6.3. Skidding.

- Experiences showed that animals can be used for elevations of 0 - 10°, their ability is 1 m3/ day covering a distance of 3 km.
  By using man power the result is 0,32 m3/day by covering a carrying distance of 3 km.
- Unimog or wheel tractors can be used for elevations of 15°-25° Working achievement of a tractor per day (6 working hours) is 35 m3 with a cost per m3 of Rp.1.535 -
- For elevations more than 25° yarders can be used with a working achievement of 19,5/day and a distance of 400 meters (cable span) and cost per m3 of Rp.2.485,81 (according to 1978 calculations).
- Yarders with a cable span of 800 meters carried out by Perhutani itself can produce approximately 8 m3/day with a cost of Rp.2.623,5/m3, depreciation cost not yet included.
- A gravity skyline can produce approximately 15 m3/day; the cost in 1976 was Rp.359,95 per m3 (depreciation cost not yet included).
- In order to prevent unemployment the integrated utilization of exploitation equipments between manual and mechanic ones (combined operation) should be considered.
- Density of roads :
  a. By using the skyline system 5 m/ha (strip road) is required.
  b. 10 m/ha is required by using tractors.

VII. SUGGESTIONS.

7.1. Inventory of Pine forest potency is needed in order to know the real situation, the extent as well as the stand volume.

7.2. In order to determine the number and the kind of equipments and their application in the field in the framework of the forest exploitation for the purpose of the paper factory, the following data should be recorded :

- Productive labour force.
- Social economic conditions.
- Topographical conditions for planning the establishment of a yarder unit.
- elevation degree.
- density of roads.
- prices of various exploitation equipments.

7.3. In order to know the working echievements of each exploitation equipment to be utilized a time study is needed.

7.4. Labour trainings should be performed in the field of felling by utilizing various kinds of equipments as well as in the field of skidding, in order to obtain skilled woekers.

7.5. Particularly the skyline should be tried in clear felling areas as well as in strip cutting ones.

7.6. Forestry handtools, animals and mechanical equipments should integratedly be utilized.

VIII. C L O S I N G.

This is in brief an article on loggi systems in the framework of the raw material supply for a paper factory in Cilacap.

This article is not perfect yet, however, at least it is expected to give an idea. For anplomentation it should be support by more accurate field data, among others are degree of slope and number of labours.

==========M/S==========

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Name	Type	No	Unit Price	Price	Depreciation cost per 1 m3	Service life Volume m3 or hours
Yarder	Y-32E	1		Rp 11.660.000	524,89	6.000h
Carriage	BCD34	1		477,300	40	12,000 m3
Loading block	BLS31B	1		109,800	9	12,000 m3
Loading hook	BLHA3D	1		57,700	5	12,000 m3
Saddle block	BD28A	2	111,500	223,000	19	12,000 m3
Heel block	BH28	2	89,950	177,900	15	12,000 m3
Skyline clamp	BC28	1		220,900	18	12,000 m3
Guide block	BS7A	8	24,738	197,900	16	12,000 m3
Guide block	BS9	7	30,371	212,600	18	12,000 m3
Guide block	BS12PE	2	44,700	89,400	7	12,000 m3
Skyline support	BN28	1		243,500	20	12,000 m3
Sub total				2.010,000	167	
Wire clip	RC12	60	847	50,800	8	6,000 m3
Wire clip	RC16	10	1.480	14,800	2	6,000 m3
Wire clip	RC24	5	3.380	16,900	3	6,000 m3
Shakie	10 m/m	15	433	6,500	1	6,000 m3
Shakie	22 m/m	2	2.600	5.200	1	6,000 m3
Special shakie	RP16	2	2.400	4,800	1	6,000 m3
Sub-total				99,000	16	
Sling ropa	R1220	2	6,950	13,900	2	7,000 m3
Sling ropa	R1230	2	9,100	18,200	3	7,000 m3
Sling ropa	R1240	2	11,250	22,500	3	7,000 m3
Choker hook	RHS1	6	6,583	39,500	7	7,000 m3
gye-socket	RS11	6	7,150	42,900	7	7,000 m3
Sub-total				137,000	22	
Skyline	24 m/m 6x7 C/L	1,100m	2,473	2.720,000	151	18,000 m3
Endlaan Line	12 m/m 6x9%	2,400	764	1,832,400	262	7,000 m3
Lifeting line	12 m/m 6x9%	1,300	764	992,500	142	7,000 m3
Haul back line	10 m/m 6x9%	2,400	586	1,405,600	201	7,000 m3
Heel line	12 m/m 6x9%	600	764	458,000	65	7,000 m3
Guy line	12 m/m 6x9%	500	764	381,800	55	7,000 m3
Support line	16 m/m 6x9%	100	1,367	136,700	13	11,000 m3
Sub total				7,927,000	889	
Telepone		1		275,900		6,000 h
Tir-for		1		1,249,400		6,000 h
Splicing too		1		149,600		6,000 h
Wire cuttex (Main cable)		1		260,200		6,000 h
Wire cutter (Operating line)		1		89,900		6,000 h
Sub-total				1,024,000	187,16	
Artivicial aedr	16	2		3,134,000		6,000 h
Total				26,000,000	1806,06	

From datas :
Report on the Forest inventory for management and logging in Central Java.

No.7-2, HISHI - SHINJUKU 1 - CHOME
SHINJUKU-KU, TOKYO, JAPAN.

Model Nama	Ex-godown Yokohama ( )	Net Weight (kg)	Shipping weight (kg)	Demensions L-W-H (nm)	Mensurment (C'ft)
T - 50 Logging Tractor	9.180.000	6.000	6.000	5390-2280-2450	1.070
T - 20A Logging Tractor	5.600.000	2.600	2.600	4390-1900-2320	689
T - 35 AD Angle Dozer (with towing winch).	7.900.000	6.850	6.850	4560-2600-2580	1.112
T - 35 AL Log Loader	8.040.000	7.100	7.100	5160-1680-2100	648
T - 12 H Mini Backhoe	2.550.000	1.300	1.450	3000-1100-1460	171
T - 230A Mini Backhoe	2.550.000	2.600	2.800	2470.1700-2260	338
T - 350B Mini Backhoe (with canapy)	5.250.000	2.850	3.100	4200-1610-2330	561
T - 350 Mini Backhoe (with cabin)	5.350.000	2.900	3.150	4200-1610-2330	561
T - 12E Yarder (Engine lass)	1.270.000	825	930	1800-1200-1200	92
T - 12KIB Yarder	2.000.000	1.100	1.250	2700-1200.1200	138
T - 23 KH Yarder	2.960.000	1.700	1.905	2990-1790-1300	248
T - 252E Yarder	3.030.000	1.850	2.100	3000-1740-1300	241
T - 32 EA Yarder	3.990.000	2.500	2.800	4450-1800-1550	443
T - 42 EA' Yarder	4.900.000	3.200	3.500	4410-1970-2150	665
T - 331 Yarder	4.450.000	2.900	3.200	5100-1580-1550	444
T - 33 KP Yarder	5.140.000	3.700	4.000	5100-1830-2300	764
T - 52 E Yarder	6.640.000	5.000	5.500	4870-2450-1780	756
T - 73 Yarder		8.200	8.900	5600-2750-1750	959
T - 103 Yarder		8.800	9.500	5600-2750-1850	1.014

Note : This price list is value only for a year.

SOME EXPERIENCES OF LOGS SKIDDING IN THE MOUNTAINOUS AREA IN JAVA

by
Soenarso Sastrodimedjo and M. Sinaga

Voluntary paper

FOREST RESEARCH PRODUCTS INSTITUTE
BOGOR 1981.

SOME EXPERIENCES OF LOGS SKIDDING IN THE MOUNTAINOUS AREA IN JAVA *)

by

Soenarso Sastrodimedjo and M. Sinaga. **)

I. INTRODUCTION.

In connecting with the plan to build a cement bag factory in Cilacap in 1985 with a capacity of 90,000 tons/year, a big amount of raw material are needed. To reach this capacity, it should be prepared a of 540,000 m3 log/year or equal to 2,100 – 2,700 m3 log/day if the raw material will be used, mainly from Pinus merkusii species, that can be found in forest district of West Pekalongan, East Banyumas and West Banyumas.

Until now PERHUTANI does not yet have an experience about logging of Pinus merkusii with the big amount of logs taken from the relatif small area, comparing with the logging in teak forest.

This paper is prepared to participate and to solve the problem of logging system in the Pinus merkusii forest, based on some results of the research on manual logs skidding in the mountainous area in Java and mechanical system in the outer island of Java for comparison.

II. GENERAL DATA.

The main activity in the logging system, covered of, felling, skidding and log loading.

A. Felling activity.

The afficiency of felling activity, can be reached, if the activity are focused in one integrated area and felling can be done by manual, together with the mechanical system.

Before felling activity is done, the planning must be arranged for making a block of area of five years planned and break it, into annual plan. In every block of annual plan an inventory of the standing stock should be carried out for knowing the exact of potential of logs.

According to the target of 540,000 m3 log/year (Capacity of the factory is 90,000 tons/year) or 2,100–2,700 m3 log/day, with a working days of 200–250 days/year

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*). Forest Products Research Institute, Bogor.

and if the potential of standing stock, average is 150 m3 log/ha, the area must be felled is 3,600 ha per year.

Chainsaw capacity in felling activity of Pinus merkusii is 25–35 m3 log/day. In reaching the targets, the chainsaw needs about 60–108 pieces and the operator included co-operator chainsaw are 120–216 persons.

Manual felling activity, depend on the available of workers. According to the experience in the felling activity in teak forest using of handsaw, the capacity of each crew (2 person) is around 2–3 m3 log/day, with 4–5 working hours/day. So, the need of workers in manual felling system are around 700–900 man/day.

B. Skidding activity.

As a description, the capacity of skidding are as follows :

Manual skidding system.

To carry on one's hip at a distance of 7 km, the capacity is 0.09 m3 log/man/day (Forest district of East Pekalongan, 1980).
The capacity to carry on the shoulder, with a crew of 14 person and at distance of 7 km, as around 1.3–2.4 m3 log/day.

By log rolling (nggelebeg, nggledek) at a distance of 1 km, the capasity is 0.4 m3 log/day. Skidding done with a carries, design by Forest Products Research Institute, namely "MAMAN TYPE I", the capacity at a distance of 1 km, is 0.72–1.00 m3 log/day (2 person). And by using gravity skyline system at a span of 500 m and 250 m, the capacity are 10–12 m3 log/day and 11–13 m3 log/day respectively (Soenarso et al, 1978 and 1980).

Mechanical Skidding System.

According to Forest Products Research Institute in 1971, logs skidding in Java, use of Unimog 80 PS at a distance of 250 m, the average capacity is 28 m3 log/day.
According to SOERJO SOEBAGIO (1980), the capacity of skyline system with Yarder type Y 32 E, at a distance of 1 km is around 25 m3 log/day. Skidding capacity by skidder (Wheel tractor) 73 S. at a distance of 250 m, is 36 m3 log/day.

The skidding capacity in the outer island of Java, according to SOENARSO et al, (1973 and 1974) can be summarize as follows :

- By crawler tractors, with various mark and a 120–180 HP, at a distance of 200–900 m, is around 70–150 m3 log/day.
- By skidder (wheel tractor), with various mark and a 130–180 HP, at a distance of 300–800 m is around 50–105 m3 log/day.

C. Log Loading Activity.

Log loading at the logyard or landing, is the important thing in logging activity. In Java, mainly, log loading is done by manual/man power. In the outer island of Java, this activity, is done by mechanical system.

The capacity of loading in the outer island of Java, log loader from various mark and horse power (120–260), is around 150–600 m3 log/day.

III. THE IMPORTANT ASPECT OF LOGGING.

1. Felling Area.

Due to the capacity of 90,000 tons/year or 540,000 m3 log/year (2,100–2,700 m3 log/day), logging must be done on large scale. To perform the logging activity as good as possible and to make the management and the supervision more perfectly, therefore, the felling activity should not be scattered, so the number of supervisor can be decreased.

In reaching the target, it is recommended that felling is conducted mechanically by using equipment of the same mark. It is, for instance, chainsaw which is in conformity with STIHL 041 AV. Bucking is, basicaly, done at the landing. The management of the equipments will be more simple if the ownership is at wood cutters themselves. In the case of engine trouble, reparation is conducted by or guaranteed by wood cutters.
Perhutani has it use in making available the chainsaw machanicians for the wood cutters, to help them to overcome when there are some difficulties that cannot be solved by the wood cutter.

Perhutani can also act as the supplier of fuel and oil for the wood cutters, whereas, in solving the need for spare parts, Perhutani should ask dealer to establish a branch situated near the location in view of great number of chainsaw used.

At each center of felling area, skidding and loading, the operation should be given to a group of workers, so that production calculation could be done on the basis of central activities and both calculation and payment could be carried out through the leader of each group. On behalf of that, a simple, but efficient system of quotation and production supervision is needed.

One of the simple method is, by weighing the truck when it is loaded and unloaded. By this way, the amount of log supplied to the factory can be known.

Payment for a group of workers at each central of activities (felling, skidding and landing) is based on the number of logs extracted from the forest, i.e the data derived from truck weighing at landing. For this purpose, a conversion factor of weight to volume should be introduced (appendix 1). To have a reliable data, a research should be held in the near future.

2. Skidding.

The forest roadnet of the three forest district is very extensive, which result in a long average skidding distance. Besides of a limited road density, the situation is become worse since the greater part of the area is topographically heavy or relatively heavy.

Apart from the above factor, i.e the high target capacity, another factor is decreasing interest of youth to work as labourer in logging activity (Soewito, Soenarso and Adang Wirapradja, 1975), log skidding system, consequently, must be stressed on mechanical system as follows :

a. Skidder.

For the topography with slope lower than 25%, a skidder (wheel tractor) be a match for Clark Ranger 664 B Cummins Engine should be used.

Utilization of skidder is profitable when the skidding distance is bellow of 3 km, and the logs size as long as possible and gathered unitely. A great number of logs at a location is not a problem, since clear felling is used. So it will not too much time wasted in gathering log by the tractor.

b. Skyline system.

It is mentioned above, that the topography of the area is heavy or relatively heavy. Since the use of skidder is limitted to the area with slope lower than 25% and skidding distance up to 3 km, skidding in area at which skidder is not possible to be used, should be carried out with skyline system by using yarder.

So, for the logging activity center, skidding can be combined as skyline and skidder system SOERJO SOEBAGIO (1980) explained, that a set up of skyline system with a main line of 800–1000 m long and a 50–100 m strip width, covered a felling area of 8–10 ha. If the standing stock of forested area is about 150 m3 log/ha and the capacity of skidding is 25 m3 log/day, the production from each set up is 1200–1500 log, enough for 48–60 skyline working days.

Furthermore, 3 recommended system probably corresponding to this pines forest logging i.e endless tyler system, tyler system and falling block system, but the cost needed for tyler system is higher than the two other systems.

As SOERJO SOEBAGIO explained (1980) the cost of using skyline system is more costly comparing with the other system.
So, if the roadnet is more favourable, the skyline system should be changed by the other system, for instance skidder system.

One's of the disadvantages of using skyline system is, less encouragement for the enterprise or concessionair to build an optimal network of road, before extraction is started.

It is clear, because the skyline system is able to extract logs, without existing of roadnet.

With the less of road density the management and control, mainly in the field, become less effectif.

3. Loading on Landing yard.

As explained in chapter II ad c, this activity is to serve logs transportation from the landing to the plant site. To conduct the activity of such abundant loading daily, therefore mechanical equipment should be introduced. It would avoid piling of logs on the landing resulting production flow disturbance.
The equipment used should be alert, is wheel log boder sizing up to Clark Ranger Model 55.

As an illustration of loading is as follows :

According to bridges and roads condition in the vicinity of the forest area, a truck with maximum of 4 m3 of loads is permissible to pass this road. So it will 600 times daily loading be done or 60 times an hour or once per minute to load 4 m3 of logs.

4. Labour and training.

The plan of labours and staff supply and increasing the technical know-how, is as essential as the preparation of the build up of a factory or the selection of equipments.

The labours needed are technical labours, i.e chainsaw operators, log loader operators and mechanics. In the frame of labour preparation it is necessary to conduct training and guidance for technical labours and who have got training and experience should be maintained their knowledge and skill ness.

5. Organization.

Besides technical problems, organization should get special attention to manage production, labour, income and administration. The entire exploitation management of the three forest districts should be under one sole unit of organization, directly responsible to Unit I Perhutani, Central Java.

The structure of exploitation body as presented by ROCHMADI and SOENARSO (1976), which should be separated from the other activities, is suitable for the logging activities (Appendix 2).

The smooth production flow from felling site skidding, loading and hauling to plant site, would be disturbed, even get confusion if the management is not properly organised, i.e the administration of logs production is poor and not be able to follow the flow speed of production. In technical matter, because of poor coordination among activities, may cause logs piling on filling site or on landing.

IV. CONCLUSION.

1. A cement bag factory, with a capacity of 90,000 tons/year will be built in 1985 with a raw material pines wood, supplied from three forest districts, i.e. West Pekalongan, East Banyumas and West Banyumas.
2. Due to the big capacity of the factory, amounting to 200 to 250 working days/year, and the target is 2,100 to 2,700 m3 logs/day; the condition of the topography and the road net density, the logging activities should be done mainly mechanised.
3. Labours preparation incluiding training and guidance for operators and mechanics should begin from now.
4. To have management experience, before the real logging activities in 1985 begin, it should be created a pilot project doing all the logging activities, administrative and technically.
5. The logging management of the three wood supply areas i.e East Pekalongan, East Banyumas and West Banyumas forest district should under one body, separated from the other activities, and responsible directly to Unit I Perhutani, Central Java.
6. To have a simple and efficient organization, the forest labours should form a group consisting of some workers, each headed by a foreman.
   All contacts between Perhutani and each group, officially should pass the foreman.
7. To skid yard logs from an area with rough and heavy topography, which cannot be reached by other system, skyline system is recommended.

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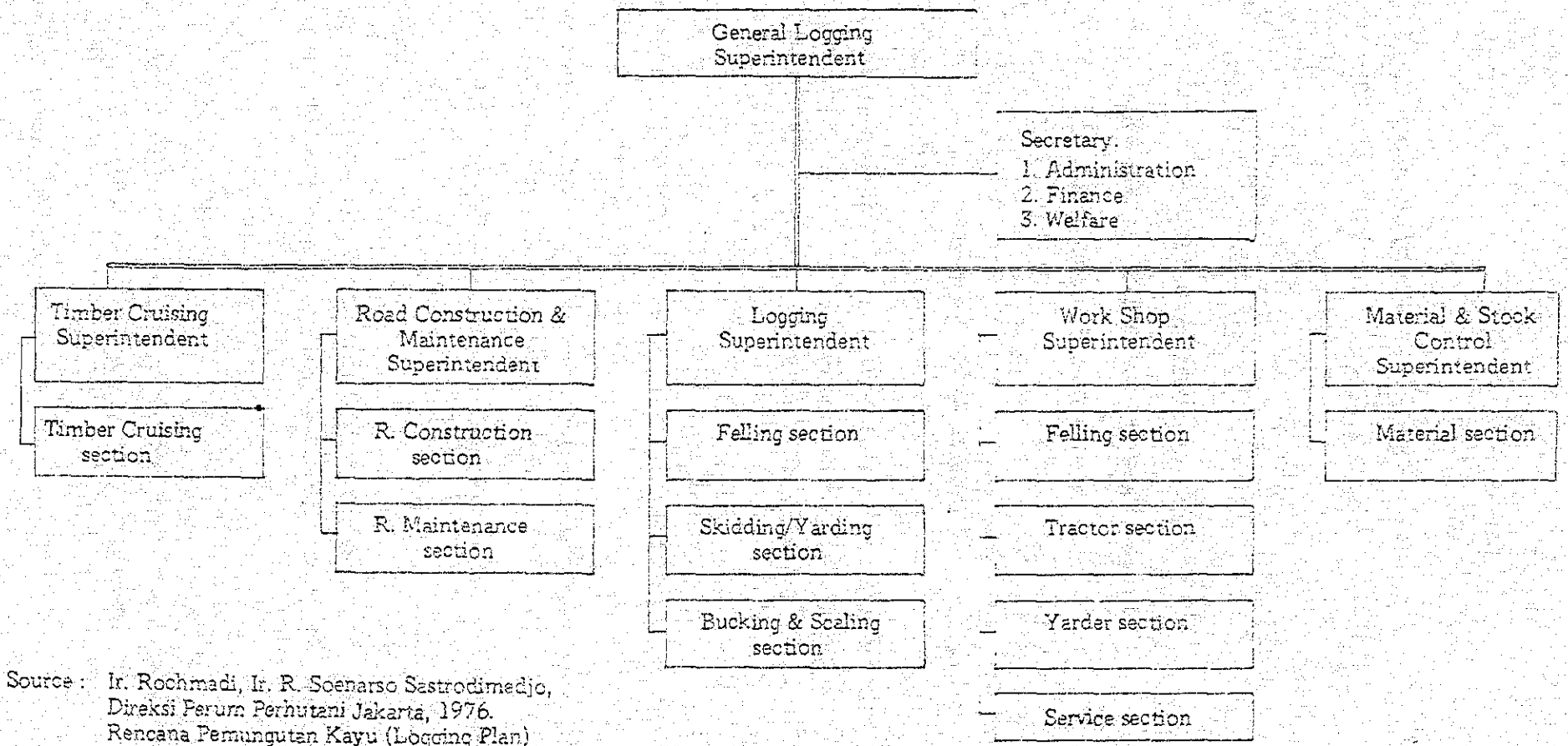
WEIGHT & VOLUME
PER METER LOG OF PINUS MERKUSII

Diameter	TREE					
	A		B		C	
(cm)	Weight (kg)	Volume (m3)	Weight (kg)	Volume (m3)	Weight (kg)	Volume (m3)
1	2	3	4	5	6	7
28	67	0.066	68	0.066	66	0.066
26	65	0.053	65	0.053	65	0.053
26	60	0.053	–	–	61	0.049
25	–	–	62	0.049	57	0.045
25	–	–	60	0.049	–	–
24	55	0.045	58	0.045	56	0.045
24	–	–	53	0.045	51	0.042
23	53	0.042	50	0.042	49	0.038
22	49	0.038	–	–	47	0.038
22	–	–	–	–	42	0.035
21	45	0.035	49	0.035	32	0.028
21	–	–	47	0.035	–	–
20	42	0.031	41	0.031	–	–
20	40	0.031	40	0.031	–	–
19	35	0.028	37	0.028	31	0.025
19	–	–	29	0.028	–	–
18	32	0.025	–	–	30	0.023
17	30	0.023	27	0.023	30	0.020
16	26	0.020	25	0.020	24	0.015
15	21	0.018	21	0.018	–	–
15	–	–	–	–	–	–
14	–	–	–	–	21	0.015
14	–	–	–	–	18	0.018
13	18	0.013	16	0.013	–	–
12	–	–	–	–	16	0.009
11	14	0.009	11	0.009	13	0.009
11	–	–	–	–	9	0.009
10	10	0.008	2	0.002	2	0.002
	663	0.538	761	0.622	755	0.621

Source : Ir. Rochmadi, Ir. R. Soenarso Sastrodimodjo
Direksi Perum Perhutani Jakarta, 1976.
Rencana Pemungutan Kayu (Logging Plan)
Hutan Pinus Merkusii Bahan Baku Pabrik
Kertas Notog Jawa Tengah.

ORGANIZATION SCHEME OF LOGGING



Source : Ir. Rochmadi, Ir. R. Soenarso Sastrodimedjo, Direksi Perum Perhutani Jakarta, 1976. Rencana Pemungutan Kayu (Logging Plan) Hutan Pinus Merkusii Bahan Baku Pabrik Kertas Notog Jawa Tengah.

SOME THOUGHTS AND FIGURES ON THE HARVEST OF PULPWOOD FOR THE CILACAP CEMENT PAPER MILL

BY :

RAHARDJO S. SUPARTO

SOME THOUGHTS AND FIGURES ON THE HARVEST OF PULPWOOD FOR THE CILACAP CEMENT PAPER MILL

BY :

RAHARDJO S. SUPANTO . 1)

INTRODUCTION .

1. The paper mill to be erected in 1985 is planned to have an output capacity of 90.000 ton per year . This will require raw material input of 540.000 cu m of wood per year, or a daily input of 2100 cu m (290 workdays in one year).

2. Raw material is pine wood to be extracted from the forest Districts Pekalongan Barat, Banyumas Barat, Banyumas Timur and others, comprising a total area of approximately 67.000 ha . The initial area will be around 12.000 ha in 1985.

3. The total system of the industry will include the following components or functions : supplying of raw material , production of paper sacks, and marketing of the finished product.

4. This paper deals with estimates and problems related to the first function with emphasis on the harvesting aspect.

5. It is assumed that availability of capital constitutes no problem.

WOODS OPERATION .

6. The objective of the raw material supplying function is to deliver pine logs of pulpwood length at hauling roads' side in the amount of 2100 cu m per day.

Felling and Bucking Operation.

7. The first phase is felling which can be done mannually or mechanically using chainsaws , depending on the availability of labour.

1) Fakultas Kehutanan, Institut Pertanian Bogor.-

8. Some authors wrote that labour in these areas is easily available However, since forest work is considered to be heavy work, people tend to reject it in favour of other less strenuous work, even when wages are lower. Therefore to depend wholy on manual labour could jeopardise the continuity of the mill.

9. On the other hand, the G.B.H.N. (The Nation's Broad Policies) dictates that efforts should be made to create labour intensive jobs. Hence, a rational combination af manual felling and mechanized felling is called for.

10. Manual felling is generally coupled to the consecutive jobs of bucking and skidding, especially on sites above and ajacent to hauling roads.

11. Considering the above ,and asuming that 50 percent of the felling sites are located in the fashion as indicated in ad .10, and 50 percent of those can be worked manually ,then 25 % of the total daily log input or approximately 600 cu m can be felled, bucked and yarded by hand.

12. Experience from the Lawu Ds district shows that a four - man crew produces 3 - 4 cu m in one 5 hr - work day. Consequently, the number of workers that has to be hired each day is around 700 men.

13. Rolling the logs down is the easiest and simplest method, but also the most destructive. The trees should be felled in an upward direction so that the butt points toward thevalley (or road) . The trunks are cut into smaller logs at the felling site so that extraction becomes easier.

14. Another method, which may lessen damage to the soil is as follows : a whole trunk is transported to the roadside with the aid of a nylon rope and a hook on the end, which is driven into the butt. After the tree is felled with the top pointing toward the valley, it is hung on to the stump for debranching. For skidding ,one man drags the top of the trunk with a canthook and so guides it, while a second man winds the rope two or three times around a tree and in this manner, controls the slow Slide of the trunk toward the road.

15. Mechanised felling and bucking in this case, is the use of chainsaws For trees with an average diameter of 30 cm, one - man chainsaws with 50 cm. bar are adequate. Each chainsaw operator is provided with one helper who carries the can of fuel, an ax, and other tools.

16. It is recognized that treelength skidding by mechanical means is most efficient, yet in view of the damage to soil, bucking should be done at the stump (except for tractor skidding) A twoman crew may produce 40 cu m in one 7 hr - work day.

17. Since 75 percent of the total input or 1575 cu m (see ad.1 and 11) has to be felled and bucked with chainsaws, the number of felling crews is 40. If 10 percent of this total is absent for any reason, a total of 44 crews is justified.

Yarding :

18. There are many systems for yarding available, but only three are considered here i. e. : manual, tractor (skidder) and cable crane.

19. Manual skidding has been covered earlier in ad .10 to 14. The systems to be discussed next are : tractor skidding and cable crane yarding.

20. The articulated four - wheel drive skidder is considered to be most suitable for mountain logging . In addition to articulation it also features oscillation of the front wheels, which ensures constant contact to the ground of all four wheels . It gives good performance on a great variety of terrain . The limit to the gradient of a slope that may be undertaken by this type of skidder is 40 percent on wet and unfavourable ground. On slopes with a gradient of 50 percent or more, the skidder can be driven only when pulling a load. It is said that this machine performs without causing a lot of damage.

21. Hence, the volume of the mechanical yarding activity can be split in two. Timber on slopes with gradient of 40 percent or less should be yarded with the skidder, and on slopes with gradient of over 40 percent should be yarded by cable cranes.

22. The volume of logs to be yarded by mechanical means is 1575 cu m per day. Assume 30 percent of these, or 500 cu m per day, are on slopes with a gradient of less then 40 percent, and can therefore be extracted with skidders.-

23. Production capacity of an 80 - 150. Hp skidder is approximately 70 cu m a day over skidding distances beteveen 300 to 800 m.
Hence, about 7 skidders are needed to do the. job . If 10 % of these machines has to be serviced or repaired , then 8 skidders are justified.
Mention has to be made that in special cases skidding distances can be up to 2000 m.

24. The remaining 1100 cu m per day are located on slopes too steep or too rough for all methods except cable cranes.

25. The characteristic of a cable crane is its suspended skyline, with a carriage . This sistem can yard uphill or down hill employing topmounted or valley - mounted winch.
The most practical type is the one with a truck - mounted yarder, which can travel along roads to any yarding operation.
The disadvantages of this sistem are its large persentage of not - up time (15 - 20 percent of total time) ,and the relatively short yarding distance (500 m) . The advantage is that it causes very little disturbance to the forest floor. This is ofcourse a most important charateristic with regard to the protection of the ecosystem . In addition, the cable crane can reach 50 m laterally to each side.-
Daily production from European experience is around 50 cu m . Hence, 22 units are necessary to handle the job. When 10 percent is not in operation for repair or maintenance, 25 units are required.-

ROADS.

26. To accomodate the above pattern of wood extraction a compatible road - network has to be designed to make the system work.

27. With an average road spacing of 1000 m, the road intensity would be 10 m per ha. This means that by the year's end of 1985 a road system of 120 km length has to be made available . When the time comes to utilize the - entire 67,000 ha of forest, an addition of 550 km of road is needed . Forest roads now available, but requiring an upgrading, have a total length of about 50 km.

28. The road bearing capacity has to be compatible with the public road system, to help ensure uninterupted transportation.-

29. In step with ad. 28 all roads have to be rock surfaced and equiped with effective drainage structures to help protect the ecosystem.

CONSTRAINT :

30. One single constraint of utmost importance is the great care that has to be taken to prevent serious damage to the forest ecosystem, which may well affect the livelyhood of the population downstreams. This is due to the steepness of terrain (20 - 100 percent slopes), erosiveness of the soil (mostly latosol) , and high rainfall (2720 - 5782 mm)

31. Damage or destruction constitute costs, and to prevent it requires costs. When benefits balance costs it is still rational to continue the venture. However , when costs exceed benefits all concerned will be better off if the forest resource is left as it is .
The greatest problem now is not the difficulty to indentify the variables, but to quantify them. In no other profession as in forestry is one probably so much aware of the fact that one sided efforts to achieve short - term maximum gain make the basis of our existence increasingly smaller.

CONCLUSION

32. Providing all assumptions used above were correct, the following conclusions are in order :

33. Roughly 600 cum wood per day is to be felled, bucked and skidded manually employing about 700 men.

34. Approximately 1600 cum wood per day is to be felled and bucked with 44 chainsaws employing 44 operators and same number of helpers.

35. Approximately 500 cum wood per day is to be skidded down slopes with 8 skidders employing 8 operators and same number of helpers.

36. Approximately 1100 cum wood per day is to be yarded downhill or uphill with 25 units of cable cranes employing 25 operators and 75 helpers.

37. Some 70 km of new roads have to be constructed for the initial run, and an addition of 550 km for the entire forest area. All roads must be well stabilized with rock surfacing and drainage structures.

38. Final assessment has to be made to at least balance benefits against cost of destruction to help ensure the continuity of the venture and protect the livelyhood of the community ajacent to the forest at the same time.

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ROVING SEMINAR ON MOUNTAIN LOGGING ACTIVITIES

IN BATURADEN 17 - 19th DECEMBER, 1981.

The Conclusions and recommendations are based on field trip to the Mountain Logging Practice activities in Bumijawa, Pekalongan Barat Forest District, and followed by paper presentation and discussion in Baturaden.

The participants Consists of :

1. Forest Product Research Institute Bogor
2. Forestry Faculty of Bogor Agriculture Institute
3. Forestry Faculty of Gajah Mada University Yogyakarta
4. Japan International Cooperation Agency's experts
5. Mountain Logging Practice Project (Project ATA 184)
6. Perum Perhutani Board of Directors
7. Central Java Perum Perhutani Unit I

The discussion concerned with Pine Mountain Logging activities in conection with supply of raw material for the sack - craft paper Mill in Cilacap.

Papers have been presentated and discussed ware :

1. Implementation of the Skyline Logging by Project Manager of M.L.P.
2. The Divelopment of Mechanical Logging in Perum Perhutani by Bambang Soeharjanto (M.L.P.)
3. Skyline Logging System and its efficiency in Pine Forest in Central Java, by Tatsuo Tsujii (J I C A)
4. A Socio - economic study on mountain Logging Practice in Central Java by Dr Sansyo Nakamura (J I C A)
5. Assuming the extration of the Pine Forest in Pekalongan Barat, by Perum Perhutani Unit I Central Java.
6. Some experiences of logs skidding in the mountainous area in Java, by Soenarso Sastrodimedjo and M. Sinaga (Forest Product Research Institute Bogor).

7. Some thoughts and figures on the harvest of pulpwood for the Cilacap Cement paper mill, by Rahardjo S. Suparto (Bogor Agriculture Institute).

The conclusions and recommedations are as follows :

1. T E C H N I C A L A S P E C T S

a. The capacity of Paper Mill which will be established is 90,000 ton/year
The requiremont of Pine wood is 540,000 m3./year.
Total working days 200 - 250 working days / year or 2,100 - 2,700 m3/day (± 2,400 m3 / day).

b. The felling area for the first and second five years are almost entirely from Pekalongan Barat Forest District.
For the third five years and on, the felling area will be centralised mainly in Banyumas Barat Forest District which its terrain is more or less flat.
For this purpose the conversion of the existing unproductive forest concern must be done immedrithy into Pine planttion.
The slope class of the area fon the first five years felling in Peka - longan Barat Forest District risulting from data survey as below :

$\angle$ 15°	= 25%	(rounded)
15° - 20°	= 15%	(")
$>$ 20° - 45°	= 60%	(")

In determening the logging system the apportunity of increasing employment still be taken into considerations :

- manual = 25 %
- mechanical = 75 % which
- consists of :
  skitdder 20%
  skyline 55%

c. The Capasity of logging equipment.

Felling by handsaw 1 crew (2 persons) = 2 - 3 M^3/ day (4 - 5 hours/day)
Felling by Chainsaw 1 crew (8 persons) = 25 - 35 M^3/day (4-5 hourse/day)
Manual ...ng 1 crew (8 persons),skidding distance 400 - 800 m =

Mechanical skyline system with aserage main line ± 700 m spent of = ± 20 m3 / day.

Mechanical skidding by tractor (Wheel tractor HP 75) optimum skidding distance of 500 m = ± 25 m3./day.

Mechanical Skidding by tractor (Crawler HP 150), with optimum skidding distance of 500 = ± 100 m3 / day.

Log - Loader of HP 200 = 150 m3 log / day.

d. Basid on point b and c can be planned the requiment of the equipment for 2,400 m3 / day as follows.

- handsaw	=	300	units
- Chainsaw	=	60	"
- Yarder	=	50	"
- Wheel tructor of HP 75	=	32	"
- Crawler Tractor of HP 150	=	8	"
- Log loader	=	16	"

e. The requirement of man power for extraction.

- handsaw	=	600	persons
- Chainsaw	=	120	"
- Yader	=	250	"
- Tractor	=	64	"
- Log loader	=	32	"
Total	=	1,066	persons.

f. R e f o r e s t a t i o n.

The extent of annual reforestation from clear felling area with the production of 200 m3/ha = 2,700 ha/year.

Spancing 3 x 2 m, with thinning frequency as usual.

The extent of annual reforestation in unproductiss Teack conversion area into Pine plantation is planned 2,000 ha/ every year.

Spacing 3 x 2 m without mixed species, and the forest thinning will be started at the age of 10 yeas if considirad necessary.

For this purpase seedling must be prepared accordingly.

2. ORGANIZATION ASPECTS

For carrying out logging activities to supply raw material of 540,000 m3 / year is required an efficient and effective organization, a Special project directhy resposinsible to Unit I is recommended.

3. MANAGEMENT ASPECTS

a. The felling plan during rotation has been done.

b. The fust five year felling plan and on has been done.

c. The planning of forest roads have been done.

d. Forest conservations Patens thould be drawn uf based on enviroment inpact.

e. The felling pattern must be set up based the technical aspect of point b.

f. The replanting patterns thould be organized based on the technical aspect of point f

g. The yearding patterns thould be organized based on the technical aspect of point o

h. The bucking patterns must be organised immediatly

i. The scaling and grading patteran thould be mode.

j. The waging patterns should be made.

4. MARKETING ASPECTS

Conception of long term Contract be twen Paper Mill and Perum Perhutani based on production Cost with reasonable profit is needed.

R E C O M M E N D A T I O N

1. As has been stated previonsly in the organization aspects the excecutor of prelimeneng special Project establishment should be appointed, aften project proposal has been drawn up by Perum Perhutani Unit I and approved by Bord of Direktors.

2. As follow up of the survey that is now being carried out, on operation plan as hed been decided in a special meeting on utilization of MLP. is needed.

3. The utilization of M L P ' s equipment and ex trainees after the Cooperation of ATA 184 has bien terminated.-

Baturaden, December 19, 1981

Chairman of the Seminar

Director of Production , Perum Perhutani

(H. IR. R. SOERJONO).-

NIP. 080013918.-

付 属 資 料 Ⅱ

プロジェクト終了報告

1. インドネシア側業務報告
   (LAPORAN UMUM PELAKSANAAN PROYEK MOUNTAIN LOGGING PRACTICE CMLP)

2. 日本側FINAL REPORT
   (FINAL REPORT ON THE MOUNTAIN LOGGING PRACTICE PROJECT IN JAVA)

3. プロジェクト終了合意書(LETTER OF AGREEMENT)

4. 機材贈与目録
   (PRESENTATION OF EQUIPMENT AND FACILITIES FOR MOUNTAIN LOGGING PRACTICE PROJECT IN JAVA)

5. 供与機材リスト
   (BERITA ACARA INVENTARISASI PERALATAN PROYEK MOUNTAIN LOGGING PRACTICE)

LAPORAN UMUM

PELAKSANAAN PROYEK MOUNTAIN LOGGING PRACTICE (MLP)

ATA 184

(APRIL 1978 S/D JUNI 1982)

KATA PENGANTAR.

Laporan ini disusun dalam rangka penutupan proyek Mountain Logging Practice (MLP) ATA 184, yaitu suatu proyek kerjasama tehnis antara Pemerintah Indonesia dengan Pemerintah Jepang.

Proyek dimulai April 1978 dan berakhir Juni 1982 sedang pelaksanaannya pada umumnya berjalan dengan sangat lancar.

Hal tersebut dapat dicapai tidak lain berkat kerjasama yang baik antara pihak-pihak expert maupun pejabat-pejabat Pemerintah Jepang dengan counterpart maupun pejabat-pejabat Pemerintah Indonesia.

Mudah-mudahan hasil kerjasama ini dapat lebih mempererat hubungan rimbawan Indonesia dan rimbawan Jepang pada khususnya maupun bangsa Indonesia dan bangsa Jepang pada umumnya.

Akhirnya pada tempatnya kiranya disini kami menyampaikan penghargaan dan terima kasih yang setinggi-tingginya kepada semua pihak atas keikut sertaannya sehingga proyek dapat mencapai hasil sebagaimana diharapkan.

Jakarta, 14 Juni 1982.
DIREKSI PERUM PERHUTANI
Direktur Utama

Hartono Wirjodarmodjo.

LAPORAN UMUM

PELAKSANAAN PROYEK MOUNTAIN LOGGING PRACTICE (MLP)

ATA 184

(APRIL 1978 S/D JUNI 1982)

DAFTAR ISI :

LAPORAN UMUM
PELAKSANAAN PROYEK MOUNTAIN LOGGING PRACTICE (MLP)
ATA 184
(APRIL 1978 S/D JUNI 1982)

I. PENDAHULUAN.

1. Latar belakang dan sejarah.

Dalam Pelita III, sebuah industri kertas yang berkapasitas ± 200 ton kertas per hari akan didirikan di Jawa Tengah. Industri ini akan menggunakan bahan baku Pinus merkusii.

Untuk menunjang program ini, Perum Perhutani menyediakan sebagian dari areal hutan pinusnya, antara lain di KPH-KPH Pekalongan Barat, Pekalongan Timur, Banyumas Barat dan Banyumas Timur sebagai sumber bahan baku.

Hutan-hutan pinus tumbuh dipegunungan pada ketinggian 600-1.500 meter d.m.l. Kegiatan eksploitasi hutan pegunungan, sangat dibatasi oleh beratnya topografi dan rendahnya intensitas jalan. Karena keadaan tersebut maka problemanya menjadi soal pengangkutan dan penyaradan kayu.

Untuk menjamin kontinuitas input pabrik yang jumlahnya besar itu,di samping cara konvensionil yang ada, akan dilakukan juga logging secara mekanis. Untuk itu akan digunakan tehnologi skyline logging, terutama di lapangan yang berat dan terpencil letaknya. Selain investasi untuk mesin dan peralatan, pemakaian sistem logging secara mekanis tersebut memerlukan persyaratan, adanya tenaga operator yang trampil dan terlatih baik. Dalam menuju penggunaan skyline logging , dapat diterangkan sejarah dan perkembangan sebagai berikut :

Agustus 1976 : diadakan pembicaraan kerjasama antara Prof Dr Soekiman Atmosoedarjo, Direktur Utama Perum Perhutani dengan Mr. Nanura , Direktur Forestry Development Cooperation Department JICA, mengenai kemungkinan KPH Pekalongan Barat dan sekitarnya sebagai supplier bahan baku untuk pabrik kertas.

Desember 1976 : Team survey JICA yang dipimpin oleh Mr Nishina, datang di Indonesia untuk menyusun (model) rencana kerja skyline logging, rencana produksi,kemungkinan pengembangannya serta mengadakan pemotretan udara.

Maret 1977 : Pembicaraan kerjasama mengenai rencana pendidikan & pengiriman exspert dan peralatan antara Direktur Jenderal Kehutanan Dr. Soedjarwo dengan Kedutaan Besar Jepang.

April 1977 : Persetujuan Pemerintah untuk mengadakan Proyek inventarisasi dan rencana logging guna penyediaan bahan baku pabrik pulp & kertas di Jawa Tengah. Persetujuan tersebut dicatat dalam buku biru BAPPENAS di bawah nomer ATA - 184.

Juni-Juli 1977 : Survey pendahuluan untuk persiapan. Kemudian disusun konsep record of Discussions (R/D) mengenai proyek ini.

Nopember-Desember 1977 :

(1). Penanda tanganan R/D oleh Prof Ir Soekiman Atmosoedarjo dan Mr. Tadao Mishina.

(2). Laporan hasil survey pendahuluan.

April-Mei 1978 : Design team dari Jepang mengadakan survey untuk rencana pengadaan fasilitas yang diperlukan oleh proyek.

April-Desember 1978 : Persiapan fasilitas training dan pembentukan organisasi MLP. Jumlah expert Jepang ditetapkan 8 orang.

Nopember 1978 : Kursus dibuka/dimulai tanggal 20 Nopember, pengikutnya 12 orang siswa. Menerima pengiriman pertama peralatan & mesin.

Desember 1978 : Rapat Komite Kerjasama di Jakarta pada tanggal 15 Desember 1978 mengenai pendirian Proyek Mountain Logging Practice (MLP) di Jawa.

Januari 1979 : Peresmian Proyek MLP di Madiun pada tanggal 24 Januari 1979.

Perlu dicatat, bahwa sebenarnya Proyek MLP telah mulai berjalan sejak kedatangan para expert yang pertama, yaitu Mr Takikawa dan Mr. Handa pada tanggal 20 April 1978.

2. Tujuan proyek.

Tujuan proyek adalah pengalihan/transfer teknologi pemungutan hasil hutan (logging) secara mekanis untuk menghasilkan kayu pinus sebagai bahan mentah yang akan disediakan dari hutan pegunungan untuk pabrik kertas Cilacap, Jawa Tengah.

II. PELAKSANAAN PROYEK.

1. Lokasi proyek.

Proyek MLP meliputi tiga lokasi pendidikan/praktek yaitu :

(1). Pusat Pendidikan Kehutanan Madiun; kantor pusat MLP juga berada disini.

(2). Hutan latihan (demonstration Forest), terletak di Ngobel, termasuk wilayah KPH Lawu Ds; ± 50 km dari Madiun.

(3). Hutan Model Logging (Model Logging Operation Forest), terletak di Bumi Jawa, termasuk wilayah KPH Pekalongan Barat; ± 450 km dari Madiun.

2. Organisasi proyek.

Bagan organisasi Proyek [illegible] dapat dilihat pada lampiran 1. Pimpinan Proyek yang dibantu oleh para Counterpart dan staf, bekerja sama dengan Team Leader JICA yang dibantu oleh para Expert JICA, bertanggu[illegible]wab langsung kepada Direksi Perum Perhutani.

3. Jangka waktu proyek.

Proyek MLP dimulai pada bulan April 1978 dan berakhir pada bulan Juni 1982 (50 bulan).

Berdasarkan "Record of Discussions" lamanya kerja sama ini ditentukan tiga tahun terhitung sejak bulan Juni 1978. Akan tetapi berhubung dirasakan perlu maka kedua belah pihak yang bekerja sama telah bersepakat [illegible] memperpanjang masa proyek selama ± satu tahun.

4. Kegiatan proyek.

Kegiatan pokok proyek adalah menyelenggarakan training course.

4.1. Pembangunan fasilitas training.

Selama proyek berjalan, oleh Perhutani telah dibangun/disediakan infrastruktur yang menunjang kegiatan training antara lain :

4.1.1. Di Pusdik Kehutanan Madiun dalam tahun 1978/1979 telah diselesaikan :

- perbaikan ruang kantor dan export,
- pembuatan pagar untuk training yard, garage, gudang olie/alat-alat, work shop dll.

4.1.2. Di Hutan latihan (DF) Ngebel dalam tahun 1979/1980 di selesaikan :

- pembuatan/perbaikan jalan sambung sepanjang 2,5 km, merupakan kelanjutan dari access road yang dibiayai oleh JICA,
- pembuatan ware house dan oil house ditempat latihan,
- penyediaan advance camp untuk expert, counterpart dan siswa,
- pembuatan jalan cabang sepanjang ± 350 m, merupakan kelanjutan dari jalan sambung tersebut di atas.

4.1.3. Di Hutan model logging (M L O F) Bumijawa dalam tahun 1979/1980 diselesaikan :

- pembuatan/perbaikan access road sepanjang 8 km (3 km milik DPU, 5 km milik Perhutani).
- pembuatan ware house, rest house, oil house dan rumah penjaga di tempat latihan.
- penyediaan advance camp dan mess expert .

4.2. Program training.

Training ini merupakan apa yang disebut "transfer of technology" logging dipegunungan, khususnya tehnologi skyline logging. Tehnologi ini meliputi bidang-bidang ilmu gerak/pesawat, aljabar, geometri, perencanaan, pembangunan, operasional dan pemeliharaan. Pelajaran teori diberikan seminimal mungkin, sedangkan sebagian besar waktu dipergunakan untuk praktek/latihan. Hasil yang diharapkan adalah tenaga-tenaga supervisor yang mampu memimpin dan mengoperasikan suatu unit skyline dengan trompil.

Lamanya training 18 bulan untuk setiap angkatan, dibagi dalam empat tahapan waktu :

Tahap I - pelajaran teori dan praktek dasar selama 3 bulan di Pusdik Kehutanan Madiun.

Tahap II - praktek dasar operasi logging selama 3 bulan di hutan latihan.

Tahap III - job training di hutan model logging selama 6 bulan di bawah bimbingan expert dan counterpart.

Tahap IV - job training lanjutan di Hutan model logging selama 6 bulan merupakan pemantapan ketrampilan.
Intensitas bimbingan para instruktur banyak dikurangi.

4.3. Kurikulum.

Kurikulum disusun sistimatis antara teori dan praktek dengan mengutamakan praktek. Enam bulan teori & praktek dasar di Pusdik dan Hutan latihan dimaksudkan agar masing-masing siswa menjalani seluruh elemen pekerjaan berulang kali, supaya kelancaran dan keselamatan kerja terjamin.
Setelah itu di Hutan model logging para siswa menjalani masa job training terbagi dalam kelompok-kelompok kecil (tiap kelompok 4 orang).
Tahap I.
Kerangka kurikulum selama tiga bulan di Pusdik adalah sebagai berikut :

4.3.1. struktur dan cara kerja mesin.
4.3.2. pengetahuan dasar tentang kabel baja.
4.3.3. keselamatan kerja.
4.3.4. perencanaan logging.
4.3.5. skyline logging.
(i). struktur dan cara kerja yarder serta penanganan peralatannya.
(ii). pengetahuan dasar tentang skyline logging.
(iii). perhitungan dan pemeriksaan rangan maksimum skyline.
(iv). praktek mengemudikan yarder.
(v). praktek bongkar/pasang yarder.

4.3.6. traktor logging :

(i). struktur dan cara kerja traktor.

(ii). praktek mengemudikan traktor.

Tahap II.

Di hutan latihan dilakukan praktek survey, membuat design, pemasangan, penyaradan dan pemindahan/pembongkaran skyline sebanyak masing-masing 2-3 kali setiap siswa. Pelajaran teori tambahan diberikan pada waktu-waktu terulang di lapangan.

Tahap III dan IV.

Job training dibagi dalam dua tahap. Disini para siswa dipersiapkan agar pada akhir training sudah bisa beroperasi dengan selamat dan efisien. Untuk menguasai tehnik skyline logging, pengalaman yang ber-ulang-ulang pada lapangan yang berbeda, menambah ketrampilan para operator. Dalam tahap III para siswa memperdalam dan memperbanyak pengalaman logging.

Tahap IV merupakan tahap dimana para siswa dapat bekerja sendiri dibantu beberapa orang pekerja, dengan bimbingan yang minimal dari para instruktur.

Dalam tahap ini diberikan juga beberapa variasi dari sistem skyline.

4.4. Peserta training.

Para siswa terdiri dari karyawan Perhutani yang berijasah S M A (jurusan ilmu pasti) dan S T M.

Selama proyek telah dididik sebanyak 60 siswa yang dibagi menjadi tiga angkatan; masing masing angkatan selama 18 bulan

- Training angkatan I , 12 siswa, dari Nopember 1978 s/d Mei 1980.
- Training angkatan II , 24 siswa, dari Desember 1979 s/d Mei 1981.
- Training angkatan III , 24 siswa, dari Desember 1980 s/d Mei 1982.

Data mengenai para peserta training ketiga angkatan ini dapat diikuti dalam lampiran 2.

Semua peserta dapat mengikuti training sampai selesai dan berhasil lulus.

Meskipun terjadi pergantian expert, tetapi proses dan subyek training pada pokoknya tidak mengalami perubahan, bahkan dapat diberikan penyempurnaan pada materi pelajaran.

5. Bentuk-bentuk bantuan J I C A.

Pada dasarnya kerjasama (tehnik) dengan J I C A ini dilaksanakan dalam bentuk bantuan berupa expert, peralatan berat/mesin dan training di Jepang.

5.1. Pengiriman Expert.

Alokasi expert J I C A untuk proyek MLP adalah :

- satu orang team leader
- dua orang pengajar (teori) logging.
- tiga orang tehnisi skyline logging.
- satu orang tehnisi tractor logging.
- satu orang tehnisi pemeliharaan mesin.
- satu orang bidang administrasi.

Disamping expert jangka panjang (dua tahun), pada waktu tertentu diperlukan juga expert jangka pendek (1-3 bulan) dibidang antara lain mesin-mesin, cost analysist, perlindungan tanah dan tata air, forest engineering dlsb.

Selama proyek dilakukan pergantian expert jangka panjang 1 x. Jumlah expert yang dikirim adalah 16 expert jangka panjang dan 5 expert jangka pendek.

Di dalam tugas sehari-hari , para expert didampingi oleh para counterpart, yaitu para karyawan Perum Perhutani yang sebelumnya telah menjalani training logging mekanis di Jepang selama 3 bulan.

5.2. Pengiriman mesin dan peralatan.

Dalam kegiatan logging secara mekanis diperlukan peralatan seperti : mesin/sumber tenaga,kendaraan, kabel baja, alat cadang,perlengkapan serta peralatan logging dlsb.

Jumlah, kapasitas dan jenis peralatan yang dikirim sesuai dengan apa yang diperlukan untuk proyek pendidikan ini.

Mesin dan peralatan yang telah diterima dan dipergunakan dalam kegiatan proyek MLP bernilai 82.592.000 yen dan Rp.2.772.000,- dalam tahun 1978, 101.686.000 yen dalam tahun 1979, 115.417.000 yen dalam tahun 1980 dan 82.160.000 yen dalam tahun 1981. Jumlah seluruhnya ± 381.855.000 yen dan Rp.2.772.000,-
Mesin/peralatan utama dan kendiraan yang diterima setiap tahun dapat diikuti pada lampiran no.3.

Bantuan dari J I C A disamping yang disebut di atas, dalam tahun 1978/1979 diberikan pula berupa :

5.2.1. Biaya pembangunan jalan sambung di Ngebel (1.000 m) sebesar Rp.18.200.000,-

5.2.2. Biaya pembangunan fasilitas praktek di Pusdik Kehutanan Madiun sebesar Rp.8.886.000,-

5.3. Training di Jepang.

Training di Jepang dimaksudkan untuk memperdalam dan memperluas pengetahuan/ketrampilan dibidang logging mekanis, mempelajari penggunaannya serta masalah-masalah yang dihadapi dalam operasi logging mekanis yang sebenarnya.
Selama persiapan maupun masa Proyek MLP, Training di Jepang dilakukan sebanyak 26 pengiriman ke Jepang yang terdiri atas 9 senior course dan 17 junior course. Nama para karyawan ybs dapat diikuti pada lampiran 4.

6. Pembiayaan Proyek.

Realisasi pengeluaran routine dan pembangunan yang dibiayai oleh Perum Perhutani sejak berdirinya Proyek sampai akhir Mei 19[illegible] mencapai jumlah Rp.305.689.000,-
Perincian lebih lanjut dapat diikuti pada lampiran no.5.

III. P E N U T U P.

1. Proyek Mountain Logging Practice (ATA 184) ini adalah proyek kerjasama tehnik antara Pemerintah Indonesia cq Perum Perhutani dan Pemerintah Jepang cq J I C A yang dimulai pada bulan April 1978 dan berakhir pada bulan Juni 1982.

2. Tujuan Proyek adalah alih tehnologi dalam bidang logging mekanis di daerah pegunungan.

3. Proyek ini dapat berjalan lancar dan selama 4 tahun 2 bulan telah menghasilkan 60 tenaga terlatih di bidang logging secara mekanis.

4. Di samping training yang dilaksanakan di dalam negeri, selama jangka waktu telah dilakukan pula 26 kali pengiriman beberapa karyawan Perhutani untuk mendapatkan training di Jepang.

5. Expert Jepang yang diperbantukan pada proyek terdiri atas 16 long term experts dan 5 short term experts. Mereka ini telah melaksanakan tugasnya dengan baik.

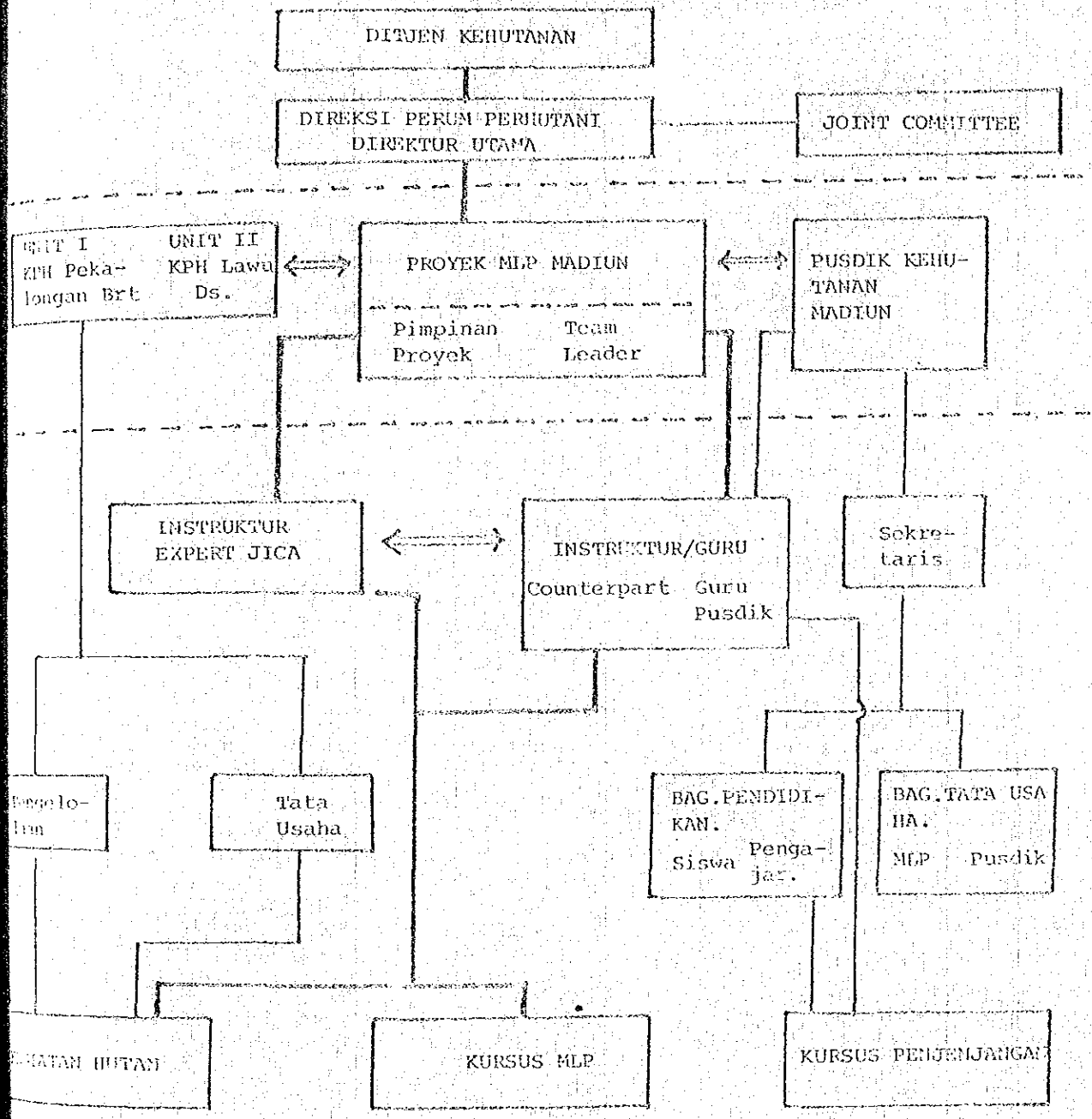
6. Bantuan mesin dan peralatan yang telah diberikan untuk keperluan proyek bernilai ± Rp.1.033.780.000.- dan ternyata sangat memperlancar jalannya proyek.

7. Proyek ini sangat bermanfaat di dalam rangka mempersiapkan teknisi-teknisi logging mekanis untuk keperluan pabrik kertas Cilacap.
   Dalam hubungan ini Perum Perhutani telah merencanakan untuk melanjutkan latihan, sehingga kebutuhan tenaga logging mekanis dapat dicukupi pada saat berdirinya pabrik kertas tahun 1985.

LAMPIRAN 1

BAGAN ORGANISASI

PROYEK MOUNTAIN LOGGING PRACTICE MADIUN



LAMPIRAN 2.

DAFTAR NAMA SISWA MLP ANGKATAN I, II DAN III

M A D I U N.

No. urut	Nama siswa Tempat & tanggal lahir	Pendidikan dan Tahun Tamat.	Pangkat & Asal KPH (Unit).
	MLP ANGKATAN I (1979-1980).		
1.	Sdr Soebardjo Poerwodadi 5-6-1950.	STM Mesin Tahun 1970.	Juru Muda (I/1) KPH Poerwodadi Unit I.
2.	Sdr Soenarjo Kejangan 5-7-1951.	STM Mesin Tahun 1970.	Juru Muda (I/1) KPH Gundih Unit I.
3.	Sdr Rudi Soeherman Tasikmalaya 10-3-1949.	STM Mesin Tahun 1968.	Juru Muda (I/1) KPH Pemalang Unit I.
4.	Sdr Soewarto Poerwodadi 23-9-1953.	STM Mesin Tahun 1972.	Juru Muda (I/1) KPH Gundih Unit I.
5.	Sdr Bambang Andriyanto Blora 6-10-1953.	STM Mesin Tahun 1973.	PP. 31/54 Banyumas Barat Unit I.
6.	Sdr Hendro Leksono Yogyakarta 11-7-1958.	STM Bangunan Tahun 1976.	PHLT Banyuwangi Utara Unit II.
7.	Sdr Soehartono Banyuwangi 6-1-1954.	STM Bangunan Tahun 1973.	PHLT Banyuwangi Barat Unit II.
8.	Sdr Suparman Banyuwangi 21-6-1950.	STM Mesin Tahun 1968.	PHLT Banyuwangi Barat Unit II.
9.	Sdr Rachmad Padangan 2-1-1955.	STM Bangunan Tahun 1973.	PHLT Bojonegoro Unit II.
10.	Sdr Hadi Siswoyo Semarang 5-9-1954.	STM Mesin Tahun 1974.	PHLT Kantor Unit I Semarang.
11.	Sdr Djoko Setiadji Pekalongan 2-7-1955.	STM Mesin Tahun 1973.	PHLT Pekalongan Timur Unit I.
12.	Sdr Supardjo Bojonegoro 27-11-1951.	STM Bangunan Tahun 1971.	PHLT Bojonegoro Unit II.

No. urut	Nama siswa Tempat & tanggal lahir	Pendidikan dan Tahun Tamat.	Pangkat & Asal KPH (Unit).
	MLP ANGKATAN II (1979-1981).		
1.	Sdr Tilam Poerwokerto 5-5-1947.	STM Mesin Tahun 1966.	Juru Muda (I/1) Banyumas Barat Unit I.
2.	Sdr Djoko Soemanto Salatiga 23-7-1951.	STM Mesin Tahun 1972.	Juru Muda (I/1) KPH Kedu Selatan Unit I.
3.	Sdr Iawan Maulana Jakarta 19-10-1954.	SMA Pas Pal Tahun 1974.	Juru Muda (I/1) KPH Pekalongan Barat Unit I.
4.	Sdr Soetjiadi Lamongan 27-1-1942.	SMA Bag.B Tahun 1964 SMI Tech.Sipil Tahun 1969.	Juru (I/3) KPH Pekalongan Timur Unit I.
5.	Sdr Kelik Poedjiharto Yogyakarta 10-1-1951.	STM Mesin Tahun 1970.	Juru Muda (I/1) KPH Magelang Unit I.
6.	Sdr Didi Safei Brebes 21-7-1948.	SMA Pas Pal Tahun 1968.	Juru Muda (I/1) KPH Balapulang Unit I.
7.	Sdr Djoemadi Klaten 13-8-1951.	STM Mesin Tahun 1971.	Juru Muda Tk.I(I/2) KPH Pati Unit I.
8.	Sdr Rasiman Palembang 19-7-1949.	STM Mesin Tahun 1967.	Juru Muda (I/1) KPH Blora Unit I.
9.	Sdr Siswoyo Banyumas 3-9-1951.	STM Listrik Tahun 1971.	Juru Muda (I/1) KPH Poerwodadi Unit I.
10.	Sdr Tanjono Sochardi Solo 31-1-1954.	STM Mesin Tahun 1973.	Juru Muda (I/1) KPH Pemalang Unit I.
11.	Sdr M. Sambik Sukabumi 3-11-1948.	SMA Pas Pal Tahun 1976.	Juru (I/3) KPH Pekalongan Barat Unit I.
12.	Sdr Toemirantoro Pare 20-7-1951.	STM Mesin Tahun 1970.	PHT/PP.31/54 KPH Kediri Unit II.
13.	Sdr Soedjarwoto Blitar 17-4-1954.	STM Mesin Tahun 1972.	Juru Muda (I/1) KPH Kediri Unit II.

No. Urut	Nama siswa Tempat & tanggal lahir.	Pendidikan dan Tahun Tamat.	Pangkat & Asal KPH (Unit).
14.	Sdr Soegeng Soetrisno Bondowoso 15-2-1945.	SMA Bag.B. Tahun 1964. SM.Hk. 1967.	PHT / PP. 31/54 KPH Jember Unit II.
15.	Sdr Moedjito Trenggalek 3-12-1948.	STM Bangunan Tahun 1970.	PHT / PP.31 / 54 KPH Banyuwangi Barat Unit II.
16.	Sdr Soeroto Bojonegoro 2-3-1952.	STM Bangunan Tahun 1972.	PHT / PP.31/54 KPH Bondowoso Unit II.
17.	Sdr Soenaryo Nganjuk 27-3-1950.	STM Mesin Tahun 1970.	PHT/PP.31/54 KPH Banyuwangi Barat Unit II.
18.	Sdr Untung Soebekti Madiun 24-6-1952.	STM Mesin Tahun 1971.	PHT/PP.31/54 KPH Saradan Unit II.
19.	Sdr Yayat Hidayat Ciparay 29-12-1949.	STM Bangunan Tahun 1970.	PHT/PP.31/54 KPH Bandung Utara Unit III.
20.	Sdr Tatang Bandung 12-2-1949.	SMA Pas Pal Tahun 1967.	PHT/PP.31/54 KPH Bandung Selatan Unit III.
21.	Sdr Amat Soeparmat Sumedang 11-12-1951.	SMA Pas Pal Tahun 1970.	PHT/PP.31/54 KPH Sumedang Unit III.
22.	Sdr Milono Pekalongan 12-5-1952.	SMA Bag.B.1970 KKMA 1975	Pengatur Muda (II/a) KPH Tasikmalaya Unit III.
23.	Sdr Soemadi Madiun	STM Mesin Tahun 1972.	PHT / PP.31/54 Pusdik Keh. Madiun.
24.	Sdr Semedi Tohdjaya Surabaya 13-12-1955.	STM Electro Tahun 1976.	PHL LPHH Bogor.
	MLP ANGKATAN III (1980-1982). UNIT I PERUM PERHUTANI JAWA TENGAH.		
1.	Sdr Soegijono Salatiga 2-7-1950.	STM Mesin Tahun 1970.	PHT (A/2) Biro Perencanaan Unit I Jawa Tengah.
2.	Sdr Suyitno Pratigno Salatiga 5-7-1949.	SMA B. Tahun 1967.	PHT (A/2) Biro Perencanaan Unit I Jawa Tengah.
3.	Sdr Soegito Imoyo Magetan 5-7-1947.	SMA B Tahun 1966.	PHT (A/2) Biro Perencanaan Unit I Jawa Tengah.

No. urut	Nama siswa Tempat & tanggal lahir	Pendidikan dan Tahun tamat.	Pangkat & Asal KPH (Unit).
4.	Sdr Mulyono Salatiga 5-5-1946.	STM Electro Tahun 1966.	PHT (A/2) Biro Perencanaan Unit I Jawa Tengah.
5.	Sdr Adang Rosdiana Ciamis 6-2-1955.	STM Mesin Tahun 1973.	Juru Muda (I/1) KIPKJ Cepu Unit I.
6.	Sdr Soewito Blora 12-2-1953.	STM Listrik Tahun 1973.	Juru Muda (I/1) KIPKJ Cepu Unit I.
7.	Sdr Soegiarto Semarang 14-1-1949.	SMA Pas Pal Tahun 1969.	Juru Muda (I/1) KIPKJ Cepu Unit I.
8.	Sdr Soejatno Wonogiri 17-2-1944.	STM Mesin Tahun 1965.	Juru Muda (I/1) KIPKJ Cepu Unit I.
9.	Sdr Soebagyo Blora 27-4-1955.	STM Listrik Tahun 1974.	Juru Muda Tk.I (I/2) KIPKJ Cepu Unit I.
10.	Sdr Margono Demak 17-9-1950.	SMA Pas Pal Tahun 1971.	PHT (A/2) KPE Jawa Tengah Semarang.
11.	Sdr Hartono Purwodadi 24-2-1948.	STM Mesin Kapal Tahun 1970.	PHT (A/2) Biro Perencanaan Unit I Jawa Tengah.
	UNIT II PERUM PERHUTANI JAWA TIMUR.		
12.	Sdr Sulijono Banyuwangi 5-5-1953.	SMA Pas Pal Tahun 1973.	PP. 31/54 KPH Kediri Unit II.
13.	Sdr Adi Tjahjo Purwanto Nganjuk 20-11-1951.	SMA Pas Pal Tahun 1970.	PP. 31/54 KPH Kediri Unit II.
14.	Sdr Soetrisno Malang 10-10-1957.	STM Listrik Tahun 1976.	PP. 31/54 KPH Probolinggo Unit II.
15.	Sdr Soetjipto Ponorogo 7-7-1947.	STM Mesin Tahun 1967.	PP. 31/54 KPH Madiun Unit II.
16.	Sdr Hasjim Asyari Randuagung 7-4-1949.	STM Mesin Tahun 1969.	PP. 31/54 KPH Probolinggo Unit II.
17.	Sdr Prawoto Madiun 15-12-1953.	SMA Pas Pal Tahun 1971.	PP. 31/54 KPH Madiun Unit II.

No. urut	Nama siswa Tempat & tanggal lahir	Pendidikan dan Tahun tamat.	Pangkat & Asal KPH (Unit).
18.	Sdr Suwito Magetan 25-5-1953.	STM Tahun 1972.	PP. 31/54 KPH Saradan Unit II.
19.	Sdr Hendro Wahono Madiun 20-8-1953.	SMA Pas Pal Tahun 1973.	Juru Muda (I/I) *) KPH Lawu Ds. Unit II.
	UNIT III PERUM PERHUTANI JAWA BARAT.		
20.	Sdr Hendra Herawan Sumedang 13-8-1942.	SMA Tahun 1966.	PHT KPH Bandung Selatan Unit III.
21.	Sdr Nana Suryana Jakarta 10-12-1952.	STM Bangunan Tahun 1972.	PHT KPH Ciamis Unit III.
22.	Sdr Ayi Sukanda Garut 9-4-1954.	SMA Pas Pal Tahun 1972.	PHT KPH Garut Unit III.
23.	Sdr Nurkam Nurhani Labuan 9-12-1954.	STM Bangunan Tahun 1974.	PHT KPH Banten Unit III.
24.	Sdr Dadi Satriadi Kediri 30-7-1949.	STM Bangunan Tahun 1969.	PHT KPH Bogor Unit III.

*) Mulai masuk tanggal 27-1-1981, mengganti Sdr Adhary dari KPH Kuningan yang mengundurkan diri.

LAMPIRAN 3.

Daftar Peralatan Utama Proyek MLP

I t e m	1978	1979	1980	1981	Total
Yarder (Large)	3 (Y-32)	6 (Y-32)	3 (Y-32)		12
(Medium)			2 (Y-252)		2
(Small)	1 (Y-12)		2 (Y-12)		3
Tractor (Crawler)	1 (CT-35)	1 (CT-35)			2
(Wheel)		1 (T-20)	1 (T-50)		2
Micro bus	2 (9 persons)	2 (15 persons)	1 (25 persons)	2(15 persons)	7
Truck	1 (4 ton)	1 (1.5 ton)			2
Crane truck	1 (TW-D)	1 (TS-D)			2
Four wheel drive car	2(Land cruiser, Light ban)	1(Mitsubishi jeep)	2 (Land cruiser.)		5
Shovel dozer			1 (D-50S)		1
Log loader				1 (510)	1
Motor cycle*		2 (Yamaha)	2 (Suzuki)		4
Chain saw		6 (Dormer 123)		5 (Dormer 133)	11
Copy machine	1	2	2	1	6
Generator.		4			4
Wire rope	25,200 m	41,000 m	54,000 m	98,000 m	218,200 m
Accessories					
Spare parts					
Office equipment					
Tools					
Nilai (1,000 Yen)	* 82,592	101,686	115,417	82,160	381,855

* tidak termasuk peralatan / kendaraan yang dibeli di Indonesia.