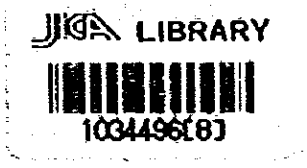
FEASIBILITY STUDY
FOR
THE PLANT RENOVATION
BASUKI RACHMAT PULP AND PAPER MILL
IN
THE REPUBLIC OF INDONESIA

SUMMARY

OCTOBER, 1984

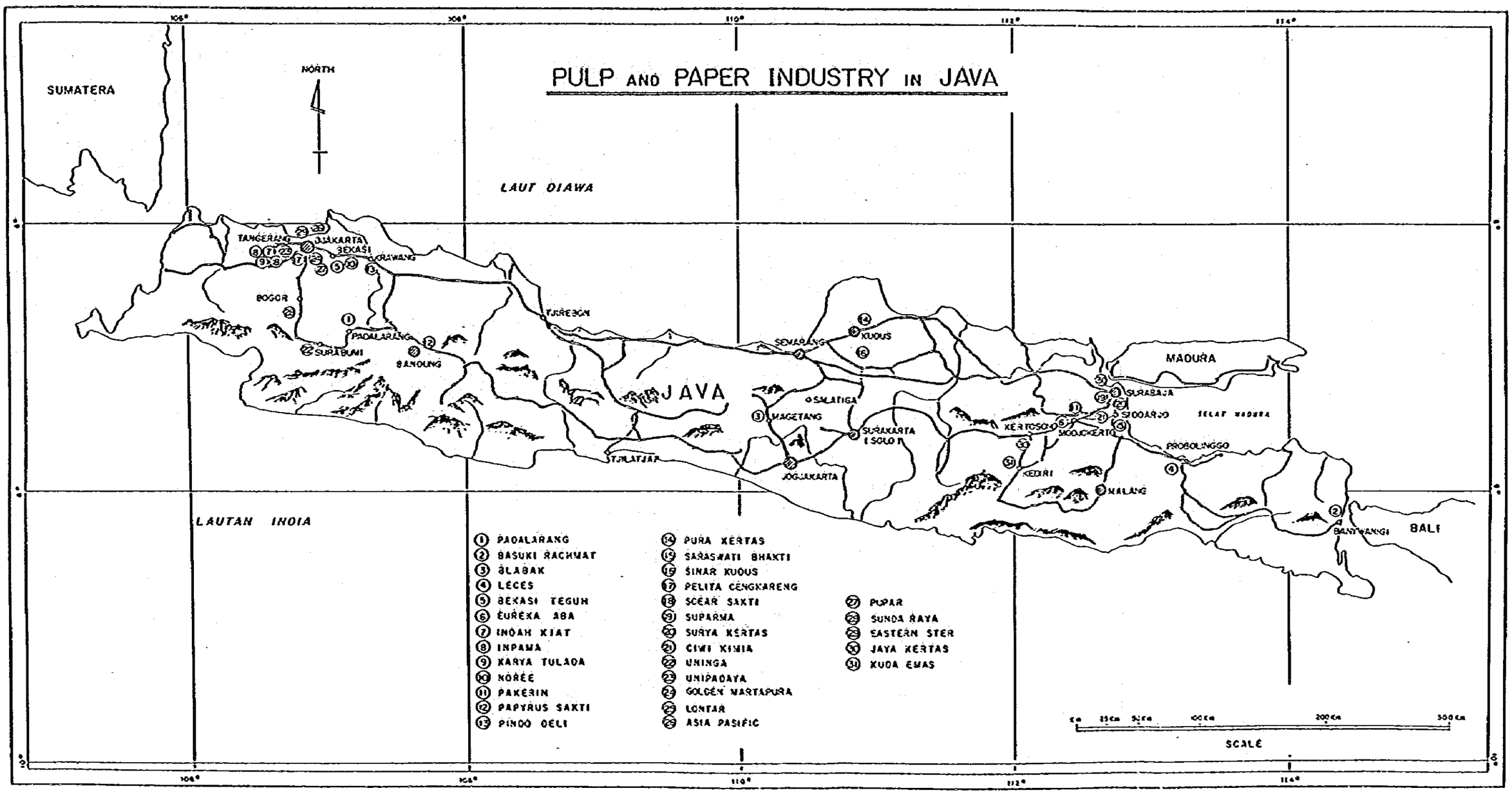
PAN INTERNATIONAL COOPERATION AGENCY



SUMMARY

INDEX

PULP AND PAPER INDUSTRY IN JAVA



In this report the following currency exchange rates are used:

Values up to Oct. 1978	US$1 = Rp425
Values from Nov. 1978 to Feb. 1983	US$1 = Rp625
Values from Mar. 1983 to Feb. 1984	US$1 = Rp1,000

When calculating new investment and others for financial analysis

US$1 = ¥230
US$1 = Rp1,000

Major Data on Basuki Rachmat Mill
(current status vs. after renovation)

	Item	Unit	Current status	After renovation	
A	General				
–1	Construction work/Builder		1962/Japan		
–2	Renovation work/Executer		1975/Japan		
–3	Number of employees		735	735	
–4	Distance from Jakarta	km	1,100	1,100	
	Distance from Surabaya	km	300	300	
B	Status of business				
–1	Annual production	ADt/y	11,791	14,245	
–2	Annual sales	1,000 Rp/y	6,788,550	10,645,408	
–3	Total production cost	1,000 Rp/y	7,809,508	9,476,111	
–4	Profit aft. tax	1,000 Rp/y	-1,334,063	203,222	
–5	Major sales terr.		Surabaya, Semarang	Surabaya, Semarang	
–6	Main products		Printing & writing Litho. paper	Same as present plus high added value papers	
C	Status of production of main equipment				
–1	Self-made pulp	BDt-BKP/y	(8,862.6)	8,426.0	
	Recovery rate of cooking liquor	%	65 ± 6	90.0	
–2	Paper production		Current grades	Current grades	New grades
	Daily production	ADt/d	34.1	44.8	31.3
	Total efficiency	%	76.3	85.0	80.0
	Pulp yield	%	95.0	95.0	
D	Status of utilities				
–1	Power generating capacity	kW	9,920.0	9,920.0	
–2	Power consumption	MWh/y	19,670.4	24,686.0	
–3	Steam generating capacity	t/d	384.0	384.0	
–4	Steam consumption	t/d	308.6	313.5	
–5	Water consumption	m^3/d	14,215.8	13,862.3	

INTRODUCTION

1. Background and Circumstances of Investigation

(1) In compliance with the request of the Government of Japan who had received a request from the Government of Republic of Indonesia, the Japan International Cooperation Agency determined to dispatch an investigation team to the Republic of Indonesia to evaluate the feasibility of the plant (pulp and paper) renovation project of Padalarang Pulp and Paper Mill (hereinafter called PPM) and Basuki Rachmat Pulp and Paper Mill (hereinafter called BRPP).

(2) The preliminary survey team, which had been dispatched prior to this investigation team, conferred with the Indonesian party during the period of December 21 to 28, 1983 as to the scope of investigation to be made and the preliminary survey team and the Indonesian party signed an agreement on December 26, 1983.

(3) Based on the said agreement, this investigation team conducted the field investigation during the period of February 26 to March 27, 1984 and reviewed the investigation results in detail. This writing reports the investigation results.

2. Purpose of Investigation

The purpose of this investigation is to make a diagnosis of BRPP and PPM and to study the feasibility of renovating the two mills, as well as to prepare a renovation program with the main target set on the higher efficiency of production and improvement of the product quality.

3. Scope of Investigation

In order to accomplish the purpose as described above, the investigation team confirmed the policy of the Ministry of Industry, Indonesia, surveyed the market conditions and investigated both mills on their operations, facilities and management practices. The investigation team integratedly evaluated the investigation results from the technical and financial viewpoints.

CHAPTER 1 SUMMARY OF THE RENOVATION PLAN

1-1 Future Prospects

Basuki Rachmat Pulp and Paper Mill manufactures commodity type of printing and writing paper on an integrated basis from pulp to paper.

However, their production scale is small and the labor productivity is low. The mill location has a distance from the markets, which is one of the disadvantages held by the mill.

If the mill is to continue the operation as it is, it may be difficult for the mill to come out of the operation in deficit. On the other hand, the mill has a social commitment to contribute toward the development of the local area where the mill is located and to stabilize the employment in the area as the only pulp and paper mill in this part of the country.

Hence, the following measures are considered for the future development of the mill:

a. Shifting of the products to more highly added value products.

b. The mill should proceed to the integrated operation from papermaking to the secondary processing of paper such as the making of notebooks as done already.

c. The mill should establish the capability of competing with the foreign products in the international market both in price and quality, whereby the export of paper should be encouraged.

In either case, the prime importance is to be placed on the reduction of production cost of the current products and the recovery of prices. The buildup of the competing ability is critically needed. In addition, it is necessary for the mill to establish production system capable of producing high added value products.

As the basis of the consolidation of the mill ability, the accumulation of the higher level of technology and strengthening of the marketing ability are very important in parallel to the improvement and renovation of the production facilities.

In addition, the better utilization of the pulp making equipment should be taken into consideration from the strategic viewpoint.

1-2 Basic Policy of Renovation Plan

(1) Problem with the present status

This mill is located at the eastern end of Java Island, having one paper machine to produce 12,000 tons of printing and writing paper. The mill has pulp producing facilities for self-use, allowing integrated operation from pulp to paper. The earnings of the mill are getting worse in recent years rapidly as shown below.

	1980	1981	1982	1983
Profit & loss (Rp 1,000)	721,160	53,105	-502,642	-1,574.93
Annual production (t)	12,873	12,702	12,595	11,787

Increased production cost due to the hike in oil price and the sluggish market price of paper are the main reasons for the worsened earnings. Besides, the following matters are pointed out as the problems peculiar to the mill:

a. Due to the unstable quality of the products the sales prices are usually 10 to 20% lower than those of the similar products made by the other manufacturers.

b. The recovery rate of cooking chemicals at the pulp plant is as low as 66%, which is an abnormal figure.

c. The total efficiency of the paper machine is extremely low at 76.3%.

d. The grades manufactured are limited to printing and writing, which is an unprofitable item due to the over-supply.

e. Generally speaking, the mill is well managed and controlled. However, further efforts should be made toward the introduction of new technique on operational control for the betterment of the mill management.

(2) Measures for improvement

To cope with the problems as mentioned above, the following measures should be taken for the betterment of profitability. However, it is thought that the change to the black account will be achievable from the year of 1991 (profit in the amount of Rp304,957,000) onwards.

a. Improvement should be made so that L-wood and N-wood can be cooked separately. In addition, all the processes throughout the mill should be more stabilized. By all means, the quality of products should be stabilized, whereby the sales price is to be improved by 7%.

b. The chemicals recovery plant should be improved, aiming at the recovery rate up to 90% from the present 66%. Thereby, the variable costs of pulp can be lowered (from Rp306 to Rp261/kg). This measure will contribute, at the same time, to the lowering of contamination of the effluent.

c. The speed of the paper machine is to be increased from the present level of 230 to 240m/min. up to 280m/min. The total efficiency should also be upped from 76.5% to 85%.

Thereby, the daily production should be raised from the present 34ADt to 45ADt.

d. Renovation will be made to enable partial production of specialty paper in the amount of 2,400tons a year.

(3) Education and training

In other to achieve the renovation plan most effectively, the level-up of operating techniques and management know-how are indispensable in parallel to the renovation of equipment.

Under this renovation plan, education and training of the employees abroad as well as at the mill site by foreign technical exports are scheduled so as to transfer the technology in every possible manner.

1-3 Equipment Renovation Plan

(1) Wood preparation

a. Investment: Rp295,652,000

b. Two units of chip silo are additionally installed so that N-wood and L-wood can be cooked separately, whereby it is expected that pulp quality can be improved.

(2) Pulp cooking

a. Investment: Rp171,304,000

b. One additional blow tank is installed for separate cooking of N and L-wood. Thus, pulp quality can be improved.

(3) Washing

a. Investment: Rp337,826,000

b. The three washers are replaced with new ones to improve the chemical recovery rate. Thus, the quality will be much stabilized and the cost of production will be reduced. At the same time the contamination of the effluent will also be reduced.

(4) Bleaching

a. Investment: Rp28,696,000

b. The number of shower pipes is increased to stabilize the quality.

(5) Stock preparation

a. Investment: Rp173,913,000

b. Two DDR are newly installed as the main investment to improve the pulp quality and to increase the production.

(6) Papermaking

a. Investment: Rp2,053,478,000

b. The following renovations are made to improve the paper quality, increase the production and to improve various efficiencies:

- Approach equipment renovation
- Flow box replacement
- Wire part remodelling
- Press part replacement
- Drainage improvement
- Reel improvement
- Sectional drive system renovation
- Cutter replacement
- Winder replacement

(7) Supercalender

a. Investment: Rp1,782,609,000

b. Installation of a supercalender to improve the paper quality and to produce new grades which will have higher profitability.

(8) Recovery boiler

a. Investment: Rp86,957,000

b. Minor renovation of the dust discharging device for the electric precipitator to improve the chemical recovery rate and to contribute to the pollution control.

(9) Spare parts

a. Investment: Rp1,004,348,000

For renovated equipment: Rp230,435,000
For existing equipment: Rp773,913,000

1-4 Education and Training

Education and training of employees to give them ability to solve various problems related to the management and control of the mill operations are very important in parallel to the renovation of equipment. The following programs are planned:

(1) Education and training abroad

a. Number of persons to be dispatched: 7 persons for a total of 17 man-month

b. Subjects for education and training

Papermaking technology and mill management as a whole (quality control, equipment control, operation control and market control).

(2) Education and training in Indonesia

The training of operators on the supercalender is to be carried out at an Indonesian paper company, for example, at Gowa Paper Mill. (13 persons × 2.5 months)

(3) Education and training at the site of BRPP

In this renovation plan, the technical assistance is to be rendered by foreign technical experts. Those experts dispatched to BRPP should make use of every opportunity to transfer the appropriate technology to the employees of BRPP. Incidentally, the number of foreign technical engineers dispatched to BRPP is 7 persons with a total of 17 man-month.

(4) Education and training programs to be continued

The following methods should be taken:

a. Opening of a course to give the employees the common sense of papermaking as a whole.

b. By classifying the employees into several ranks, an education system should be established to hold several courses for freshmen, group leaders, superintendents, middle management class, etc.

c. Circle activities by jobsites and proposal systems should be introduced and the OJT (on the job training) should be actively pursued.

d. Establishment of overseas training system.

1-5 Implementation of Renovation Project

(1) We recommend that the overall scheme to secure the profit consistently and to contribute to the development of the area, where the mill is located, should be carried out, dividing it into short-term, middle-term and long-term plans.

a. Short-term plan

Improvement items pointed out by the investigation team during the field investigation and any items that can be started among the items described in this report are put into practice.

b. Middle-term plan

This renovation project is implemented as a major project in the fourth 5-year plan (1984 – 1988). The project is to start its work in 1985 and the whole work is to be completed in two years and two months.

c. Long-term plan

A new paper machine is installed as a project the fifth 5-year plan (1989 – 1993) depending on the situation of fund availability, trend of the domestic market and results of the middle-term plan. In order to implement the plan, further study and review of the plan will be required.

(2) Implementation system

a. Since this renovation project is essentially a renovation project of the existing plant, we recommend that the control system that the plant possesses is fully utilized and at the same time, a renovation project execution team is organized.

b. In order to complete this project successfully, we recommend that BRPP receives assistance of engineers of a foreign consultant or foreign papermaking company, who have experience in such renovation work as this project.

(3) Project implementation schedule

a. The project should be started in 1985, and should be completed within a period of two years and two months.

b. The shutdown of the paper machine for the renovation work is scheduled for 60 days.

(4) Total funds for investment

a. Total funds required for the implementation of the middle-term plan follow:

Unit: Rp1,000

A.	Equipment cost	6,840,578
B.	Engineering fee	403,478
C.	Construction work	684,566
D.	Operation supervision	180,570
E.	Training fee	260,869
F.	Overhead	340,409
G.	Contingency	680,834
	Total	9,391,304
H.	Interest during the construction	1,186,434
I.	Repayment	217,826
J.	Initial working capital	234,870
	Grand total	11,030,434

b. Procurement of funds

Equity : 30% Long-term loan : 70%
(The terms and conditions for the loan are not decided yet. The above percentages are used provisionally for the purpose of financial calculations)

Unit : Rp 1,000

	Foreign cur.	Local cur.	Total
Equity	—	3,309,130	3,309,130
Long-term loan	7,552,174	169,130	7,721,304
Total funds	7,752,174	3,478,260	11,030,434

1-6 Financial Analysis and Economic Evaluation

(1) Basis for financial analysis

a. Conversion rate: US$1 = Rp1,000
US$1 = ¥230

b. Fiscal year: Jan. to Dec.

c. Rate of achievement of renovation work: 1987 (50%), 1988 (80%)
1989 and thereafter (100%)

d. Total funds invested and funds procurement
Equity 30%, Long-term loan 70%

Unit : Rp 1,000

	Foreign cur.	Local cur.	Total
Equity	—	3,309,130	3,309,130
Long-term loan	7,552,174	169,130	7,721,304
Total funds	7,552,174	3,478,260	11,030,434

e. Interest rate for long-term loans

Foreign: 12%
Local: 16%

(The terms and conditions for the loan are not decided yet. The above interest rates are used provisionally for the purpose of financial calculations. Incidentally, the use of the provisional figures will not affect the I.R.R.O.I. substantially.)

f. Terms of repayment for long-term loan

After 2-year grace period, repayment in 10 years on an even installment basis (once a year).

g. Depreciation :

Machinery and equipment	10 years
Civil and building works	30 years
Vehicles	5 years

h. Corporation tax

Profit ≦ Rp 10 million	:	15% of profit
Rp 10 million < Profit ≦ Rp 40 million	:	25% of profit
Rp 40 million < Profit	:	35% of profit

(2) Results of financial analysis

a. Profit and loss calculation by years

As shown in the table attached, the account in the red figure will continue until the year of 1990, and the account will turn to the black in the year of 1991 and thereafter. For the time being, difficult years will continue to exist for BRPP.

There will be a shortage of funds until 1988. The shortage of funds will disappear finally in 1989 and thereafter. Until then, the situation will be serious for BRPP.

b. Profit and loss break-even point is shown in the table attached. The operating ratio to correspond the break-even point is now as high as 157%. After completion of the renovation work, this percentage will come down to 97%. Although this is an improvement, the situation is still critical. As regards the existing grades, the loss in sales will continue to exist, even after the completion of the renovation work.

c. I.R.R.O.I. and the payout period will be 22.61% and 3.55 years respectively.

d. The sensitivity analysis is given in the following tables:

Plus or minus 5% in the selling price

	-5%	0	+5%
I.R.R.O.I. (%)	18.58	22.61	26.29
Payout period (yr.)	4.05	3.55	3.17

Plus or minus 5% in the total investment

	-5%	0	+5%
I.R.R.O.I. (%)	23.93	22.61	21.47
Payout period (yr.)	3.40	3.55	3.70

The figures justify that the proposed investment is a worthwhile investment.

e. The following are the various indexes calculated:

- Aft. Tax. Profit – to – Sales Revenue (%)

$$\frac{\text{Net profit aft. tax}}{\text{Total sales}} \times 100$$

- Bef. Tax Profit – to – Investment (%)

$$\frac{\text{Net profit bef. tax.}}{\text{Total investment}} \times 100$$

- Debt Service Ratio

$$\frac{\text{Depreciation + Interest payable (long term) + Net profit aft. tax}}{\text{Repayment of long-term loans + Interest payable (long term loans)}}$$

		Net profit aft. tax agst. total sales	Net profit bef. tax agst. investment	Debt service ratio
		%	%	%
1	(1987)	-15.8	-12.9	65.6
2	(1988)	-8.3	-7.5	100.8
3	(1989)	-3.8	-3.7	128.6
4	(1990)	-0.7	-0.6	136.0
5	(1991)	1.9	2.8	136.8
6	(1992)	2.4	3.5	143.4
7	(1993)	2.9	4.3	150.9
8	(1994)	3.4	5.0	159.6
9	(1995)	3.9	5.8	169.7
10	(1996)	4.4	6.5	181.5

The financial ability to repay the loans will be improved to a certain extent from the year of 1988. However, the financial position will still be serious. The accumulation of own equity will be difficult to do.

From the year of 1991, the mill will get into the black figure. Still the profitability will be at a low level.

(3) Economic evaluation

a. Basuki Rachmat Mill will be able to turn to a black-ink balance from the year of 1991, securing a fairly sound financial position from that year onwards. Thus, the company will become able to contribute to the development of the area, where the mill is located, and to serve as a source of employment of the local residents.

b. BRPP will expand sales of new products which had not been manufactured domestically and their technical capability will be much improved.

Table 13-14-1 Annual Statement of Profit and Loss

Items	Present	(1985) -2	(1986) -1	(1987) 1	(1988) 2	(1989) 3	(1990) 4	(1991) 5	(1992) 6	(1993) 7	(1994) 8	(1995) 9	(1996) 10	Remarks
Sales	6,788,550	6,788,550	5,657,125	9,012,138	9,992,108	10,645,408	10,645,408	10,645,408	10,645,408	10,645,408	10,645,408	10,645,408	10,645,408	
(Q'ty, t)	(11,791 t)	(11,791 t)	(9,826 t)	(13,008 t)	(13,750 t)	(14,245 t)	(14,245 t)	(14,245 t)	(14,245 t)	(14,245 t)	(14,245 t)	(14,245 t)	14,245 t)	
Production cost														
Variable cost	4,297,182	4,297,182	3,580,985	4,742,778	5,216,967	5,333,093	5,333,093	5,333,093	5,333,093	5,333,093	5,333,093	5,333,093	5,333,093	
Personnel expenses	1,018,956	1,018,956	1,018,956	1,018,956	1,018,956	1,018,956	1,018,956	1,018,956	1,018,956	1,018,956	1,018,956	1,018,956	1,018,956	
Depreciation (current)	568,630	568,630	568,630	568,630	568,630	294,191	-	-	-	-	-	-	-	
Depreciation (new)	0	0	0	979,122	979,122	979,122	979,122	979,122	979,122	979,122	979,122	979,122	979,122	
Other fixed cost	918,572	918,572	918,572	918,572	918,572	918,572	918,572	918,572	918,572	918,572	918,572	918,572	918,572	
Total	6,783,138	6,783,138	6,066,941	8,207,856	8,682,045	8,993,171	8,743,952	8,449,741	8,449,741	8,449,741	8,449,741	8,449,741	8,449,741	
Operating income	5,412	5,412	- 409,816	804,302	1,310,063	1,647,237	1,901,476	2,195,667	2,195,667	2,195,667	2,195,667	2,195,667	2,195,667	
Selling expenses	248,419	248,419	248,419	248,419	248,419	248,419	248,419	248,419	248,419	248,419	248,419	248,419	248,419	
Administrative expenses	777,951	777,951	777,951	777,951	777,951	777,951	777,951	777,951	777,951	777,951	777,951	777,951	777,951	
Total	1,026,370	1,026,370	1,026,370	1,026,370	1,026,370	1,026,370	1,026,370	1,026,370	1,026,370	1,026,370	1,026,370	1,026,370	1,026,370	
Total cost	7,809,508	7,809,508	7,093,311	9,234,226	9,708,415	10,026,541	9,770,322	9,476,111	9,476,111	9,476,111	9,476,111	9,476,111	9,476,111	
Interest payable														
Current (Long-term loan)	110,695	110,695	110,695	110,695	110,695	110,695	110,695	110,695	110,695	110,695	110,695	110,695	110,695	
(Short-term loan)	202,410	202,410	202,410	202,410	202,410	202,410	202,410	202,410	202,410	202,410	202,410	202,410	202,410	
New (Long-term loan)	0	0	0	880,122	798,396	716,004	633,622	551,235	468,848	386,461	304,074	221,687	139,304	
(Short-term loan)	0	0	0	6,244	0	0	0	0	0	0	0	0	0	
Total	313,105	313,105	313,105	1,199,471	1,111,501	1,029,109	946,727	864,340	781,953	699,566	617,179	534,792	452,409	
Profit before tax	- 1,334,063	- 1,334,063	-1,749,291	- 1,421,539	- 827,808	- 408,242	- 71,621	304,957	387,344	469,731	552,118	634,505	716,888	
Corporation tax	0	0	0	0	0	0	0	101,735	130,570	159,406	188,241	217,077	245,911	
Profit after tax (B)	- 1,334,063	-1,334,063	- 1,749,291	- 1,421,539	- 827,808	- 408,242	- 71,621	203,222	256,774	310,325	363,877	417,428	470,977	
A - B	- 785,633	- 785,633	- 1,200,861	106,013	699,744	1,119,310	1,201,692	1,182,344	1,235,896	1,289,447	1,342,999	1,396,550	1,450,099	
Loan repayment				38,900 681,046	686,592	686,552	686,552	686,552	686,552	686,552	686,552	686,552	686,552	

Table 13-15-1 Break-even Point for Every Kind of Paper

Kinds		Present				
		Daily production	Operation profit	Fixed cost	Break-even point	Ratio of operation
		t/day	RP/kg	Thousand RP/day	t/day	%
HVS	45g	33.76	182.67	11,058	60.50	219
HVS	55g	31.00	255.11	11,058	43.36	140
HVS	65g	36.64	267.50	11,058	53.33	146
HVO	65g	36.54	173.22	11,058	64.04	175
HVS,O	85g	33.87	244.63	11,058	45.33	134
CS	75g	34.58	219.64	11,058	50.48	145
Sub total		34.18	211.30	11,058	52.48	154
Oil Proof Paper	45g					
Base Paper Laminate	45g					
Form Paper	65g					
Sub total						
Total		34.18	211.30	11,058	52.48	154

Improved					Remarks
Daily production	Operation profit	Fixed cost	Break-even point	Ratio of operation	
t/day	RP/kg	Thousand RP/day	t/day	%	(1) Annual fixed cost (Present)
35	263.81	14,505	53.76	154	1000 Rp Personnel expenses 1,818,554 Depreciation 541,439 Other fixed cost 918,532 Selling expenses 245,419 Administrative expenses 777,951 Interest payable 313,335 Total 3,925,431
41	347.83	14,505	41.70	132	(1000 Rp) (1000 Rp) 3,925,431÷345 (Exp.)= 11,058
59	214.75	14,505	52.79	136	
50	230.84	14,565	63.84	126	
59	269.45	14,505	43.44	93	
50	234.65	14,505	61.83	124	
44.75	291.12	14,505	43.82	111	(2) Annual fixed cost after improved (Average for 10 years)
16	356.96	14,505	41.63	254	1000 Rp Personnel expenses 1,818,554 Depreciation 1,173,870 Other fixed cost 918,532 Selling expenses 245,419 Administrative expenses 777,951 Interest payable 823,765 Total 4,960,671
25	698.36	14,505	20.77	83	(1,000 RP) (1,000 RP) 4,960,671÷342 (Exp.)= 14,505
50	753.18	14,505	19.81	38	
31.33	651.16	14,505	21.29	68	
41.65	358.89	14,505	65.42	92	

CHAPTER 2 SUMMARY OF INVESTIGATION RESULTS

2-1 Government Policy of Indonesia toward Pulp & Paper Industry

2-1-1 Policies Given to Pulp and Paper Industries

(1) The Indonesian Government sets a policy of completing three major expansion and new installation projects in the fourth 5-year plan (1984 – 1988), satisfying the domestic demand for newsprint paper, kraft paper and kraft liner, as well as developing the paper industry into an export oriented industry.

(2) The existing paper mills are still far from being competitive in the international market both on the quality and cost, and these mills require protection by means of tariff and others.

(3) For this reason, the Indonesian Government takes measures to encourage optimization and rational enlargement of the existing paper mills for the purposes of establishing the foundation as an export industry as far as it is possible.

2-1-2 General Policies toward Basuki Rachmat Pulp and Paper Mill and Padalarang Pulp and Paper Mill

(1) The Indonesian Government has set the major policies as follows:

a) Optimization of production scale
b) Production of grades that the internationally competitive
c) Effective use of domestic raw materials and import restrictions
d) Activation and stabilization of employment as regional industries
e) Switch to an export-oriented industry
f) Raising of equipment efficiencies with relatively small investment
g) Change to an energy saving industry
h) Utilization of secondhand equipment will be permissible
i) Necessity for education of all the employees

2-2 Market

2-2-1 Demand and Supply of Paper in Indonesia (Government Statistics)

(1) Production, import, export and consumption

	Production t/y		Export/Import t/y		Consumption	
	Actual	Capacity	Export	Import	t/y	Kg/capita
1982	329,688		5,200	306,955	631,483	4.20
1983	374,379	505,000	10,706	267,105	630,778	4.10
1984		676,000		228,850	670,000	4.30

(2) According to the statistics of production, import, export and consumption of paper in Indonesia during the period from 1976 to 1983, printing and writing paper is in the status of over-supply while the most part of specialty paper, and cigarette paper are dependent upon imports.

In addition, the demand and supply forecast in the future until the year of 1990 indicates that the printing and writing paper will continue to be in the status of over-supply.

2-2-2 Estimated Requirement of Specialty Paper

Official statistics on individual items of specialty paper are not available. The investigation team made their own survey, getting information from private sources and so on. Demand estimate thus obtained is shown in the table attached.

Selection of some promising grades for future production is to be made out of various grades listed on the table.

The prices of various types of specialty paper are kept much higher than printing and writing paper owing to the tariff protection at a higher rate.

Table 3-3-1 Forecast of Demand for Paper (1984 - 1990)

Unit: ton

Kinds	1983	Growth rate	1984	1985	1986	1987	1988	1989	1990
Glassine paper	1,700	0 %	1,700	1,700	1,700	1,700	1,700	1,700	1,700
Greased-proof paper	1,200	1	1,212	1,224	1,236	1,248	1,260	1,273	1,286
Carbon base paper	2,000	2	2,040	2,080	2,120	2,160	2,203	2,247	2,292
N.C.R.	2,400	5	2,520	2,646	2,778	2,917	3,063	3,216	3,377
Base paper for lamination	2,000	9.5	2,190	2,398	2,626	2,875	3,148	3,448	3,776
Manifold	7,500	5	7,875	8,269	8,682	9,116	9,572	10,051	10,554
Ribbed kraft paper	7,500	9.5	8,213	8,993	9,846	10,782	11,807	12,928	14,156
Onion skin	150	2	153	156	160	162	165	169	172
Soap wrapper	1,500	5	1,575	1,654	1,736	1,823	1,914	2,010	2,111
Tracing paper	100	9.5	110	120	131	144	157	172	188
Cigarette paper	15,000	7	16,050	17,174	18,376	19,662	21,038	22,511	24,086
Computer paper	3,600	20	4,320	5,184	6,221	7,465	8,958	10,750	12,900
Transfer paper	240	2	245	250	255	260	265	270	275
W/F pap. (incl. coated paper)	160,000	5	168,000	176,400	185,220	194,481	204,205	214,415	225,136
Newsprint	120,000	5	126,000	132,300	138,915	145,860	153,154	160,811	168,852
Kraft liner Corrugated medium	250,000	9.5	273,750	299,976	328,233	359,415	393,560	430,945	471,885
White board	105,000	9.5	114,975	125,898	137,858	150,954	165,295	180,998	198,193
Sack kraft	45,000	5	47,250	49,613	52,093	54,698	57,433	60,304	63,319
Total	724,890		778,178	836,035	898,185	965,722	1,038,897	1,118,218	1,204,258
Population (estimation): mil.	158.1		161.6	165.2	168.7	172.2	175.6	179.1	182.7
Consumption per capita	4.6		4.8	5.1	5.3	5.6	5.9	6.2	6.6
IPPA'S ANNOUNCEMENT	630,778		709,000	790,000	864,000	949,000	1,140,000	1,270,000	-
Consumption per capita	4.0		4.4	4.8	5.1	5.5	6.5	7.1	-

2-2-3 BRPP Characteristics from Market Viewpoint

(1) Types of products

The entire products manufactured by BRPP are in the category of printing and writing paper. No distinctive products are found among their products.

However, the switch of production to specialty paper in a large quantity involves a great risk since the market size is not large enough and BRPP lacks the facilities and experiences in the making of specialty paper.

(2) Location

The products are sold in the Surabaya district (70%). BRPP is apparently handicapped in its location when compared with private paper mills.

(3) Users

Printing and writing paper sold by BRPP is for general use. No major users are found. BRPP has a notebook processing plant. The ratio of secondary processing should be raised in order to put added value to the products. At the same time, efforts should be made to have direct connections with the end users. Such will be a clever selection to go ahead.

(4) Production facilities and production cost

a. Printing and writing paper for general use is in over-supply as mentioned earlier. Production facilities should be remodelled so that the mill will become able to produce certain types of specialty paper.

b. On the other hand, efforts should be made to reduce the production cost for printing and writing paper for general use in order to compete with other manufacturers.

(5) Evaluation of quality in the market

The quality of the products of BRPP is less evaluated in the market as compared with the products of the competitors. The market price of BRPP products is cheaper by 10 to 23% than the price given to the competitors' products. The price difference corresponds to about Rp100 per kg.

It is most urgent that the quality is stabilized and the price is raised to the level of the price of the competitors.

(The terms and conditions for the loan are not decided yet. The above interest rates are used provisionally for the purpose of financial calculations. Incidentally, the use of the provisional figures will not affect the I.R.R.O.I. substantially.)

(6) New production items recommendable for the present

a. As a result of the study on the types of specialty paper now imported into Indonesia and in consideration of the market size, the degree of renovation to be given to the existing facilities and the technical level of the mill thus far accumulated, we recommend that the three items, namely, computer paper (form paper), grease-proof paper and base paper for lamination should be chosen as the new grades to be produced.

b. Although glassine paper is one of the promising items, all-out renovation of the existing facilities will be required for the production of this paper. So, we will drop it from the production items.

c. Production of carbonizing paper and onion skin paper is much more risky than the production of glassine paper.

2-2-4 Market of the Three New Items to be Produced

a. Computer paper

The demand for computer paper in 1983 is estimated at 3,600 tons. The growth rate is estimated at 20% per year.

The tariff rate is 70%, and the prevailing price in the market is Rp1,700/kg.

b. Base paper for lamination

The demand for this item is estimated at 2,000 tons in 1983, with growth rate of 9.5%. The tariff rate is 70%, and the prevailing price in the local market is Rp1,500/kg.

c. Grease-proof paper

The demand for this paper is estimated at 1,700 tons in 1983. The growth rate will be about 1%.

The tariff rate is 70%, and the prevailing price in the local market is Rp1,260/kg.

2-3 Current Situation of Mill

(1) History

BRPP was constructed for production of printing/writing paper in a scale of 30t/d out of bamboo pulp based on Japanese reparations of World War II and the plant started the operation in 1969.

In 1976, the paper machine was renovated to increase the production (from 30t/d to 45t/d) and at the same time electrolytic facilities were newly installed. The bamboo resources became short since about 1974, and at present about 90% of the materials are pine and broadleaved trees.

(2) Location: Banyuwangi City, Eastern Java

(3) Plant site area: 50ha

(4) Actual sales amount: (1983)

Paper: 10,431tons/y
Notebooks: 1,461tons/y

(5) Number of employees: 735 persons (as of 1984)

(6) Main facilities

a. Bleached pulp manufacturing equipment: 30ADt/d as designed

Chipper (4units), Vertical digester (2units),
Washing screen (1set), Bleaching tower (5-stage, 1 line)

b. Papermaking and finishing equipment

Paper machine
30ADt/d as designed, Printing/writing paper, wire width 2,850mm

Finishing equipment
Double cutter (1unit), Winder (1unit)

c. Chemical recovery equipment

1set each of evaporator, recovery boiler and causticizer

d. Auxiliary facilities

Electrolytic equipment (1set), Power boiler (1unit)
Diesel power generator (5units)

2-4 Review of Managerial and Control Problems

2-4-1 Plant Management

There are ample management data on the operation, facilities, financial state and materials, and the plant is well controlled.

However, the data are not effectively used and the practice of analyzing the data from the viewpoints of why and how must be adopted and we recommend that causes for troubles are thoroughly pursued and countermeasures are established and executed firmly.

2-4-2 Production Control

The production is fairly well controlled, but reviews of the following are desired.

a) How to correctly grasp the quantity of wood for self-made pulp
b) Accuracy of pulp consistency meter and pulp flow meter
c) Calculation method of various efficiencies of paper machine
d) Check method of daily production of paper machine
e) Analysis and arrangement of data by types and purposes

2-4-3 Quality Control

(1) SQC (Statistic Quality Control) has been introduced under the guidance of the top management as the first step of TQC (Total Quality Control). We recommend that the following items are sequentially introduced to combine the quality control activities with concrete effects.

   a. Introduction of proposal system
   b. Introduction of circle activities

(2) Thorough penetration of "Quality First" concept

   At present, a rewarding system is enforced based on the production quantity, and the system is contributing to increasing the productivity.

   However, the use of the production quantity only as the basis tends to invite the attitude of neglecting the quality. We recommend that the aspect of quality is given consideration in the rewarding system.

2-4-4 Cost Control

(1) Although there is plenty of data for financial analysis, this data is not used directly connected with cost control. Therefore, we recommend reviews are given to the following points for the effective use of the data for cost reduction and profitability increase within the plant.

a) Simplification of in-process cost calculation
b) Clarification of in and out notebooks and self-made chemicals
c) Alteration of the standard from on-reel system to product system

(2) Data of such items as various efficiencies and yields that are in the hand of operation people should be utilized directly for the control of cost.

2-4-5 Product Control and Sales Control

(1) The products are being stored and shipped properly.

(2) Whether or not this renovation project will be successful depends on the ability of selling the new products recommended by this project.

(3) The sales organization must be improved as quickly as possible, and at the same time, new talents should be added to strengthen the sales force.

2-4-6 Equipment Control

Generally, all equipments are well maintained.

The repair expenses, according to the record, occupy about 8% of the total sales amount, which is a very high rate. Also, the number of facilities that one person of the maintenance department takes care is 21 and this is rather small.

We recommend that the following improvement steps are taken immediately and the maintenance practice is shifted from Breakdown Maintenance to Preventive Maintenance.

a) Thorough investigation of trouble causes
b) Control of repair expenses
c) Improvement of repair techniques
d) Implementation of periodical repairs

The repair expenses and mechanical troubles should be reduced by taking these measures.

2-5 Review of Various Technical Problems

We pointed out the matters to be improved in regard to the operations, supervisions and equipment controls in detail. It is recommended that any matters pointed out be put into practice wherever possible so that such improvements may contribute to the stabilization of quality and the betterment of profitability.

2-5-1 Pulp Division

(1) General

a. L-wood and N-wood are now cooked in a mixture. Renovation will be made to enable separate cooking of N and L-wood.

b. The furnish ratio of LBKP to NBKP should be set constant.

c. Chemical recovery rate should be improved.

(2) Wood preparation

a. There must be a stock for three-month production on both of N and L-wood.

b. Two additional units of silo are to be installed so that N and L-wood are cooked separately.

c. Stop of using mangrove is recommended.

d. N-wood must be debarked.

e. On L-wood, the chip screen must be improved.

f. The mesh of chip screen at the bottom should be altered.

(3) Cooking

a. The current production is 32.76BDt-UKP/d but the capacity can be increased to 50BDt/d without large scale renovation.

b. The standard value of Roe No., which indicates the degree of cooking, is 4.0±0.3. However, only 25 to 40% of the pulp in all batches are within the standard range and more than two thirds are outside of the standard range.
It is required that L and N-wood be cooked separately and the individual differences by operators in the way of cooking be eliminated.

c. The rate of make-up chemicals at KP plants is usually 20 to 60kg/BDt-BKP, which is thought to be a standard rate. At BRPP the rate is as high as 400kg/BDt-BKP.
This abnormally high rate is due to the defect in construction of unbleached pulp washing system, in particular, at the recovery section.

d. The digesters are being corroded partially and a countermeasure should be taken as early as possible.

(4) Unbleached pulp washing

a. The existing washer has a structural defect in the air-seal mechanism and it cannot retain the vacuumness necessary for washing. In addition, the washer is operated exceeding the designed capacity by 27%.

b. The dilution factor is minus. The weak black liquor is sent to the evaporator in a quantity exceeding the standard. This means that a large amount of water is added from outside of the line, irrelevant to the water for washing.

c. Because of these, the chemical loss is as high as 28 to 40%, greatly exceeding the standard value of 5 to 3% of KP plants.

d. The washer must be completely renovated.

(5) Bleaching

a. The bleaching is processed in five stages of C-E-H-E-H with the maximum capacity of 40ADt/d, and there is no fundamentally defective part in the bleaching process.

b. The inlet pressure of bleaching screen must be raised to obtain higher dust removing effect.

c. Impurities in the hypo-solution must be removed.

(6) Evaporator

a. The nominal capacity of solid to be treated is 1.84t/h, but the quantity being treated actually is 2.29t/h, and it will be 2.22t/h after the renovation.

This is an excess of about 20% over the nominal capacity, but this much of excess can be managed.

b. For the increased production of pulp, the existing capacity of the evaporator is a bottleneck. A large-scale investment will be required for upraising of its capacity.

c. In this renovation project, in order to maintain the pulp production at the optimum quantity and to stabilize the operation, a weak black liquor tank is installed anew.

(7) Boiler

a. The current treatment quantity of black liquor solids is 107% of the nominal value and the rate of heat generation per furnace volume is 120% of the nominal value. On both of these, the treatment quantity is beyond the nominal value, but we do not consider this will create a problem.

b. The capacity of recovery boiler is a problem to increase the pulp production. To increase this capacity, a large amount of money must be invested.

c. In this renovation project, the pulp production is kept to the optimum quantity.

(8) Causticizing

a. The designed capacity is 122m³/d of white liquor for cooking and actual quantity processed is 122.8m³/d, which means that the operation is normal.

b. About 10% increase of calcium oxide for causticizing is recommended.

c. The purity of calcium oxide to be used should be slightly higher.

2-5-2 Stock Preparation, Papermaking and Finishing Divisions

(1) Stock preparation

a. The refiners are very efficiently used. However, the desirable paper strength property is unobtainable if a super-refiner is used for primary refining and a deluxe refiner for secondary refining. We recommend using DDR as the primary refiner and super refiner as the secondary refiner.

b. If the pulp cooking section is improved, the pulp furnish combination is stabilized. However, the consistency must be stabilized by a consistency regulator.

c. The concentration and adding place of chemicals must be changed.

d. A paper strength improving agent and yield raising agent must be used.

e. Broke containing much ash and broke containing less ash must be separately controlled.

(2) Papermaking

a. The maximum speed at the current operation is 250m/min, but when the paper machine is partially renewed and strengthened, the speed can be increased to 300 to 350m/min basically.

b. Sheet break occurs frequently and the sheet making efficiency is poor.

c. The formation is good but the quality is not stabilized.

d. The pump is to be renewed and an appropriate differential pressure is to be maintained to increase the dust removing efficiency. Also, these facilities should be controlled better.

e. The flow box must be replaced to make thin papers since the slice lip adjuster does not function properly.

f. Measures to reduce the initial dewatering must be established.

g. The dandy roll must be renovated.

h. The press part needs large scale renovation.

i. The drainage must be renovated.

j. The method of threading the paper through the calender part must be changed.

k. The paper clothing materials must be reviewed.

(3) Finishing

The cutter should be replaced with a new one.

2-5-3 Equipment Control

(1) Machinery

The machinery is well maintained. The key points of the equipment control are minimization of downtime of the paper machine by accidents and reduction of repair cost.

Downtime of the machine by mechanical accidents now reaches 135 hours per year on the average. The target should be set at 80 hours.

The cost of repair works now represents about 8% of the total sales. The target should be set at 4 to 5%.

In order to achieve the said targets, "breakdown maintenance" should be changed to "preventive maintenance".

(2) Electric equipment

a. Electrical facilities are cleverly operated and maintained. There is no equipment that must be replaced soon because of deterioration.

b. The power needed by the plant is generated by five diesel generators and the capacity of power generation is large enough. The power generating efficiency is normal.

c. Sectional drive system
Since this system is old, the speed fluctuates frequently, and for this reason the paper machine had to be stopped 22 times in 1983. The frequency of the sheet break is thought to be very high. For solving these troubles, a thorough renovation of the system is required.

d. The power distribution facilities must be reinforced due to the increased load at stock prepatation and papermaking divisions with the execution of the renovation plan.

e. The power distribution lines have no problem.

f. Induction motor

Some of these motors vibrate. We recommend giving re-centering again.

g. DC motor

Deterioration of insulation on the field widing may be occurring. Step-by-step overhauling of the stator side is recommended.

h. Electrolytic equipment has no problem.

i. The change from the breakdown maintenance to preventive maintenance is required.

(3) Instrumentation

a. All meters and gauges related to pulp cooking, washing, bleaching and causticizing have greatly deteriorated because of the bad atmospheric conditions.

b. The pulp consistency meter and pulp flow meter, which are directly related with the quantitative control, have deteriorated, besides more number of these must be installed.

c. Introduction of the latest instruments like basis weight-moisture content meter can be thought of, but in this renovation project, stabilization of consistency is taken up as the first step.

d. Instrument tools and measuring gauges should be sufficiently provided.

e. Preparing more spare parts.

f. The levelling up of the techniques of the persons in charge of instrumentation is critically needed.

2-6 Economical Quantity of Pulp Production

(1) Production scale from the viewpoint of raw material collection

a. BRPP started the pulp production in 1969 using bamboo only as the pulp material. Since then, the ratio of bamboo gradually decreased, arriving at 10% in the 1984 plan, and no bamboo will be used in 1989.

b. The decreased portion of bamboo has been filled by coniferous and broadleaved trees, and at present the cooking and bleaching are conducted with a mixture of bamboo, softwood and hardwood.

c. The quantity of raw materials that can be collected steadily for a long period in areas close to the mill at low prices is the key factor to determine the economical production of pulp in quantities. This quantity is estimated to be 32ADt-BKP/d.

(2) Production scale viewed from the capacity of chemical recovery plant (washer, evaporator, recovery boiler, causticizer)

a. The current production of bleached pulp is 28.7 BDt/d and a low figures of chemical recovery rate of 60 to 70%. On this renovation project, the washer is completely renovated, aiming at a chemical recovery rate of 90% with a daily production of 27.0 BDt bleached pulp.

b. To obtain a larger daily production of bleached pulp and a greater chemical recovery rate, Rp4,000,000,000 or more must be invested to improve the evaporator, recovery boiler and causticizer.

(3) Under this renovation plan, the economical pulp production scale is set at 27.0BDt/d.

2-7 Review of BRPP's Plan for No. 2 Paper Machine

(1) License for producing 6,000tons of specialty paper a year

Printing/writing paper is an item that is produced in Indonesia in an excessive quantity at present and in the future. If BRPP remains as a producer of this type of paper with a paper machine of 40t/d capacity, the operation of BRPP will not be sound in the future. For this reason, BRPP being given the license for production of 6,000tons of specialty paper is very meaningful.

(2) BRPP's basic plans (production and sales) related to installation of No. 2 paper machine.

a. Pulp plant — Increase of production from 43.2BDt-UKP/d to 52BDt-UKP/d

Paper plant — Installation of a paper machine having a capacity of producing 20ADt/d or 6,200ADt/y of thin papers

b. Sales plan

Manifold paper	30%	1,860 t
Glassine paper	25%	1,550 t
Onion skin paper	20%	1,240 t
Litho paper	10%	620 t
Grease-proof paper	15%	930 t
Total	100%	6,200 t

(3) BRPP's basic plan (facilities)

a. Pulp plant — Renovation and reinforcement of existing facilities

b. Paper machine — New installation

(4) Progress

BRPP proposed their plan twice, in 1980 and 1982.

The total investment and IRR (Internal Rate of Return) of the 1982 plan are as follows:

Loan	Rp9,413 million (US$15.06 million)
Equity	7,673 million (US$12.28 million)
Total	Rp17,086 million (US$27.34 million)
IRR	11.8%

(5) Result of reviewing BRPP plan

a. It is practically difficult to aim at an increased production of pulp. BRPP will have to depend upon purchased pulp.

If BRPP dares to increase pulp production the expansion of chemical recovery plant will be required. Yet, it is difficult to compete with pulp producers in the international market.

b. Even the machine is for making thin paper or specialty paper, daily production of 20tons should be the minimum capacity of such a machine.

c. Specialty papers have a wide variety, each lot being rather small. It is practically difficult to expect a bulk sale with a single item.

d. The water saving measures must be put in practice for the existing facilities as the first thing to do.

e. The technical ability to produce specialty papers and sales ability to sell them out must be accumulated.

(6) Relationship with this renovation project

a. Under this renovation project, the existing paper machine will be renovated to enable it to produce a part of the specialty paper grades in the amount of 2,400tons a year. The switching of production from commodity type of paper to specialty paper should be stepped up gradually even after the completion of the renovation work. In so doing, the profitability should be improved and the technical and sales abilities are to be accumulated.

b. The installation of PM2 in an easy going way will not serve as an effective measure to write off the huge deficit now encountered with PM1.

c. The problem of PM2 should be taken up as a long-term plan.

2-8 NCR

2-8-1 NCR Reviewed from the Market

Annual requirement in 1982 in Indonesia is estimated at 2,400tons. For 10 years to come, annual growth of demand is estimated at 5%. Until 1982, all the NCR has been imported in the processed and completed form. P.T. Pusakarya commenced secondary processing of NCR in 1983 with the use of the base papers imported. In addition, P.T. Ciwi Kimia and P.T. Pakerin have been planning integrated production from base paper to secondary processing of NCR. The over-supply of NCR is foreseen in the near future. It will be difficult to enter into the NCR market.

2-8-2 NCR from Technical Viewpoint

(1) The base paper is mainly 40g/m^2

a. Free from pin-holes
b. Free from dirts and foreign matter
c. Dimentional stability

(2) Conditions for production of base paper

a. Chemical woodpulp, thorough removal of dirts is required.
b. Paper machine should be equipped with pin-hole and dirts detector.

(3) Coloring agent (micro capsule) and developing agent are patented chemicals. Licensing of the patents is required.

(4) Air-knife coater is generally used for coating the coloring agent in capsule. In case of resin type of coloring agent, high consistency coating is applied with the use of roll coater or blade coater. The installation is very expensive.

(5) Cautions to be paid for processing and for finished products

a. Any dirts or foreign matter contained in the base paper will cause sheet break in the coating process, low coating efficiency and the loss of paper and coating chemical.
b. Any dirts on the paper will cause confusion with the dots typed.
c. Any pin-holes in the base paper will cause strike-through of the coloring agent resulting in serious troubles.
d. Caution must be paid for handling the products. Improper handling will cause coloring of the products and the value as the product will be lost.

2-8-3 As mentioned above, the manufacture of the base paper of NCR involves various technical problems. This renovation project will not include NCR as the item to be developed. However, the plan to manufacture NCR should not be given up totally. The mill should plan to manufacture the base paper on the trial basis some day and have it test coated on the test coater to be installed at the training center. In so doing, the mill should learn how to make the base paper and how to cost it to complete the finished product.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS AND RECOMMENDATIONS

1. This investigation has been made to take a form of renovation of the existing facilities of BRPP as the first step to consolidate the foundation of the company, which may include installation of an additional machine some day in the future. The immediate target of the renovation plan is to find the ways and means for BRPP to eliminate the serious losses now incurred in the plant operation and to contribute toward the development of the area, where BRPP is located.

2. The best available plan is summarized below:

(1) Measures to reduce the production cost

a. Production cost of self-use bleached pulp is to be reduced by Rp44.68/BDkg. In addition, production scale is to be set at the reasonable level of 25.8BDt from 28.9BDt. This will realize a cost reduction of Rp24 – 36 per kg.

b. Unit consumption rate of steam and the cost of steam are to be lowered, whereby the production cost of paper could be lowered by Rp6 per kg.

c. For the improvement of quality, there are some elements which push up the cost such as the change in pulp furnish, increased power required for the operation of the supercalender, etc.

d. Summing up various factors as mentioned above, production cost of the existing grades could be lowered by Rp12 to Rp42 per kg.

(2) Measures for increased production

a. Machine speed should be increased from 235m/min. to 280m/min. Total efficiency should be increased from the present 76% up to 85%. Thus, daily production can be raised.

b. By means of raising daily production, surplus capacity can be obtained. With this capacity, three new grades of specialty paper are to be produced in the amount of 2,400tons a year.

(3) Price recovery

With quality of paper improved, the sales price is expected to be recovered by 7%.

(4) Improvement of managerial and operational technique

Education and training of the employees for a total of 17 man-month.

(5) Total funds required: Rp11,030,434,000 (of which foreign currency Rp7,552,174,000)

(6) Period of time required for renovation work: 26months

(7) Total employment: no change

3. Market

Products scheduled for increased sale are aimed at the replacement of the imported items, thus, the sale can be performed without disturbing the domestic market of Indonesia.

Such sales will contribute to the saving of foreign currency.

4. Raw materials for self-use pulp

Raw materials are collectible from the vicinity of the mill.

5. When the best available plan is implemented.

(1) I.R.R. (O.I.) after tax is 22.61%. Pay-out period is 3.55 years.

(2) The loss in 1983 is so big as Rp1,300,000,000, whereby the situation of the account in the red will continue well into the year of 1990. However, we foresee the turnabout to the favorable balance from 1991 onwards.

(3) During the course of the renovation work, no shortage of the funds is foreseen except for the year of 1987. The repayment of the long-term loans will have no problem. It can be said that the financial position of BRPP is relatively sound.

6. As is clear from the results of our investigation, this renovation plan is feasible. An early implementation of the project is recommended.

7. In order to achieve this renovation project successfully, the following matters are recommended:

(1) Stabilization and improvement of quality and reduction of cost are fundamental needs for any enterprise to survive. In our survey report, we pointed out various matters to be improved or corrected in regard to operational, managerial and equipment control problems. Some of those advices and suggestions are rather easy to put into practice. It is hoped that BRPP people will actively carry out the countermeasures proposed, wherever and whichever possible, for the betterment of quality and profitability of their plant.

(2) Both the improvement of hardware and software are important for the effectuation of the project, the two phases being inseparable as if both wheels of a cart. A good balance between them should be kept.

(3) For the smooth implementation of the renovation work, it is desirable that technical guidance be received from a foreign consultant and/or foreign pulp and paper manufacturers having matured experiences in engineering services.

(4) The successful production and sales of the three new grades recommended are most important. In order to get confidence in own ability to produce and sell the new items, it is hoped that the study on this problem be started as early as possible.