Cusco) and X (Puno).

The most important concentration in primary and secondary wood-processing and sales companies is in regions VII Huanuco, VIII Huancayo with a total of 375 companies besides 9 factories processing tannin, root esters and similar wood-derived materials.

All statistics are based on the number of sawmills. No figures are available for the production of secondary wood processing e.g. prefab building components, joinery and furniture. This sector is classified in the aforementioned directory issued by the Ministry of Agriculture under item "others" listing 87 companies while the CIDA study is numbering 500 joinery and furniture factories. The companies listed are mostly combined joinery and furniture manufacturers, a few are specialized in furniture, and windows (joinery).

Every year the leading furniture factories exhibit their products at the fairgrounds of the Pacific Fair in Lima. The range of furniture offered varies from style furniture to modern furniture. The average quality is of poor standard compared to furniture manufactured in the USA and Europe. But a few manufacturers could compete in quality and range in the international furniture market especially in offering solid wooden furniture and veneered furniture when using the manifold beauty of wood species not yet marketed.

The ratio of primary to secondary wood processing industries is 375 : 87 or 4,3 : 1. The ratio of primary wood processing industries to lumber and panel dealers is 375 : 226 or 1,7 : 1.

Due to the above mentioned official statistic with 87 manufacturers for prefab houses, furniture and joinery products, the secondary wood processing industry is not yet appropriately developed. The estimation of 500 furniture and joinery manufacturers is probably based on small scale workshops throughout the country. The rate of manufacturing industries to sales companies is not well balanced the ratio should be 10 : 1 for a better sales organization of individual countries.

There is a grave danger of over-supplying the market if too many or too large new sawmills, plywood or particle board mills are brought into production too quickly. There is a potential domestic market for dimension stock which should be envisaged for a better yield of sawn lumber.

3. Present stage of research and training centres

Existing research and training centres

Iquitos: Training Centre with log haul, travelling horizontal log band saw and saw doctering station.
This centre is adjusted to the University of Iquitos.

Pucallpa: CIFF - Centro de Investigacion Forestal y de Fauna de la Selva 1979

Location: 4 Km - Federico Bassadre (forest area 15 ha)

It is a research centre which has to study and find out best ways in utilizing tropical wood species with the aim to create appropriate technologies. This centre is already equipped with:

- lumber kiln;
- preservation stations;
- woodworkshop with basic machines;
- laboratory with climate chambers;
- and precision scales.

Planned research and development centres:

Alexander von Humboldt project

Location 86 Km - A.V. Humboldt (forest area 56,500 ha)

Establishment of a timber complex manufacturing:

sawn lumber, sleepers, poles, peeled veneer, sliced veneer, mosaic parquetry.

Capacity per year 59,800 m³

Fixed capital: US\$ 25,7 million

Working capital: US\$ 3,3 million

Total: US\$ 29 million

The production of this complex shall be marketed as follows:

	<u>Domestic market %</u>	<u>Export market %</u>	<u>Total 1000 m³</u>
Sawn lumber	40	60	21,7
Sleepers	100	-) 2,0
Poles	100	-)
Peeled veneer	-	100)
Sliced veneer	-	100) 7,1
Parquetry	-	100) 1,1
Total:			<u>31,0</u>

The financing of this project was approved in 1979.

A further pilot plant timber complex is planned to be established in Tusco.

4. Need for a wood technology centre

The idea of establishing the wood technology centre "Centro Tecnológico de la Industria de la Madera (CTM)" was discussed in 1976 in the Technology Department of the institute "Instituto de Investigación Tecnológica Industrial y de Normas Técnicas (ITINTEC)". As representative of the Peruvian industry, INDUPERU prepared, in collaboration with experts from USA, the techno-economic feasibility study for this centre which was issued in June 1979. The activities for this centre are limited to the following products and geographical areas:

Products: Sawn lumber, parquetry, pit props, sleepers (railroad ties), veneer and plywood, sliced veneer, particle board, kiln drying and preserved lumber.

Geographical areas: Iquitos, Pucallpa, Tingo Maria, Selva Central (Chanchamayo, Oapampa, Villa Rica, Salipo) and Valle del Mantaro.

All different investigations show that the Peruvian forest regions include 2,500 different species of which at present only fifty species are commercialized.

One of the priority operations of the CTM centre will be to determine the different species to commercialize them either as first quality species or as secondary species for the local and/or export market.

New and known species should be classified according to use:

- Sawn lumber (first, select, common, etc.)
- Veneer timber
- Dimension stock
- Construction stock
- Select lumber

The proposed wood technology centre of the feasibility study should be located according to the areas with the strongest concentration of primary wood industries.

Outline of the wood technology centre

As mentioned above, the Centre is limited in its proposed activities to the present development stage of the primary wood processing industry. However, the Centre has to be outlined in view of the wood processing industry's development in general viz.:

Primary wood processing:

Sawmilling
Veneer production
Panel production
Post, pole and sleeper production

Secondary wood processing:

Timber engineering (carpentry) - Prefab housing, prefab construction material, bridge and jetty manufacture
Joinery - Doors, windows, louvre shutters, stairways, interior fittment, etc.
Furniture - Case good furniture, seating furniture.
Dimension manufacturing and other wooden products - Flooring, wall panelling (interior/exterior) turnings (balustrade) etc.

According to the outline of the primary and secondary wood processing the developmen of the centre has to cover all industry branches. Since the proosed centre covers only views for the primary wood processing industries which in its outline in relation to the industry capacity cannot be justified when used for research work only. The urgent need of research and development of wood processing industries justifies an appropriate development of a wood technolcgy centre. Two possibilities should be envisaged (Annex IV).

A. A co-ordinated operation of the centre of the Alexander von Humboldt project and the CTM should concentrate in the first stage on:

Group 1: Sawmilling - Furniture - Dimension manufactureing and in the second stage

Group 2: Panel production - Timber Engineering - Joinery while the Av. H. Centre will concentrate first on

Group 2: Panel production - Timber Engineering- Joinery and second on
Group 1: Sawmilling - Furniture - Dimension manufacturing.

Both centres will establish their laboratories on identifying new species, classify them and present them for marketing either for species used in group one or two. In this way the centres could develop results faster and contribute for better marketing of timber products.

B. The Av. H. Centre and the CTM will develop simultaneously within a period of three years, but the broader view of research and development will be in Pucallpa at the CTM including:

- Forestry research
- Wood research
- Development of technologies for:
 - saw milling and saw doctering
 - panel products
 - timber engineering and glue lam production by secondary species
 - joinery
 - furniture.

In Case "A" the research is split but concentrated for sawn goods and its derived products including poles and sleepers, veneer and plywood, laminated products.

In the case of "B", the primary product centres are starting simultaneously in two different places but one of the main problems is the preliminary training for the AvH and CTM Centre. A step-by-step growing of the centres should be given preference so that full operation of individual centres is guaranteed after set up of the equipment.

Machinery outline for the different centres

- Sawmill

The equipment has to be selected in a way to demonstrate the present stage of existing sawmills but for conversion into higher production levels and for further completion through modern machines;

- Veneer and plywood centre

The equipment has to be selected in a way that plywood production is comparable to appropriate conditions in industrialized countries. Production equipment for blockboard (solid or semi-hollow core), flush door and furniture hollow core panels should be included. Production equipment for plymoulds should be envisaged to make use of stump (bolt) material from log off-cuts.

- Dimension stock centre

The equipment has to include: parquetry machines (strip flooring), moulding and matching machines, turning and copying machines, glue cramps.

- Timber engineering centre

This centre has to be equiped with cross cutting and trenching machines for the manufacture roof trusses and similar building components and special cramps for glue lam production.

- Joinery Centre

This centre will include machines for the manufacture of exterior doors, windows, louvre shutters and all interior trim work

- Furniture centre

Machines of intermediate technology for the manufacture of veneered case good furniture, solid wooden furniture, office furniture, etc. should be included in this centre, but as well as a department for bench work for basic training in woodwork.

- Wood laboratory

The laboratories should split for chemical and mechanical research but co-ordinate to benefit the whole industry. During the first stage the subjects Biology and Wood Chemistry should be grouped together and at a later stage research in adhesive and surface treatment (staining, lacquer coating) should be added.

Research of wood species to identify properties viz.: general characteristics, natural durability, treatability, seasoning characteristics, working qualities, strength classification, stress characteristics. According to a research programme to be outlined by FAO and UNIDO, the equipment has to be selected. The expert from INDUPERU passed European institutes (Annex V.) to identify the equipment necessary to start research work on the basis that future results could be compared with standards of other institutes.

- Centre for quality control of finished products

Most of the Peruvian furniture products do not meet the standards of developed countries. The furniture manufacturers should, therefore, group themselves to establish quality standards in co-ordination with ISO standard developments. The test laboratory has to include:

(i) Furniture testing laboratory

- chair testing equipment
- upholstered seating testing equipment
- table testing equipment
- drawer testing equipment
- case good furniture equipment
- furniture door testing equipment
- textile wear testing equipment
- fabric and foam fire check testing equipment

- (ii) Joinery testing laboratory
 - door testing equipment (impact, action)
 - window testing equipment (light fittings)
 - noise tester (accoustic characteristics)

- (iii) Surface treatment laboratory
 - surface scratch testing equipment
 - adhesion testing equipment
 - hardness testing equipment
 - abrasion testing equipment
 - surface coated kiln drier
 - climate chamber

- (iv) Laboratory press

- (v) Joint strength testing (pulsator)

- (vi) Experimental kiln drier

- Energy centre

A complex as outlined above has sufficient waste material to run a waste utilization plant. This plant should be used to generate gas. The waste material is distilled into charcoal and finally gasified to lean gas. Motors or engines running with lean gas produced from wood-waste will convert up to thirty per cent of the heat supply from the gas into mechanical or electrical energy. Some of the trucks for log transport should also be equipped with gas motors.

- Chemical wood-processing

Most of the wood chemical research should be done in co-ordination with the pulp and paper industry and the existing laboratories in La Molina. At a later stage it has to be decided in which laboratory basic wood chemical research not related to pulp and paper has to be carried out.

- Tooling maintenance centre

The tool maintenance centre should operate as a workshop for training, and the resharpening station for industry and tool research in saw-milling and woodprocessing.

Sawdoctoring equipment forwide handsaw blades:

- combined band saw blade grinding and saw setting equipment
- saw swaging device
- saw levelling and saw tensioning equipment
- bracing equipment
- stellite tipping equipment
- semi-automatic grinder for resharpening inserted point saws

Sawdoctoring equipment for narrow bandsaw blades and circular saw blades of high speed steel

- saw filing equipment
- combined bandsaw blade and circular saw blade grinding equipment
- bandsaw butt welder
- planer knife grinding machine
- shaper head grinding machine for tools with bore, moulder heads, tenoning heads, hogging units, matcher tools
- grinder for boring and routing bits
- tool grinding stand with attachment for grinding plane irons, gouges, chisels, etc.

Grinding equipment for carbide tipped toolings:

- circular saw grinding
- tool grinder for shaper tools with bore
- universal tool grinder for carbide tipped toolings
- carbide retipping equipment

Tooling repair equipment:

- saw retoothing (excenter punch)
- Oxy-acetylene welding unit
- circular saw filing device
- knife and cutter blade balancer
- grinder wheel dresser
- saw blade polisher

Tooling measuring equipment and safety material:

- precision gauges for checking saw set
- side projection of carbide tips, roundness of cutting tips
- illuminated magnifier
- safety eye shields
- Central machinery maintenance centre

The concentration of wood-processing industries (40 sawmills, 11 parquetry mills, 4 plywood mills and one sliced veneer mill) justifies to include a machinery maintenance station with a spare part store financed by the industry.

- The new CTM is justified when income is guaranteed through:
 - 60 per cent of the production to be commercialised
 - the tooling maintenance centre to be run as a service station for reconditioning of toolings
 - the machine maintenance centre operates as a service station for the woodprocessing industry
- The new CTM is justified when full time practical training is guaranteed for technical personnel of the industry, supervisors, students etc.

5. The establishment of a wood technology centre through INDUPERU

In the previous study prepared by CIDA it was mentioned that the different ministries should jointly prepare through a committee the activities of the wood technology centre.

The responsibility of the Ministry of Agriculture should be forestry related only on the following subjects: silviculture, reforestation, logging, preservation, pulp and paper, navel stores, wood chemicals, charcoal.

The responsibility of the Ministry of Industry should cover the following industries:

Primary woodprocessing:

- sawmilling
- panel production
- dimension manufacturing
- kiln drying

Secondary woodprocessing:

- joinery, furniture production
- Tooling maintenance station
- Energy station
- Product testing laboratory

The responsibility of the Ministry of Education should cover basic training on machinery and research within the courses required for follow-up study at the university, college and/or vocational schools (3 universities, 1 college, and 2 vocational schools).

Students of the following universities, in particular, should be trained in wood technologies and wood-machining:

Universidad Nacional Agraria, La Molina - with the facilities listed:

- pulp laboratory
- physic (mechanical properties laboratory)
- mechanical processing of wood
- kiln drying laboratory (1 m³)
- preservation laboratory
- wood processing engineer

Universidad Nacional Del Centro Del Peru:

- Huancayo (UNCP)
- wood processing engineer.

Universidad Nacional de la Amazonia:

- Peruana - Iquitos (UNAP)
- Forest engineer
- Wood processing engineer

During the establishment of the Centre INDUPERU will co-ordinate the work for setting up the Centre and training of Peruvian operational staff abroad for those taking over the different places within the Centre.

The organization of the CTM (Annex VI)

The general control and advisory authority will establish a co-ordinating board of directors consisting of:

Industry	4
Ministry of Agriculture	1
Ministry of Industry	2
Ministry of Education	1
Bank	2
Institute Directors	<u>2</u>
Total	<u>12</u>

At the beginning the board of directors have to prepare the outline operation between CIFF and CTM. Sound advise has to be given in view of a balanced primary and secondary wood processing industries development, to serve the local market and develop the export market.

The CTM within its own development has to create a "Wood Promotion Centre" including a marketing section promoting wood in general and wood products in particular. ITINTEC with its sub-committee "Standardization for Woodprocessing Industries" (The outline of standardization activities is listed in Annex VII will co-ordinate the work between the industry and CTM.

Priorities in research will be discussed under the direction of ITINTEC with a Research Programming board represented by:

CIFF	1
CTM	2
UNA	2
College	1
Industry	<u>4</u>
Total:	<u>10</u>

The UNA at La Molina has to prepare a new lecture outline which covers the whole research and development programme of the CTM. Different courses for all students in the field of wood technology and woodprocessing should be held for all. It is also the task of the University to organize a Documentation Centre and issue a periodic journal "Peruvian Forestry and Woodprocessing Information".

7. Introduction to European research institutes





After discussions held between the consultants and the counterpart of INDUPERU, an itinerary was prepared for a Peruvian Engineer to study the various activities of European Wood Research Institutes giving an insight to basic and applied research for wood and wood derived products. The one month mission took place from 28 April to 2 May 1980 (Suggested visits to Institutes shown in Annex V.

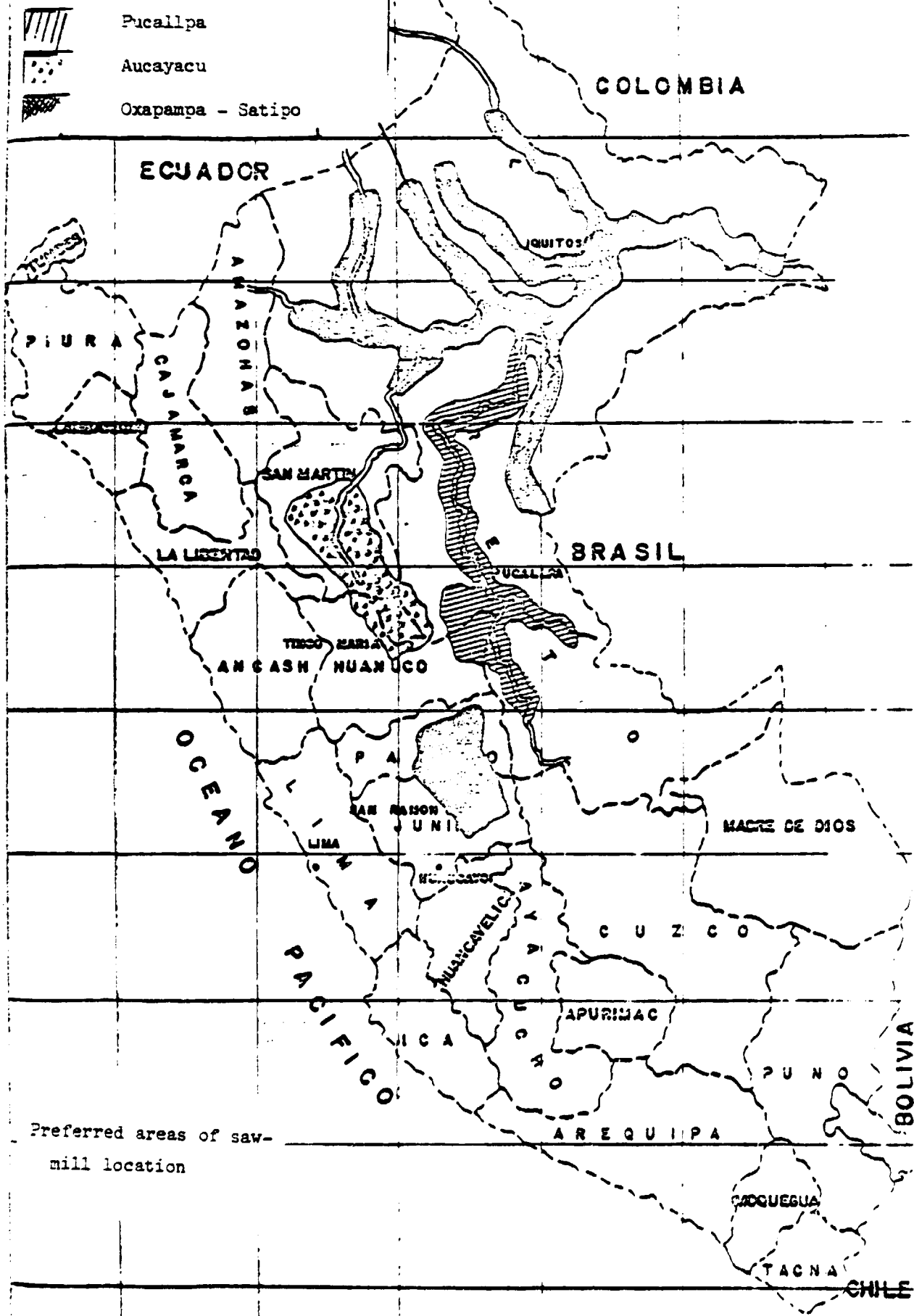
8. Recommendations

- The wood technology centre should be established within three years;
- Machinery and equipment should be selected for both Alexander von Humboldt project and the Woodtechnology centre at one time;
- The whole centre should run at sixty per cent on a commercial bases and has to be available for research at forty per cent of the time;
- The centre is simultaneously training centre for machine operators, supervisors, and students from colleges, technical universities and and vocational schools;
- The centre includes a maintenance service station for the Peruvian industry holding a spare part storage for existing machinery and equipment;
- The centre includes a tooling maintenance centre to assist the industry in maintenance work and training;
- Possible technical assistance through UNIDO/UNDP in: preparation and evaluation of tenders, experts for training in wood research and development, fellowships for training in applied research and wood-processing industries;
- No technical and economic assistance should be recommended or provided as long as the competence is not clearly stated through high level authorities.

Main areas of forest exploitation

ANNEX I

-  Iquitos
-  Pucallpa
-  Aucayacu
-  Oxapampa - Satipo



Preferred areas of saw-mill location

The boundaries shown on maps do not imply official endorsement or acceptance by the United Nations.



The boundaries shown on maps do not imply official endorsement or acceptance by the United Nations.

ANNEX III
WOOD PROCESSING INDUSTRIES AND WOOD PRODUCT SALES COMPANIES IN
DIFFERENT AGRO - REGIONS

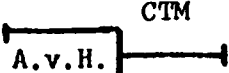
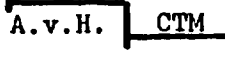
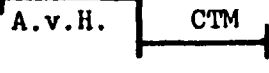



	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	Total for 1979	1978
I. WOOD PROCESSING															
PRIMARY WOOD PROCESSING															
Sawmills	0	3	1	12	1	0	60	160	57	2	30	93	0	224	
Resawmills	0	12	0	0	0	0	3	5	1	4	0	9	4	38	344
Box Factories	0	18	0	0	0	0	29	5	0	0	0	0	0	52	78
Sliced Veneer Mills	0	0	0	0	2	0	0	0	0	0	0	1	0	3	4
Rotary Veneer Mills	0	0	0	0	0	0	0	0	1	0	0	2	0	3	4
Parquetry Factories	4	9	0	0	0	0	1	11	0	0	3	17	0	45	43
Plywood Factories	0	0	0	0	0	0	1	0	1	0	0	3	0	10	8
SECONDARY WOOD PROCESSING														375	
Others: Prefab Housing, Furniture, Joinery	0	0	0	9	6	0	26	28	0	4	0	3	1	87	462
II. WOOD PULP PRODUCTION	-	-	-	-	-	-	-	-	-	-	-	1	-	1	
III. SECONDARY PRODUCTS: Rattan, Tanin, Straw mats, Resin, etc.	0	5	1	0	3	0	0	9	1	0	0	3	0	22	
IV. LUMBER AND PANEL DEALERS	0	35	14	16	85	0	24	23	25	40	4	0	0	226	
V. CONSULTANTS	-	-	-	-	3	-	-	-	-	-	-	1	-	4	
Woodworking Machine Manufacturers	-	-	-	-	1	-	-	-	-	-	-	-	-	1	

Source: Ministerio De Agricultura Y Alimentacion Direccion General Forestal Y De Fauna, Banco Popular Del Peru, Lima

REGION:	I. Piura	IV. Huaraz	VII. Huanuco	X. Puno	XIII. Tacna
	II. Chiclayo	V. Lima	VIII. Huancayo	XI. Moyobamba	
	III. Trujillo	VI. Arequipa	IX. Cusco	XII. Iquitos	

ANNEX IV

Development Plan of Research and Development Centres

Research Centre Location		Preliminary activities		Implementation of Research and Development Centre			Co-ordination of Research Work
		(1 year)		(1 year)	(2 year)	(3 year)	
ALTERNATIVE	1	CTM Km4 Pucallpa	Tender Request	Tender evaluation	sawmill start-up	Furniture Centre start-up	Dimension Stock Centre start-up Expansion plans 4,5,and 6 years
	A.v.H. Centre Km 85	Establishing of buildings: offices and training halls Training Centre		Veneer and Plywood Centre start-up		Joinery Centre start-up	
	2	Simultaneous Development of both CTM and A.v.H. Centres	Tender Request	Same as above	sawmill 	Furniture C. 	Dimension Stock C. 
			Veneer and Plywood Centre 	Joinery Centre 	Timber Engineering Centre 	Same as above	

ANNEX V

One Month Suggested Study Tour of European Research
Institutes and Associations

Schedule

Departure from Lima

Arrival in England

Visit to FURNITURE INDUSTRY RESEARCH ASSOCIATION (FIRA)

Day Off

Travel to High Wycombe

Visit to TIMBER RESEARCH AND DEVELOPMENT ASSOCIATION
(TRADA)

Visit to TRADA'S Research facilities

Travel to Paris

Visit to the CENTRE TECHNIQUE DU BOIS

Visit to the CENTRE DU BOIS TROPICAUX

Travel to Helsinki

Summary report of British and French Institutes

Visit to the TECHNICAL RESEARCH CENTRE OF
FINLAND, TIMBER LABORATORY

Travel to Stockholm

Visit to the SVENSKA TRAFORSKNINGSINSTITUTET

Travel to Hamburg

Visit to BUNDESFORSCHUNGSANSTALT FÜR HOLZ - UND
FORSTWIRTSCHAFT

Summary report of Scandinavian Research Institutes

Day Off

Visit to BUNDESFORSCHUNGSANSTALT FÜR HOLZ - UND
FORSTWIRTSCHAFT

Travel to Rosenheim

Schedule Cont.

Visit to Training LABORATORIES OF THE
FACHHOCHSCHULE IN ROSENHEIM

Day Off

Visit to the INSTITUT FÜR FENSTERTECHNIK IN
ROSENHEIM

Summary report of German Research and Testing
Institutes and Wood processing Training Centres

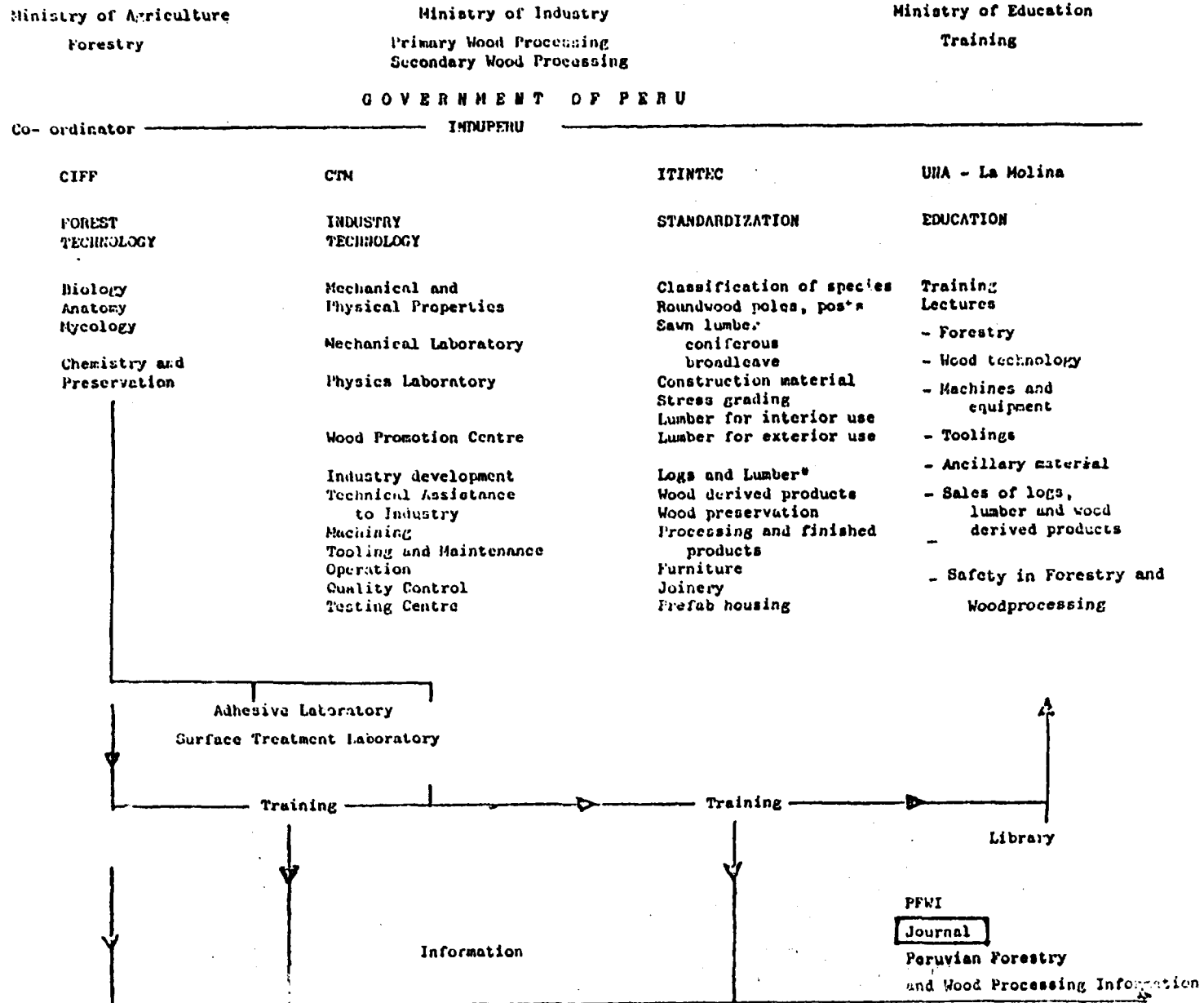
Travel to Vienna

Visit to the AUSTRIAN WOODTECHNOLOGY INSTITUTE

Return to Lima

ANNEX VI

ORGANIZATION PLAN



ANNEX VII

Standardization in the Field of Wood Processing Industries (ITINTEC)

Branch groups

1. Logs and sawn wood
2. Wood derived products
3. Wood preservation
4. Wood processing and finished products
5. Furniture

- 1.1 Wood species
- 1.2 Wood lists
- 1.3 Round wood
- 1.4 Poles and posts
- 1.5 Coniferous sawn wood
- 1.6 Broadleave sawn wood
- 1.7 Construction wood, quality
- 1.8 Stress grading of sawn wood
- 1.9 Lumber for joinery and cabinet making, quality
- 1.10 Wooden mouldings

- 2.1 Hardboard, requirements
- 2.2 Hardboard, building material
- 2.3 Hardboard, testing
- 2.4 ISO hardboard
- 2.5 Insultation board, Bitumen
- 2.6 Laminated hardboard
- 2.7 Particle board, requirements
- 2.8 Particle board, testing
- 2.9 Particle board, layer density
- 2.10 ISO - Particle board
- 2.11 Laminated particle board
- 2.12 Extruded particle board
- 2.13 Plywood, requirement
- 2.14 Plywood, testing
- 2.15 ISO plywood
- 2.16 Abreviation for wood derived products

- 3.1 Terminology
- 3.2 Abbreviations
- 3.3 Wood preservation for construction
 - 3.31 basics
 - 3.32 constructive preservation
 - 3.33 preventive chemical fire resistance preservation
 - 3.34 protective chemical fire resistance preservation
 - 3.35 preservation of wood derived products
 - 3.36 preventive chemical preservation of pre-dried construction material

- 4.1 Wood processing industry
- 4.2 Drawings
- 4.3 Tolerances
- 4.4 Calculation of machining losses
- 4.5 Wood glueing
 - 4.51 terminology and symbols
 - 4.52 requirements and testing

- 4.6 Finger jointing
- 4.7 Parquetry
- 4.8 Parquet adhesives
- 4.9 Prefab parquetry
- 4.10 VOB - parquetry work
- 4.11 Block flooring
- 4.12 Adhesives for block flooring
- 4.13 Windows
- 4.14 Flush doors
- 4.15 Panelled doors
- 4.16 Glazed doors
- 4.17 Door fitting
- 4.18 Pallets
- 4.19 Ladders
- 4.20 Scaffolding boards (shutters)
- 4.21 Wood wool

- 5.1 Living room furniture
 - 5.11 case good furniture
 - 5.12 chairs and tables

- 5.13 upholstered furniture
- 5.14 folding beds
- 5.15 bunk beds
- 5.16 kitchen furniture
- 5.17 school furniture

ANNEX VIII

Reference Documentation

- (1) ESTUDIO DE FACTIBILIDAD DEL CENTRE TECHNOLOGICO DE LA LA INDUSTRIA DE LA MADERA - Volumes 1 - 3, Published by Gremio de Proyectos, June 1979.
- (2) PROYECTO ALEXANDER VON HUMBOLT - PROYECTO AMAZONIA.
- (3) CENTRO DE INVESTIGACION FORESTAL Y DE FAUNA DE LA SELVA (CIFI) - Dirección de Investigación Forestal y de Fauna, 1979.
- (4) INFORMACION ADICIONAL REFERENTE AL CENTRO DE INVESTIGACION FORESTAL Y DE FAUNA DE LA SELVA.
- (5) NOTA TECNICA NO.2, Marzo 1979, Lima, Peru Publicación seriada de la Dirección General Forestal y de Fauna sobre Artículos de interés del Sub-Sector, Recursos Forestales.
- (6) LA EXTRACCION FORESTAL EN EL PERU, Ministerio de Agricultura y alimentación Dirección general forestal y de Fauna, Torsten Frisk S. Oficial de Montes F A O, Diciembre, 1978.
- (7) LEY ORGANICA DEL INSTITUTO NACIONAL DE INVESTIGACION AGRARIA, Instituto Nacional de Investigación Agraria Secretaria General, Enero 1979.
- (8) REPORT FOR CANADIAN INTERNATIONAL DEVELOPMENT AGENCY ON PERU FOREST SECTORAL STUDY PROJECT NO. 730-00142, for CIDA, November 1974.
- (9) REGLAMENTO DE ORGANIZACION Y FUNCIONES DEL INSTITUTO NACIONAL DE INVESTIGACION AGRARIA, Resolución Ministerial No. 00294-79-AA/INIA, Lima, Febrero de 1979.
- (10) DIRECTORIO DE EMPRESAS DE TRANSFORMACION Y COMERCIALIZACION DE PRODUCTOS FORESTALES, Lima, Peru 1979.
- (11) PLAN NACIONAL DE DESARROLLO, Loreto, Vol 1, 1979-1980
Vol 2: PROGRAMA DE INVERSION PUBLICA.
- (12) MECHANISMES POUR RENFORCER LA CAPACITE TECHNIQUE DES PAYS EN VOIES DE DEVELOPPEMENT: LE CAS DE L'ITINTEC AU PEROU, Par: Jorge Vega Boggio

