APPENDIX

Production facility for feed yeast

(1)	Kasten	x 4	Box type, SUS 304
(2)	Seed tank	x 4	1.5 m^3, with jacket, SS 41
(3)	Fermentor	x 6	120 m^3, SS 41, air sparger
(4)	Cooler	x 6	tubler type, 200 m^3, SS 41
(5)	Defoamer tank		3 m^3, SS 41
(6)	Make up tank	x 2	40 m^3, SS 41, cooling coil
(7)	Broth out tank		120 m^3, SS 41
(8)	Sifter		W 600 x L 1,500, 40 mesh
(9)	Cushion tank		3 m^3, SS 41
(10)	Separtor	x 2	Nozzle type, SUS 304
(11)	1st cell tank		3 m^3, SS 41
(12)	2nd cell tank		3 m^3, SS 41
(13)	Heat treatment tank	x 2	15 m^3, SS 41, with agitator
(14)	Drum dryer	x 2	35 m^2, SS 41
(15)	Screw conveyor		15 m^3, SS 41
(16)	Pulveerizer	x 2	250 kg/h
(17)	Hopper	x 2	15 m^3, SS 41

Chapter 7.

SCHEDULE FOR PLANT CONSTRUCTION AND OPERATION

Chapter 7. SCHEDULE FOR PLANT CONSTRUCTION AND OPERATION

7.1 Plant Construction Plan

7.1.1 Plant site area and building area

1) Plant site area

The total plant size area is 376,550 m^2, and in the site the welfare accomodations, cane collecting facility and old sugar factory are laid out. The site used for this project is the land of about 40,000 m^2 situated in the old sugar factory and the surrounding area in the northern part. The site exclusively used for this project consists of about 16,000 m^2 of the old building and about 7,000 m^2 of the outdoor tank and others, totalling to about 23,000 m^3. The area sizes are wide enough for maintenance and future expansion.

2) Building area

In this project, inside layout of the building is changed and no expansion of the building is considered.

7.1.2 Civil work

1) Basic conditions

The civil work expenses are estimated on the following conditions.

(1) All civil works including procurement of the necessary materials shall be conducted by the Indonesian side. Naturally, the design conditions such as necessary loading date and configuration drawings of facility bases shall be submitted by the pertinent manufacturers.

(2) The existing foundations, channels and wells shall be used as much as possible.

(3) No pile shall be driven into the ground since the ground is judged to be firm enough, as described later.

(4) No distrubing substance is assumed in the ground.

(5) No soft ground that requires soil improvement is assumed.

2) Major civil works

(1) Obstacle removal

All obstacles for the construction shall be removed.

(2) Land leveling

Since the project site is a site of an existing plant, hardly any leveling work is required, and the leveling work shall be limited to only those necessary for the construction.

(3) Foundation work

Foundations for equipment, frames and storage tanks shall be built. The foundations shall be made of reinforced concrete.

(4) Structures

The water intake pit, cooling water tank and ditches shall be constructed. The major materials shall be reinforced concrete.

(5) Paving

The passage between the outdoor tank yard and building shall be paved with asphalt.

(6) Channeling

The water intake channel shall be newly constructed and the drain channel in the plant site shall be repaired. Repair of the drain channel outside of the plant site shall not be included.

3) Ground

The site ground is good according to the Soil Profile, Soil test, Direct shear tests, grading measurement, Unconfirmed compression test and earth resistance and local friction data prepared by the Soil Mechanics Laboratory, Technical Faculty Diponegoro University. Accordingly, this report is prepared basen on non-used of support pile. However, it is conceivable that driving piles may be advantageous in the actual work, and whether or not piles should be used must be reviewed at the time of construction.

7.1.3 Building work

1) Basic conditions

The estimation conditions for the building work are as follows.

(1) The existing old sugar factory and the chimney shall be used.

(2) The major buildings to be newly constructed shall be the frame work and pipe racks. The Indonesian side shall engage in the whole work related to these new buildings from design of details, material procurement, construction based on the submited layout and loading data needed for the design.

(3) The Indonesian side shall engage in repair of the existing building based on detailed field investigation results. The repair expenses shall be limited to the necessary minimum.

2) Major building works

(1) Frame work and pipe racks

The columns, beams, stages, steps and handrails shall be fabricated with structural section steels, steel pipes and checkered plates using bolts or by welding. The fabrication shall be conducted mainly indoor using a winch or chain block. Heavy machines shall be used as needed.

The standard for painting shall be twice under-coating and twice finish coating of oil paint.

(2) Repair work

Repair work shall be conducted only partially. Painting shall be conducted only inside the building and no outside.

(3) Auxiliary facilities

The plant inside shall be provided with a ventilation system, sound-proofing against the compressor and others, separation of the boiler and turbine room, and automatic fire alarm system.

The warehouse shall be provided with shelves and facilities necessary for transportation and measuring.

The analysis room shall be air conditioned and installed with the necessary water and gas outlets, lighting and interphone unit, as well as the fixed facilities of testing bench.

Fixture such as water supply and drainage facilities, fire extinguishing facility, rest room, lavatory and septic tank shall all be installed as explained earlier.

7.1.4 Inland transportation and stroage of imported equipment and machinery

The imported equipment and machinery shall be landed at Jakarta and transported mainly by trucks to the construction site. At the time of landing, instruments and electric machines and equipment that must be protected from wetting shall be stored in a warehouse. The same precaution is required for transportation and the machines and equipment that require protected shall be covered with a sheet. In the plant site, since the buildings is large enough, all imported machines and equipment shall be stroed inside the building, while such precaution is unnecessary on piping materials and the like on which wetting does not create any problem.

At the time of dispatch and unloading, a responsible person from the dispatcher side shall check the number and state of the machines and equipment to ensure correct transportation.

7.1.5 Installation work

The installation work of machines and equipment can be divided into two types; single unit installation and field assembling. While the expenses for these works are included in the construction cost, the work itself shall be attended by Indonesian contractors under the supervision of the pertinent machinery manufacturer.

The construction equipment for heavy machinery and welders used in this project shall be procured by Indonesian contractors.

Many forms are conceivable for the construction system, but as a rule, major construction works shall be attended by Indonesian constructors with Japanese supervisors on work where know how or supervision is needed.

7.1.6 Trial operation

As the plant construction progresses, equipment shall be tested through machinery performance tests, flushing tests of piping and water run tests.

Then, a trial operation test shall be run using actual materials to solve any problems that may occur on the processes, as well as for training of the operators.

When the production quantity and results reach the goals through performance tests, the commercial operation shall commence and the plant shall be delivered to the plant owner from the general contractor.

7.1.7 Education and instruction

1) Supervisor mission during construction stage

The general contractor shall dispatch supervisors on civil work, facilities, electric equipment and instruments and a general manager to manage the whole work to the construction site for operation management of the construction during the period from start to completion of the plant construction.

2) Supervisor mission during trial operatin

A necessary number of supervisors shall be provided during the trial operation to

operate the plant, to train the operators and to establish the plant management system. Since two items are to be produced concurrently in this project, the trial operation plan must be made very carefully.

3) Training of operators

Persons in a variety of faculties are needed to operate the plant, and particularly advanced knowledge and skill are required for operation management of the fermentation and isolation processes. Accordingly, the operators and supervisors working on the production site must be sufficiently educated and trained.

The major training contents are as follows.

(1) Basic education

Implementation of basic education related to chemistry, chemical industry, chemical plant, fermentation, isolation, and safety and sanitation.

(2) Education and training on the technology and operation method of this project by the general contractor. The plant emplyees of the engineer and foreman level and above should be trained in Japan (by the process owner).

(3) On the job training to be conducted by the supervisors dispatched from Japan.

7.2 Plant Operation

7.2.1 Organization and number of employees

Fig. 7.1 shows the overall plant organization.

Table 7.1 shows the employee plan.

The schedule number of employees for this plant is 200.

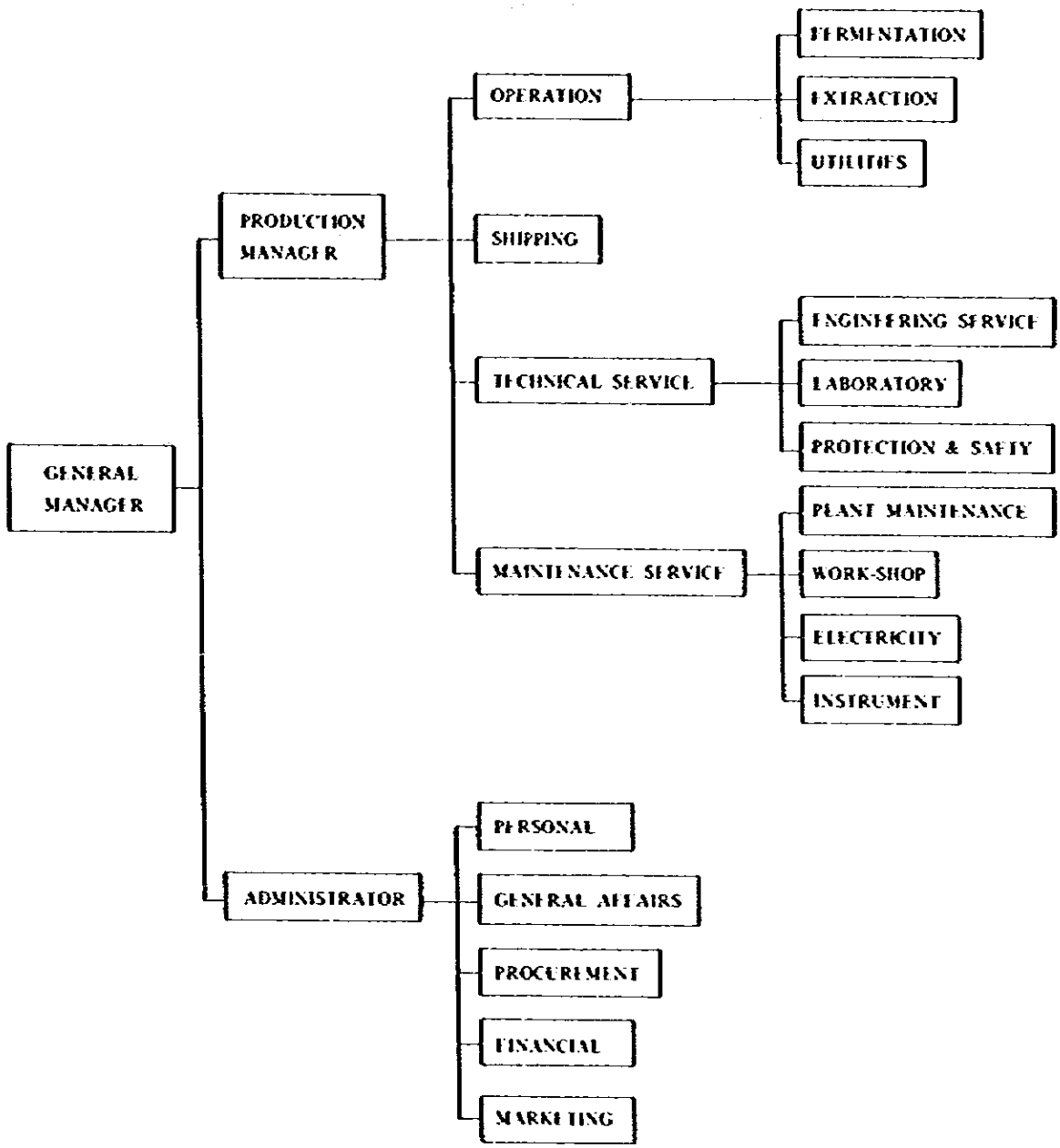


Fig. 7.1. Organization Structure of the Plant

Table 7.1. Total Staff Requirement

	*
Manager	12 (12)
Specialist	29 (32)
Supervisor	11 (15)
Skilled (A)	38 (50)
Skilled (B)	84 (111)
Unskilled	2 (13)
Clerk	24 (27)
Total	200 (260)

* Remarks: ( ) ... When contains Yeast production staff.

7.2.2 Operation conditions

1) The standard operation of this plant is set to 336 days a year, and particular attention to continuously supply the raw materials (especially, since the cane molasses is not produced to the full extent through one year) is needed. Also, this operation standard assumes that the product can be sold constantly, and for this reason, there must be close cooperation between the production and marketing activities.

2) The 3-shift system is adopted for the operation and availability of enough employees is assumed.

7.2.3 Raw materials, auxiliary materials and utilities

1) At the minimum, the raw materials must be stored in the quantity of one-month to one and half month production according to the production schedule. Sufficient attention must be paid to the stock situation of raw materials which are not easy to obtain or which are obtained in places of long distances.

3) It is expected that almost the whole amount of the river water that can be taken will be consumed. The water intake plan must be established firmly causing no problem to the irrigation.

4) Fermentation is an industry that consumes a large amount of energy. A large volume of steam is needed for steam sterilization to maintain the sterility in the fermentation process and for distillation and condensation in the steam sealing and isolation process. In addition, since the temperature of water both from the river and well is about 30°C, it cannot be used as cooling water in the fermentation process, and an energy-consuming chiller must be used.

Accordingly, energy conservation is a critical point in operating the plant, and effort must be made constantly to reduce the energy consumption.

7.2.4 Measures for environmental protection

National regulations related to environmental protection have been established and enforced in Indonesia. Regulating values on waste water are also provided, but generally both of the enterprise and inhabitant sides do not recognized the importance of the regulations well enough. At the same time, the set regulating values are very severe, for example, BOD is set to maximum 30 ppm (mean value per day is 20 ppm), NH_3 is maximum 0.1 ppm, and in actual cases, to observe these values is extremely difficult.

Table 7.2 shows the waste water regulation values for reference.

Local regulations have not been set in the central Java area, but we understand that they will be set in the near future.

We propose the waste water treatment method described in Clause 6.3 as an actual measure based on our experience in Japan and recommend the plant placing an emphasis on environmental protection. It is important that the plan is made coping with changes of the legal restrictions that may be given in the future.

No particular consideration has been given to air pollution and bad smell since there are no regulating values set on these items.

Table 7.2. Quality Standard of Waste Water

Item		Min.	Average in 24 hrs	Max.
Temp.	°C			30°
Floating matter	mg/ℓ			0
Sedimented matter	"			1.0
Al	mg/ℓ			10
As				1
Ba				1
Fe				1
Cr				0.1
Cd				1
Ni				2
Ag				0.1
Hg				0.1
Zn				1
Cu				1
Pb				1
NH_3				0.1
Cl_2				0.05
F				2
NO_3				1
PO_4			2	
S				0.1
BOD			20	30
COD			50	80
PH		6.5		8.5
Hydrocarbon			10	
Oil in Fat			10	
Total Phenol			0.1	
CN			0.1	

7.3 Construction and Trial Operation Schedule

Normally, the planning stage is extremely important prior to starting a plant construction. This report may be regarded as the result of feasibility study for the first step in the planning stage. In actuality, the contents and policies of this report must be reviewed sufficiently at the implementation stage based on the social and economical conditions. The construction and trial operation schedule should start at the point at whcih the prior technical and economical reviews have been made and the review on the location and construction cost estimation have been completed. The schedule shown in Fig. 7.2 describes the trial operation using actual raw materials.

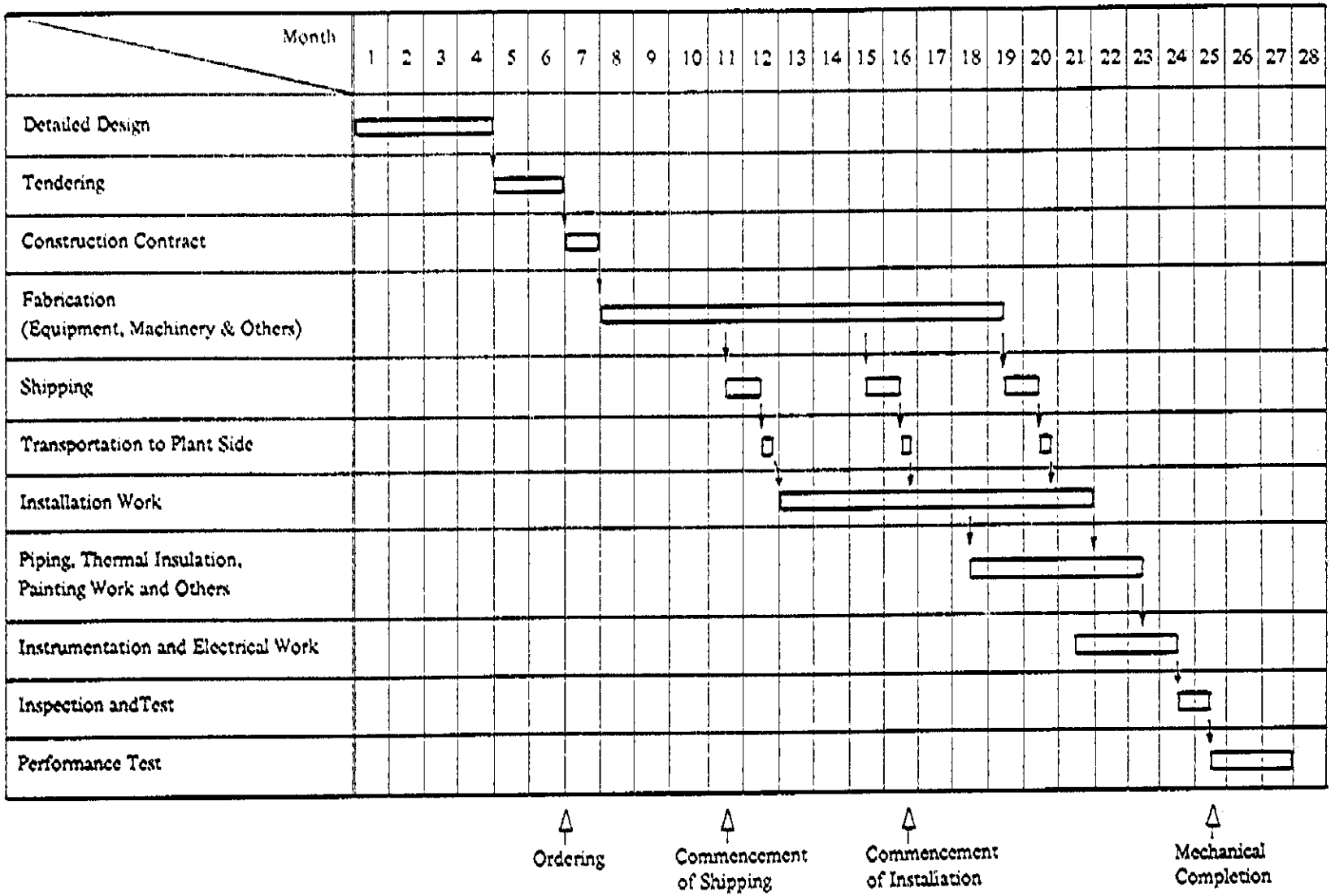


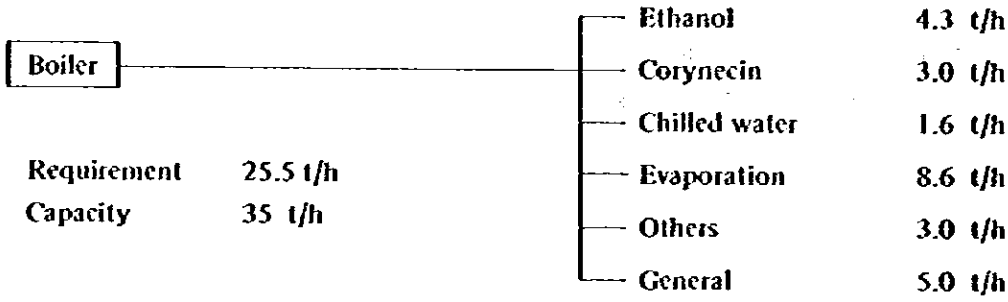
Fig. 7-2 Project Process Schedule (Tentative)

APPENDIX

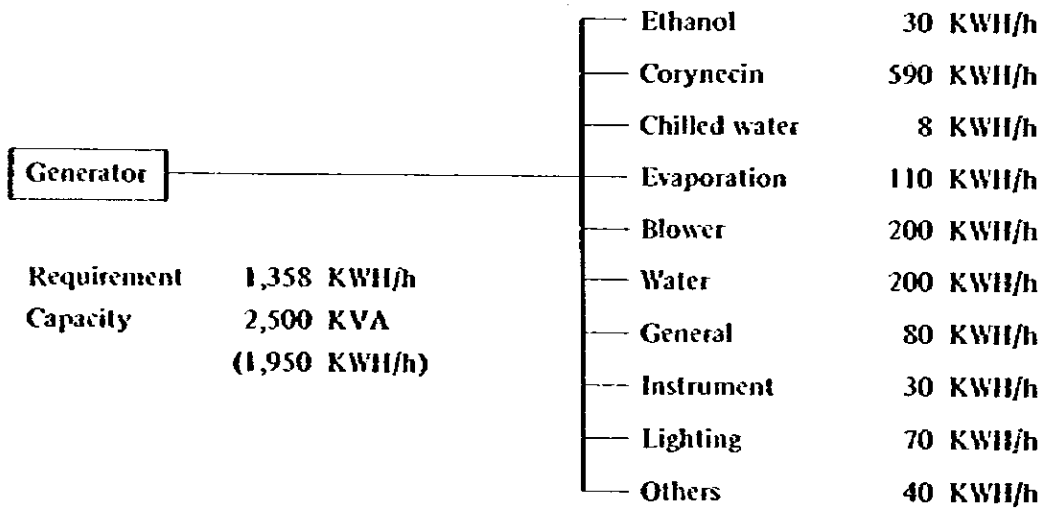
Utilities requirement and installed capacity.

Ethanol:	45 Kℓ/day
Corynecin:	56 kg/day

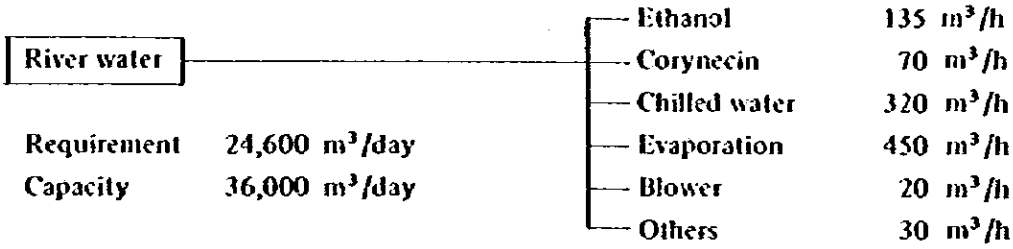
Steam



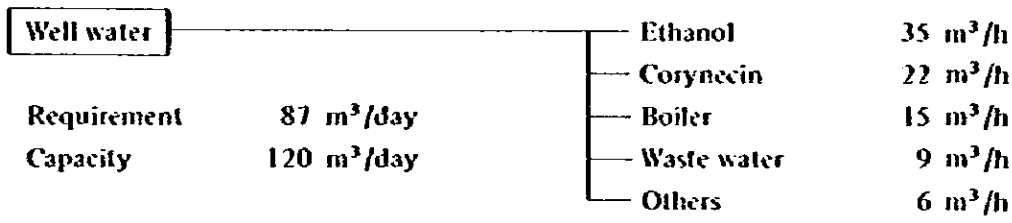
Electricity



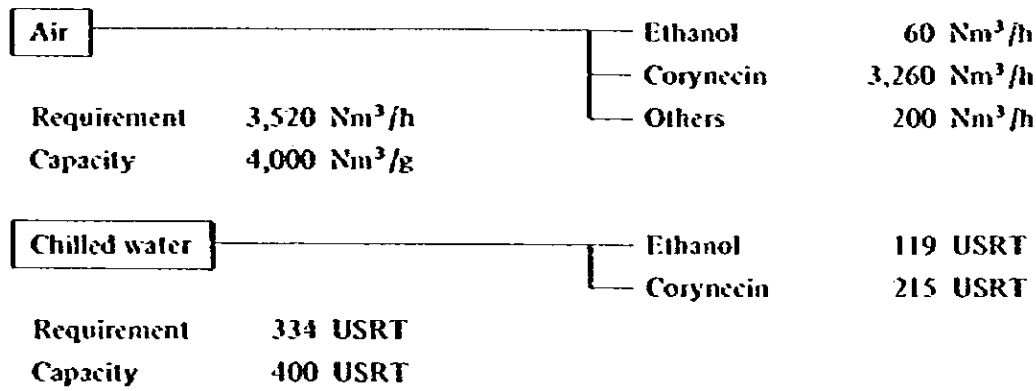
River water



Well water



Air



Chapter 8.

REQUIRED INVESTMENT AND FUND PLAN

Chapter 8. REQUIRED INVESTMENT AND FUND PLAN

This chapter describes the estimation of the investment necessary to implement this project and the fund plan.

8.1 Basic Conditions

The basic conditions in the estimation of the investment are as follows.

1. Currency exchange rates
   US$1.00 = ¥240 = Rp. 695

2. Time of estimation of investment
   Prices as of January, 1983

3. Procurement method of machinery and equipment
   International tender

4. Contract form
   Turn key, lump sum contract

5. Price escalation (per annum)
   Foreign currency portion: 5%
   Local currency portion: 10%

8.2 Projet Cost Estimation (January, 1983) and Scope

The project cost has been estimated in the following scope based on the prices as of January, 1983.

1. Land

   Since the land of the Ex Comal Sugar Factory in Comal is owned by PTP, there is no need to procure a land for this project.

2. Machinery and Equipment (FOB)

The procurement prices of machinery and equipment necessary to produce 45 Kℓ/day of ethanol and 56 kg/day of Corynecin. The estimation has been made split in two portions of foreign and local currencies.

3. Ocean Freight and Insurance

These expenses are estimated based on the tariff effective as of January, 1983. The gross freight tonnage of the machinery and equipment is about 5,000.

4. Inland Transportation and Handling

Expenses necessary to land the machinery and equipment in the Jakarta port and to transport them by tracks to the Comal site.

5. Erection Work

The total man-days necessary to install the machinery and equipment and work for piping, insulation, painting, frames, electricity supply and telephone are 46,650.

6. Supervisory Work

The total man-days of the Japanese engineers necessary for supervision of the construction and operation guidance are 5,800. The air fares and remuneration are estimated for 40 engineers.

7. Building and Civil Engineering Work

The material expenses and labor charges necessary to remove the existing foundation, to repair the existing drainage, to rehabilitate the building and to newly construct the foundations of machinery and equipment and water intake cannal in the Ex Comal Sugar Factory.

8. Miscellaneous

Expenses to procure tools, fixture and etc. necessary for plant operation.

9. Know-how Fee

Know-how-fee necessary to introduce the fermentation techniques.

10. Pre-operation Expenses

1) Consulting fee

Consultants shall be hired for tender document preparation and technical and economical evaluation of submitted tender documents.

2) Training

Expenses necessary to dispatch trainees for technique acquisition.

3) Test run expenses

Expenses necessary to procure raw materials, fuel and etc. for test run.

11. Physical Contingency

The contingency is estimated at 5% of the foreign currency portion and 10% of the local currency portion in anticipation of unforeseen expenses.

Table 8-1 shows the above estimation results.

Table 8-1. Estimate of Project Cost
(Jan. 1983)

Unit: 1,000

Item	Foreign Currency Portion		Rupiah Portion	Total
	¥	Rp.	Rp.	Rp.
Machinery & Equipment	2,417,846	7,001,679	276,868	7,278,547
Ocean Freight & Insurance	98,503	285,248		285,248
Inland Transp. & Handling			140,000	140,000
Erection Work			186,596	186,596
Supervisory Work	189,700	549,340		549,340
Building & Civil Eng. Work			944,836	944,836
Miscellaneous			43,437	43,437
Know-how Fee	250,000	723,958		723,958
Preoperation Expenses	28,050	81,228	90,683	171,911
Total	2,984,099	8,641,453	1,682,420	10,323,873

8.3 Required Project Cost

On the project cost estimation (Table 8-1) as of January, 1983, the disbursement schedule is established for each expense item according to the project schedule, and the total project cost is calculated by estimating the required amount at the disbursement points assuming that the prices rise at 5% per annum on the foreign currency portion and at 10% per annum on the local currency portion.

The following calculation formula is used:

$$P = PO\ (1 + r)^n$$

PO : Estimated price as of January, 1983

r : Annual price escalation rate (%)

n : Number of years after January, 1983

The results of calculation with the above formula are shown in Table 8-2. The total expenditures up to March 31, 1986 are shown in Table 8-3.

Table 8-2. Disbursement Schedule

Unit: Rp. 1,000

Item	Month. Year	Foreign Currency Portion	Rupiah Portion	Total
Machinery & Equipment	Aug., 1984	1,518,965	64,906	1,583,871
	Dec., 1984	1,235,096	53,602	1,288,698
	Jun., 1985	2,531,194	112,436	2,643,630
	Oct., 1985	2,572,696	116,065	2,688,761
		7,857,951	347,009	8,204,960
Ocean Freight & Insurance	Aug., 1984	61,883		61,883
	Dec., 1984	50,318		50,318
	Jun., 1985	103,121		103,121
	Oct., 1985	104,812		104,812
		320,134		320,134
Inland Transportation & Handling	Aug., 1984		32,821	32,821
	Dec., 1984		27,101	27,101
	Jun., 1985		56,854	56,854
	Oct., 1985		58,689	58,689
			175,468	175,468
Erection Work	Dec., 1984		45,156	45,156
	Jun., 1985		94,721	94,721
	Oct., 1985		97,778	97,778
			237,655	237,655
Supervisory Services	Dec., 1984	121,130		121,130
	Jun., 1985	124,121		124,121
	Oct., 1985	126,156		126,156
	Feb., 1986	256,449		256,449
		627,856		627,856
Building & Civil Eng. Work	Aug., 1984		553,751	553,751
	Nov., 1984		567,104	567,104
			1,120,855	1,120,855
Miscellaneous	Feb., 1986		58,740	58,740
			58,740	58,740
Know-how Fee	Oct., 1985	831,284		831,284
		831,284		831,284
Preoperation Expenses	Apr., 1984	72,781		72,781
	Oct., 1985	14,963	12,275	27,238
	Feb., 1986		109,961	109,961
		87,562	122,236	209,980
Contingency	Sep., 1984	153,009	134,444	287,453
	Sep., 1985	333,239	71,752	404,991
		486,248	206,196	692,441
Grand Total		10,211,350	2,268,159	12,479,376

Table 8-3. Total Project Cost Required
(March, 1986)

Unit: 1,000

Item	Foreign Currency Portion		Rupiah Portion	Total
	¥	Rp.	Rp.	Rp.
Machinery & Equipment	2,713,537	7,857,951	347,009	8,204,960
Ocean Freight & Insurance	110,550	320,134		320,134
Inland Transp. & Handling			175,468	175,468
Erection Work			237,655	237,655
Supervisory Work	216,814	627,856		627,856
Building & Civil Eng. Work			1,120,855	1,120,855
Miscellaneous			58,740	58,740
Know-how Fee	287,062	831,284		831,284
Preoperation Expenses	30,300	87,744	122,236	209,980
Contingency	167,913	486,248	206,196	692,444
Total	3,526,176	10,211,217	2,268,159	12,479,376

Table 8-4. Total Project Cost Required (Product Wise)

Unit: Rp. 1,000

Item	Ethanol		Corynecin		Total
	Foreign Portion	Rupiah Portion	Foreign Portion	Rupiah Portion	
Machinery & Equipment	4,367,479	152,354	3,490,472	194,655	8,204,960
Ocean Freight & Insurance	176,074		144,060		320,134
Inland Transp. & Handling		96,507		78,961	175,468
Erection Work		107,197		130,458	237,655
Supervisory Work	313,928		313,928		627,856
Building & Civil Eng. Work		492,656		628,199	1,120,855
Miscellaneous		29,370		29,370	58,740
Know-how Fee	415,642		415,642		831,284
Preoperation Expenses	43,872	92,138	43,872	30,098	209,980
Contingency	270,258	90,530	215,990	115,666	692,444
Total	5,587,253	1,060,752	4,623,964	1,207,407	12,479,376

Note: This table is worked out for distribution of production costs of ethanol and Corynecin.
Therefore, this table should not be used for the estimate of ethanol project or Corynecin project.

8.4 Fund Procurement Plan

Table 8-4 shows the fund procurement plan of this project.

Note: The terms and conditions of long-term loan are as follows:

Grace period	:	4 years
Repayment period	:	Semi-annual payment in 10 years after the grace period
Annual interest rate	:	13.5%

The ratio of the net equity and long-term loan is 35:65.

Table 8-5. Fund Requirement Plan

Unit: 1,000

Fund Source		Month, Year	Value
Own Capital		Apr., 1984	4,450,000
			4,450,000
Long Term Loan	(1)	Dec., 1984	1,476,871
	(2)	Jun., 1985	2,896,357
	(3)	Oct., 1985	3,832,406
	(4)	Feb., 1986	269,271
			8,474,905
Total			12,924,905

Interest during construction period (Rp. 395,000,000) is included.

Chapter 9.

FINANCIAL ANALYSIS

Chapter 9. FINANCIAL ANALYSIS

The purpose of this study is to select several marketable products in quantity out of the 7 proposed fermentation products listed in the "Scope of Work" and to establish a practical construction project of a fermentation plant to produce them to realize effective utilization of the excess cane molasses which is the by-product from the sugar production increase implemented by the Indonesian government.

The study team selected ethanol, feed yeasts for animal and Corynecin antibiotics based on the market survey in Indonesia and gave technical and economical reviews to the first plan. However, since it was found that the plan for a plant to produce the three products would be financially impossible, as described in the latter part of this chapter, the second plan was established for construction of a plant to produce a combination of profit making ethanol and Corynecin.

In this chapter, the plan of a plant to produce ethanol and Corynecin is described as the basic plan.

9.1 General Conditions

1. This project calls for start of preparation of plant construction in April, 1984 and operation start in April, 1986.

2. The project life is 15 years after start of the plant operation.

3. The prices as of December, 1982, at which time the field survey was conducted, are the standard for the financal analysis. Assumptions are applied for 5% per year hike on imported items and 10% per year hike on domestic items up to March, 1986. The prices shall be fixed for the period from April, 1986 to March, 2000.

   The calculation formula applied is as follows:

   $$P = PO\,(1 + r)^n$$

   PO : Prices as of December, 1982

   r : Annual price escalation rate (%)

   n : Number of years after December, 1982

9.2 Financial Calculation Conditions for Basic Plan

The basic plan referred to in the title is the plan for daily production of 45 Kℓ ethanol and 56 kg Corynecin.

1. Production and sales conditions

Table 9-1 shows the production and sales conditions.

Table 9-1. Sales and Production

	Unit	Ethanol	Corynecin
Annual Production Capacity	Kℓ	15,120	
	Kg		18,816
Inventory Level	Month	0.5	0.5
Operation Level			
Apr. 1986 – March 1987	%	80	70
Apr. 1987 – March 1988	%	90	85
Apr. 1988 – March 2000	%	100	100
Unit Selling Price	Rp./Kℓ	361,220	
	Rp./Ton		32,521,000

2. Variable costs

The conditions of variable costs necessary to produce 1 Kℓ of ethanol and 1 ton of Corynecin are shown in Table 9-2. The stock level of the raw materials and others related to the variable costs are as follows:

Cane molasses	Quantity required for 1 month operation
Fuel oil	Quantity for 1 month operation
Chemicals	Quantity for 1.5 month operation

Table 9-2. Variable Cost

Raw material, Chemicals & etc.	Unit	Unit Price	Consumption	
			Alcohol (kℓ)	Corynecin (Ton)
· Molasses	Kg	27.26	3,300	111,300
· Oleic Acid	Kg	1,746.03	1.24	
· Alginate	Kg	7,281.76	0.344	
· CSL	Kg	420.69		2,179
· Amm. Sulfate	Kg	204.46		4,357
· Ammonia	Kg	199.01		4,464
· Butanol	Kg	727.71		5,804
· Other Chemical	Rp./unit		5,018.37	3,536,370
· Fuel Oil	ℓ	122.68	252	168,000
· Water	m^3	0.31	144	129,000
· Total	Rp./unit		130,606.4	34,140,163

3. Fixed expense conditions

1) Depreciaton expenses

Number of depreciation years on depreciative assets such as fixed assets and deferred assets

Machinery and equipment	8 years
Building and structures	20 years
Other fixed assets	5 years
Preoperation expenses	5 years
Interest during construction	5 years
Contingency	8 years

2) Maintenance and repair expenses

The annual maintenance and repair expenses are calculated at the following ratios applied to the purchase prices.

Buildings	2%
Machinery and equipment	3%
Contingency	3%

3) Fire insurance premium

The annual fire insurance premium is calculated at the following ratios applied to the purchase prices.

Buildings	1%
Machinery and equipment	1%
Contingency	1%
Other fixed properties	1%

4) Man power cost

The monthly man power cost is as shown in Table 9-3.

Table 9-3. Monthly Man Power Cost

	Salary & Wage	No. of Person	Required M.P.C.
Manager	545,240	12	6,542,880
Specialist	278,120	29	8,065,480
Skilled Labour (A)	136,310	38	5,179,780
Supervisor	124,400	11	1,368,400
Unskilled Labour (B)	81,790	84	6,870,360
Unskilled Labour	40,890	2	81,780
Clerk	102,690	24	2,464,560
Total		200	30,573,240

5) Other fixed expenses

Rp 180 million per year is calculated as additional fixed expenses.

3. Long term loan interest

Loan conditions

Grace period	4 years
Repayment period	10 years after the grace period
Annual interest rate	13.5%
Repayment method	Semiannual installment

The repayment schedule of loan is shown in Table 10-4.

Table 9-4. Repayment Schedule

PAGE = 1

REPAYMENT SCHEDULE FOR LONG TERM LOAN & BOND
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)

YEAR	1984	1985	1986	1987	1988
(DOMESTIC CURRENCY)					
DOMESTIC REPAYMENT	0	0	0	0	0
(FOREIGN CURRENCY)					
LONG TERM LOAN	0	1,477	6,998	0	0
PRINCIPAL REPAYMENT	0	0	0	0	0
INTEREST REPAYMENT	0	0	0	1,144	1,144
DEBT (PRIN.+INTER.)	0	0	0	1,144	1,144
BALANCE AFT.PAYMENT	0	1,477	8,475	8,475	8,475
FOREIGN REPAYMENT	0	0	0	1,144	1,144
TOTAL REPAYMENT	0	0	0	1,144	1,144

PAGE = 2

REPAYMENT SCHEDULE FOR LONG TERM LOAN & BOND
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)

YEAR	1989	1990	1991	1992	1993
(DOMESTIC CURRENCY)					
DOMESTIC REPAYMENT	0	0	0	0	0
(FOREIGN CURRENCY)					
LONG TERM LOAN	0	0	0	0	0
PRINCIPAL REPAYMENT	0	293	847	847	847
INTEREST REPAYMENT	1,144	1,127	1,042	931	820
DEBT (PRIN.+INTER.)	1,144	1,419	1,889	1,779	1,668
BALANCE AFT.PAYMENT	8,475	8,182	7,335	6,487	5,640
FOREIGN REPAYMENT	1,144	1,419	1,889	1,779	1,668
TOTAL REPAYMENT	1,144	1,419	1,889	1,779	1,668

PAGE = 3

REPAYMENT SCHEDULE FOR LONG TERM LOAN & BOND
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)

YEAR	1994	1995	1996	1997	1998
(DOMESTIC CURRENCY)					
DOMESTIC REPAYMENT	0	0	0	0	0
(FOREIGN CURRENCY)					
LONG TERM LOAN	0	0	0	0	0
PRINCIPAL REPAYMENT	847	847	847	847	847
INTEREST REPAYMENT	710	599	488	377	266
DEBT (PRIN.+INTER.)	1,557	1,446	1,336	1,225	1,114
BALANCE AFT.PAYMENT	4,792	3,945	3,097	2,250	1,402
FOREIGN REPAYMENT	1,557	1,446	1,336	1,225	1,114
TOTAL REPAYMENT	1,557	1,446	1,336	1,225	1,114

PAGE = 4

REPAYMENT SCHEDULE FOR LONG TERM LOAN & BOND
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)

YEAR	1999	2000
(DOMESTIC CURRENCY)		
DOMESTIC REPAYMENT	0	0
(FOREIGN CURRENCY)		
LONG TERM LOAN	0	0
PRINCIPAL REPAYMENT	847	555
INTEREST REPAYMENT	156	50
DEBT (PRIN.+INTER.)	1,003	605
BALANCE AFT.PAYMENT	555	0
FOREIGN REPAYMENT	1,003	605
TOTAL REPAYMENT	1,003	605

4. Taxes

The corporation tax is levied to the profit before tax after the 4-years tax holiday of the operation start.
The tax rate is 45%.

5. The divident is assumed to be 15% of the paid-in capital, should a profit be made after paying the corporation tax, provided that the total dividend does not exceed the profit after tax.

9.3 Financial Statements of Basic Plan

9.3.1 Production cost statements

1. Production cost of ethanol

The production cost of ethanol, excluding the interests on the loan, is shown in Table 9-2. The production cost of 1 Kℓ ethanol is Rp 230,100 in the "1988 March term of fiscal year" as the highest and drops to Rp 165,900 in the "2000 March term" in which the depreciation of the machinery and equipment completes.

The sales price of ethanol is Rp 361,200 per 1 Kℓ indicating a high profitability.

When the interests on the long term loan is split in the ratio of facility investment amount between ethanol and Corynecin, the production cost of ethanol including the interests is Rp 273,300 per Kℓ in the "1987 March term" in which the burden of depreciation is the greatest.

2. Corynecin production cost

The production cost of Corynecin, excluding the interests on the loan, is shown in Table 9-6. The production cost of 1 ton Corynecin is Rp 121,551,700 in the "1987 March term" as the highest and drops down to Rp 61,669,000 in the "2000 March term".

However, the sales price of Corynecin is Rp 32,521,000 per ton, and Corynecin is

not profitable at all. Accordingly, production of Corynecin alone is financially impossible.

Significance of this project can be observed in the effective use of cane molasses by concurrently producing Corynecin and highly profitable ethanol.

9.3.2 Production and sales plans

The production and sales plans for each year are shown in Table 9-7.

9.3.3 Income statement

Since the depreciation period of the machinery and equipment investment is 8 years, the sales profit ratio is less than 7% up until the "1995 March term" through which the investment is depreciated. After the period, however, the sales profit ratio rises to 17.4% – 21.36%, making the average ratio of 4.84% in the 15 years. Superiority of this project can be recognized when this sales profit ratio is compared with 2 to 3% of the sale profit ratio in manufacturing industries of advanced countries where much of the investment has been fairly depreciated. Superiority of this project is confirmed, even in combination of Corynecin, if the ethanol market can be established.

The income statement is shown in Table 9-8.

9.3.4 Fund flow statement

The review results of Table 9-9, Fund flow statement, indicate that the fund necessary for production activities and repayment of the loans can be obtained from product sales for 15 years after production commencement.

Significance of this project, in which the fund flow is very stabilized, is really great in Indonesia since in the country there are not a few enterprises whose management activities are disturbed by lack of fund and obliged to ask support of the government fund.

9.3.5 Balance sheet

The review results of Table 9-10, balance sheet, indicate that no dividend can be paid for 6 years after production commencement, but that dividend can be paid starting from the "1992 March term". The cumulative dividend paid up to the "2000 March term" is equivalent to about 95% of the own capital of Rp 4,450 million.

Also the financial situation is extremely sound with the average current ratio of 482% and quick acid ratio of 446% for the 15 years.

9.3.6 Break-even point analysis

The break-even point is shown in Table 9-11 assuming that ethanol and Corynecin are produced in about the same operation rate. Fig. 9-1 shows a break-even point chart. The break-even point of each year in the 15 years resides on the sales line between BEP*1 and BEP*2.

9.3.7 Internal rate of return

1. The internal rates of return are as follows, as shown in Table 9-2.

ROI before tax	15.15%
ROI after tax	13.37%
ROE after tax	11.42%

This project is feasible if PTP can sell ethanol as the sales plan of this project indicates.

2. Sensitivity analysis

In this study, the sensitivity analysis is carried out for the case of the sales price, variable costs and investment fluctuate up or down by 10%.

The sensitivity analysis results are given in Fig. 9-2, Fig. 9-3 and Fig. 9-4.

In this study, the investment is estimated in detail and contingency is calculated at 5% on the foreign currency portion and 10% on the local currency portion. Accordingly, there is few element causing increase of the investment amount.

It is recommended that the Indonesian Government takes protective measures to maintain sales prices of the ethanol and Corynecin.

9.3.8 Case study

Upon a strong request from SBPN, we studied the case to substitute the Rp 30,000 per ton of cane molasses and Rp 150 per ℓ of fuel oil for the prices as of December, 1982.

In this case, the variable cost increases by about 50% of the basic plan, substantially lowering the profitability. As the result, the internal rates of return will drop as shown below.

ROI before tax	3.34%
ROI after tax	3.27%
ROE after tax	No solution

Under the circumstances, the cash fund is short for 15 years and the management will fail.

The price of cane molasses violently fluctuates. For healthy growth of the fermentation plant using cane molasses as the raw material, the price of cane molasses must be stabilized.

9.4 Construction Plan of 3-Item Production Plant

Prior to analysing the basic plan, we analysed the financial situation of the construction plan of a plant for daily production of 30 Kℓ ethanol, 10 ton feed yeasts for animal and 56 kg Corynecin. The results indicated that such a project was infeasible since the variable cost ratio were extremely high on feed yeasts for animal and Corynecin, and a large amount must be invested for the plant, and these disadvantages can not be offset by production of highly profitable ethanol. The internal rates of return in the 3-item production plan are hopeless figure as shown below.

ROI before tax	-10.3316%
ROI after tax	-10.3316%

Accordingly, in this report, we adopt the plan to daily produce 45 Kℓ ethyl alcohol and 56 kg Corynecin, described in 9-2, as the most practical plan. The financial statements for the case of producing the three items are attached to the Appendix for reference.

Table 9-5. Production Cost

- ETHANOL -

PAGE = 1

PRODUCTION COST STATEMENTS
I.S.I. PROJECT (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1984	1985	1986	1987	1988
MATERIALS VOLUME					
MOLASSES	0	0	0	39.917	44.906
OLEIC ACID	0	0	0	15	17
ALGINATE	0	0	0	4	5
OTHER CHEMICAL	0	0	0	61	68
MOLASSES	0	0	0	907	1.190
OLEIC ACID	0	0	0	22	29
ALGINATE	0	0	0	25	33
OTHER CHEMICAL	0	0	0	51	66
RAW MATERIALS COST	0	0	0	1.004	1.318
BY-PRODUCT CREDITS	0	0	0	0	0
FUEL OIL	0	0	0	312	409
WATER	0	0	0	0	1
VARIABLE COST TOTAL	0	0	0	1.317	1.728
MAN POWER COST	0	0	0	172	172
OTHER FIXED COST	0	0	0	86	86
REPAIR.MAINTENAN.	0	0	0	182	182
INSURANCE	0	0	0	63	63
TAX & LICENSES	0	0	0	0	0
FIXED COST TOTAL	0	0	0	503	503
DEPRCI. & AMORTIZAT.	0	0	0	901	901
EX-FACTORY PRD.COST	0	0	0	2.720	3.131
UNIT DIRECT COST	0.0000	0.0000	0.0000	0.2249	0.2301

PRODUCTION COST STATEMENTS
I.S.I. PROJECT (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1989	1990	1991	1992	1993
MATERIALS VOLUME					
MOLASSES	49,896	49,896	49,896	49,896	49,896
OLEIC ACID	19	19	19	19	19
ALGINATE	5	5	5	5	5
OTHER CHEMICAL	76	76	76	76	76
MOLASSES	1,315	1,360	1,360	1,360	1,360
OLEIC ACID	32	33	33	33	33
ALGINATE	37	38	38	38	38
OTHER CHEMICAL	73	76	76	76	76
RAW MATERIALS COST	1,456	1,507	1,507	1,507	1,507
BY-PRODUCT CREDITS	0	0	0	0	0
FUEL OIL	452	467	467	467	467
WATER	1	1	1	1	1
VARIABLE COST TOTAL	1,909	1,975	1,975	1,975	1,975
MAN POWER COST	172	172	172	172	172
OTHER FIXED COST	86	86	86	86	86
REPAIR,MAINTENAN.	182	182	182	182	182
INSURANCE	63	63	63	63	63
TAX & LICENSES	0	0	0	0	0
FIXED COST TOTAL	503	503	503	503	503
DEPRCI. & AMORTIZAT.	901	901	901	874	736
EX-FACTORY PRO.COST	3,312	3,378	3,378	3,352	3,214
UNIT DIRECT COST	0.2191	0.2234	0.2234	0.2217	0.2125

PRODUCTION COST STATEMENTS
I.S.I. PROJECT (RP. 1.000.000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1994	1995	1996	1997	1998
MATERIALS VOLUME					
MOLASSES	49.896	49.896	49.696	49.896	49.896
OLEIC ACID	19	19	19	19	19
ALGINATE	5	5	5	5	5
OTHER CHEMICAL	76	76	76	76	76
MOLASSES	1.360	1.360	1.360	1.360	1.360
OLEIC ACID	33	33	33	33	33
ALGINATE	38	38	38	38	38
OTHER CHEMICAL	76	76	76	76	76
RAW MATERIALS COST	1.507	1.507	1.507	1.507	1.507
BY-PRODUCT CREDITS	0	0	0	0	0
FUEL OIL	467	467	467	467	467
WATER	1	1	1	1	1
VARIABLE COST TOTAL	1.975	1.975	1.975	1.975	1.975
MAN POWER COST	172	172	172	172	172
OTHER FIXED COST	86	86	86	86	86
REPAIR.MAINTENAN.	182	182	182	182	182
INSURANCE	63	63	63	63	63
TAX & LICENSES	0	0	0	0	0
FIXED COST TOTAL	503	503	503	503	503
DEPRCI. & AMORTIZAT.	736	31	31	31	31
EX-FACTORY PRO.COST	3.214	2.508	2.508	2.508	2.508
UNIT DIRECT COST	0.2125	0.1659	0.1659	0.1659	0.1659

PRODUCTION COST STATEMENTS
I.S.I. PROJECT (RP. 1.000.000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1999	2000
MATERIALS VOLUME		
MOLASSES	49.896	49.896
OLEIC ACID	19	19
ALGINATE	5	5
OTHER CHEMICAL	76	76
MOLASSES	1.360	1.360
OLEIC ACID	33	33
ALGINATE	38	38
OTHER CHEMICAL	76	76
RAW MATERIALS COST	1.507	1.507
BY-PRODUCT CREDITS	0	0
FUEL OIL	467	467
WATER	1	1
VARIABLE COST TOTAL	1.975	1.975
MAN POWER COST	172	172
OTHER FIXED COST	86	86
REPAIR.MAINTENAN.	182	182
INSURANCE	63	63
TAX & LICENSES	0	0
FIXED COST TOTAL	503	503
DEPRCI. & AMORTIZAT.	31	31
EX-FACTORY PRO.COST	2.508	2.508
UNIT DIRECT COST	0.1659	0.1659

Table 9-6. Production Cost

- CORYNECIN -

PAGE = 1

PRODUCTION COST STATEMENTS
I.S.I. PROJECT (CORYNECIN) (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1984	1985	1986	1987	1988
MATERIALS VOLUME					
MOLASSES	0	0	0	1,466	1,720
CSL	0	0	0	29	35
AMM. SULFATE	0	0	0	57	70
AMMONIA	0	0	0	59	71
BUTANOL	0	0	0	76	93
OTHER CHEMICAL	0	0	0	47	57
MOLASSES	0	0	0	33	46
CSL	0	0	0	10	14
AMM. SULFATE	0	0	0	10	14
AMMONIA	0	0	0	10	14
BUTANOL	0	0	0	46	65
OTHER CHEMICAL	0	0	0	39	54
RAW MATERIALS COST	0	0	0	148	206
BY-PRODUCT CREDITS	0	0	0	0	0
FUEL OIL	0	0	0	226	315
WATER	0	0	0	0	1
VARIABLE COST TOTAL	0	0	0	375	522
MAN POWER COST	0	0	0	195	195
OTHER FIXED COST	0	0	0	97	97
REPAIR,MAINTENAN.	0	0	0	148	148
INSURANCE	0	0	0	53	53
TAX & LICENSES	0	0	0	0	0
FIXED COST TOTAL	0	0	0	493	493
DEPRCI. & AMORTIZAT.	0	0	0	733	733
EX-FACTORY PRO.COST	0	0	0	1,601	1,743
UNIT DIRECT COST	0.0000	0.0000	0.0000	121.5517	109.3058

PRODUCTION COST STATEMENTS
I.S.I. PROJECT (CORYNECIN) (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1989	1990	1991	1992	1993
MATERIALS VOLUME					
MOLASSES	2,094	2,094	2,094	2,094	2,094
CSL	41	41	41	41	41
AMM. SULFATE	82	82	82	82	82
AMMONIA	84	84	84	84	84
BUTANOL	109	109	109	109	109
OTHER CHEMICAL	67	67	67	67	67
MOLASSES	54	57	57	57	57
CSL	16	17	17	17	17
AMM. SULFATE	16	17	17	17	17
AMMONIA	16	17	17	17	17
BUTANOL	75	79	79	79	79
OTHER CHEMICAL	63	67	67	67	67
RAW MATERIALS COST	241	254	254	254	254
BY-PRODUCT CREDITS	0	0	0	0	0
FUEL OIL	388	388	388	388	388
WATER	1	1	1	1	1
VARIABLE COST TOTAL	610	642	642	642	642
MAN POWER COST	195	195	195	195	195
OTHER FIXED COST	97	97	97	97	97
REPAIR.MAINTENAN.	148	148	148	148	148
INSURANCE	53	53	53	53	53
TAX & LICENSES	0	0	0	0	0
FIXED COST TOTAL	493	493	493	493	493
DEPRCI. & AMORTIZAT.	733	733	733	727	599
EX-FACTORY PRD.COST	1.837	1.869	1.869	1.862	1.734
UNIT DIRECT COST	97.6042	99.3112	99.3112	98.9605	92.1684

PRODUCTION COST STATEMENTS
I.S.I. PROJECT (CORYNECIN) (RP. 1.000.000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1994	1995	1996	1997	1998
MATERIALS VOLUME					
MOLASSES	2.094	2.094	2.094	2.094	2.094
CSL	41	41	41	41	41
AMM. SULFATE	82	82	82	82	82
AMMONIA	84	84	84	84	84
BUTANOL	109	109	109	109	109
OTHER CHEMICAL	67	67	67	67	67
MOLASSES	57	57	57	57	57
CSL	17	17	17	17	17
AMM. SULFATE	17	17	17	17	17
AMMONIA	17	17	17	17	17
BUTANOL	79	79	79	79	79
OTHER CHEMICAL	67	67	67	67	67
RAW MATERIALS COST	254	254	254	254	254
BY-PRODUCT CREDITS	0	0	0	0	0
FUEL OIL	388	388	388	388	388
WATER	1	1	1	1	1
VARIABLE COST TOTAL	642	642	642	642	642
MAN POWER COST	195	195	195	195	195
OTHER FIXED COST	97	97	97	97	97
REPAIR.MAINTENAN.	148	148	148	148	148
INSURANCE	53	53	53	53	53
TAX & LICENSES	0	0	0	0	0
FIXED COST TOTAL	493	493	493	493	493
DEPRCI. & AMORTIZAT.	599	25	25	25	25
EX-FACTORY PRD.COST	1.734	1.160	1.160	1.160	1.160
UNIT DIRECT COST	92.1684	61.6691	61.6691	61.6691	61.6691

PRODUCTION COST STATEMENTS
I.S.I. PROJECT (CORYNECIN) (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1999	2000
MATERIALS VOLUME		
MOLASSES	2,094	2,094
CSL	41	41
AMM. SULFATE	82	82
AMMONIA	84	84
BUTANOL	109	109
OTHER CHEMICAL	67	67
MOLASSES	57	57
CSL	17	17
AMM. SULFATE	17	17
AMMONIA	17	17
BUTANOL	79	79
OTHER CHEMICAL	67	67
RAW MATERIALS COST	254	254
BY-PRODUCT CREDITS	0	0
FUEL OIL	388	388
WATER	1	1
VARIABLE COST TOTAL	642	642
MAN POWER COST	195	195
OTHER FIXED COST	97	97
REPAIR,MAINTENAN.	148	148
INSURANCE	53	53
TAX & LICENSES	0	0
FIXED COST TOTAL	493	493
DEPRCI. & AMORTIZAT.	25	25
EX-FACTORY PRD.COST	1,160	1,160
UNIT DIRECT COST	61.6691	61.6691

Table 9-7. Production and Sales

PAGE = 1

PRODUCTION SALES PLAN
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)
ACCOUNTING DATE -- MONTH(3) DATE(31
)

YEAR	1984	1985	1986	1987	1988
MAIN PRODUCT NO 1 ALCOHOL					
RATED CAPACITY	0	0	0	15,120	15,120
CAPAC. UTILIZATION	0.000 %	0.000 %	0.000 %	80.000 %	90.000 %
PRODUCTION VOLUME	0	0	0	12,096	13,608
BEGINNING INVENTORY	0	0	0	0	504
ENDING INVENTORY	0	0	0	504	567
SALES VOLUME	0	0	0	11,592	13,545
UNIT SALES PRICE	0.0000	0.0000	0.0000	0.3612	0.3612
SALES REVENUE	0	0	0	4,187	4,893
MAIN PRODUCT NO 2 CORYNECIN					
RATED CAPACITY	0	0	0	19	19
CAPAC. UTILIZATION	0.000 %	0.000 %	0.000 %	70.000 %	85.000 %
PRODUCTION VOLUME	0	0	0	13	16
BEGINNING INVENTORY	0	0	0	0	1
ENDING INVENTORY	0	0	0	1	1
SALES VOLUME	0	0	0	13	16
UNIT SALES PRICE	0.0000	0.0000	0.0000	32.5210	32.5210
SALES REVENUE	0	0	0	410	516
TOTAL SALES REVENUE	0	0	0	4,598	5,409

PAGE = 2

PRODUCTION SALES PLAN
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)
ACCOUNTING DATE -- MONTH(3) DATE(31
)

YEAR	1989	1990	1991	1992	1993
MAIN PRODUCT NO 1 ALCOHOL					
RATED CAPACITY	15,120	15,120	15,120	15,120	15,120
CAPAC. UTILIZATION	100.000 %	100.000 %	100.000 %	100.000 %	100.000 %
PRODUCTION VOLUME	15,120	15,120	15,120	15,120	15,120
BEGINNING INVENTORY	567	630	630	630	630
ENDING INVENTORY	630	630	630	630	630
SALES VOLUME	15,057	15,120	15,120	15,120	15,120
UNIT SALES PRICE	0.3612	0.3612	0.3612	0.3612	0.3612
SALES REVENUE	5,439	5,462	5,462	5,462	5,462
MAIN PRODUCT NO 2 CORYNECIN					
RATED CAPACITY	19	19	19	19	19
CAPAC. UTILIZATION	100.000 %	100.000 %	100.000 %	100.000 %	100.000 %
PRODUCTION VOLUME	19	19	19	19	19
BEGINNING INVENTORY	1	1	1	1	1
ENDING INVENTORY	1	1	1	1	1
SALES VOLUME	19	19	19	19	19
UNIT SALES PRICE	32.5210	32.5210	32.5210	32.5210	32.5210
SALES REVENUE	608	612	612	612	612
TOTAL SALES REVENUE	6,047	6,074	6,074	6,074	6,074

PRODUCTION SALES PLAN
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)
ACCOUNTING DATE -- MONTH(3) DATE(31)

YEAR	1994	1995	1996	1997	1998
MAIN PRODUCT NO 1	ALCOHOL				
RATED CAPACITY	15,120	15,120	15,120	15,120	15,120
CAPAC. UTILIZATION	100.000 %	100.000 %	100.000 %	100.000 %	100.000 %
PRODUCTION VOLUME	15,120	15,120	15,120	15,120	15,120
BEGINNING INVENTORY	630	630	630	630	630
ENDING INVENTORY	630	630	630	630	630
SALES VOLUME	15,120	15,120	15,120	15,120	15,120
UNIT SALES PRICE	0.3612	0.3612	0.3612	0.3612	0.3612
SALES REVENUE	5,462	5,462	5,462	5,462	5,462
MAIN PRODUCT NO 2	CORYNECIN				
RATED CAPACITY	19	19	19	19	19
CAPAC. UTILIZATION	100.000 %	100.000 %	100.000 %	100.000 %	100.000 %
PRODUCTION VOLUME	19	19	19	19	19
BEGINNING INVENTORY	1	1	1	1	1
ENDING INVENTORY	1	1	1	1	1
SALES VOLUME	19	19	19	19	19
UNIT SALES PRICE	32.5210	32.5210	32.5210	32.5210	32.5210
SALES REVENUE	612	612	612	612	612
TOTAL SALES REVENUE	6,074	6,074	6,074	6,074	6,074

PRODUCTION SALES PLAN
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)
ACCOUNTING DATE -- MONTH(3) DATE(31)

YEAR	1999	2000
MAIN PRODUCT NO 1	ALCOHOL	
RATED CAPACITY	15,120	15,120
CAPAC. UTILIZATION	100.000 %	100.000 %
PRODUCTION VOLUME	15,120	15,120
BEGINNING INVENTORY	630	630
ENDING INVENTORY	630	630
SALES VOLUME	15,120	15,120
UNIT SALES PRICE	0.3612	0.3612
SALES REVENUE	5,462	5,462
MAIN PRODUCT NO 2	CORYNECIN	
RATED CAPACITY	19	19
CAPAC. UTILIZATION	100.000 %	100.000 %
PRODUCTION VOLUME	19	19
BEGINNING INVENTORY	1	1
ENDING INVENTORY	1	1
SALES VOLUME	19	19
UNIT SALES PRICE	32.5210	32.5210
SALES REVENUE	612	612
TOTAL SALES REVENUE	6,074	6,074

Table 9-8. Income Statement

PAGE = 1

INCOME STATEMENTS INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)

ACCOUNTING DATE --- MONTH(3) DATE(31)

YEAR	1984	1985	1986	1987	1988
SALES REVENUE	0	0	0	4,598	5,409
TOTAL COST OF SALES	0	0	0	4,140	4,855
VARIABLE COST TOTAL	0	0	0	1,691	2,250
MOLASSES	0	0	0	940	1,237
OLEIC ACID	0	0	0	22	29
ALGINATE	0	0	0	25	33
CSL	0	0	0	10	14
AMM. SULFATE	0	0	0	10	14
AMMONIA	0	0	0	10	14
BUTANOL	0	0	0	46	65
OTHER CHEMICAL	0	0	0	89	120
FUEL OIL	0	0	0	538	724
WATER	0	0	0	1	1
CREDIT OF BY-PROD.	0	0	0	0	0
FIXED COST TOTAL	0	0	0	2,629	2,629
DEPRICIATION	0	0	0	1,252	1,252
AMORTIZATION	0	0	0	386	386
DEPR. OF ISSUE COST	0	0	0	0	0
MAN POWER COST	0	0	0	367	367
OTHER FIXED COST	0	0	0	180	180
REPAIR+MAINTENANCE	0	0	0	330	330
INSURANCE	0	0	0	114	114
TAX & LICENCE FEE	0	0	0	0	0
INC.INVENTORY(PROD)	0	0	0	-180	-24
PROFIT ON SALES	0	0	0	458	554
OPERATING PROFIT	0	0	0	458	554
INT.ON LONG TERM D.	0	0	0	1,144	1,144
ON BOND	0	0	0	0	0
ON SHORT TERM D	0	0	0	0	0
SUBSIDY	0	0	0	0	0
NET PROFIT BFR.TAX	0	0	0	-686	-590
INCOME TAX	0	0	0	0	0
NET PROFIT AFT.TAX	0	0	0	-686	-590

INCOME STATEMENTS INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)

ACCOUNTING DATE --- MONTH(3) DATE(31)

YEAR	1989	1990	1991	1992	1993
SALES REVENUE	6,047	6,074	6,074	6,074	6,074
TOTAL COST OF SALES	5,125	5,246	5,246	5,133	4,947
VARIABLE COST TOTAL	2,519	2,617	2,617	2,617	2,617
MOLASSES	1,369	1,417	1,417	1,417	1,417
OLEIC ACID	32	33	33	33	33
ALGINATE	37	38	38	38	38
CSL	16	17	17	17	17
AMM. SULFATE	16	17	17	17	17
AMMONIA	16	17	17	17	17
BUTANOL	75	79	79	79	79
OTHER CHEMICAL	137	142	142	142	142
FUEL OIL	820	855	855	855	855
WATER	1	1	1	1	1
CREDIT OF BY-PROD.	0	0	0	0	0
FIXED COST TOTAL	2,629	2,629	2,629	2,516	2,330
DEPRICIATION	1,252	1,252	1,252	1,252	1,252
AMOTIZATION	386	386	386	273	87
DEPR. OF ISSUE COST	0	0	0	0	0
MAN POWER COST	367	367	367	367	367
OTHER FIXED COST	180	180	180	180	180
REPAIR-MAINTENANCE	330	330	330	330	330
INSURANCE	114	114	114	114	114
TAX & LICENCE FEE	0	0	0	0	0
INC.INVENTORY(PROD)	-23	0	0	0	0
PROFIT ON SALES	922	828	828	940	1,127
OPERATING PROFIT	922	828	828	940	1,127
INT.ON LONG TERM D.	1,144	1,127	1,042	931	820
ON BOND	0	0	0	0	0
ON SHORT TERM D	0	0	0	0	0
SUBSIDY	0	0	0	0	0
NET PROFIT BFR.TAX	-223	-299	-214	9	306
INCOME TAX	0	0	0	4	138
NET PROFIT AFT.TAX	-223	-299	-214	5	168

INCOME STATEMENTS INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)

ACCOUNTING DATE --- MONTH(3) DATE(31)

YEAR	1994	1995	1996	1997	1998
SALES REVENUE	6,074	6,074	6,074	6,074	6,074
TOTAL COST OF SALES	4,947	4,701	3,665	3,665	3,665
VARIABLE COST TOTAL	2,617	2,617	2,617	2,617	2,617
MOLASSES	1,417	1,417	1,417	1,417	1,417
OLEIC ACID	33	33	33	33	33
ALGINATE	38	38	38	38	38
CSL	17	17	17	17	17
AMM. SULFATE	17	17	17	17	17
AMMONIA	17	17	17	17	17
BUTANOL	79	79	79	79	79
OTHER CHEMICAL	142	142	142	142	142
FUEL OIL	855	855	855	855	855
WATER	1	1	1	1	1
CREDIT OF BY-PROD.	0	0	0	0	0
FIXED COST TOTAL	2,330	2,084	1,047	1,047	1,047
DEPRICIATION	1,252	1,042	56	56	56
AMORTIZATION	87	51	0	0	0
DEPR. OF ISSUE COST	0	0	0	0	0
MAN POWER COST	367	367	367	367	367
OTHER FIXED COST	180	180	180	180	180
REPAIR-MAINTENANCE	330	330	330	330	330
INSURANCE	114	114	114	114	114
TAX & LICENCE FEE	0	0	0	0	0
INC.INVENTORY(PROD)	0	0	0	0	0
PROFIT ON SALES	1,127	1,372	2,409	2,409	2,409
OPERATING PROFIT	1,127	1,372	2,409	2,409	2,409
INT.ON LONG TERM D.	710	599	488	377	266
ON BOND	0	0	0	0	0
ON SHORT TERM D	0	0	0	0	0
SUBSIDY	0	0	0	0	0
NET PROFIT BFR.TAX	417	774	1,921	2,032	2,143
INCOME TAX	188	348	864	914	964
NET PROFIT AFT.TAX	229	425	1,057	1,117	1,178

INCOME STATEMENTS INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)

ACCOUNTING DATE --- MONTH(3) DATE(31)

YEAR	1999	2000
SALES REVENUE	6,074	6,074
TOTAL COST OF SALES	3,665	3,665
VARIABLE COST TOTAL	2,617	2,617
MOLASSES	1,417	1,417
OLEIC ACID	33	33
ALGINATE	38	38
CSL	17	17
AMM. SULFATE	17	17
AMMONIA	17	17
BUTANOL	79	79
OTHER CHEMICAL	142	142
FUEL OIL	855	855
WATER	1	1
CREDIT OF BY-PROD.	0	0
FIXED COST TOTAL	1,047	1,047
DEPRICIATION	56	56
AMORTIZATION	0	0
DEPR. OF ISSUE COST	0	0
MAN POWER COST	367	367
OTHER FIXED COST	180	180
REPAIR·MAINTENANCE	330	330
INSURANCE	114	114
TAX & LICENCE FEE	0	0
INC.INVENTORY(PROD)	0	0
PROFIT ON SALES	2,409	2,409
OPERATING PROFIT	2,409	2,409
INT.ON LONG TERM D.	156	50
ON BOND	0	0
ON SHORT TERM D	0	0
SUBSIDY	0	0
NET PROFIT BFR.TAX	2,253	2,359
INCOME TAX	1,014	1,062
NET PROFIT AFT.TAX	1,239	1,298

Table 9-9. Fund Flow Statement

PAGE = 1

FUNDS FLOW STATEMENTS
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1984	1985	1986	1987	1988
SOURCE OF FUNDS	0	5,927	6,998	2,095	2,192
CASH FROM OPERATION	0	0	0	2,095	2,192
PROFIT BFR.TAX & I.	0	0	0	458	554
DEPRECIATION	0	0	0	1,252	1,252
AMOTIZATION	0	0	0	386	386
DEPR. OF ISSUE COST	0	0	0	0	0
FINANCIAL RESOURCES	0	5,927	6,998	0	0
SHARE CAPITAL	0	4,450	0	0	0
LONG TERM DEBT	0	1,477	6,998	0	0
BOND	0	0	0	0	0
SUBSIDY	0	0	0	0	0
SHORT TERM DEBT	0	0	0	0	0
INCR.IN ACCT PAYAB.	0	0	0	0	0
USES OF FUNDS	0	4,692	8,182	1,474	1,218
INV. IN FIXED ASSET	0	4,692	8,182	0	0
LAND & SITE IMPROV.	0	0	0	0	0
CONSTRUC.FACILITIES	0	1,121	0	0	0
MACHINERY,EQUIPMENT	0	3,211	6,355	0	0
PRE-OPERATION EXP.	0	73	968	0	0
INT. DURING CONST.	0	0	395	0	0
PHYSICAL CONTINGEN.	0	287	405	0	0
OTHER ASSETS	0	0	59	0	0
ISSUE COST	0	0	0	0	0
INC.IN CURRENT AST.	0	0	0	330	74
INC.ACCT RECEIVABLE	0	0	0	0	0
INC.IN PRODUCTION	0	0	0	180	24
INC.IN MATERIALS	0	0	0	150	50
DEBT SERVICES	0	0	0	1,144	1,144
REPAY. L-TERM DEBT	0	0	0	0	0
REPAYMENT OF BOND	0	0	0	0	0
REPAY. S-TERM DEBT	0	0	0	0	0
INT.ON L-TERM DEBT	0	0	0	1,144	1,144
INTEREST ON BOND	0	0	0	0	0
INT.ON S-TERM DEBT	0	0	0	0	0
INCOME TAX PAYMENT	0	0	0	0	0
DIVIDENDS PAYMENT	0	0	0	0	0
CASH INCREASED	0	1,235	-1,184	621	974
BEGINNING CASH BAL.	0	0	1,235	51	672
ENDING CASH BALANCE	0	1,235	51	672	1,646

FUNDS FLOW STATEMENTS
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1989	1990	1991	1992	1993
SOURCE OF FUNDS	2,559	2,465	2,465	2,465	2,465
CASH FROM OPERATION	2,559	2,465	2,465	2,465	2,465
PROFIT BFR.TAX & I.	922	828	828	940	1,127
DEPRECIATION	1,252	1,252	1,252	1,252	1,252
AMOTIZATION	386	386	386	273	87
DEPR. OF ISSUE COST	0	0	0	0	0
FINANCIAL RESOURCES	0	0	0	0	0
SHARE CAPITAL	0	0	0	0	0
LONG TERM DEBT	0	0	0	0	0
BOND	0	0	0	0	0
SUBSIDY	0	0	0	0	0
SHORT TERM DEBT	0	0	0	0	0
INCR.IN ACCT PAYAB.	0	0	0	0	0
USES OF FUNDS	1,191	1,428	1,889	1,784	1,840
INV. IN FIXED ASSET	0	0	0	0	0
LAND & SITE IMPROV.	0	0	0	0	0
CONSTRUC.FACILITIES	0	0	0	0	0
MACHINERY,EQUIPMENT	0	0	0	0	0
PRE-OPERATION EXP.	0	0	0	0	0
INT. DURING CONST.	0	0	0	0	0
PHYSICAL CONTINGEN.	0	0	0	0	0
OTHER ASSETS	0	0	0	0	0
ISSUE COST	0	0	0	0	0
INC.IN CURRENT AST.	47	9	0	0	0
INC.ACCT RECEIVABLE	0	0	0	0	0
INC.IN PRODUCTION	23	0	0	0	0
INC.IN MATERIALS	24	9	0	0	0
DEBT SERVICES	1,144	1,419	1,889	1,784	1,836
REPAY. L-TERM DEBT	0	293	847	847	847
REPAYMENT OF BOND	0	0	0	0	0
REPAY. S-TERM DEBT	0	0	0	0	0
INT.ON L-TERM DEBT	1,144	1,127	1,042	931	820
INTEREST ON BOND	0	0	0	0	0
INT.ON S-TERM DEBT	0	0	0	0	0
INCOME TAX PAYMENT	0	0	0	0	4
DIVIDENDS PAYMENT	0	0	0	5	168
CASH INCREASED	1,368	1,037	576	681	625
BEGINNING CASH BAL.	1,646	3,014	4,051	4,626	5,308
ENDING CASH BALANCE	3,014	4,051	4,626	5,308	5,932

FUNDS FLOW STATEMENTS
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1994	1995	1996	1997	1998
SOURCE OF FUNDS	2,465	2,465	2,465	2,465	2,465
CASH FROM OPERATION	2,465	2,465	2,465	2,465	2,465
PROFIT BFR.TAX & I.	1,127	1,372	2,409	2,409	2,409
DEPRECIATION	1,252	1,042	56	56	56
AMOTIZATION	87	51	0	0	0
DEPR. OF ISSUE COST	0	0	0	0	0
FINANCIAL RESOURCES	0	0	0	0	0
SHARE CAPITAL	0	0	0	0	0
LONG TERM DEBT	0	0	0	0	0
BOND	0	0	0	0	0
SUBSIDY	0	0	0	0	0
SHORT TERM DEBT	0	0	0	0	0
INCR.IN ACCT PAYAB.	0	0	0	0	0
USES OF FUNDS	1,924	2,059	2,351	2,757	2,696
INV. IN FIXED ASSET	0	0	0	0	0
LAND & SITE IMPROV.	0	0	0	0	0
CONSTRUC.FACILITIES	0	0	0	0	0
MACHINERY,EQUIPMENT	0	0	0	0	0
PRE-OPERATION EXP.	0	0	0	0	0
INT. DURING CONST.	0	0	0	0	0
PHYSICAL CONTINGEN.	0	0	0	0	0
OTHER ASSETS	0	0	0	0	0
ISSUE COST	0	0	0	0	0
INC.IN CURRENT AST.	0	0	0	0	0
INC.ACCT RECEIVABLE	0	0	0	0	0
INC.IN PRODUCTION	0	0	0	0	0
INC.IN MATERIALS	0	0	0	0	0
DEBT SERVICES	1,786	1,872	2,003	1,892	1,781
REPAY. L-TERM DEBT	847	847	847	847	847
REPAYMENT OF BOND	0	0	0	0	0
REPAY. S-TERM DEBT	0	0	0	0	0
INT.ON L-TERM DEBT	710	599	488	377	265
INTEREST ON BOND	0	0	0	0	0
INT.ON S-TERM DEBT	0	0	0	0	0
INCOME TAX PAYMENT	138	188	348	864	914
DIVIDENDS PAYMENT	229	425	668	668	668
CASH INCREASED	541	406	114	-292	-231
BEGINNING CASH BAL.	5,932	6,473	6,878	6,992	6,701
ENDING CASH BALANCE	6,473	6,878	6,992	6,701	6,470

FUNDS FLOW STATEMENTS
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1999	2000
SOURCE OF FUNDS	2,465	2,465
CASH FROM OPERATION	2,465	2,465
PROFIT BFR.TAX & I.	2,409	2,409
DEPRECIATION	56	56
AMOTIZATION	0	0
DEPR. OF ISSUE COST	0	0
FINANCIAL RESOURCES	0	0
SHARE CAPITAL	0	0
LONG TERM DEBT	0	0
BOND	0	0
SUBSIDY	0	0
SHORT TERM DEBT	0	0
INCR.IN ACCT PAYAB.	0	0
USES OF FUNDS	2,635	2,286
INV. IN FIXED ASSET	0	0
LAND & SITE IMPROV.	0	0
CONSTRUC.FACILITIES	0	0
MACHINERY,EQUIPMENT	0	0
PRE-OPERATION EXP.	0	0
INT. DURING CONST.	0	0
PHYSICAL CONTINGEN.	0	0
OTHER ASSETS	0	0
ISSUE COST	0	0
INC.IN CURRENT AST.	0	0
INC.ACCT RECEIVABLE	0	0
INC.IN PRODUCTION	0	0
INC.IN MATERIALS	0	0
DEBT SERVICES	1,671	1,272
REPAY. L-TERM DEBT	847	555
REPAYMENT OF BOND	0	0
REPAY. S-TERM DEBT	0	0
INT.ON L-TERM DEBT	156	50
INTEREST ON BOND	0	0
INT.ON S-TERM DEBT	0	0
INCOME TAX PAYMENT	964	1,014
DIVIDENDS PAYMENT	668	668
CASH INCREASED	-170	179
BEGINNING CASH BAL.	6,470	6,300
ENDING CASH BALANCE	6,300	6,479

Table 9-10. Balance Sheet

PAGE = 1

BALANCE SHEET
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1984	1985	1986	1987	1988
ASSETS	0	5,927	12,925	12,239	11,649
CURRENT ASSETS	0	1,235	51	1,001	2,049
CASH	0	1,235	51	672	1,646
ACCT. RECEIVABLE	0	0	0	0	0
PRODUCTS INVENTO.	0	0	0	180	204
MATERIALS INVENT.	0	0	0	150	199
FIXED ASSETS INV.	0	4,692	12,874	12,874	12,874
LAND	0	0	0	0	0
CONST.FACILITIES	0	1,121	1,121	1,121	1,121
MACHINERY,EQUIPM.	0	3,211	9,566	9,566	9,566
PRE-OPERATION EXP	0	73	1,041	1,041	1,041
INT.DUR.CONSTRUCT	0	0	395	395	395
PHYSI. CONTIGENCY	0	287	692	692	692
OTHER ASSETS	0	0	59	59	59
DEFERRED ASSETS	0	0	0	0	0
DEPREC. & AMORTIZ.	0	0	0	-1,637	-3,275
LIABILITY & EQUITY	0	5,927	12,925	12,239	11,649
LIABILITIES	0	1,477	8,475	8,475	8,475
CURRENT LIABILITY	0	0	0	0	0
ACCONTS PAYABLE	0	0	0	0	0
INCOME TAX PAYABLE	0	0	0	0	0
CURRENT PORTION OF DEBT					
LONG TERM DEBT	0	0	0	0	0
BOND PAYABLE	0	0	0	0	0
SHORT TERM DEBT	0	0	0	0	0
FIXED LIABILITIES	0	1,477	8,475	8,475	8,475
L-TERM DEBT BLNC.	0	1,477	8,475	8,475	8,475
BOND BALANCE	0	0	0	0	0
STOCK HOLDERS EQUI.	0	4,450	4,450	3,764	3,174
SHARE CAPITAL	0	4,450	4,450	4,450	4,450
NET PROFIT AFT. TAX	0	0	-0	-686	-590
DIVIDENDS PAYABLE	0	0	0	0	-0
BEGINNING BALANCE	0	0	0	0	-686
RETAINED ERNINGS	0	0	0	-686	-1,276

BALANCE SHEET
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1989	1990	1991	1992	1993
ASSETS	11,426	10,834	9,773	8,929	8,215
CURRENT ASSETS	3,464	4,509	5,085	5,766	6,391
CASH	3,014	4,051	4,626	5,308	5,932
ACCT. RECEIVABLE	0	0	0	0	0
PRODUCTS INVENTO.	226	226	226	226	226
MATERIALS INVENT.	224	232	232	232	232
FIXED ASSETS INV.	12,874	12,874	12,874	12,874	12,874
LAND	0	0	0	0	0
CONST.FACILITIES	1,121	1,121	1,121	1,121	1,121
MACHINERY,EQUIPM.	9,566	9,566	9,566	9,566	9,566
PRE-OPERATION EXP	1,041	1,041	1,041	1,041	1,041
INT.DUR.CONSTRUCT	395	395	395	395	395
PHYSI. CONTIGENCY	692	692	692	692	692
OTHER ASSETS	59	59	59	59	59
DEFERRED ASSETS	0	0	0	0	0
DEPREC. & AMORTIZ.	-4,912	-6,549	-8,187	-9,711	-11,050
LIABILITY & EQUITY	11,426	10,834	9,773	8,929	8,215
LIABILITIES	8,475	8,182	7,335	6,492	5,778
CURRENT LIABILITY	293	847	847	852	985
ACCONTS PAYABLE	0	0	0	0	0
INCOME TAX PAYABLE	0	0	0	4	138
CURRENT PORTION OF DEBT					
LONG TERM DEBT	293	847	847	847	847
BOND PAYABLE	0	0	0	0	0
SHORT TERM DEBT	0	0	0	0	0
FIXED LIABILITIES	8,182	7,335	6,487	5,640	4,792
L-TERM DEBT BLNC.	8,182	7,335	6,487	5,640	4,792
BOND BALANCE	0	0	0	0	0
STOCK HOLDERS EQUI.	2,951	2,652	2,438	2,438	2,438
SHARE CAPITAL	4,450	4,450	4,450	4,450	4,450
NET PROFIT AFT. TAX	-223	-299	-214	5	168
DIVIDENDS PAYABLE	0	0	0	-5	-168
BEGINNING BALANCE	-1,276	-1,499	-1,798	-2,012	-2,012
RETAINED ERNINGS	-1,499	-1,798	-2,012	-2,012	-2,012

BALANCE SHEET
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1.000.000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1994	1995	1996	1997	1998
ASSETS	7,418	6,731	6,789	6,441	6,154
CURRENT ASSETS	6,931	7,337	7,451	7,159	6,929
CASH	6,473	6,878	6,992	6,701	6,470
ACCT. RECEIVABLE	0	0	0	0	0
PRODUCTS INVENTO.	226	226	226	226	226
MATERIALS INVENT.	232	232	232	232	232
FIXED ASSETS INV.	12,874	12,874	12,874	12,874	12,874
LAND	0	0	0	0	0
CONST.FACILITIES	1,121	1,121	1,121	1,121	1,121
MACHINERY.EQUIPM.	9,566	9,566	9,566	9,566	9,566
PRE-OPERATION EXP	1,041	1,041	1,041	1,041	1,041
INT.DUR.CONSTRUCT	395	395	395	395	395
PHYSI. CONTIGENCY	692	692	692	692	692
OTHER ASSETS	59	59	59	59	59
DEFERRED ASSETS	0	0	0	0	0
DEPREC. & AMORTIZ.	-12,388	-13,481	-13,537	-13,593	-13,649
LIABILITY & EQUITY	7,418	6,731	6,789	6,441	6,154
LIABILITIES	4,980	4,293	3,962	3,164	2,367
CURRENT LIABILITY	1,035	1,196	1,712	1,762	1,812
ACCONTS PAYABLE	0	0	0	0	0
INCOME TAX PAYABLE	188	348	864	914	964
CURRENT PORTION OF DEBT					
LONG TERM DEBT	847	847	847	847	847
BOND PAYABLE	0	0	0	0	0
SHORT TERM DEBT	0	0	0	0	0
FIXED LIABILITIES	3,945	3,097	2,250	1,402	555
L-TERM DEBT BLNC.	3,945	3,097	2,250	1,402	555
BOND BALANCE	0	0	0	0	0
STOCK HOLDERS EQUI.	2,438	2,438	2,827	3,277	3,787
SHARE CAPITAL	4,450	4,450	4,450	4,450	4,450
NET PROFIT AFT. TAX	229	425	1,057	1,117	1,178
DIVIDENDS PAYABLE	-229	-425	-668	-668	-668
BEGINNING BALANCE	-2,012	-2,012	-2,012	-1,623	-1,173
RETAINED ERNINGS	-2,012	-2,012	-1,623	-1,173	-663

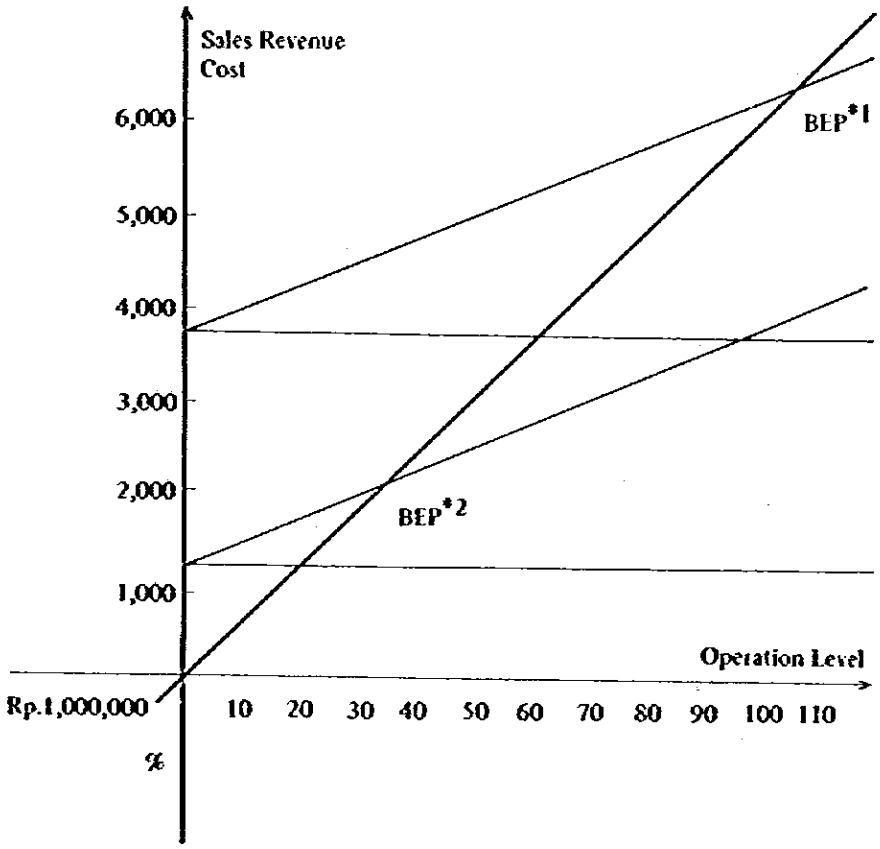
BALANCE SHEET
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1999	2000
ASSETS	5,928	6,051
CURRENT ASSETS	6,759	6,938
CASH	6,300	6,479
ACCT. RECEIVABLE	0	0
PRODUCTS INVENTO.	226	226
MATERIALS INVENT.	232	232
FIXED ASSETS INV.	12,874	12,874
LAND	0	0
CONST.FACILITIES	1,121	1,121
MACHINERY,EQUIPM.	9,566	9,566
PRE-OPERATION EXP	1,041	1,041
INT.DUR.CONSTRUCT	395	395
PHYSI. CONTIGENCY	692	692
OTHER ASSETS	59	59
DEFERRED ASSETS	0	0
DEPREC. & AMORTIZ.	-13,705	-13,761
LIABILITY & EQUITY	5,928	6,051
LIABILITIES	1,569	1,062
CURRENT LIABILITY	1,569	1,062
ACCONTS PAYABLE	0	0
INCOME TAX PAYABLE	1,014	1,062
CURRENT PORTION OF DEBT		
LONG TERM DEBT	555	0
BOND PAYABLE	0	0
SHORT TERM DEBT	0	0
FIXED LIABILITIES	0	0
L-TERM DEBT BLNC.	0	0
BOND BALANCE	0	0
STOCK HOLDERS EQUI.	4,359	4,989
SHARE CAPITAL	4,450	4,450
NET PROFIT AFT. TAX	1,239	1,298
DIVIDENDS PAYABLE	-668	-668
BEGINNING BALANCE	-663	-91
RETAINED ERNINGS	-91	539

Table 9-11. Break Even Point

BREAK EVEN POINT

YEAR	SALES REVENUE	VARIABLE C.	FIXED C.	INTEREST	BEP (%)
1987	4598	1691	2629	1144	98.25
1988	5409	2250	2629	1144	106.36
1989	6047	2519	2629	1144	106.47
1990	6074	2617	2629	1127	108.65
1991	6074	2617	2629	1042	106.19
1992	6074	2617	2516	931	99.71
1993	6074	2617	2330	820	91.12
1994	6074	2617	2330	710	87.74
1995	6074	2617	2084	599	77.61
1996	6074	2617	1047	488	44.40
1997	6074	2617	1047	377	41.19
1998	6074	2617	1047	266	37.98
1999	6074	2617	1047	156	34.80



Note: BEP*1: Year of 1990
BEP*2: Year of 2000

Fig. 9-1. Break Even Point Chart

Table 9-12. Internal Rate of Return

IRR CALCULATION TABLE INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT
RP. 1.000.000

IRR CALCULATION ON TOTAL INVESTMENT (ROI BEFORE TAX)

YEAR	TOTAL INVESTMENT	PROFIT BEFORE TAX	DEPRECIATION	INTEREST ON DEBT	RETURN BEFORE TAX	DISCOUNT RATIO	PRESENT VALUE INVEST.	PRESENT VALUE RETURN
1984	0	0	0	0	0	1.32605	0	0
1985	5927	0	0	0	0	1.15154	6825	0
1986	6603	0	0	0	0	1.00000	6603	0
1987	0	-686	1637	1144	2095	0.86840	0	1819
1988	0	-590	1637	1144	2192	0.75412	0	1653
1989	0	-223	1637	1144	2559	0.65488	0	1676
1990	0	-299	1637	1127	2465	0.56870	0	1402
1991	0	-214	1637	1042	2465	0.49386	0	1217
1992	0	9	1525	931	2465	0.42887	0	1057
1993	0	306	1338	820	2465	0.37243	0	918
1994	0	417	1338	710	2465	0.32342	0	797
1995	0	774	1093	599	2465	0.28086	0	692
1996	0	1921	56	488	2465	0.24390	0	601
1997	0	2032	56	377	2465	0.21180	0	522
1998	0	2143	56	266	2465	0.18393	0	453
1999	0	2253	56	156	2465	0.15972	0	394
2000	836	2359	56	50	2465	0.13870	116	342
TOTAL	13366				33960		13544	13544

----- INTERNAL RATE OF RETURN ----- = 15.1541 %

PAY-OUT PERIOD AFT.START OF OPERATION = 6.5337 YEAR

IRR CALCULATION TABLE INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT
RP. 1.000.000

IRR CALCULATION ON TOTAL INVESTMENT (ROI AFTER TAX)

YEAR	TOTAL INVESTMENT	PROFIT BEFORE TAX	DEPRECIATION	INTEREST ON DEBT	INCOME TAX	RETURN AFTER TAX	DISCOUNT RATIO	PRESENT VALUE INVEST.	PRESENT VALUE RETURN
1984	0	0	0	0	0	0	1.28531	0	0
1985	5927	0	0	0	0	0	1.13372	6719	0
1986	6603	0	0	0	0	0	1.00000	6603	0
1987	0	-686	1637	1144	0	2095	0.88206	0	1848
1988	0	-590	1637	1144	0	2192	0.77802	0	1705
1989	0	-223	1637	1144	0	2559	0.68626	0	1756
1990	0	-299	1637	1127	0	2465	0.60532	0	1492
1991	0	-214	1637	1042	0	2465	0.53392	0	1316
1992	0	9	1525	931	-4	2461	0.47095	0	1159
1993	0	306	1338	820	-138	2327	0.41540	0	967
1994	0	417	1338	710	-188	2277	0.36641	0	834
1995	0	774	1093	599	-348	2117	0.32319	0	684
1996	0	1921	56	488	-864	1601	0.28507	0	456
1997	0	2032	56	377	-914	1551	0.25145	0	390
1998	0	2143	56	266	-964	1501	0.22179	0	333
1999	0	2253	56	156	-1014	1451	0.19563	0	284
2000	836	2359	56	50	-1062	1403	0.17256	144	242
TOTAL	13366					28464		13467	13467

----- INTERNAL RATE OF RETURN ----- = 13.3716 %

PAY-OUT PERIOD AFT.START OF OPERATION = 6.5329 YEAR

IRR CALCULATION TABLE INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT
RP. 1,000,000

IRR CALCULATION ON EQUITY (ROE AFTER TAX)

YEAR	TOTAL EQUITY	PROFIT AFTER TAX	DEPRECI ATION	REPAYMENT OF DEBT	RETURN AFTER TAX	DISCOUNT RATIO	PRESENT VALUE INVEST.	PRESENT VALUE RETURN
1984	0	0	0	0	0	1.24139	0	0
1985	4450	0	0	0	0	1.11418	4958	0
1986	395	0	0	0	0	1.00000	395	0
1987	0	-686	1637	0	951	0.89752	0	854
1988	0	-590	1637	0	1047	0.80555	0	844
1989	0	-223	1637	0	1415	0.72300	0	1023
1990	0	-299	1637	-293	1046	0.64891	0	679
1991	0	-214	1637	-847	576	0.58241	0	335
1992	0	5	1525	-847	682	0.52273	0	357
1993	0	168	1338	-847	659	0.46916	0	309
1994	0	229	1338	-847	720	0.42109	0	303
1995	0	425	1093	-847	671	0.37794	0	253
1996	0	1057	56	-847	265	0.33921	0	90
1997	0	1117	56	-847	326	0.30445	0	99
1998	0	1178	56	-847	387	0.27325	0	106
1999	0	1239	56	-847	448	0.24525	0	110
2000	836	1298	56	-555	799	0.22012	184	176
TOTAL	5681				9991		5537	5537

----- INTERNAL RATE OF RETURN ----- = 11.4175 %

PAY-OUT PERIOD AFT.START OF OPERATION = 999.9999 YEAR

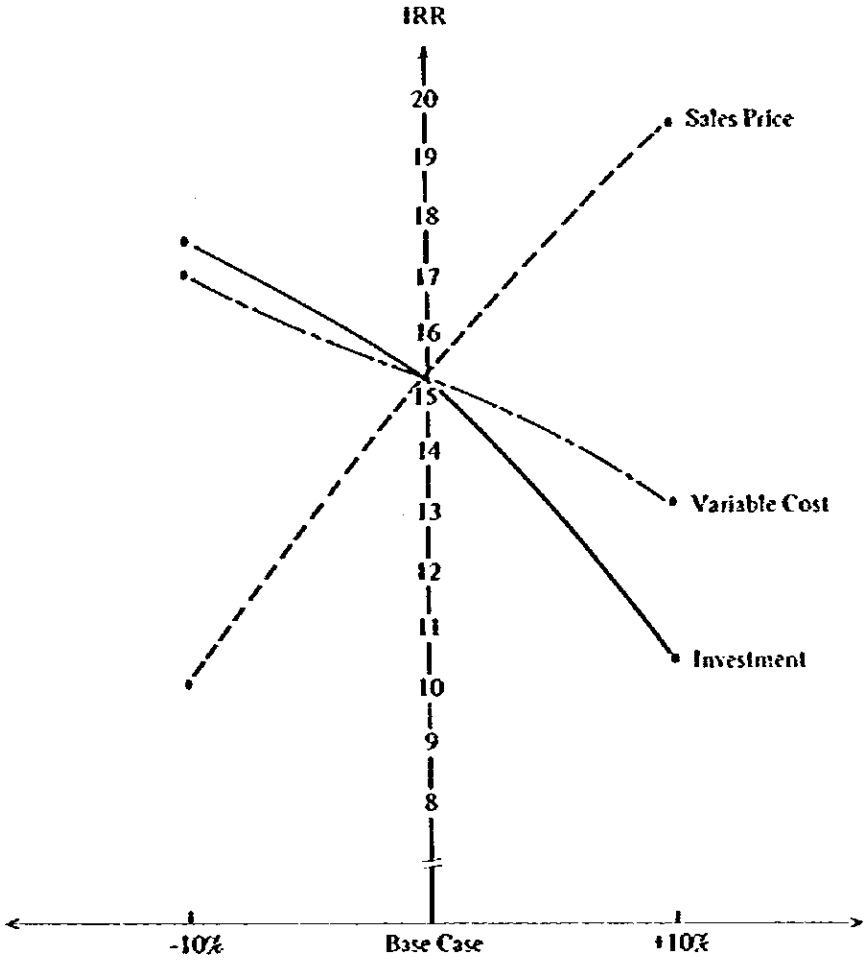


Fig. 9-2. Sensitivity Analysis
ROI Before Tax

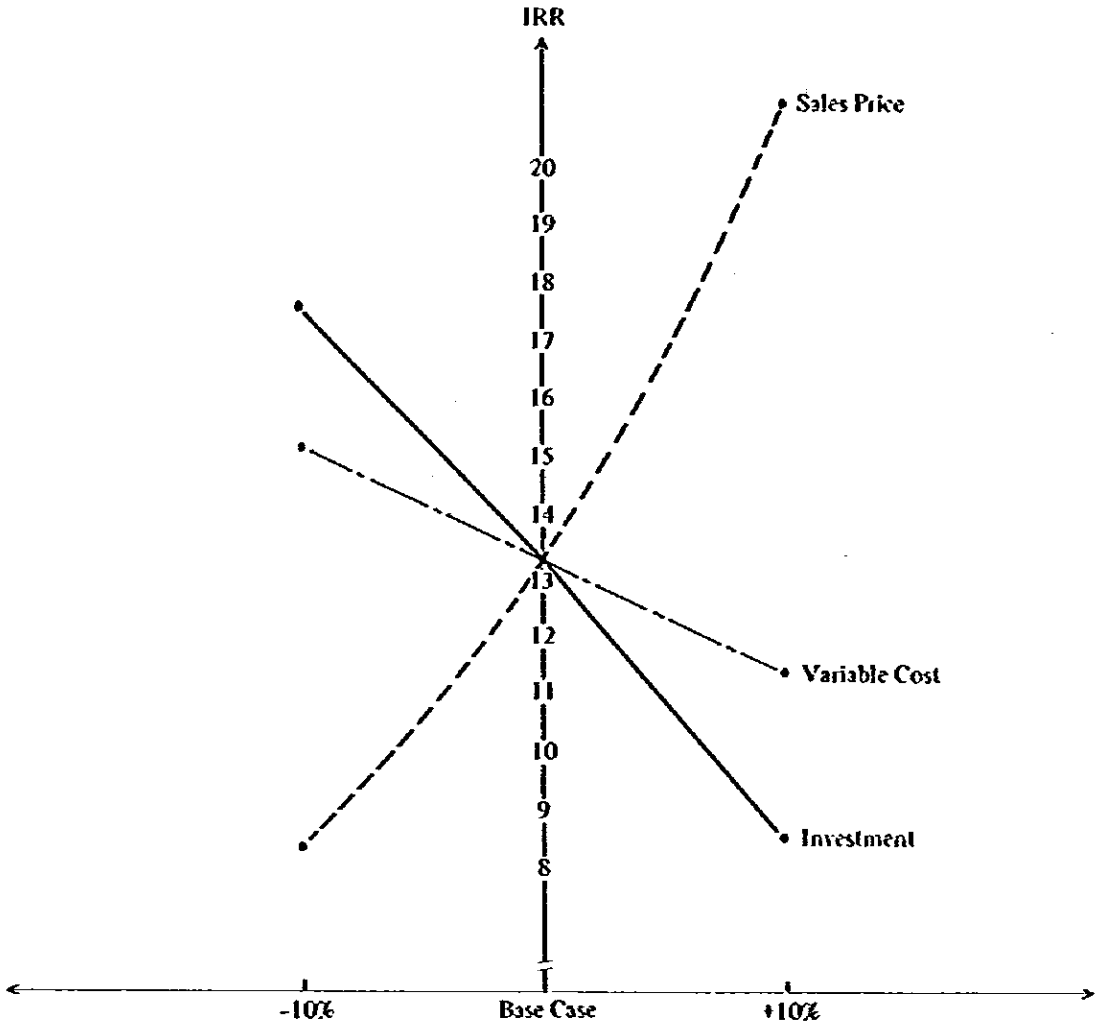


Fig. 9-3. Sensitivity Analysis
ROI After Tax

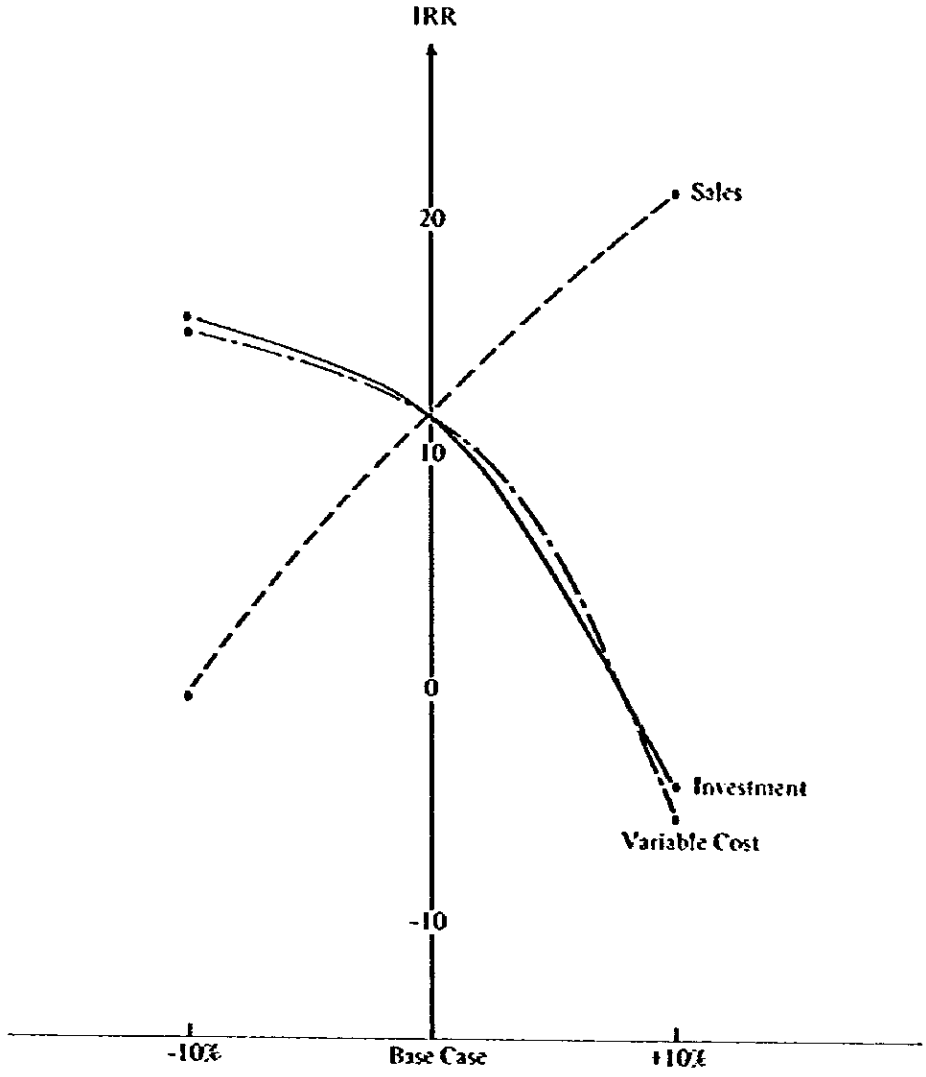


Fig. 9-4. Sensitivity Analysis
ROE After Tax

Chapter 10.

ECONOMIC EVALUATION OF THE PROJECT

Chapter 10. ECONOMICAL EVALUATION OF THE PROJECT

10.1 Economic Internal Rate of Return

10.1.1 Shadow prices

The shadow price of each item must be determined to calculate the economic rate of return (ERR) of this project.

1. Selling price of ethanol

In the financial calculation condition for the basic plan described in Clause 9.2 of Chapter 9, the following "Provenue" only is adopted as the selling price of ethanol as of December, 1982. The reason for this determination is that the not sales revenue of PTP is the "Provenue" only and Pajak, MPO, Iuran BKS and Kompensos are taxes and imposts so that they should not be counted as net sales revenue of PTP.

However, Pajak, MPO, Iuran BKS, and Kompensos are parts of benefit in the sense of the national economy.

Therefore, the selling price of ethanol adopted for ERR calculation should be Rp 303.45 per liter as of December, 1982. (Rp. 414 as of March 1986)

Unit Selling Price

Provenue	Rp.	265.00	
Pajak		6.65	
MPO		5.30	
Iuran BKS		1.50	
Kompensos		25.00	
Total		303.45	(Rp. 413.63 in March, 1986)

2. Price of sugarcane molasses

The Indonesian Government, which is implementing a sugar production increase project at present, is protecting sugarcane farmers by maintaining the sugarcane procurement price at a high level. Therefore, the domestic cane molasses price is controlled at Rp20,000 per ton as of December, 1982, much higher than the international market price of US$22 (Rp15,290). The difference is used as the incentive paid to sugarcane farmers by the Government, and it is a benefit if looked at from the national economy standpoint. Accordingly, the price of Rp15,290 per ton as of December, 1982 (Rp20,841 as of March, 1986) should be adopted as the cane molasses price to calculate the ERR of this project.

3. Man power cost

In Indonesia, approximately 47.3 million people are working and approximately 48.43 million people are searching jobs as data of 1976. The wages being paid to employees at present seem to include labor incentives. Accordingly, the shadow price of man power cost used for calculation of ERR is determined to be 85% of the man power cost for the basic plan shown in Item 4 of Clause 9.2.

10.1.2 Economic internal rate of return (ERR)

ERR of this project is extremely high, as shown in Table 10-1.

ERR : 23.44%

Accordingly, this project is feasible from the standpoint of national economy.

Table 10-1. Economic Internal Rate of Return

IRR CALCULATION TABLE INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT
RP. 1,000,000

IRR CALCULATION ON TOTAL INVESTMENT (ROI BEFORE TAX)

YEAR	TOTAL INVESTMENT	PROFIT BEFORE TAX	DEPRECIATION	INTEREST ON DEBT	RETURN BEFORE TAX	DISCOUNT RATIO	PRESENT VALUE INVEST.	PRESENT VALUE RETURN
1984	0	0	0	0	0	1.52373	0	0
1985	5927	0	0	0	0	1.23439	7316	0
1986	6603	0	0	0	0	1.00000	6603	0
1987	0	185	1637	1144	2966	0.81011	0	2403
1988	0	463	1637	1144	3244	0.65628	0	2129
1989	0	941	1637	1144	3722	0.53167	0	1979
1990	0	881	1637	1127	3645	0.43071	0	1570
1991	0	965	1637	1042	3645	0.34892	0	1272
1992	0	1189	1525	931	3645	0.28267	0	1030
1993	0	1486	1338	820	3645	0.22899	0	835
1994	0	1597	1338	710	3645	0.18551	0	676
1995	0	1953	1093	599	3645	0.15029	0	548
1996	0	3101	56	488	3645	0.12175	0	444
1997	0	3211	56	377	3645	0.09863	0	359
1998	0	3322	56	266	3645	0.07990	0	291
1999	0	3433	56	156	3645	0.06473	0	236
2000	836	3539	56	50	3645	0.05244	44	191
TOTAL	13366				50025		13963	13963

----- INTERNAL RATE OF RETURN ----- = 23.4394 %

10.2 Economic Effect and Significance

The following describes the economic effect and significance of this project.

10.2.1 Ethanol

The feature of the ethanol production is its superiority of the unit. The cane molasses unit consumption required to produce 1 ℓ of ethanol in the current facilities and method is 4 kg, but in the plant to be built by this project only 3.3 kg is needed. If the new plant facilities are fully operated and 15,230 KℓL ethanol is produced in one year, saving of the cane molasses amounts to 10,584 tons. Money-wise, this is a saving of Rp212 million a year when the cane molasses price is calculated at Rp20,000/ton.

Marketability is a problem in the case of ethanol. The import statistics of 1981 indicates that 309,000 Kℓ of gasoline (US$116 million) and 24,714 tons of methanol (US$11 million) were imported. From this information, the unit prices of gasoline and methanol are calculated to Rp261/ℓ and Rp253/kg, respectively. Since then, the methanol price dropped, but the ethanol price from the new plant can compete with them price-wise, while there are many problems to be solved to substitute these with ethanol. On gasoline, the "Gasohol" project being developed by BPPT must be realized. When this technique is completed, the problem of marketing the product ethanol is completely solved as described in Clause 4.2, or rather, the ethanol production capacity must be substantially increased. Even in such case, the new facilities are most advantageous in the sense of cost and the significance of being the model case is really great.

On methanol, China, Canada and Saudi Arabia are taking quite strong export campaigns and the market situation is confused at present. A far serious problem in Indonesia is the tax system. A commodity tax of Rp350/ℓ is levied on ethanol that is used for purposes of other than an industrial material. Since ethanol price is Rp265/ℓ, the tax amount is more than 100% of it and it is impossible for ethanol to compete with methanol on which no tax is levied. Almost all methanol that is available in Indonesia consists of byproduct from the textile industry and imports. As everyone can understand, prices of byproducts can be very flexible since the supplyers may quite well satisfy with whatever prices that they can get. In the case of prices on imported items, the shippers often think that a price that can cover the variable cost may be good enough if the operation rate can be raised. Thus, ethanol is facing unfair competition with methanol, and furthermore, under the circumstance of being subjected for such high rate tax, amount of which exceeds 100% of the ethanol price, there is no hope of domestically produced ethanol being developed a sound industry item.

Increase of sugar production is a national policy, and this essentially increases cane molasses as it is a byproduct of sugar production. Should ethanol production be planned as the prime measure to consume the cane molasses, the current taxation system is just impractical and irrational. Revision of the taxation system must be strongly appealed. Ethanol produced by the new plant can be really competive if the taxation system is revised and the reduction of the ethanol production cost by the new method will play a very important role.

10.2.2 Corynecin

The meaning of Corynecin production is entirely different from that of ethanol

We cannot recommend the corynecin production if it is looked at from the profitability viewpoint only, since there is no prospect of the corynecin production contributing to the project profitability.

However, Corynecin project is extremely meaningful. In 1981, 99,723 kg of Chloramphenicol (approximately US$5 million) were imported. In the quantity, this ranks at the second after 182.123 kg of tetracycline, and in the money amount, this ranks at the third after US$6.4 million of tetracycline and US$5.4 million of penicillin. Corynecin production of 18,816 kg/year from this project is equivalent to 27,270 kg/year of Chlorophenicol, saving foreign currency amounting to US$1.35 million a year.

Significance of producing Corynecin domestically is not restricted to saving of foreign currency only.

The Government of Republic of Indonesia is promoting domestic production of major antibiotics, vitamin drugs, antihistamine, and sulfa drugs as the national policy along the WHO's recommendation of essential drugs. Yet, the progress of domestically producing them is very slow for many problems of profitability, techniques because of the limited domestic market size. On antibiotics, there is hardly any item that has completed been converted to domestic production because of the necessity of a real cultivation process.

Most probably, the Corynecin plant of this project is the first real antibiotic fermentation facility in Indoneisa. However, since PTP has no experience of manufacturing and selling medical raw materials, we recommend that industrialization is promoted backed up by the Ministry of Health, aiming at cooperation system with the pharmaceutical circle by consigning the simple conversion process from Corynecin to chloramphenicol to National Indofarma or Kimiafarma. We might mention here that installing Chloramphenicol production facilities matches the policy of Ministry of Health for domestic production of antibiotics, and such project is given with a priority following the most important one in the Priority List of 1982 Investments.

Since we were unable to learn the market price of Chloramphenicol in Indonesia, we conducted financial analysis based on the international price. In actual cases, about 40% of extra expenses for import duty, customs clearance fee, etc. will have to be added in the case of import, profitability of domestic production will be better to some extent.

We initially planned Corynecin project to be more profitable, but unfortunately, the profitability is not as great as we thought because of a high production cost affected by the necessity of large amount of cooling water since the temperature of the water available in the site is rather high, or 28 to 30°C. We hope that the cost is reduced in the future by improving the system, for example by developing high temperature resistance microorganisms. Highly advanced antibiotic fermentation technologies cannot be easily realized. They are the results of untiring effort paid on improvement of each process. We firmly believe that Corynecin plant bears an important significance as the field for acquisition and improvement of the fermentation technologies.

APPENDICES

APPENDIX 1.

DEMAND FORECAST FOR FERMENTATION PRODUCT

BY STATISTIC METHOD

CONTENTS

1. Demand Forecast Concerning Fermentation Products

Short- and medium-term demand forecasts are made based on data concerning fermentation products obtained through our investigation. In collecting data, it would be better if data covering the last few decades had been gathered in order to obtain better results. However, data from such a long period are unfortunately not available. Therefore, it must be understood that our analysis is based on data available to us concerning the volume of fermentation product imports, and the period of forecast is limited to five years. The forecast results obtained by mathematical methods are intended to be used as basic data for offering more precise proposals after due examination by specialists taking part in the fermentation industry.

1.1 Purpose and Significance of Demand Forecast

Variable functions of the following are obtained by mathematical methods first and, then, analyzed: the production of molasses, which is a raw material for fermentation products, up to the present; the fermentation product imports; the numbers of swine and chicken, a possible market for feed yeast, a business in which fermentation products are expected to make entry; and the consumption of gasoline, a potential market for ethanol, which is a possible substitute for gasoline. Then, by drawing certain rules from among several variable functions, the trend and amount of demand in the near future are estimated. This gives us an idea of the trend in the fermentation industry, and contributes to the more effective use of molasses. The above-mentioned method of analysis by which variable functions including trend curves are obtained based on data up to the present, is called the analysis of time series.

1.2 Demand Forecast by Mathematical Methods

In making a demand forecast, many factors affecting demand and supply must be taken into consideration. They are, namely, condition of the general economy, government policies, and possible new markets resulting from the development of a new product or a new use of existing goods. However, since most such factors are qualitative in nature, our analysis concerning the demand forecast by mathematical methods is made within the limits of measurable factors.

Several methods can be thought of in making a forecast for fermentation products similarly to any other products. In our analysis, the following two methods are adopted. All of the quantitative analyses have been done by computer.

1.2.1 Analysis of Trend Curves

If a line is fitted into demand data covering several years, the median point of the line gives an estimate of average demand and the slope of the line gives an estimate of the slope of the growth of the market at the middle of the given period. By fitting several lines one by one, a series of estimates of average demand and slope is obtained. Average demand is known as a moving average. Generally speaking, the period must be not shorter than five years. In estimating a slope, some errors are unavoidable according to the period of time selected and due to the variation of demand data. Therefore, in order to confirm the reliability of an estimate equation obtained, a test is required.

It is possible that the demand or imports of fermentation products during the past several years is increasing as a whole, while decreasing in some individual years. A measuring method in which the increase is shown by a trend curve or by a trend line is called an analysis of trend curves.

We now consider the method by which a short- or medium-term forecast is made by the analysis of trend curves. This is done by fitting a line or a curve of the "goodness of fit" into the time series data concerning the demand in the past several years. The forecast is made by extrapolating the trend curve or line of the "goodness of fit" adopted as the trend into the following years.

Our analysis attempts to obtain the trend by the method of least squares. According to this method, the following equation is formed for n time series data (t_1, x_1), (t_2, x_2), ... , (t_n, x_n).

$$X = (t, a_1, a_2, \ldots\ldots a_n) \qquad (1)$$

In equation (1), coefficients $a_1, a_2, \ldots, a_n$ are chosen to minimize the S (prediction error) in $S = \sum_{i=1}^{n} (Xi - Xi)^2$. Here, xi stands for the time series data showing the demand and xi is the demand estimated from the equation.

Out analysis adopts the best fitting equation selected from among the following twelve trends.

1	$Y = A_1 + A_2 (t)$	(2)
2	$Y = A_1 + A_2 \sqrt{t}$	(3)
3	$Y = A_1 + A_2 \log (t)$	(4)
4	$Y = A_1 + A_2 (1/t)$	(5)
5	$Y = A_1 + A_2 (t) + A_3 (1/t)$	(6)
6	$Y = A_1 + A_2 (t) + A_3 (t \times t)$	(7)
7	$A \log (Y) = A_1 + A_2 (t)$	(8)
8	$A \log (Y) = A_1 + A_2 (A \log (t))$	(9)
9	$A \log (Y) = A_1 + A_2 \sqrt{t}$	(10)
10	$A \log (Y) = A_1 + A_2 (1/t)$	(11)
11	$A \log (Y) = A_1 + A_2 (A \log (t)) + A_3 (1/t)$	(12)
12	$A \log (Y) = A_1 + A_2 (A \log (t)) + A_3 (A \log (t) \times A \log (t))$	(13)

where, A_1, A_2, and A_3 are constants and t=1 in the first year. The values of A_1, A_2, and A_3 are obtained by the method of least squares, which has been explained previously. A log stands for common logarithms. Among the equations above, 1 of equation (2) is widely adopted as the polynomial for a trend line, and 6 of equation (1) as the simple exponential for a trend curve.

1.2.2 Multiple Regression Analysis

According to this method of analysis, the trend up to the present is not obtained by trend analysis alone. We also take into consideration of the demand or imports of fermentation products as a function of income, price of products, and other factors. Therefore, a demand function expressed by a simple equation is not enough to explain the fluctuations of demand. Accordingly, pluralistic functions are required.

Demand function is an economic concept which is used in explaining what factors in what way determine a demand.

On method of analysis based on this concept is multiple regression analysis. According to this method, the relation between a single dependent variable and several independent variables which explain the former most effectively is described by means of a linear equation. For example, the linear equation with dependent variable Y, which stands for the demand, and independent variables X_1 and X_2 is as follows:

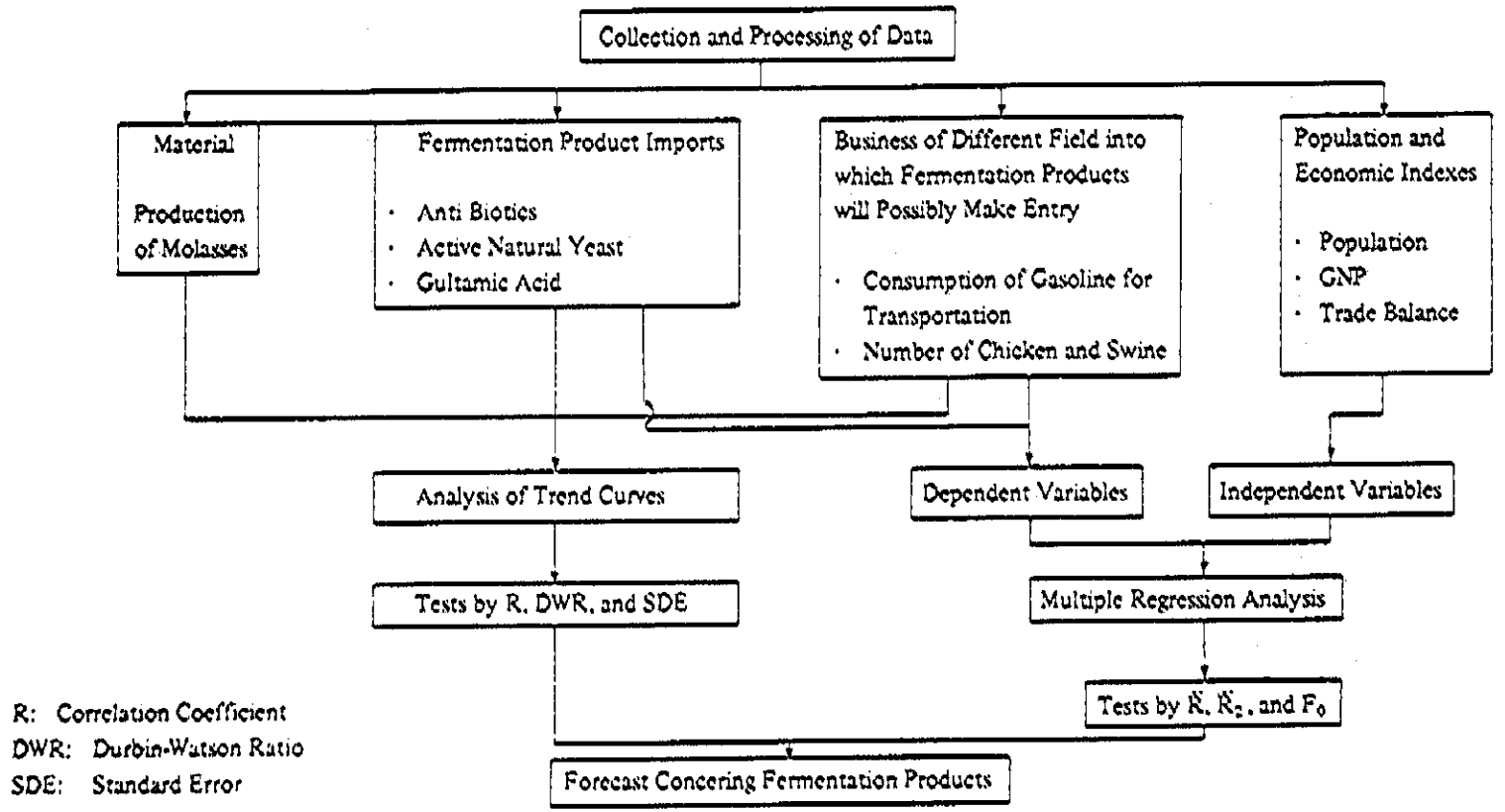
$$Y = a + bx_1 + cx_2 \qquad (14)$$

Here, Y in equation (14) is the demand for a specific product. a is a constant and b and c are the coefficients which show the variation per unit of independent variables X_1 and X_2 affecting demand Y.

In our analysis, we make use of National Accounts and External Trade, which are included as Key Statistics in Year Book of National Statistics published yearly by the government of Indonesia, besides population, in selecting the dependent variables.

1.3 Flow-chart for Demand Analysis and Significance of Test

We now analyze the data concerning the demand for fermentation products, which were obtained by the two methods explained in paragraphs 1.2.1 and 1.2.2. The flow-chart of the analysis is given in Figure 1.



R: Correlation Coefficient
DWR: Durbin-Watson Ratio
SDE: Standard Error

$\dot{R}$: Multiple Correlation Coefficient
$\dot{R}_2$: Coefficient of Determination
F_0: Analysis of Variance Ratio

Fig. 1 Flow-Chart for the Method of Demand Forecast

Terms and definitions employed in testing the forecast equations in Figure a are as follows:

(a) R: Correlation Coefficient

Correlation coefficient shows what relations the two variable quantities X and Y maintain while they fluctuate. In other words, it is the coefficient by which the "goodness of fit" of the estimate obtained through forecast equations into the actual is judged. $0 \leqq R \leqq 1$, and the closer to 1 R is, the better the estimate.

(b) DWR: Durbin-Watson Ratio

Time series data such as those dealt with in our analysis require a test of the Durbin-Watson Ratio. When considering economic phenomena, errors are sometimes not independent from each other. For this reason, the test of the Durbin-Watson Ratio is all the more necessary. If there is no correlation between residuals, the value of the DWR is somewhere around 2. When the DWR is larger than 2, there is a negative correlation and when smaller than 2, a positive correlation.

(c) SDE: Standard Error

SDE is the standard deviation between actual Y and $\hat{Y}$, the estimate of Y. The better the fitness is, the smaller SDE becomes.

(d) F_0: F-observed

This is well known as the ratio obtained through an analysis of the variance table. F_0, F-observed, is obtained as a ratio of mean square of regression (fluctuation of estimated value obtained based on regression)/mean square of residual (residual = actual – estimate). The F-test in an analysis of a variance table is as follows:

i) When $F_0 \geqq F(k, n-k-1; 0.01)$, the regression equation is significant at the 1% level. In this case, ** is attached to F_0 (for example F_0**).

ii) When $F(k, n-k-1; 0.01) > F_0 > F(k, n-k-1; 0.05)$, the regression equation is significant at the 5% level.

In this case, * is attached to F_0 (for example F_0^*).

Here, k stands for the number of variables, n the number of data, and n--k--1 the degrees of freedom.

(e) $\bar{R}$: Multiple Correlation Coefficient

This is the coefficient by which it is judged whether the relation between the dependent variables is linear or not; it has the value of $0 \leqq \bar{R} \leqq 1$. The closer to 1 $\bar{R}$ is, the more reliable the equation becomes.

(f) $\bar{R}^2$: Coefficient of Determination

This is the coefficient by which it is explained how well estimate $\hat{Y}$ obtained through a regression equation fits the "real" values. It has the value of $0 \leqq \bar{R}^2 \leqq 1$ and the closer to 1 $\bar{R}$ is, the better the fitness of the equation becomes.

1.4 Examples of Computer Output of Trend Curve Analysis

Since examples of computer output of the multiple regression analysis are rather complicated, they are not given here. Instead, examples of output of the twelve methods explained above in the paragraph on analysis of trend curves are given. Figure 2 shows the twelve types of trend curves and the parameters needed in testing. Figure 3 shows the actual values, and the estimates and predictions obtained through the twelve types of trend curves.

****PRODUCTION OF MOLASSES (NO. 1 INCLUDING PLANNING BOTH SECTER)****

MULTIPLE REGRESSION ANALYSIS (NO. 1)

DEPENDENT VARIABLE 1
SAMPLE SIZE 7

PROBLEM	REGRESSION COEFFICIENT A1 (*)	A2 (*)	A3 (*)	Correlation Coefficient R	Standard Error S.D.E.	F - Test F TEST (***)	Durbin-Watson Ratio D.W.R.
1	0.29133600E+06 (15.158)	0.40023000E+05 (9.313)		0.972365	0.22741105E+05	0.86733536E+02	2.07815
2	0.16557600E+06 (5.588)	0.14846400E+06 (10.022)		0.975995	0.21214359E+05	0.10041234E+03	2.37197
3	0.29909000E+06 (13.986)	0.28801700E+06 (8.031)		0.963356	0.26127055E+05	0.64497681E+02	1.94414
4	0.54821494E+06 (19.789)	-0.26130400E+06 (-4.383)		0.890782	0.44264762E+05	0.19212234E+02	1.29811
5	0.34489800E+06 (6.388)	0.32451875E+05 (3.902)	-0.62869000E+05 (-1.061)	0.978224	0.22603520E+05	0.44426834E+02	2.44647
6	0.27389500E+06 (7.383)	0.51665000E+05 (2.430)	-0.14542500E+04 (-0.560)	0.975814	0.23806625E+05	0.39852905E+02	2.28015
7	0.54878540E+01 (236.987)	0.39782524E-01 (7.683)		0.960172	0.27399492E-01	0.59044724E+02	1.52405
8	0.54913635E+01 (346.277)	0.29423523E+00 (11.064)		0.980288	0.19374371E-01	0.12308939E+03	2.27533
9	0.53589783E+01 (143.589)	0.14956665E+00 (8.015)		0.962153	0.26722852E-01	0.62329086E+02	2.13568
10	0.57484751E+01 (250.657)	-0.2740020BE+00 (-5.552)		0.927557	0.36643859E-01	0.30806839E+02	1.35774
11	0.54406738E+01 (22.151)	0.35009766E+00 (1.265)	0.56396484E-01 (0.208)	0.869819	0.54091331E-01	0.62164307E+01	2.36034
12	0.54981842E+01 (182.476) (**)	0.23364258E+00 (1.554) (**)	0.70800781E-01 (0.420) (**)	0.959345	0.30943312E-01	0.23107574E+02	2.38317

PROBLEM	
(1)	Y=A1+A2*T
(2)	Y=A1+A2*SQRT (T)
(3)	Y=A1+A2*ALOG (T)
(4)	Y=A1+A2*1/T
(5)	Y=A1+A2*T+A3*1/T
(6)	Y=A1+A2*T+A3*(T*T)
(7)	ALOG(Y)=A1+A2*T
(8)	ALOG(Y)=A1+A2*ALOG (T)
(9)	ALOG(Y)=A1+A2*SQRT (T)
(10)	ALOG(Y)=A1+A2*1/T
(11)	ALOG(Y)=A1+A2*ALOG (T)+A3*1/T
(12)	ALOG(Y)=A1+A2*ALOG (T)+A3*(ALOG (T)*ALOG (T))

(****)

Fig. 2 Forecast Equations and Their Test (Computor Output)

(*) Coefficients for the twelve types of forecast equation

(**) Standard errros concerning the coefficient of each forecast equation. In our analysis, these are not used in testing the forecast equations.

(***) F test is not used in testing the forecast equations.

(****) Twelve types of forecast equations. Among the figures concerning the forecast equations for the production of molasses, DWR-2.078 and R=0.972 show best fitting. Therefore, equation 1 is adopted. Accordingly, the trend curve is described as Y=291336+40023.0t.

.....PRODUCTION OF MOLASSES(NOT INCLUDING PLANNING,BOTH SECTER).....

NEN	ACTUAL (*)	(1) (**)	(2)	(3)	(4)	(5)	(6)
1	0.313483000E+06	0.331359000E+06	0.314040000E+06	0.299090000E+06	0.288910940E+06	0.314480870E+06	0.327410375E+06
2	0.378437000E+06	0.371382000E+06	0.375535690E+06	0.380791750E+06	0.417562940E+06	0.378367250E+06	0.371408000E+06
3	0.424762000E+06	0.411465000E+06	0.422723190E+06	0.436508940E+06	0.461111360E+06	0.421297250E+06	0.415801750E+06
4	0.470262000E+06	0.451428000E+06	0.462504000E+06	0.472493500E+06	0.482888940E+06	0.458988250E+06	0.457287000E+06
5	0.491294000E+06	0.491451000E+06	0.497551560E+06	0.500405250E+06	0.495954120E+06	0.494583560E+06	0.495863750E+06
6	0.493824000E+06	0.531474000E+06	0.529257000E+06	0.523210750E+06	0.504664250E+06	0.529135060E+06	0.531532000E+06
7	0.587927000E+06	0.571497000E+06	0.558374750E+06	0.542492500E+06	0.510885750E+06	0.563079810E+06	0.569291750E+06
8		0.611520000E+06	0.585495620E+06	0.559195190E+06	0.515551940E+06	0.596654570E+06	0.599143000E+06
9		0.651543000E+06	0.610968000E+06	0.573928060E+06	0.519181120E+06	0.629979370E+06	0.621085750E+06
10		0.691566000E+06	0.635060310E+06	0.587106940E+06	0.522084500E+06	0.663129810E+06	0.643120000E+06
11		0.731589000E+06	0.657975310E+06	0.599028690E+06	0.524460000E+06	0.696155250E+06	0.666245750E+06
12		0.771612000E+06	0.679870370E+06	0.609912370E+06	0.526439560E+06	0.729081370E+06	0.688463000E+06
13		0.811635000E+06	0.700870620E+06	0.619924500E+06	0.528114620E+06	0.761936250E+06	0.709771750E+06
14		0.851658000E+06	0.721077370E+06	0.629194250E+06	0.529550370E+06	0.794735560E+06	0.731217000E+06
15		0.891681000E+06	0.740574500E+06	0.637822940E+06	0.530794620E+06	0.827484810E+06	0.752166750E+06
16		0.931704000E+06	0.759432000E+06	0.645894690E+06	0.531885440E+06	0.860198690E+06	0.772827000E+06
17		0.971727000E+06	0.777709750E+06	0.653480120E+06	0.532844060E+06	0.892881690E+06	0.793192750E+06

NEN	ACTUAL	(7)	(8)	(9)	(10)	(11)	(12)
8		0.639900060E+06	0.571589060E+06	0.605362870E+06	0.517874870E+06	0.580620250E+06	0.586691300E+06
9		0.701288500E+06	0.591745250E+06	0.642211690E+06	0.522432250E+06	0.603972690E+06	0.610388370E+06
10		0.762856250E+06	0.610376500E+06	0.679124250E+06	0.526107060E+06	0.625762620E+06	0.634783560E+06
11		0.824229020E+06	0.627736190E+06	0.716199250E+06	0.529133310E+06	0.646232120E+06	0.658082310E+06
12		0.923090500E+06	0.644013120E+06	0.753513810E+06	0.531668940E+06	0.665565310E+06	0.680428870E+06
13		0.101164190E+07	0.659362440E+06	0.791129750E+06	0.533823810E+06	0.683910190E+06	0.701944810E+06
14		0.120868800E+07	0.673899060E+06	0.829096060E+06	0.535676810E+06	0.701358060E+06	0.722752120E+06
15		0.121504400E+07	0.687717370E+06	0.867454560E+06	0.537288370E+06	0.718090560E+06	0.742849060E+06
16		0.133160200E+07	0.700902060E+06	0.906243440E+06	0.538703690E+06	0.734104620E+06	0.762378560E+06
17		0.145934100E+07	0.713514500E+06	0.945469060E+06	0.539934310E+06	0.749494500E+06	0.781378310E+06

(*) Actual values of production of molasses

(**) Estimates obtained through equation (1). Here, t=1 in 1976. Therefore, NEN=8 is the estimate (61,152 tons) in 1983.

Fig. 3 Estimates Obtained through Each Trend Curve (Computor Output)

2. Forecasts by Trend Curve Analysis for Molasses Production, Fermentation Product Imports, and Business Fields Into which Entry is Possible

By the method shown in Section 1, estimates are made for future years by obtaining a trend curve. Forecasts for molasses production, fermentation product imports, the consumption of gasoline for transportation, and the numbers of chicken and swine are made up to fiscal year 1986.

2.1 Forecast for Production of Molasses

Molasses is a raw material for fermentation products. Making a forecast of it may furnish a basis for decisions on the supply of materials and the production of fermentation products. The production of molasses in Indonesia is divided into the private and public sectors. In our analysis, the production of each is examined as well as the total production. Our analysis is based on actual values.

The trend curves adopted are as follows:

(1) Production of the private sector

$$PM_1 = 256378.0 + 28666.3\,t \qquad (15)$$

DWR = 2.0456 R = 0.9455 SDE = 23369.03

where $t = 1$ in 1976.

(2) Production of the public sector

$$PM_2 = 34995.5 + 11350.4\,t \qquad (16)$$

DWR = 1.5062 R = 0.8934 SDE = 13506.91

where $t = 1$ in 1976.

(3) Total production

$$PMT = 291336.0 + 40023.0\,t \qquad (17)$$

DWR = 2.0782 R = 0.9724 SDE = 22741.11

where $t = 1$ in 1976.

The forecast results are given in Table 1 and Figure 4.

Table 1. Estimate of Production of Molasses

(Unit: Ton)

Year	Public Sector		Private Sector		Both Sectors (Total)	
	A	E	A	E	A	E
1976	272.193	285.014	41.290	46.346	313.483	331.359
1977	326.437	313.711	52.090	57.696	378.437	371.382
1978	362.666	342.376	62.096	69.047	424.762	411.405
1979	366.338	371.043	103.924	80.397	470.262	451.428
1980	359.436	399.709	101.858	91.747	491.294	491.451
1981	395.361	428.376	98.463	103.098	493.824	531.474
1982	484.870	457.042	103.057	114.448	587.927	571.497
1983		485.708		125.799		611.520
1984		514.374		137.149		651.543
1985		543.041		148.499		691.566
1986		571.707		159.850		731.589

A: Actual Production

E: Estimate Production

Data Source: PIP

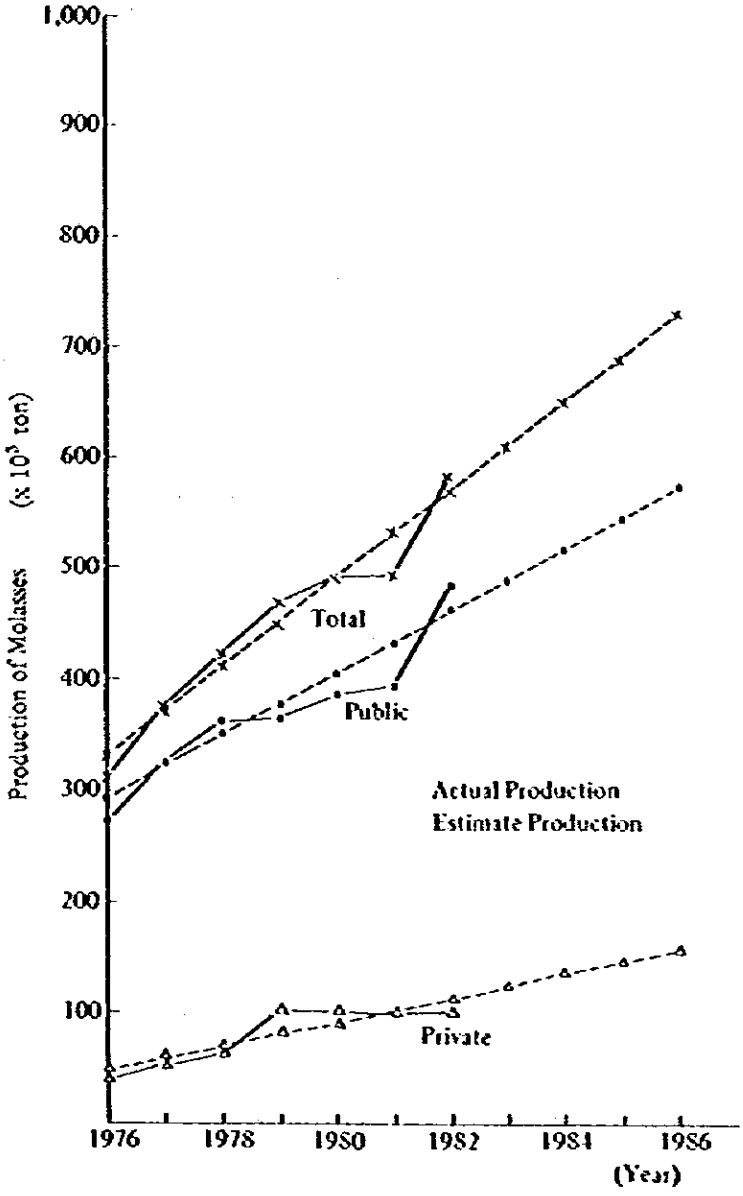


Fig. 4. Estimate of the Production of Molasses

2.2 Forecast for Fermentation Product Imports

Forecasts are made for those imported fermentation products whose data were available to us and those products found hopeful in the near future through our investigation.

The trend curves adopted are as follows:

(1) Active natural yeast

① Forecast for the weight of imports (in tons)

$$YET = 1067.3 + 239.3\,t \qquad (18)$$

DWR = 1.3219 R = 0.9042 SDE = 236.37

② Forecast for the amount of imports (in US$)

$$YE\$ = 117.1 + 101.4\,t \qquad (19)$$

DWR = 2.1272 R = 0.8479 SDE = 150.12

where t = 1 in 1975.

(2) Antibiotics

① Forecast for the weight of imports (in tons)

$$YAT = 117.1 + 101.4\,t \qquad (20)$$

DWR = 2.1272 R = 0.8479 SDE = 150.12

② Forecast for the amount of imports (US$)

$$YA\$ = 3824.9 + 4949.7\,t \qquad (21)$$

DWR = 1.2345 R = 0.9613 SDE = 3358.51

where t = 1 in 1975.

(3) Gultamic acid

① Forecast for the weight of imports (in tons)

$$YGT = 2686.91 - 766.47\,t + 115.31\,(t^2) \qquad (22)$$

DWR = 2.5469 R = 0.7180 SDE = 650.48

② Forecast for the amount of imports (in US$)

$$YGS = -2791 + 915.97\,(t) + 4813.29\,(1/t) \qquad (23)$$

DWR = 1.9906 R = 0.8140 SDE = 912.23

where t = 1 in 1975.

The forecast results for active natural yeast are given in Table 2 and Figure 5, those for antibiotics in Table 3 and Figure 5, and those for gultamic acid in Table 4 and Figure 6.

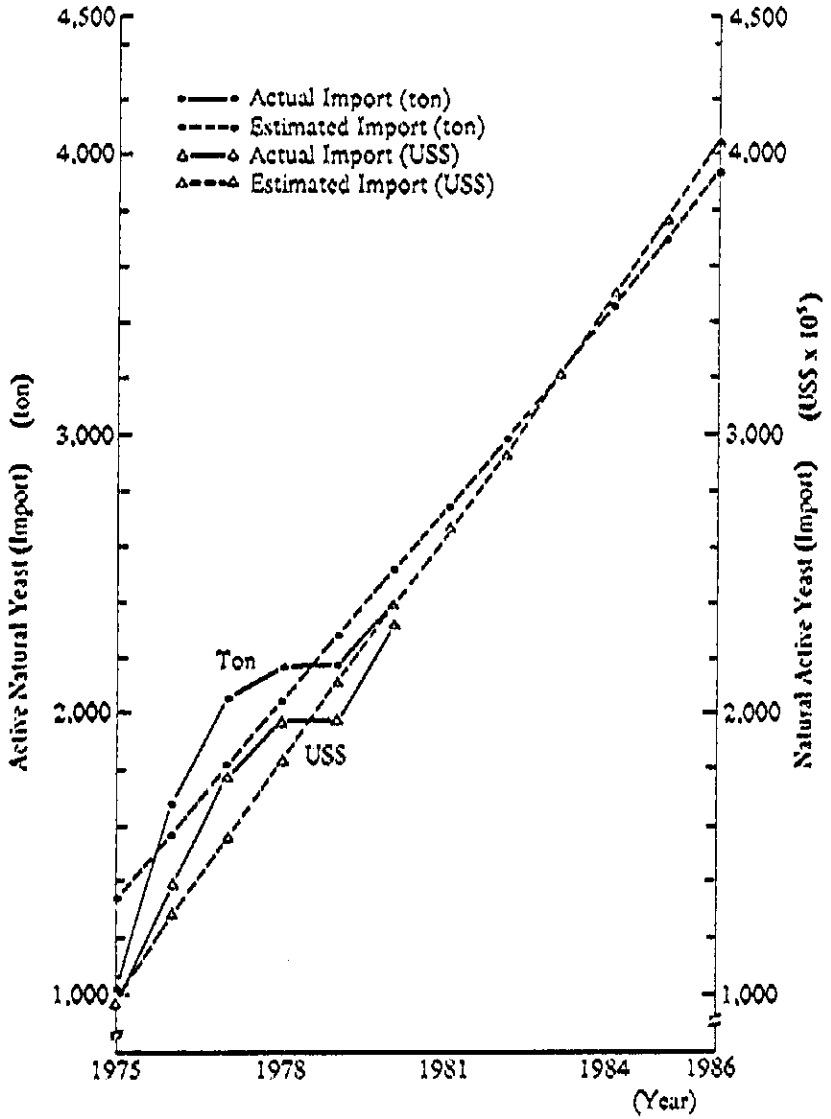


Fig. 5. Forecast of Active Natural Yeast (Imports)

Table 2. Estimate of Active Natural Yeast (Imports)

Year	Active Natural Yeast (Unit: Ton)		Active Natural Yeast (Unit: US$X10³)	
	A	E	A	E
1975	1,018	1,307	837	1,008
1976	1,671	1,546	1,294	1,285
1977	2,051	1,785	1,783	1,562
1978	2,171	2,024	1,984	1,839
1979	2,114	2,264	1,980	2,117
1980	2,403	2,503	2,326	2,394
1981		2,742		2,671
1982		2,981		2,948
1983		3,221		3,226
1984		3,460		3,503
1985		3,699		3,780
1986		3,938		4,057

A: Actual Import
E: Estimated Import

Data Source: BTN

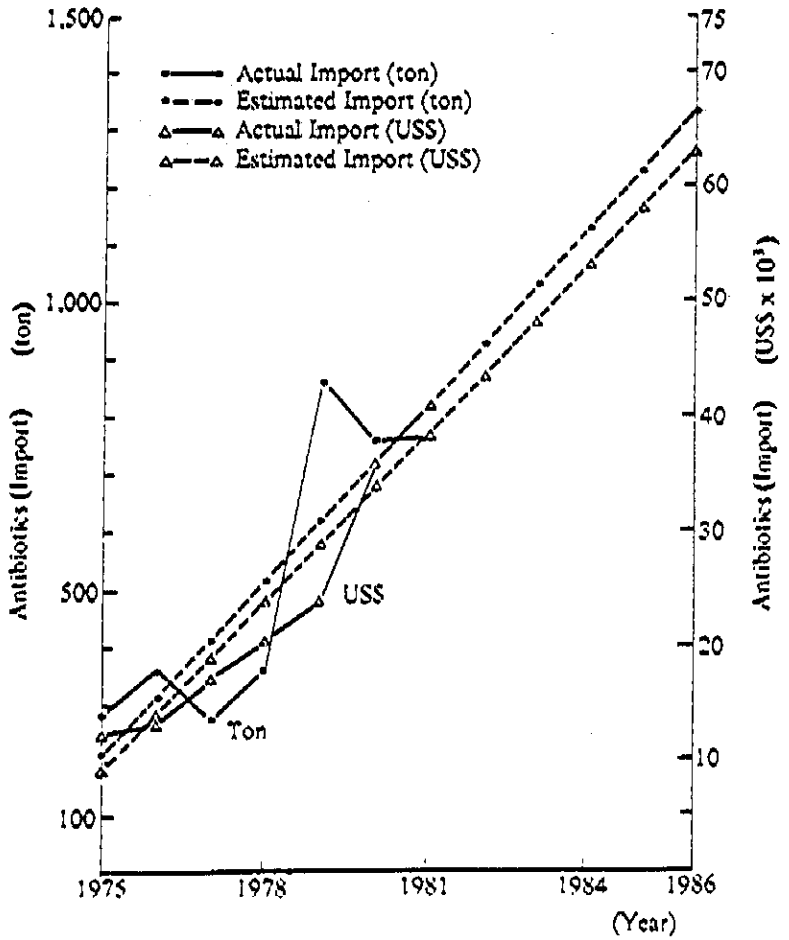


Fig. 6. Estimate of Antibiotics (Imports)

Table 3. Estimate of Antibiotics (Imports)

Year	Antibiotics (Unit: Ton)		Antibiotics (Unit: US$X10³)	
	A	E	A	E
1975	282.9	218.5	12,474.1	8,774.6
1976	360.1	320.0	13,300.3	13,724.3
1977	271.9	421.4	17,286.5	18,674.0
1978	360.8	522.9	20,911.5	23,623.8
1979	856.2	624.3	24,160.4	28,573.5
1980	759.3	725.7	35,959.6	33,523.2
1981	768.8	827.2	41,273.8	38,472.9
1982		928.6		43,422.7
1983		1,030.1		48,372.4
1984		1,131.5		53,322.1
1985		1,233.0		58,271.8
1986		1,334.4		63,221.5

A: Actual Import
E: Estimated Import

Data Source: BTN

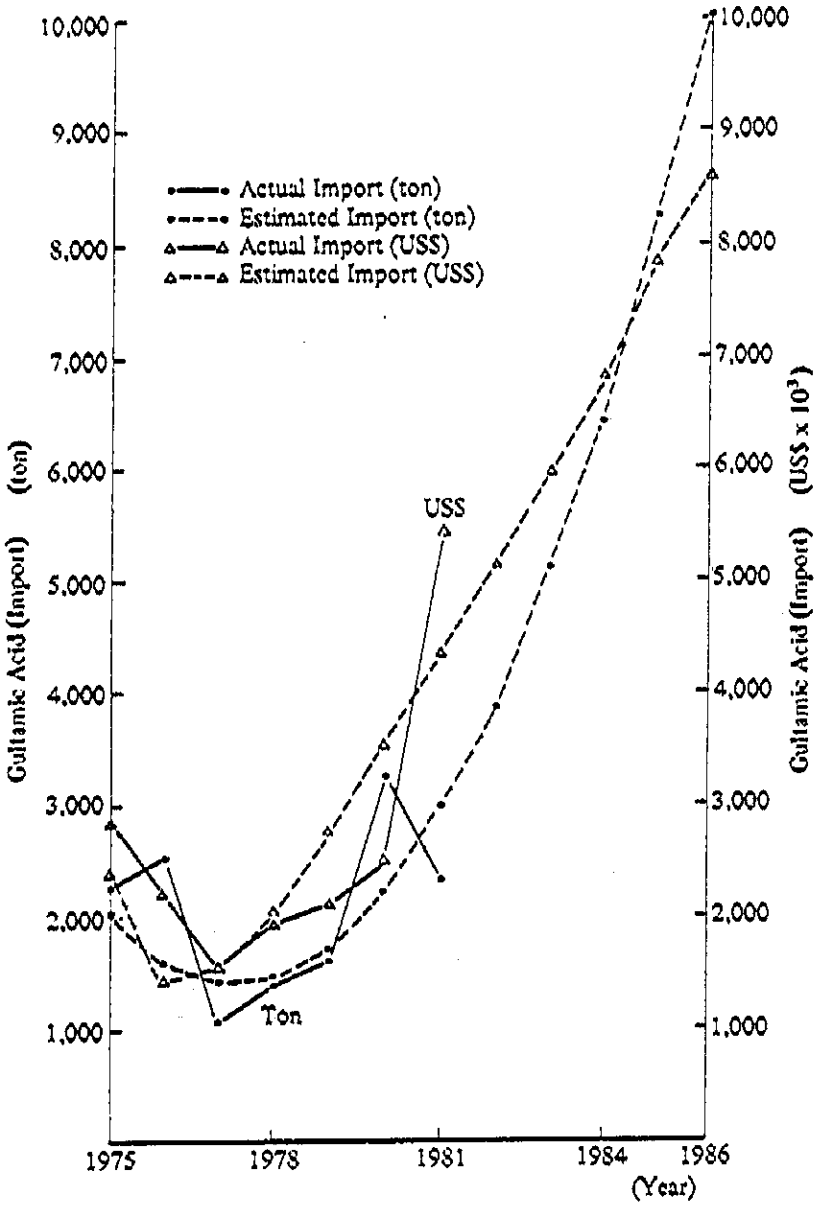


Fig. 7. Estimate of Gultamic Acid (Imports)

Table 4. Estimate of Gultamic Acid (Imports)

Year	Gultamic Acid (Unit: Ton)		Gultamic Acid (Unit: US$×10³)	
	A	E	A	E
1975	2,293	2,036	2,686	2,938
1976	1,506	1,615	2,240	1,448
1977	1,006	1,425	1,569	1,561
1978	1,414	1,466	1,981	2,076
1979	1,640	1,737	2,148	2,752
1980	3,268	2,239	2,522	3,507
1981	2,363	2,972	5,445	4,308
1982		3,935		5,138
1983		5,129		5,988
1984		6,554		6,850
1985		8,209		7,722
1986		10,095		8,602

A: Actual Import
E: Estimated Import

Data Source: BTN

2.3 Forecast for Business Fields into which Entry is Possible

Two fields are considered here as businesses into which fermentation products will possibly make entry. First, we take the consumption of gasoline for transportation, with which ethanol can be mixed. Second, we make a forecast for the numbers of chicken and swine and attempt to relate the results with a forecast for feed yeast. However, since the ratio between gasoline and ethanol or the percentage of yeast in chicken and swine feed should be determined with the advice of experts in their respective subjects, here is not given the concrete amounts of those converted into fermentation products.

The trend curves adopted are as follows:

(1) Consumption of gasoline for transportation (in liters)

$$YGS = 1916.19 - 143.69\,t + 33.4899\,t^2 \qquad (24)$$

DWR = 2.6491 R = 0.9882 SDE = 308.76

where t = 1 in 1963.

(2) Numbers of chicken and swine

① Number of swine

$$Ys = 2581.21 + 635.66 \log (t) \qquad (25)$$

DWR = 2.0218 R = 0.8523 SDE = 130.30

② Number of chiecken

$$Yc = 79081 + 3451\,t + 276.38\,t^2 \qquad (26)$$

DWR = 1.8225 R = 0.9882 SDE = 2332.27

where t = 1 in 1973.

The forecast results for the consumption of gasoline for transportation are given in Table 5 and Figure 8, and those for the numbers of swine and chicken in Table 6 and Figure 9.

Table 5. Estimate of the Consumption of Gasoline for Transportation

Year	The consumption of Gasoline for Transportation	
	A	E
1963	1,630	1,806
1964	1,763	1,763
1965	1,953	1,786
1966	1,994	1,877
1967	1,938	2,035
1968	2,163	2,260
1969	3,248	2,551
1970	2,386	2,910
1971	3,318	3,336
1972	3,854	3,828
1973	4,030	4,388
1974	4,920	5,014
1975	6,057	5,708
1976	6,576	6,468
1977	7,199	7,296
1978		8,190
1979		9,152
1980		10,180
1981		11,276
1982		12,438
1983		13,668
1984		14,964
1985		16,327
1986		19,255

A: Actual Consumption

E: Estimated Demand

Data Source:

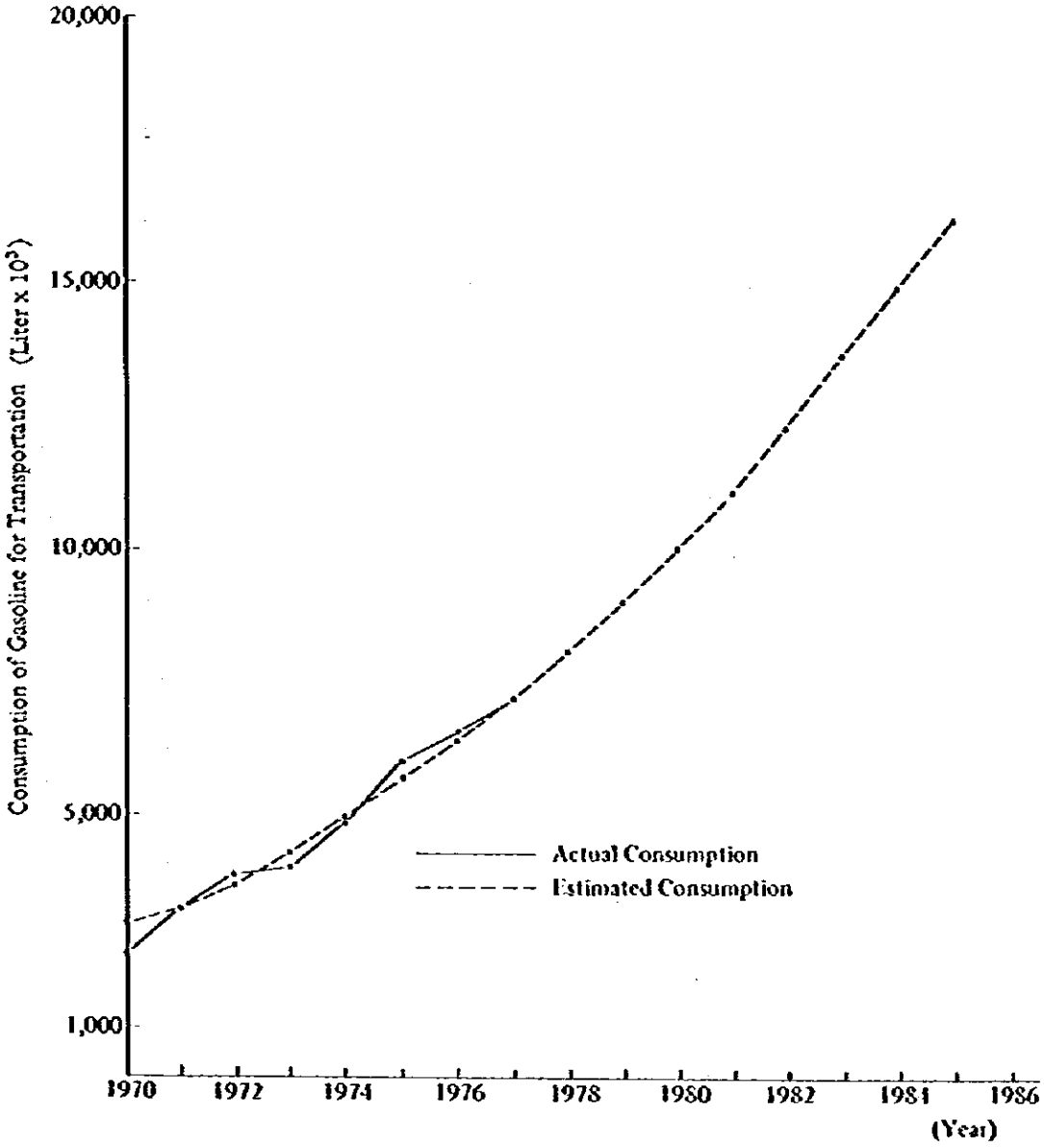


Figure 8. Forecasts of the Consumption of Gasoline for Transportation

Table 6. Estimate of the Number of Chicken and Swine

(Unit: X 10^3)

Year	Number of Chicken		Number of Swine	
	A	E	A	E
1973	79,906	80,808	2.622	2.581
1974	89,650	87,089	2.906	2.773
1975	94,572	91,921	2.707	2.884
1976	97,504	97,307	2.947	2.963
1977	101,686	103,245	2.979	3.026
1978	108,916	109,737	2.902	3.076
1979	114,350	116,780	3.183	3.118
1980	126,310	124,377	3.155	3.155
1981	132,878	132,526	3.364	3.188
1982		141,229		3.217
1983		150,483		3.243
1984		160,291		3.267
1985		170,651		3.289
1986		181,565		3.310

A: Actual Number

E: Estimated Number

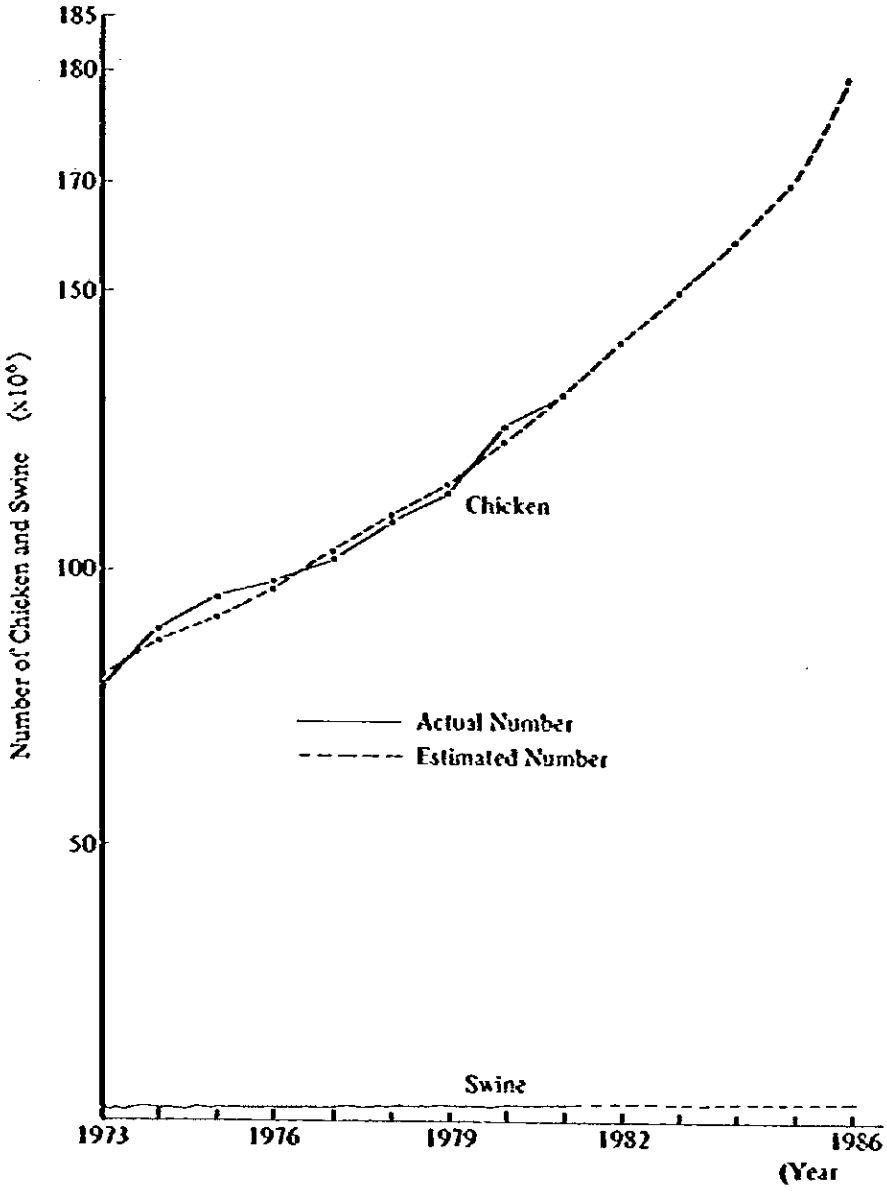


Figure 9. Forecasts of the Numbers of Chicken and Swine

3. Forecast by Multiple Regression Analysis for Product Imports and Businesses into which Fermentation Products will Possibly Make Entry

In this section, the demand forecast for fermentation products is made by multiple regression analysis as explained in paragraph 1.2.2 on the assumption that the demand is affected by social or economic factors. Accordingly, the fermentation product imports, the consumption of gasoline for transportation, and the numbers of swine and chicken are employed as the independent variables and those quantities that are affected by the independent variables as the dependent variables.

3.1 Variables Employed as Independent Variables

In our analysis, the following three factors are employed as the independent variables.

X_1: Population (in units of 1,000 people)
X_2: GNP (Gross National Products) (in units of Rp.Bn)
X_3: Trade Balance (in Units of Rp.Mn)

In order to understand the fluctuations of the three independent variables, illustrations of them during the period from 1972 through 1980 or 1981 are given below. Table 7 and Figure 10 show the population trend. Table 8 and Figure 11 show the National Accounts. We employ the GNP within the National Accounts as the independent variables. Table 9 and Figure 12 show the External Trade. We employ the Trade Balance within the External Trade as the independent variable.

Therefore, for one dependent variable (for example, the antibiotics imports) three regression equations with the different independent variables (X_1: Population, X_2: GNP, X_3: Trade Balance) are obtained, namely, $Y = A+BX_1$, $Y = A+BX_2$, and $Y = A+BX_3$. It is possible that all the three are judged to be significant by testing and the estimates obtained through the three regression equations may differ from one another. In this case, the decision on which equation gives the best estimate should be left to the experts' judgment. In this section, therefore, all the estimates obtained through the three regression equations are shown. In addition, the regression equation judged significant by testing are studied briefly.

Table 7. Population Trend

POPULATION

(Unit: Mn)

Year	Population
1972	121.32
1973	123.74
1974	126.21
1975	128.73
1976	131.30
1977	133.94
1978	136.63
1979	139.38
1980	142.18
1981	145.04

Data Source: Year Book of National Statistics

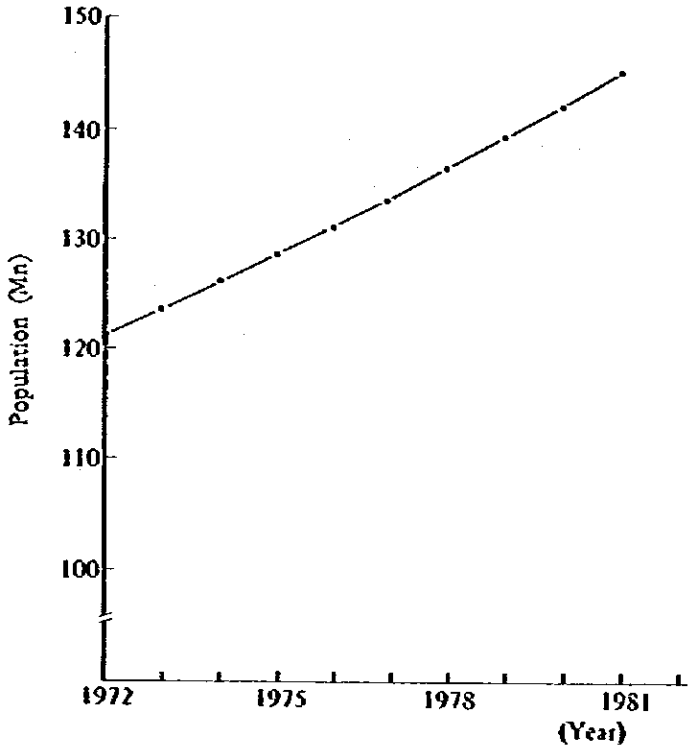


Fig. 10. Population Trend

Table 8. Trend of National Accounts

NATIONAL ACCOUNTS

(Unit: Rp. Bn)

Year	GDP Market Price	GNP Market Price	Gross Domestic Investment
1972	4,546	4,405	857
1973	6,753	6,508	1,208
1974	10,708	10,201	1,797
1975	12,643	12,087	2,572
1976	15,467	15,035	3,205
1977	19,011	18,332	3,826
1978	22,458	21,606	4,671
1979	31,023	29,534	6,704
1980	43,765	41,596	9,485

Data Source: Year Book of National Statistics

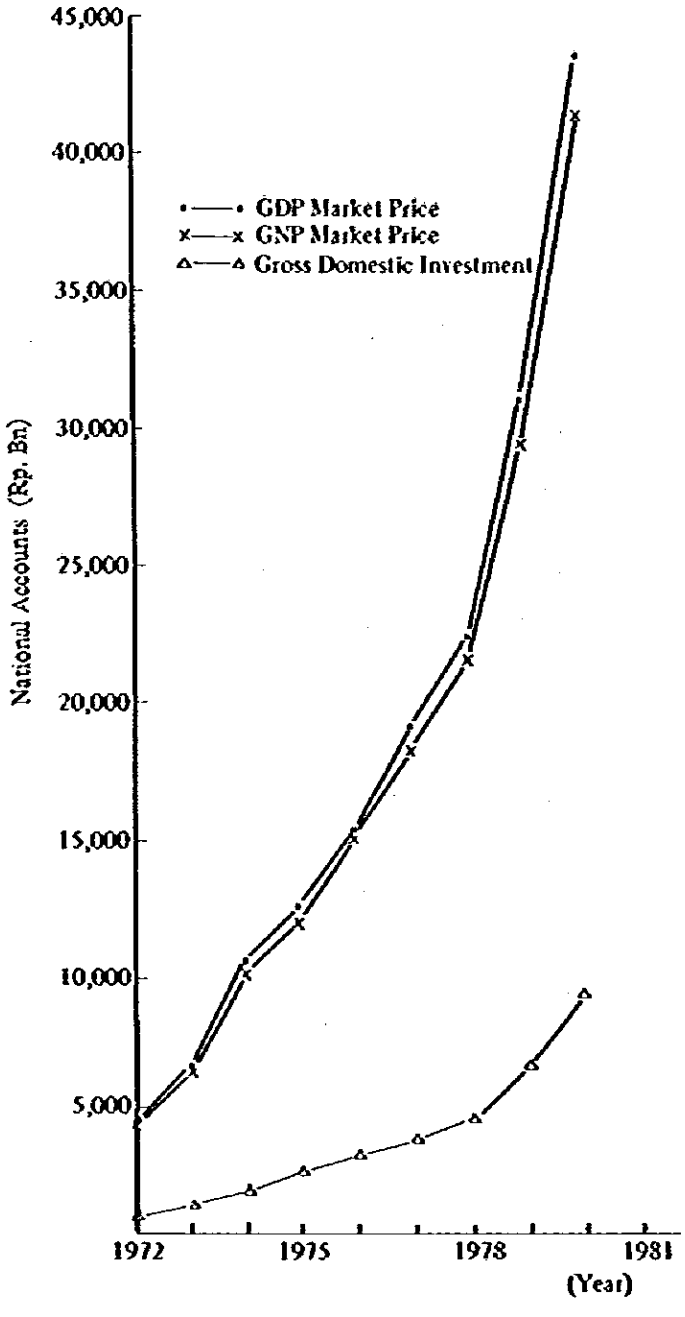


Fig. 11. Trend of National Accounts

Table 9. External Trade Trend

(Unit: US$ Mn)

Year	Trade Balance	Export (FOB)	Import (CIF)
1972	216	1,778	1,562
1973	482	3,211	2,729
1974	3,584	7,426	3,842
1975	2,333	7,103	4,770
1976	2,873	8,546	5,673
1977	4,622	10,553	6,230
1978	4,953	11,643	6,690
1979	8,388	15,590	7,202
1980	11,075	21,909	10,834

Data Source: Year Book of National Statistics

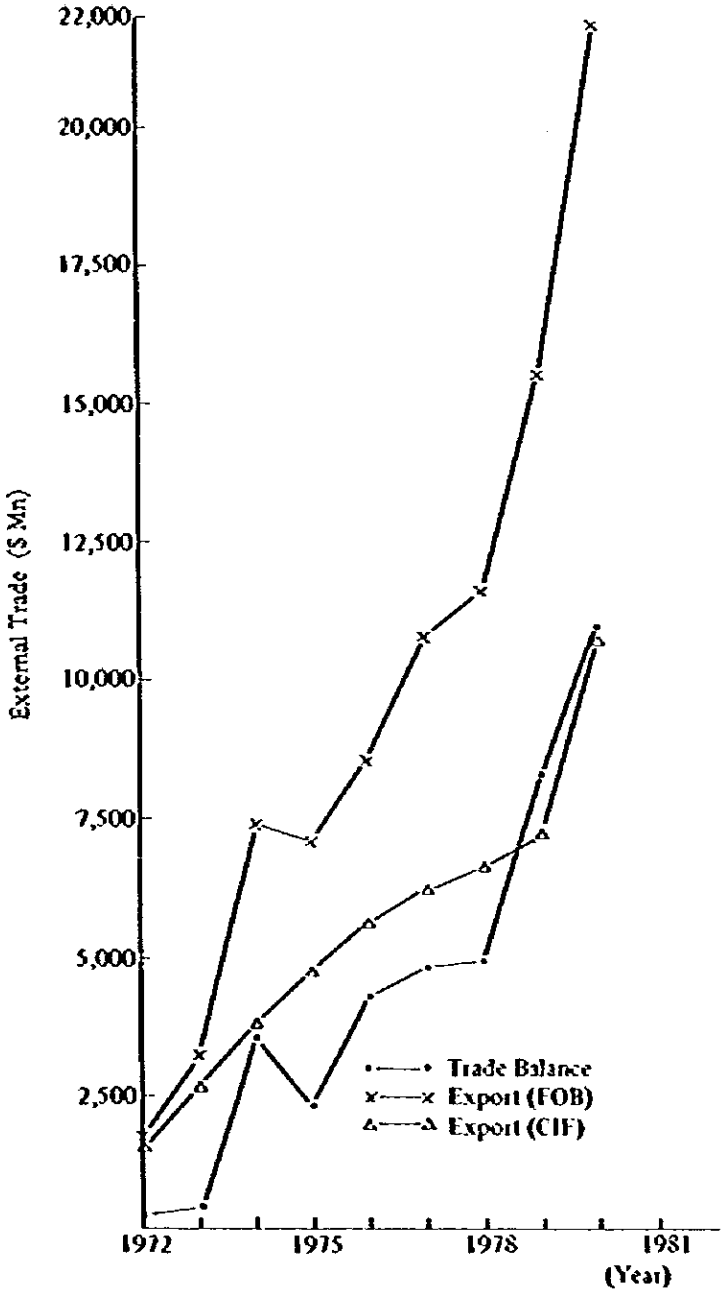


Fig. 12. External Trade Trend

3.2 Testing Method of Regression Formula

Now forecast will be performed on the imports of fermentation products by regression analysis. The results are given in terms of the independent variables (X_1, X_2, X_3). That is, for the same variable Y,

$Y = A+BX_1$ --- Population is taken as the independent variable (27)

$Y = A+BX_2$ --- GNP is taken as the independent variable (28)

$Y+A+BX_3$ ---- Trade balance is taken as the independent variable (29)

Thus, three regression equations are obtained, corresponding to the different variables on which the prediction is made.

Here, in the F-test, F_0* is significant at 5%, while F_0** is more highly significant, to 1%, as has been previously explained in subsection 1.3. In this analysis, n (number of data) = 5, k (number of variables) = 1. In order that a regression equation be accepted at 1% or 5% level of significance, F_0 should satisfy the following conditions:

$$F_0 \geqq F(k, n-k-1; 0.01) = 34.12 \quad \text{or}$$
$$F(k, n-k-1: 0.01) > F_0 \geqq F(k, n-k-1; 0.05)$$
$$34.12 > F_0 \geqq 10.13$$

3.3 Regression Equations for the Amounts of Fermentation Products Imported

3.3.1 Case of Population (X_1) as the Independent Variables

(1) Active natural yeast

① Regression equation for the quantity imported (in tons)

$$Y_{ETX_1} = -5578.09 + 0.0560\ X_1 \qquad (30)$$
$$F_0^* = 34.4369 \quad \bar{R} = 0.9075 \quad \bar{R}^2 = 0.8782$$

② Regression equation for the value of imports (in US$)

$$Y_{E\$X_1} = -9472.12 + 0.0830\,X_1 \qquad (31)$$
$$F_0{}^{*} = 24.2532 \qquad \bar{R} = 0.9434 \qquad \bar{R}^2 = 0.8900$$

Both ① and ② are significant at the 5% level.

(2) Antibiotics

① Regression equation for the quantity imported (in tons)

$$Y_{ATX_1} = -6452.559 + 0.0510\,X_1 \qquad (32)$$
$$F_0 = 6.3946 \qquad \bar{R} = 0.8250 \qquad \bar{R}^2 = 0.6806$$

② Regression equation for the value of imports (in US$)

$$Y_{A\$X_1} = -240930.1 + 1.9259\,X_1 \qquad (33)$$
$$F_0{}^{**} = 34.4369 \qquad \bar{R} = 0.9591 \qquad \bar{R}^2 = 0.9199$$

② is significant at the 1% level.

(3) Gultamic acid

① Regression equation for the quantity imported (in tons)

$$Y_{GTX_1} = -19347.56 + 0.1545\,X_1 \qquad (34)$$
$$F_0 = 4.1441 \qquad \bar{R} = 0.7616 \qquad \bar{R}^2 = 0.5800$$

② Regression equation for the value of imports (in US$)

$$Y_{G\$X_1} = -3747.617 + 0.0427\,X_1 \qquad (35)$$
$$F_0 = 1.1122 \qquad \bar{R} = 0.5217 \qquad \bar{R}^2 = 0.0722$$

In this case both ① and ② are rejected at the 5% level of significance.

3.3.2 Case of GNP (X_2) as the Independent Variable

(1) Active Natural Yeast

① Regression equation for the quantity imported (in tons)

$$Y_{ETX_2} = 1552.311 + 0.21\ X_2 \qquad (36)$$
$$F_0 = 7.1970 \qquad \bar{R} = 0.8401 \qquad \bar{R}^2 = 0.7057$$

② Regression equation for the value of imports (in US$)

$$Y_{ESX_2} = 1090.775 + 0.031\ X_2 \qquad (37)$$
$$F_0 = 9.4405 \qquad \bar{R} = 0.8711 \qquad \bar{R}^2 = 0.7588$$

Both ① and ② are rejected at the 5% level of significance.

(2) Antibiotics

① Regression equation for the quantity imported (in tons)

$$Y_{ATX_2} = 2.6238 + 0.0206\ X_2 \qquad (38)$$
$$F_0 = 6.2476 \qquad \bar{R} = 0.8219 \qquad \bar{R}^2 = 0.6755$$

② Regression equation for the value of imports (in US$)

$$Y_{ASX_2} = 2029.172 + 0.8047\ X_2 \qquad (39)$$
$$F_0{}^{**} = 144.54 \qquad \bar{R} = 0.9898 \qquad \bar{R}^2 = 0.9797$$

Equation ② is accepted at the 1% level of significance.

(3) Gultamic Acid

① Regression equation for the quantity imported (in tons)

$$Y_{GTX_2} = -90.1604 + 0.0736\ X_2 \qquad (40)$$
$$F_0{}^{*} = 12.3098 \qquad \bar{R} = 0.8967 \qquad \bar{R}^2 = 0.8041$$

② Regression equation for the value of imports (in US$)

$$Y_{G\$X_2} = 1545.16 + 0.0217\ X_2 \qquad (41)$$
$$F_0 = 2.2419 \qquad \bar{R} = 0.6540 \qquad \bar{R}^2 = 0.4278$$

Regression equation ② is accepted at the 5% level of significance.

3.3.3 Case of Trade Balance (X_3) as the Independent Variable

(1) Active Natural Yeast

① Regression equation for the quantity imported (in tons)

$$Y_{E1X_3} = 1650.632 + 0.0676\ X_3 \qquad (42)$$
$$F_0 = 7.1703 \qquad \bar{R} = 0.0397 \qquad \bar{R}^2 = 0.7051$$

② Regression equation for the value of imports (in US$)

$$Y_{E\$X_3} = 1231.958 + 0.1005\ X_3 \qquad (43)$$
$$F_0 = 9.9187 \qquad \bar{R} = 0.8762 \qquad \bar{R}^2 = 0.7677$$

Regression equations ① and ② are rejected at the 5% level of significance.

(2) Antibiotics

① Regression equation for the quantity imported (in tons)

$$Y_{A1X_3} = 78.1906 + 0.0695\ X_3 \qquad (44)$$
$$F_0 = 8.6654 \qquad \bar{R} = 0.8619 \qquad \bar{R}^2 = 0.7429$$

② Regression equation for the value of imports (in US$)

$$Y_{A\$X_3} = 6152.184 + 2.533\ X_3 \qquad (45)$$
$$F_0{}^{**} = 44.5427 \qquad \bar{R} = 0.9679 \qquad \bar{R}^2 = 0.9368$$

Regression equation ② is accepted at the 1% level of significance.

(3) Gultamic Acid

① Regression equation for the quantity imported (in tons)

$$Y_{GIX_3} = 365.8196 + 0.2195\ X_3 \qquad (46)$$
$$F_0 = 6.6557 \qquad \bar{R} = 0.8302 \qquad \bar{R}^2 = 0.6892$$

② Regression equation for the value of imports (in US$)

$$Y_{GSX_3} = 1697.328 + 0.0618\ X_3 \qquad (47)$$
$$F_0 = 1.5150 \qquad \bar{R} = 0.5793 \qquad \bar{R}^2 = 0.3356$$

Regression equations ① and ② are rejected at the 5% level of significance.

3.4 Predictions in Fields in which Entry is Possible

3.4.1 Case of Population (X_1) as the Independent Variable

(1) Regression equations for the consumption of gasoline for transportation

$$Y_{GSX_1} = -37855.46 + 0.3374\ X_1 \qquad (48)$$
$$F_0{}^{**} = 739.84 \qquad \bar{R} = 0.9980 \qquad \bar{R}^2 = 0.9960$$

This regression equation is highly significant, being accepted at the 1% level of significance.

(2) Regression equations for the numbers of swine and chicken

① Regression equation for the number of swine

$$Y_{SX_1} = -97.0098 + 0.0229\ X_1 \qquad (49)$$
$$F_0 = 4.4599 \qquad \bar{R} = 0.7732 \qquad \bar{R}^2 = 0.5978$$

② Regression equation for the number of chicken

$$Ycx_1 = -244442.7 + 2.5913\,X_1 \qquad (50)$$
$$F_0^{**} = 101.427 \qquad \bar{R} = 0.9855 \qquad \bar{R}^2 = 0.9712$$

Regression equation ② is accepted at the 1% level of significance.

3.4.2 Case of GNP (X_2) as the Independent Variable

(1) Regression equation for the consumption of gasoline for transportation

$$Ygsx_2 = 4904.141 + 0.1330\,X_2 \qquad (51)$$
$$F_0^{*} = 51.3869 \qquad \bar{R} = 0.9720 \qquad \bar{R}^2 = 0.9448$$

This regression equation is accepted at the 5% level of significance.

(2) Regression equations for the numbers of swine and chicken

① Regression equation for the number of swine

$$Ysx_2 = 2789.041 + 0.0097\,X_2 \qquad (52)$$
$$F_0 = 5.6166 \qquad \bar{R} = 0.8074 \qquad \bar{R}^2 = 0.6519$$

② Regression equation for the number of chicken

$$Ycx_2 = 83230.25 + 1.0516\,X_2 \qquad (53)$$
$$F_0^{**} = 121.9129 \qquad \bar{R} = 0.9819 \qquad \bar{R}^2 = 0.9759$$

Regression equation ② is accepted at the 1% level of significance.

3.4.3 Case of Trade Balance (X_3) as the Independent Variable

(1) Regression equation for the consumption of gasoline for transportation

$$Y_{GSX_3} = 5519.312 + 0.4293\, X_3 \qquad (54)$$

This regression equation is accepted at the 5% level of significance.

(2) Regression equations for the numbers of swine and chicken

① Regression equation for the number of swine

$$Y_{SX_3} = 2819.373 + 0.0335\, X_3 \qquad (55)$$

$F_0 = 9.1449 \qquad \bar{R} = 0.8677 \qquad \bar{R}^2 = 0.7529$

② Regression equation for the number of chicken

$$Y_{CX_3} = 88435.81 + 3.3401\, X_3 \qquad (56)$$

$F_0{}^{**} = 56.5182 \qquad \bar{R} = 0.9745 \qquad \bar{R}^2 = 0.9497$

Regression equation ② is accepted at the 1% level of significance.

3.5 Prediction of the Quantity and Value of Fermentation Products to be Imported

Here predicted values for the amounts of fermentation products to be imported, found from the regression equations in subsections 3.3 and 3.4, are given in separate tables for each product. Next, those regression equations judged to be significant will be studied further.

(1) Prediction of the quantity and value of active natural yeast to be imported

Predicted values of the quantity and value of active natural yeast to be imported, found from the regression equations, are given in Table 10.

Table 10. Quantity and Value of Active Natural Yeast to be Imported Found from Regression Equations

Year	Active Natural Yeast (Unit: Ton)				Active Natural Yeast (Unit: US$ X 10^3)			
	A_T	$Y^*_{ETX_1}$	Y_{ETX_2}	Y_{ETX_3}	A_S	$Y^*_{ES X_1}$	$Y_{ES X_2}$	$Y_{ES X_3}$
1976	1,671	1,780	1,868	1,845	1,294	1,426	1,557	1,521
1977	2,051	1,928	1,937	1,963	1,783	1,645	1,660	1,696
1978	2,171	2,079	2,006	1,985	1,984	1,869	1,761	1,730
1979	2,114	2,233	2,173	2,218	1,980	2,097	2,007	2,075
1980	2,403	2,390	2,426	2,399	2,326	2,329	2,382	2,345

A_T: Actual Imports (Ton)
$E_T(X_1)$: Estimate Imports (Ton) (X_1: Population)
$E_T(X_2)$: Estimate Imports (Ton) (X_2: GNP)
$E_T(X_3)$: Estimate Imports (Ton) (X_3: Trade Balance)

A_S: Actual Imports (US$)
$E_S(X_1)$: Estimate Imports (US$) ($X_1$: Population)
$E_S(X_2)$: Estimate Imports (US$) ($X_2$: GNP)
$E_S(X_3)$: Estimate Imports (US$) ($X_3$: Trade Balance)

In Table 10, Y_{ETX_1}, found from equation (30), and $Y_{ES X_1}$, found from equation (31), are significant at the 5% level. For example, regarding Y_{ETX_1}, found from equation (30), if the independent variable population is taken to be 150,000 (in units of 1,000 people), equation (30) gives

$$Y_{ETX_1} = -5578.09 + 0.0560\,(150{,}000) \qquad (57)$$
$$= 2821.91$$

meaning that when the population becomes 150,000 (in units of 1,000 people), it is predicted that about 2,821 tons of active natural yeast will be imported. Similarly, for $Y_{ES X_1}$, when the population becomes 150,000 (in units of 1,000 people), it is predicted that the value of active natural yeast to be imported will be about 2,978 (in units of US$1,000). That is, for every 1,000 people the quantity imported will be about 0.056 tons, having a value of 0.083 (in units of US$1,000).

(2) Prediction of the quantity and value of antibiotics to be imported

Predicted values of the quantity and value of antibiotics to be imported, obtained from the regression equations, are given in Table 11.

Table 11. Actual and Predicted Quantities and Values of Imported Antibiotics Found From the Regression Equations

Year	Antibiotics (Ton)				Antibiotics (US$ X 10^3)			
	A	Y_{ATX_1}	Y_{ATX_2}	Y_{ATX_3}	A	$Y^{*}_{A\$X_1}$	$Y^{**}_{A\$X_2}$	$Y^{**}_{A\$X_3}$
1976	360.1	246.8	312.0	277.8	13,300.3	11,950.4	14,127.5	13,431.9
1977	271.9	381.5	379.9	399.4	17,286.5	17,035.0	16,780.5	17,863.6
1978	360.8	518.8	447.3	422.4	20,911.5	22,215.9	19,415.1	18,702.3
1979	856.2	659.1	610.4	661.0	24,160.4	27,512.3	25,794.1	27,406.0
1980	759.3	802.0	858.7	847.7	35,959.6	32,905.0	35,500.6	34,214.4

A_T: Actual Imports (Ton)
$E_T(X_1)$: Estimate Imports (Ton) (X_1: Population)
$E_T(X_2)$: Estimate Imports (Ton) (X_2: GNP)
$E_T(X_3)$: Estimate Imports (Ton) (X_3: Trade Balance)

$A_\$$: Actual Imports (US$)
$E_\$(X_1)$: Estimate Imports (US$) (X_1: Population)
$E_\$(X_2)$: Estimate Imports (US$) (X_2: GNP)
$E_\$(X_3)$: Estimate Imports (US$) (X_3: Trade Balance)

In Table 11, $Y_{A\$X_1}$ found from equation (33), $Y_{A\$X_2}$ found from equation (39), and $Y_{A\$X_3}$ found from equation (45) are judged to be significant at the 1% level or 5% level.

The value of $Y_{A\$X_1}$ indicates that for every 1,000 people, it is predicted that antibiotics worth 1.93 (in units of US$ 1,000) will be imported.

Similarly, the values of $Y_{A\$X_2}$ indicate that with respect to GNP (in units of Rp. Bn), about 0.80 (in units of US$ 1,000) are expected to be imported, while it is predicted that with respect to trade balance (in units of US$ million) about 2.13 (in units of US$ 1,000) worth of antibiotics will be imported.

(3) Prediction of the quantity and value of gultamic acid to be imported

Predicted quantity and value of gultamic acid to be imported, as obtained from the regression equations, are given in Table 12.

Table 12. Predicted Quantity and Value of Gultamic Acid to be Imported, As Obtained from the Regression Equations

Year	Gultamic Acid (Unit: Ton)				Gultamic Acid (Unit: US$ X 10^3)			
	A_T	Y_{G1X_1}	Y_{G1X_2}	Y_{G1X_3}	A_S	Y_{GSX_1}	Y_{GSX_2}	Y_{GSX_3}
1976	1,506	935	1,017	996	2,240	1,862	1,871	1,875
1977	1,006	1,343	1,260	1,380	1,569	1,975	1,943	1,983
1978	1,414	1,758	1,501	1,453	1,981	2,090	2,014	2,003
1979	1,640	2,183	2,084	2,207	2,148	2,207	2,186	2,216
1980	3,268	2,615	2,972	2,797	2,522	2,326	2,447	2,382

A_T: Actual Imports (Ton)
$E_T(X_1)$: Estimate Imports (Ton) (X_1: Population)
$E_T(X_2)$: Estimate Imports (Ton) (X_2: GNP)
$E_T(X_3)$: Estimate Imports (Ton) (X_3: Trade Balance)

A_S: Actual Imports
$E_S(X_1)$: Estimate Imports (US$) ($X_1$: Population)
$E_S(X_2)$: Estimate Imports (US$) ($X_2$: GNP)
$E_S(X_3)$: Estimate Imports (US$) ($X_3$: Trade Balance)

In Table 12, only Y_{G1X_1}, obtained from equation (40), is judged to be significant at the 5% level. From the values of Y_{G1X_1}, it is predicted that with respect to GNP (in units of Rp. Bn), about 0.07 tons of gultamic acid will be imported.

3.6 Predictions concerning Fields of Business into which Fermentation Products will Possibly Make Entry

In this paragraph, estimated values obtained from the regression equations are given, and studies will be made on regression equations which are judged significant in the fields to which fermentation products can enter.

(1) Prediction of the consumption of gasoline for transportation.

Estimated values of the consumption of gasoline for transportation, found from the regression equations, are given in Table 13.

Table 13. Actual and Estimated Values of Gasoline Consumption for Transportation

(Unit: Litre X 10^3)

Year	The Consumption of Gasoline for Transportation			
	AG	$Y^{**}_{GSX_1}$	$Y^{*}_{GSX_2}$	$Y^{*}_{GSX_3}$
1976	6,576	6,442	6,904	6,753
1977	7,199	7,332	7,343	7,504
1978	*8,189	8,240	7,779	7,646
1979	*9,152	9,168	8,833	9,121
1980	*10,180	10,112	10,438	10,274

* Estimated Consumption by Trend Analysis
AG: Actual Consumption
EG(X_1): Estimated Consumption (X_1: Population)
EG(X_2): Estimated Consumption (X_2: GNP)
EG(X_3): Estimated Consumption (X_3: Trade Balance)

In Table 13, Y_{GSX_1}, obtained from equation (48), Y_{GSX_2} obtained from equation (51), and Y_{GSX_3} obtained from equation (54) are judged to be significant at 1% and 5% level. From the values of Y_{GSX_2}, we see that for every 1,000 people, it is predicted that about 0.34 (in units of 1,000 liters) of gasoline will be consumed for transportation. From the values of Y_{GSX_1}, with respect to GNP(in units of Rp. Bn), it is predicted that about 0.13 (in units of

1,000 liters) of gasoline will be consumed for transportation, and from the values of Y_{GSX_3}, with respect to trade balance (in units of US$ million), it is predicted that about 0.43 (in units of 1,000 liters) will be consumed.

(2) Prediction of the number of swine and chicken

Predicted numbers of swine and chicken obtained from the regression equations are given in Table 14.

Table 14. Actual and Estimated Numbers of Swine and Chicken

Year	Chicken				Swine			
	Ac	Y_{CX_1}**	Y_{CX_2}**	Y_{CX_3}**	As	Y_{SX_1}	Y_{SX_2}	Y_{SX_3}
1976	97,504	95,796	99,011	98,032	2,947	2,910	2,935	2,916
1977	101,686	102,638	102,509	103,874	2,979	2,970	2,967	2,974
1978	108,916	109,608	105,952	104,979	2,902	3,032	2,998	2,985
1979	114,350	116,734	114,289	116,453	3,183	3,095	3,075	3,100
1980	126,310	123,989	126,974	125,428	3,155	3,159	3,192	3,190

Ac: Actual Number of Chicken
Ec (X_1): Estimate Number of Chicken (X_1: Population)
Ec (X_2): Estimate Number of Chicken (X_2: GNP)
Ec (X_3): Estimate Number of Chicken (X_3: Trade Balance)

As: Actual Number of Swine
Fs (X_1): Estimate Number of Swine (X_1: Population)
Fs (X_2): Estimate Number of Swine (X_2: GNP)
Fs (X_3): Estimate Number of Swine (X_3: Trade Balance)

In Table 14, Y_{CX_1} found from equation (50), Y_{CX_2} found from equation (53), and Y_{CX_3} found from equation (56) are judged to be significant at the high 1% level of significance. Values of Y_{CX_1} show that for every 1,000 people, it is predicted that there will be about 2.59 more chickens than today; by Y_{CX_2} it is predicted that there will be about 1.05 more chickens for increase of GNP (in units of billion Rp); and by Y_{CX_3} it is predicted that there will be about 3.34 more chickens for increase of trade balance (in units of US$1,000).

Summary

Based on statistical data on fermentation products which were gathered in this survey, demand forecasts were made by two methods, trend line analysis and multiple regression analysis. In this survey, analysis was concentrated on three points: (1) prediction of the amount of molasses to be produced as a raw material for fermentation products, (2) prediction of the quantity and value of fermentation products to be imported in the near future, and (3) prediction of demand in fields of business in which it is possible for fermentation products to make entry. From the results of the trend line analysis in section 2, the following observations can be made.

According to the trend line analysis in subsection 2.1, the production of molasses will continue to increase in the near future, so there will be adequate raw material available to make fermentation products. The trend line analysis in subsection 2.2 looked at some specific fermentation products, namely active natural yeast, antibiotics and gultamic acid. It was estimated that there is a large potential demand for these products. The trend line analysis in subsection 2.3 looked at the demand in fields of business in which fermentation products have a chance to make entry. As a result it was judged that there are good prospects in the demand for gasoline for use in transport vehicles, into which ethanol can be mixed, and in the potential market for yeast in feeds for chickens.

Next, in section 3, multiple regression analyses were performed. The results led to the following observations. According to the multiple regression analysis in subsection 3.5, it was estimated that there is a large potential demand for the three specific fermentation products which were considered: active natural yeast, antibiotics and gultamic acid. The results of the multiple regression analysis in subsection 3.6 confirmed that there are good prospects in the potential markets for ethanol and for yeast for use in animal feeds. These results agree with the results of the trend line analysis in section 2.

APPENDIX 2.

PROGRESS REPORT
ON
FEASIBILITY STUDY
ON
THE DEVELOPMENT SUGAR BY-PRODUCT INDUSTRY
IN THE REPUBLIC OF INDONESIA

DECEMBER, 1982

JAPANESE SURVEY TEAM
JAPAN INTERNATIONAL COOPERATION AGENCY

CONTENTS

1. BACKGROUND

The Government of the Republic of Indonesia requested in July 1982 to the Government of Japan for a feasibility study on the development of sugar byproduct industry in Java.

According to the above request, JICA sent a preliminary survey team headed by Mr. Iwaguchi, Director, JICA in September 1982 considering with a significance view that the study will have the great impacts to the sugar industry in this country.

The preliminary survey team agreed with Mr. Soedjai Kartasasmita, Chairman of SBPN for the scope of work to be done in the feasibility study.

The mission in this time will stay in Indonesia from 28 November 1982 until 25 December 1982 in order to survey on the proposed site as well as to collect enough data and document necessary to the feasibility study on the development of sugar byproduct industry in Java.

2. MEMBERS LIST

Mr. Atsushi NISHIMURA	:	Team leader	Nov 28 - Dec 25
Mr. Takeshi SAITO	:	Sub leader, Raw material	"
Mr. Yutaka SUMIE	:	Market analysis	Nov 28 - Dec 11
Mr. Hiroshi HOSODA	:	Process engineer	Dec 2 - Dec 22
Mr. Tomoatsu USUKU	:	Plant design	Nov 28 - Dec 25
Mr. Shogo MOCHIZUKI	:	Economist	Nov 28 - Dec 18
Mr. Yasuji NODA	:	Economist, Market analysis	Dec 12 - Dec 25

3. SCHEDULE

Nov	28 (Sun)	Lv. Tokyo Av. Jakarta
	29 (Mon)	JICA, Japanese Embassy, SBPN
	30 (Tue)	SEKNEG, JETRO, JICA
Dec	1 (Wed)	Statistic Bureau, Taisei Corp.
	2 (Thu)	PT Takeda, The Industrial Bank of Japan
	3 (Fri)	Lv. Jakarta Av. Surabaya, Meeting at PTP XXI & XXII
	4 (Sat)	Meeting at BP3G
	5 (Sun)	Travel to Situbondo
	6 (Mon)	Survey at Panji Sugar Factory
	7 (Tue)	same as above, Travel to Jatiroto
	8 (Wed)	Visit to Jatiroto Alcohol Factory, Travel to Tretes
	9 (Thu)	Travel to Pesantren Sugar Factory
	10 (Fri)	Survey at Pesantren Sugar Factory
	11 (Sat)	same as above, Travel to Solo
	12 (Sun)	Preparation of report
	13 (Mon)	Visit to PTP XV & XVI, Travel to Semarang
	14 (Tue)	Travel to Suragi Sugar Factory
	15 (Wed)	Survey at Ex Comal Sugar Factory
	16 (Thu)	Travel to Cirebon, Visit to PTP XIV, Travel to Jakarta
	17 (Fri)	SBPN, JETRO, JICA, PT Meiji Pharmaceutical
	18 (Sat)	Direktorat Jenderal Industri Kimia Dasar, MOI, SBPN, KAPB
	19 (Sun)	Preparation of report
	20 (Mon)	Direktorat Jenderal Cattle Breeding, MOA, SBPN, BKSM

21 (Tue) JICA, Japanese Embassy

22 (Wed) Report preparation, BPPT

23 (Thu) Meeting with Mr. Soedjai, President, SBPN

24 (Fri) Report submit to SBPN

25 (Sat) Lv. Jakarta Av. Tokyo

4. FACT FINDINGS

4.1 Availability of molasses

Cane production in Indonesia amounted to 15,000,000 tons in 1981 and it will be expected to reach 24,000,000 tons in coming 1984. At that time the policy of sugar self-sufficiency will be established in all district of Indonesia.

But this policy will incidentally cause the rapid increase for the production of molasses which is the byproduct from sugar mills.

The molasses production in 1981 was 490,000 tons and it will be approximately 800,000 tons in 1984.

The domestic demand of molasses in Indonesia in 1981 was estimated as follows:

Alcohol production	134,600 ton	
MSG production	123,200 ton	
Yeast production	13,700 ton	
Others	.....	+
T o t a l	280,000 ton	

The balance were directed for export purpose.

FOB price of molasses is declining to US$20 - 22/ton at the moment which is merely one sixth comparing with that of US$129/ton in February 1981. Also the pay-back price of molasses to cane farmers is decided by the government as Rp 65,000/ton which is rather high price.

To overcome such the circumstance, the project which add the value to the molasses seems to be essential to PTP concerns sugar production.

Especially in the proposed project area for this Study, the molasses production will be estimated to increase upto 40 to 70% during 1981 to 1984.

	1981	1984
PTP XXIV & XXV (Panji)	90,926 ton	151,908 ton
PTP XXI & XII (Pesantren)	107,904 ton	147,543 ton
PTP XV & XVI (Ex Comal)	91,968 ton	139,154 ton

There could be enough availability to utilize molasses for the down stream industry such as fermentation industry and feed industry.

4.2 Market for fermentation product

4.2.1 Ethanol

There are 13 alcohol factories in Indonesia and their capacity totalled to 191.5 KL/day which correspond to 57,450 KL when 300 days operation in a year. Nevertheless the actual production in 1982 will be 26,100 kl according to the estimation of KAPB.

The reason of such small production are:
less consumption of beverage from religious custom, market competition with recovered methanol from textile industry.

Foreign market of ethanol will also be mostly occupied by that from Latin Americans such as Brazil and Argentine due to the quantity and price aspect.

While the alcohol production is most suitable item to consume a lot of molasses, it is urgently required to establish so called "Gasohol" project utilizing alcohol with mixing into premium/solar on the basis of national economical aspect by the Government.

4.2.2 Yeast

Active natural dried yeast for bakery was imported from France, West Germany and Netherland about 2,400 ton and 1,000 ton in 1980 and 1981 respectively. The value amounted to US$ 2,000,000.

There is a company called P.T. Indo Fermex who is producing compressed yeast by trade name "Mauripan" to the domestic market but the quantities are very limited.

As 2,000 ton of natural dried yeast will be correspond to approximately 5,000 ton of compressed yeast, it would be satisfied a minimum capacity of fermentation plant. But there could be foreseen the difficulties to be solved such as the refrigeration warehouse due to the climate circumstance and high sugar tolerable dough activity due to the food customs.

Another aspect is animal feed yeast. There is a company called P.T. Sumber Protein who is producing about 200 ton/month of feed yeast contains 48% of crude protein and is selling about Rp. 250- 280/kg.

So far as the information obtained from the staff of cattle breeding section, Ministry of Agriculture, the number of livestock in Indonesia is rapidly increasing.

The figures in 1981 are estimated as follows:

Swine	3,364,000
Local chicken	132,878,000
Layer	24,586,000
Broiler	28,110,000

There are 7 big compound feed manufacturers in Indonesia. And they use imported fish meal as protein source of the feed.

From the above findings, it will be worthwhile to produce animal feed yeast from the molasses fermentation. Although from the marketing aspect, it will be required technical service to feed compounders as well as livestock producers how to use the feed yeast and how effective it is.

4.2.3 MSG and glutamic acid (GA)

In Indonesia, there are 3 integrators manufacturing through GA to MSG from molasses and 7 convertors who convert purchased GA to MSG.

Their production capacity is 45,000 ton as GA or 40,000 ton as MSG per year.

From the information obtained here, the seasoning production in Indonesia amounted to 16,283 ton of MSG and 2,149 ton of GA in 1981. Besides this, the import statistic shows 3,268 ton of GA is imported from the People's Republic of China and when the all GA converted to MSG, it will be approximately 23,000 ton which is around 60% of the production capacity.

From the present situation that almost of MSG are consumed for family use and not for food processing industry, the existing capacity of MSG in Indonesia seems to be too excess ones.

For export to foreign market, the strong competition will be foreseen with that of exported from the People's Republic of China.

4.2.4 L-Lysine

The market for L-Lysine is supposed to be too small that we could not find out from the import statistic. The actual utilization of feed yeast should be solved and realized prior to L-Lysine application to animal feed. There is unidentified information that Ajinomoto is planning to build L-Lysine production plant.

4.2.5 Antibiotics

The Government of Indonesia will faithfully follow the drug policy of WHO and she has aimed to have the advanced medical care to her nations until the year of 2,000. As the essential drug list recommended by UN/WHO to Indonesia is amounted to be 150 to 190 items, the Government is considering to manufacture the antibiotics and super essential drugs like Aspirin, Sulfa-drug, Vitamine B_1 and Vitamine C as bulk pharmaceuticals.

The existing pharmaceutical manufacturers are classified as follows:

Foreign investors	40 companies
Domestic (large to middle)	15 companies
Domestic (small)	200 companies

In 1980, the import of pharmaceutical preparations were US$80,000,000 and that of raw materials for pharmaceuticals were US$500,000,000 respectively by value. Among them, the import of antibiotics were:

Penicillin	US$ 8,000,000
Streptomycin	US$ 4,000,000
Tetracycline	US$ 2,000,000
Chloramphenicol	US$ 2,000,000
The total amount was	US$36,000,000 by

value in 1980.

Although there is problem from technical aspect to produce such antibiotics out of molasses fermentation, there could be only one possibility to produce upto intermediate for a special antibiotic.

Almost of the antibiotics production by fermentation, higher purity of raw materials such as glucose or starch are commonly used.

4.2.6 Citric acid

There are 6 manufacturers of citric acid and Ca-citrate in Indonesia when including under construction and planning ones. But each capacity is rather small and utilize the waste of cassava starch by the surface culture system. None of them utilize molasses as raw material.

As for the import statistic, citric acid is mixed with the category of carboxylic acid, it is difficult to know the actual figures. But from the various source, the domestic market of citric acid is estimated less than 2,000 ton per year.
This amount is too small for one unit of fermentation plant at the moment.

It is commonly said that the consumption of soft drinks will increase according to the GNP per capita, the future analysis for market would be important. Also it should be taken into the consideration on the export citric acid from the People's Republic of China.

4.2.7 Acetic acid and vinegar

From statistic, we find that acetic acid and its salt are imported about 2,500 ton and 3,900 ton in 1980 and 1981 respectively and amounted US$3,000,000 by value.

But acetic acid cannot be produced from ethanol by fermentation process but produced via chemical process. Such a plant exist in Pakistan where they produce ethanol from molasses and then ethanol converted to anhydrous acetic acid then they produce acetate rayon with cotton linter. This should be good example for the relief of existing alcohol plant in Indonesia.

Vinegar can be produced by the oxidative fermentation from ethanol. But the import of vinegar is only 400 ton in 1981. It cannot be considered as a unit of fermentation plant.

We have briefly summarized from the marketing aspect on the candidate fermentation products referred to the letter of JICA preliminary survey team addressed to Mr. Soedjai Kartasasmita dated on September 8, 1982.

We recommend that PTP should have or should enlarge the function on marketing activity once they decide to install fermentation plant producing commodities with the purpose to add the value for their own molasses.

4.3 Proposed site survey

4.3.1. PANJI Sugar Factory

i) Candidate Area

It is available to utilize planting field outside of the existing factory. (East side of the factory)
Its area is about 3.5 ha.

ii) Water condition

(a) River water

It is possible to use river water from the irrigation channel by the permission. But there is some limitation like as follows.

- o No treatment of waste water : 250 l/sec
- o After treatment of waste water: 700 l/sec

(b) Well water

It is possible to dig well by the governmental permission.

iii) Pollution problem

(a) Regulation

There are National regulation and Local regulation (East Java) for the waste water.

(b) Route of waste water

The waste water is discharged to the irrigation channel.

4.3.2. PESANTREN Sugar Factory

i) Candidate Area

It is available to utilize the building area of the old sugar factory.
Its area is about 13,000 m2.

ii) Water condition

(a) River water

It is difficult to get much quantities of water from the irrigation channel for new factory.

It would be necessary to open a new water channel from BRANTAS River which is 8 km distance from the factory.

(b) Well water

It is possible to dig well by the governmental permission but there is some limitation.

iii) Pollution problem

(a) Regulation

There are National regulation and Local regulation (East Java) for the waste water.

(b) Route of waste water

The waste water is discharged to the irrigation channel.

4.3.3. Ex COMAL Sugar Factory

i) Candidate Area

It is available to utilize the building area of the old sugar factory.

Its area is about 13,000 m2

ii) Water condition

(a) River water

It is possible to get water from the irrigation channel which is about 500 m distance from the factory.

The flow capacity of the channel is about 1,000 l/sec in which about 500 l/sec of the water flow will be available for new factory.

(b) Well water

It is possible to dig well by the governmental permission.

iii) Pollution problem

A) Regulation

There is National regulation but Local regulation is not yet published.

B) Route of waste water

It is possible to discharge the waste water to the Factory's own channel which is connected with Comal River at the down stream.

5. BASIS FOR FINANCIAL AND ECONOMIC ANALYSIS

5.1 The Study Team collected data and information for financial and economic analysis of "the feasibility study on the development of sugar cane molasses fermentation industry in the Republic of Indonesia".

5.2 In accordance with 6 of "the Scope of Work of the Study" agreed between SBPN and JICA on September 8, 1982, the Study Team will form an estimate of capital requirement. However, land cost will be excluded because PTP already have a land for this project.

5.3 In accordance with 7.1, 7.2, and 7.3 of 7 in "the Scope of Work" the Study Team will work out balance sheet and cash flow.

5.4 With regard to internal financial rate of return (FRR) mentioned in 7.3 and 7.4 of 7 in "the Scope of Work", the Study Team will not perform sensitivity analysis of interest rate and inflation.

5.5 The Study Team will assess the economic effect of the Project on the national economy of Indonesia in accordance with 8 in "the Scope of Work".

5.6 Major assumptions to be taken for financial and economic analysis are as follows:

5.6.1 Capital Structure

i) Debt equity ratio : 65 : 35

ii) Terms and condition of long term loan.

Repayment period (exclude grace period)	10 years
Annual interest rate	13.5%
Grace period	4 years

5.6.2 Depreciation and Amortization

i) Depreciation period

Road & Bridge	20 years
Machinery and equipment	8 years
Building	20 years
Vehicles and others	5 years

ii) Amortization

Preoperation cost	5 years

iii) Method

Straight line method

5.6.3 Tax

i) Import tax of machinery and equipment	exempted
ii) Corporation tax	45%
iii) Tax holiday	3 years

5.6.4 Utilities Cost

i) Electricity

Connection charge	:	own power station
Power charge	:	ditto

ii) Water

Consumption charge	:	according to basic tariff in each site.

5.6.5 Cost

i)	Molasses	: Local	Rp. 20,000/ton
ii)	Diesel Fuel Oil	:	Rp. 90/l
	(including transportation charge)		Rp. 15/l
iii)	Premium	:	Rp. 240/l

5.6.6 Price

	Alcohol	Spiritus
* Provenue	Rp. 265	Rp. 265
Cukai	350	-
Total	615	265
Pajak	15.37	6.65
MPO	5.30	5.30
Iuran BKS	1.5	1.5
Kompensas	25	25
	662.17	303.45

"Provenue" is net sales revenue for PTP and the others mentioned above are transfer expenditure from PTP to Government concerned.

5.6.7 Inventory

i)	Local raw materials	: 3 months
ii)	Import raw materials	: 6 months

6. APPENDIX

Meeting Minute (No. 1)

Meeting Minute (No. 2)

Meeting Minute (No. 3)

Meeting Minute (No. 4)

Meeting Minute (No. 5)

Meeting Minute (No. 6)

Meeting Minute (No. 7)

Meeting Minute (No. 1)

Date	:	December 3, 1982 PM 1.00 - 4.00	
Place	:	PTP XXI & XXII, Surabaya	
Attendants	:	Ir. Soetjipto Wirjopranoto	SBPN
		Ir. Sjamsir	PTP XXI & XXII
		Mr. Djoko Moejono, BSc.	PTP XV & XXVI
		Mr. Satmoko, BSc.	PTP XXI & XXII
		Mr. Bambang Soekamto	Pesantren S.F.
		Mr. Wahjoedi	Financialist (KINWIL IV)
		Mr. Haroen Noerasjid	PTP XX
		Mr. Abdul Madjid Soejoedono BSc.	PTP XXIV & XXV
		Mr. Noerdjamil	"
		Ir. Yahya Kurniawan	BP3G
		Ir. Untung	BP3G

1. Ir. Soetjipto W. made welcome speech for Japanese survey team on the development of sugar by-product industry.

2. Mr. Nishimura, Head of the team, replied and introduced the team members and their role to Indonesian counterparts.

3. Ir. Soetjipto W. confirmed the site survey schedule for Japanese survey team. He suggested to visit Cirebon in Central Java where the head quarter of PTP XIV locates.

4. As for the information required to Japanese team attached to the Talking Paper, Ir. Soetjipto W. assured these information will be available at BP3G as well as the head office of each PTPs.

5. Inquiries for site condition survey which was submitted from Japanese team were discussed by the attendants. The data will be restricted to those of the existing sugar factories, namely Panji, Pesantren and Ex Comal.

6. Ir. Soetjipto W. expressed his principle idea on the process for desugarization of molasses.
The process is introduced to Indonesia from European group, Finn Sugar Engineering and there are some existing factories designed with Finn Procedure.
The name of factories and its capacity are :

MOERBEKEN/BELGIUM	± 105 ton molasses/day
NATALI/FINNLAND	± 120 ton molasses/day
AMINO/WEST GERMANY	± 180 ton molasses/day

But it was agreed to future items to be surveyed besides this survey team's object.

Meeting Minute (No. 2)

Date	:	December 4, 1982	AM 9.30 ~ 12.00
Place	:	BP3G, Pasuruan	
Attendants	:	Ir. Soetjipto W.	SBPN
		Ir. Mochter	Associate Director BP3G
		Ir. Yahya Kurniawan	
		Ir. Untung	
		Ir. Sudijanto Tedjowahjono	

1. Ir. Mochter made welcome speech and brief introduction of the function on BP3G to sugar industry of Indonesia.

2. Mr. Nishimura, Head of the team, replied and introduced the team members and their role.

3. Japanese team asked to BP3G attendants what items are the most preferable to Indonesia for the molasses utilizing industry among 7 items which were agreed by the previous mission. Their views are :

   i) Ethanol

   There is capacity of 30,000 kl/year but recovered methanol from textile industry amounted to 20,000 kl which substitute of ethanol market at the moment.

   ii) Yeast

   Dried natural yeast is imported to Indonesia about 2 million US dollars per annum.

   There is small feed yeast plant (200 t/month) in Indonesia.

iii) MSG

There are already 3 MSG manufacturer in Indonesia. Other than Na-salt of glutamic acid will be of interest.

iv) L-Lysine

There are no data for import quantity which means the market will be premature in Indonesia.

v) Antibiotics

There are fairly large market for Penicillin, Streptomycin, Tetracycline and Chloramphenicol. But those antibiotics are difficult to manufacture from molasses.

vi) Citric acid

The market in Indonesia is less than 1000 tons per annum and there are small manufacturers from tapioca waste.

vii) Acetic acid

About 4,000 tons are imported and oxidation of ethanol to acetic acid will be worthwhile for the relief of alcohol plant.

4. Ir. Soetjipto W pointed out the priority of the A items from the above views with future prospects.

i)	Alcohol	: gasoline blending 20%	AA
ii)	Barkers yeast	:	A
	Animal feed yeast	:	AA
iii)	Glutamic acid	: local	B
		: export	AA
iv)	L-Lysine	: Animal feed	B
v)	Antibiotics	: quantity	B
		value	A
vi)	Citric acid	:	C
vii)	Acetic acid	: assistance of alcohol plant	B

5. It is agreed that Mr. Sumie, Market expert, will stay BP3G for further discussion on the future market survey.

Meeting Minute (No. 3)

Date : December 6, 1982 AM 7.30 - 12.30

December 7, 1982 AM 7.00 - 9.00

Place : Panji Sugar factory, Situbondo, PTP XXIV & XXV

Attendants Mr.H.M. Soemadjono, Administrator

Mr.P.M. de Fretes, Massinis Kepala

Mr.Soeparno Teng. Mr. Noerdjamil, PTP XXIV & XXV

Ir. Yahya Kurniawan, BP3G

1. Activity of Panji Sugar Factory

Capacity : 1,600 ton cane/day

Operation : 150 days (end of May to October)

Production : Sugar 9.0% of cane

Molasses 3.5% of cane

Bagasse 33 % of cane

Cane field : 2,000 ha (100 t cane/ha)

Labor : Staff 35 persons

Operator 540 persons

+ 1200 persons in season

Labor cost : Operator (weekly payment)

about 1000 Rp./day, 7 days/week

2. Sugar and molasses price

Sugar price is decided by the Government as Rp. 350,000/ton. Actual price at Panji Sugar Factory for crystal/ton is estimated as follows:

Factory cost	279,238 Rp.
Overhead cost	104,942 Rp. +
Total	384,180 Rp.

Sugar is divided to farmers and factory at the ratio of 60% and 40% and farmers receive money from BULOG.

Molasses is produced approximately 3.5% against to cane. 1.5% of them are paid to farmers by the price of 65,000 Rp./ton. But actual selling price of molasses to domestic MSG manufacturer is 20,000 Rp./ton at the moment.

3. Engineering data

Necessary data for conceptual design such as water quantity available, water temperature, electricity and construction cost are summarized as separate sheets.

Meeting Minute (No. 4)

Date	:	December 9, 1982	PM 12.30 - PM 6.00
		December 10, 1982	AM 8.00 - PM 1.00
Place	:	Pesantren Baru Sugar factory, Kediri, PTP XXI & XXII	
Attendants:		Mr. Soeleiman,	Manager
		Mr. Soewarso,	Chief engineer
		Mr. Walujo,	Process engineer
		Mr. Sunardi,	Administration
		Mr. Satomoko,	PTP XXI & XXII
		Ir. Yahya Kurniawan	BP3G

1. Activity of Pesantren Sugar Factory

Capacity	:	3,000 ton cane/day		3,600 ton
Production	:		Budget	Actual
		Sugar	10,8 - 11%	11.36%
		Molasses	3.5%	4.58%
		Bagasse	27%	29.5%
		Cake	3%	
Operation	:	200 days	(end of May to December)	
Cane field	:	Estate	2500 ha	
		Private	6000 - 7000 ha (8000 farmers)	
		Contract farmers; 500		

2. Pesantren Baru Sugar Factory was established 1978 in which about 70% of machineries are imported from Japan.

3. Total sugar content of the molasses from this sugar factory is approximately 51%, so almost of the molasses is directed to export through Surabaya port.

Meeting Minute (No. 5)

Date : December 13, 1982 AM 9.00 - 12.00

Place : PTP XV & XVI, Headquarter, Solo

Attendants : Ir. Warjatmo, Director T. Saito

Drs. Benno Djoko Soetamri S. Mochizuki

1. There are two kinds of byproduct from sugar industry, namely bagasse and molasses. The amount of bagasse will fluctuate year by year, while molasses will be constantly increasing. PTP knows to produce alcohol, MSG, L-lysine, cattle feed and liquid sugar as the application of molasses but after producing those commodities who is responsible on marketing ?
   Although PTP is the government owned enterprise, it is treated as same as a private company. So the forecasting in the marketing will be very important for this feasibility study.

2. Sugar
   Just after the production, sugar will be owned by Bank Bumi Daya under the control of BULOG.
   BULOG will issue delivered order to the Bank and the buyer will pay the charge to the Bank.
   Sugar price is decided as follows :

i)	Factory revenue	Rp. 35,000/100 Kg
ii)	Government tax	.....
iii)	Bank interest for stock	.....
iv)	BULOG fee	.....
		(+)
	Distributor	Rp. 46,000/100 Kg
	Market price	Rp. 50,000/100 Kg ca.

3. Molasses

Molasses is owned by PTP 14, 15/16, 20, 21/22 and 24/25 and is sold by themselves. But KAPB in Jakarta will handle the joint market and the distribution for export and domestic industry.

The price of molasses to the domestic industry is decided by the Ministry of Agriculture. The price for 1982 is decided as Rp. 20,000/ton.

The export price will be fluctuate by international market. The current FOB price is US$ 21 to 23/ton.

For the cost calculation basis, Rp. 20,000/ton should be adapted.

4. Alcohol

The price is decided by KAPB but is sold by PTP itself.

The development of alcohol industry in Indonesia will entirely depend on the Gasohol project due to heavy completion with methanol for industrial use.

The Government now subsidize huge amount to premium and diesel which will increase year by year. The gasohol will be the breakthrough of this problem. But the taxazation system on alcohol should be improved.

5. The basis for cost analysis.

Following figures are agreed.

i) Inflation rate 10%/year

ii) Bank interest 13.5%/year

iii) Tax free for import mechanics on new project.

iv) Equity ratio

65% Debt : 35% Equity

v) Depreciation

Straight line system:

building	:	20 years
machinery	:	10 years
vehicle	:	5 years

vi) 5 years tax holiday for new factory.

Meeting Minute (No. 6)

Date : Dec. 13, 1982 AM 9.00 - AM 12.00

Place : PTP XV & XVI Headquarter, Solo.

Attendant : Mr. Djoko Moeljono Director, Development
Mr. Hardiman Joedo Head, Research Dept.
Mr. Soetardi Technology
Mr. Harsono Assist. Technik
Mr. Soeharto Assist. Technik
Ir. Yahya Kurniawan

1. General situation of Sragi Sugar Factory

Capacity : 2,900 ton cane/day

Operation : 216 days (Mar/20 to Nov/9)

Production index (1982)

Molasses	4,2%	to cane
Sugar	8,96%	"
Bagasse	34,5%	"
Filter Cake	2,4%	"

2. Comal Alcohol Factory

Capacity : 4,000 Kl/year

Actual production in 1982 : 2,800 Kl

Production index : 250 l alcohol/ton molasses

Fermentor number : 15 x 40 Kl

Among the above, 12 fermentor were fabricated at 1917 using wood.

Fermentation temperature : 33 to 35^{o}C

River water temperature : 27 to 29^{o}C

Operator : 17 person x 3 shift

Total factory : 148 persons.

Price of Water : 20 Rp/l/sec.day

3. Ex Comal Sugar Factory

Established at 1927

Operated until World War II

No intention to begin sugar production.

Meeting Minute (No. 7)

Jatiroto Alcohol Factory & Sugar Factory

Date : Dec. 7, 1982 pm 1.00 - 5.00

Dec. 8, 1982 am 7.30 - 9.00

Place : Jatiroto, Factory & Guest House

Attendants:

Mr. Salem Brotojuwano, Chief Chemist

Mr. Pitojo, Chief engineer

Mr. Widodo, Chief Chemist, alcohol factory

Mr. Noerdjamill PTP XXIV & XXV

Mr. Soeharno "

Ir. Yahya Kurniawan BP3G

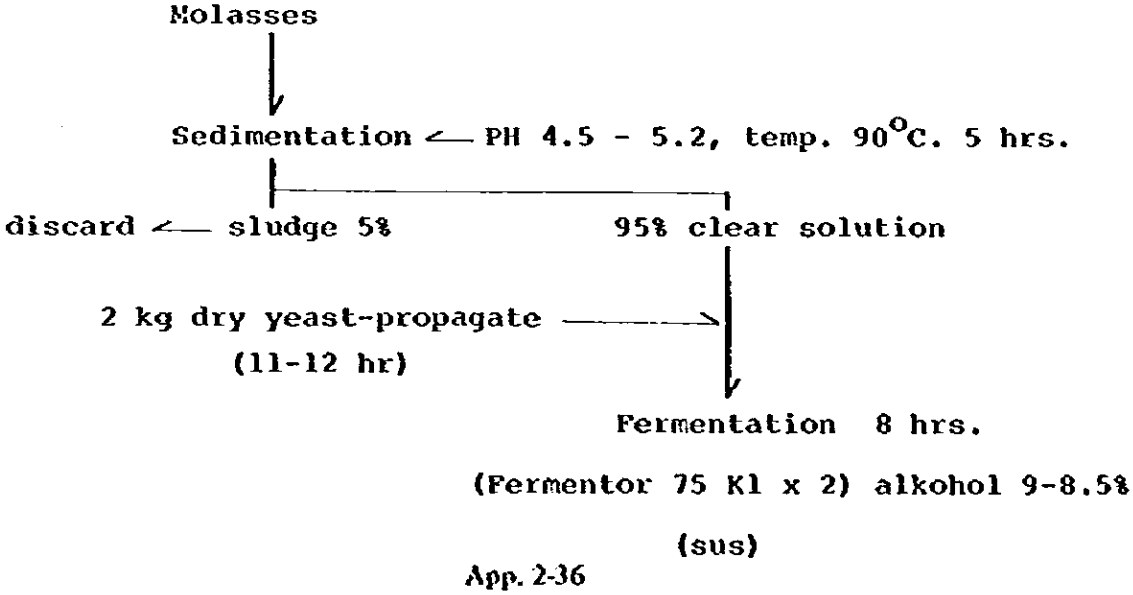
1. Alcohol factory

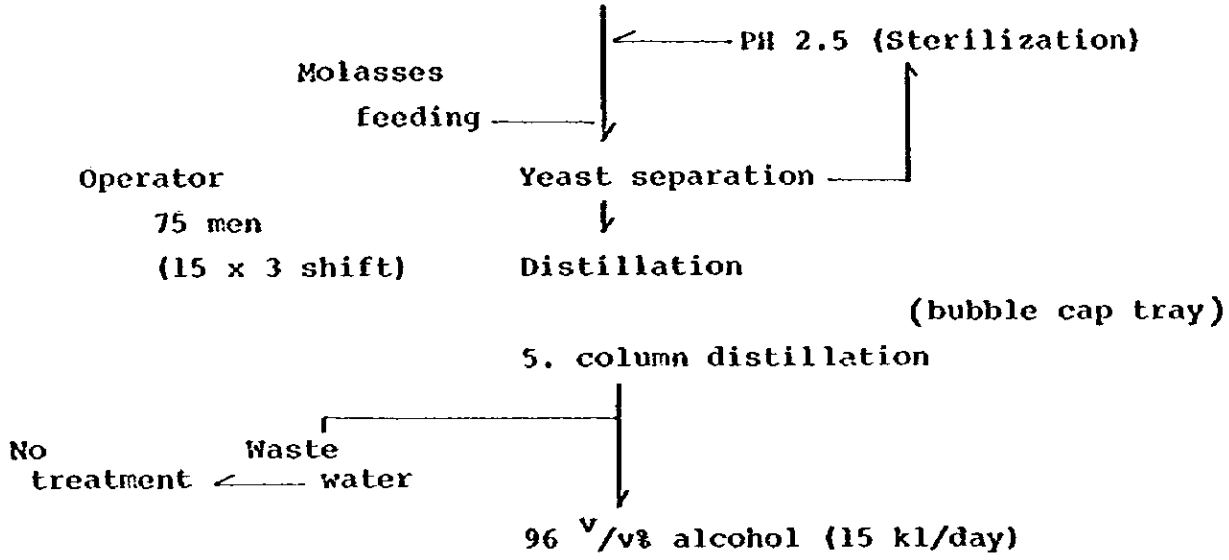
Designed by Vogelbusch, Austria

Construction cost : Factory machine 1,300 Mil. Rp.

Erection 800 Mil. Rp.

2,100 Mil. Rp.





Unit consumption : Molasses 3.36

(old plant 4.0)

: Steam 2,3 kcal/l alcohol

Chilled water : 20°C for cooling

Fermentation temperature : 30 - 32°C

Boiler : 8 ton/hour, 6.5 Kg/cm^2 (distillation)

2. Sugar factory

Capacity : 4.000 ton cane/day

All the bagasse produced in Jatiroto will be sent to the paper mill factory which is now installed in Leces. Jatiroto will be supplied the heat equivalent fuel oil from PTP headquarter.

APPENDIX 3.

SCOPE OF WORK
FOR
THE FEASIBILITY STUDY
ON
THE DEVELOPMENT OF SUGARCANE MOLASSES FERMENTATION INDUSTRY
IN
THE REPUBLIC OF INDONESIA
AGREED BETWEEN
DEPARTMENT OF AGRICULTURE
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

In response to the request of the Goverment of the Republic of Indonesia, the Government of Japan decided to extend technical cooperation to the Government of the Republic of Indonesia in undertaking a feasibility study (hereinafter referred to as "the Study") on the Development of Sugarcane molasses fermentation Industry in accordance with laws and regulations in force in Japan.

Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, dispatched a preliminary survey team headed by Mr. Kenji Iwaguchi from August 31 to September 9, 1982 to work out the scope of work of the Study with the Department of Agriculture (hereinafter referred to as "the Department") the counterpart organization on the part of the Government of the Republic of Indonesia.

As a result of a series of discussions, JICA and the Department hereto agreed upon the scope of work of the Study.

Date : 8th September 1982

Place: Jakarta

Kenji IWAGUCHI
Leader, Preliminary Survey Team
Director, Industry Division
Japan International Cooperation Agency.

SOEDJAI KARTASASMITA
Chairman, Staf Bina Perusahaan Negara Sektor Pertanian.

I. OBJECTIVE OF THE STUDY

The objective of the Study is to examine the technical, economic and financial feasibility of the establishment of a fermentation plant in Java using molasses as raw material (hereinafter referred to as "the Project").

The fermentation plant unit (integrated) producing the best production mix consists of several commodities (maximum 5) having the best marketing prospects locally as well overseas.

II. PROJECT LOCATION

The study will cover three locations, one in Central Java and two in East Java. Based on the market study, the feasibility study team (hereinafter referred to as " the F/S team ") will make a comparative study to decide the most feasible location.

III. SCOPE OF THE STUDY

In order to achieve the above objective, the Study will cover the following items :

1. Survey and Analysis of Data and Materials

1.1. Present state and future prospect of :

1.1.1. Sugarcane and sugar production
(country as a whole, by region and their prices)

1.1.2. Production of molasses and its down-stream products

1.1.3. Fermentation industry in Indonesia

1.2. Market

1.2.1. Molasses

1.2.1.1. Size and growth rate of domestic market
(demand by region and use)

1.2.1.2. Size and growth rate of overseas market
(demand by major country and use)

1.2.1.3. Movement 2

1.2.1.3. Movement of price
(domestic price, export price)

1.2.1.4. Future prospect of demand
(domestic and overseas)

1.2.2. Molasses fermentation products

1.2.2.1. Present state of domestic market and possibility of expansion

1.2.2.2. Present state of overseas market and its future prospect

(by major country)

1.2.2.3. Movement of price
(domestic and overseas)

1.3. Raw materials and products

1.3.1. Availability of raw materials in the Project area

1.3.2. Selection of molasses fermentation products and determination of production mix.

1.4. General outlook of project area and plant site

1.4.1. Natural conditions

1.4.1.1. Location

1.4.1.2. Geology

1.4.1.3. Meteorology

1.4.2. Socio-economic conditions

1.4.2.1. Population

1.4.2.2. Industries

1.4.2.3. Labor force

1.4.3. Utilities and Infrastructure

1.4.3.1. Transportation

1.4.3.2. Electricity

1.4.3.3. Telecommunication, ...

1.4.3.3. Telecommunication

1.4.3.4. Water

1.4.4. Selection of site

2. Conceptual Design

2.1. Design standard

2.2. Layout of plant

2.3. Design of process

2.4. Design of plant

2.4.1. Main facilities

2.4.2. Auxiliary facilities

3. Organization and Manpower Plan

3.1. Organization chart and their function

3.2. Manpower and expertise requirements in operating the fermentation plant and training program to develop the expertise.

4. Construction and Operation Plan

5. Environmental Consideration

5.1. Environmental impacts

5.2. Countermeasures to be taken

6. Capital Requirements

6.1. Fixed capital (land, plant, construction, auxiliary facilities, pre-operation cost, etc.)

6.2. Working capital

6.3. Expenditure schedule

7. Financial Analysis .....

7. Financial Analysis

7.1. Balance sheet

7.2. Cash flow

7.3. Internal financial rate of return

7.4. Sensitivity analysis based on possible variations in (a) investment cost (b) price of raw material (c) sales price (d) interest rate, and (e) inflation rate.

8. Economic and Social Evaluation

9. Conclusions and Recommendations

IV. MEASURES TO BE TAKEN BY THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF THE REPUBLIC OF INDONESIA

The authorities concerned of the Government of the Republic of Indonesia will :

1. assign a certain number of full-time counterparts,

2. arrange the F/S Team's visits to relevant authorities concerned and ensure that the F/S Team has access to all relevant information required for the execution of the Study,

3. provide the F/S Team with office accomodation with sufficient office supplies and equipment,

4. provide relevant information and data available to the F/S Team, including the following items:

   4.1. procurement plan of raw material (molasses)

   4.2. data and policy on sugarcane production scheme

5. exempt the F/S Team from taxes, duties and charges in the Republic of Indonesia on materials, equipment and personel effects brought into the Republic of Indonesia for the purpose of the Study,

6. exempt the F/S Team, ...5

6. exempt the F/S Team members from income taxes and charges of any kind imposed on or inconnection with the staying expenses remitted from abroad,

7. ensure the security of the F/S Team members during their stay in the Republic of Indonesia,

8. coordinate the inter-departmental matters for the Study, if necessary,

9. bear claims against the F/S Team members occuring in the course of the Study, except when such claims arise from the gross negligence or willful misconduct on the part of the F/S Team members.

V. REPORTS

JICA will prepare and submit the following reports in English to the Department.

1. Progress Report: 10 copies

2. Draft Final Report and Summary: 15 copies

3. Final Report and Summary : 40 copies

VI. SCHEDULE OF THE STUDY

The schedule of the Study is as shown in the Annex. The schedule, however, is subject to change according to circumstances.

VII. If any matter or difficulties may arise except those mentioned above, both parties will consult with each other based on the spirit of cooperation and mutual trust.

Annex.

Schedule of the Study

Item \ Year & month	1982			1983											
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Study in the Republic of Indonesia			▨												
Submission of Progress Report			○												
Study in Japan				▨	▨	▨	▨	▨							
Submission of Draft Final Report (D/F Report)								○							
Comment on D/F Report								▨							
Submission of Final Report										○					

App. 3-8

2.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
P.O BOX 214 MITSUI BLDG
3-1, MUSO-SHINJUKU, SHINJUKU-KU TOKYO
160 JAPAN

Jakarta, September 8th, 1982

Mr. Soedjai Kartasasmita
Ketua
Staf Bina Perusahaan Negara
Departemen Pertanian Republik Indonesia

The feasibility study on the development of sugarcane molasses fermentation industry.

Dear Sir,

With reference to the Scope of Work on the above study, I would like to acknowledge the following points.

1. With regards the market study, the possible sugarcane molasses down-stream products to be studied by the feasibility study team are as shown in the attached sheet and the study will be mainly conducted on 1) ethyl alcohol 2) MSG 3) yeast 4) L-lysine 5) antibiotics 6) citric acid and 7) acetic acid of the list.

2. The materials, equipment and personal effects to be covered in IV-5 of the S/W will be only those for the purpose of feasibility study, therefore will be brought back to Japan after the completion of the study in Indonesia.

3. In conection with the IV-6 of the S/W, all the staying expense of the feasibility study team will be paid by the Japan International Cooperation Agency in foreign currency.

4. As for the schedule of the feasibility study (VI in S/W), feasibility study team will be dispatched at the begining of October 1982 and the final report will be submitted to you by the end of July 1983.

The Indonesian 2

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
P.O BOX 216 MISUI BLDG
2-1, NISHI-SHINJUKU, SHINJUKU-KU TOKYO
160 JAPAN

The Indonesian side strongly requested to us for earlier submission of draft report than is scheduled in the *Annex* bardhart sheet of S/W. On this point, we will make our best effort to meet the request substantially.

5. The Indonesian side requested to the Japanese side to consider to take appropriate measures to ensure the communication and discussions during the study in Japan.

We also consider it significant and fruitful to have interim discussions during the study in Japan between both parties.

In this connection, we are ready to accept Indonesian counterparts to Japan of which one (1) will be financed by JICA.

Kenji EGUCHI
Leader, preliminary Survey Team
Director, Industry Division
Japan International Cooperation Agency.

3.

DEPARTEMEN PERTANIAN REPUBLIK INDONESIA
Staf Bina Perusahaan Negara Sektor Pertanian
[S.B.P.N.]
Jalan Taman Cut Mutiah No. 11 – Telpon 347543 - 348149, JAKARTA PUSAT
Telex : 45781 kbnegjkt – Kawat : Kebunnegara - Jakarta – Telepos : 3401/JKT

Nomor : 4086 /ID.Y/U/1982 Jakarta, September 8, 1982.
Lampiran :
Perihal :

Mr. Kinji IWAGUCHI,
Preliminary Survey Mission Leader
Japan International Cooperation Agency
(JICA)
2-1, Nishi-Shinjuku, Shinjuku-ku,
Tokyo 160
Japan.

Dear Sir,

Re : Feasibility Study on The Development of Sugarcane Molasses Fermentation Industry.

In response to the request of the Preliminary Survey Team of the Development of Sugarcane Molasses Fermentation Industry, we herewith point out 3 locations for the study, as follows:

1. East Java : 1.1. Panji Sugar Factory, Situbondo Area.

1.2. Pesantren Baru Sugar Factory, Kediri Area.

2. Central Java : Ex Comal Sugar Factory, Pekalongan Area.

Looking forward to a fruitful cooperation between our two countries, we remain,

Yours Sincerely,

Soedjai Kartasasmita
Chairman.

APPENDIX 4.

FINANCIAL ANALYSIS ETHANOL, FEED YEAST AND CORYNECIN PRODUCTION PLAN

Ethanol	30 Kℓ/d
Feed Yeast	10 ton/d
Corynecin	56 kg/d

```
-------------------------------------------------------------------------------

   1. PAYMENT PLAN FOR CAPITAL STOCK  ...UNITRP.1000000

THE CAPITAL PAYMENT  =   2 TIMES
-------------------------------------------------
YEAR(  1983 )  MONTH(  10 )  AMOUNT(         100 )
YEAR(  1984 )  MONTH(   4 )  AMOUNT(       7,400 )
-------------------------------------------------
                      TOTAL AMOUNT(       7,500 )

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------

   2. REQUIREMENT PLAN FOR LONG TERM LOAN  ...UNITRP.1000000

 1.  DOMESTIC CURRENCY LOAN  =  0
 2.  FOREIGN CURRENCY LOAN   =  1
-------------------------------------------------------------------------------

THE REQUIREMENT TIMES OF THE  1TH FOREIGN CURRENCY LOAN   =  2
-------------------------------------------------
YEAR(  1985 )  MONTH(   6 )  AMOUNT(       5,253 )
YEAR(  1985 )  MONTH(  10 )  AMOUNT(       5,253 )
-------------------------------------------------
                      TOTAL AMOUNT(      10,506 )
REPAYMENT YEARS =  10
HOW TO SET GRACE PERIOD   2.INPUT GRACE PERIOD(YEARS) FOR EACH REQUIREMENT
GRACE PERIOD (YEARS) =   4
THE INTEREST WILL BE DEPRECIATED AS ASSET
THE WAY OF REPAYMENT = 1.EQUAL-INSTALLMENT-REPAYMENT OF PRINCIPAL
R % ( ANNUAL INTEREST RATIO ) =    13.50 %
(THE PAYMENT IS  2 TIMES PER YEAR)
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------

  INPUT OF FIXED ASSET INVESTMENT PLAN  & RELATED DATA
                PROJECT --- ALTERNATIVE PROJECT (ALCOHOL

  INPUT ---  2.CONSTRUCTED FACILITIES              RP.1000000

 NUMBER OF CONSTRUCTED FACILITIES =  1

 INVESTMENT TIMES OF THE  1 CONSTRUCTED FACILITY =  2
-------------------------------------------------
YEAR(  1984 )  MONTH(   7 )  AMOUNT(         202 )
YEAR(  1984 )  MONTH(   8 )  AMOUNT(       1,031 )
-------------------------------------------------
                      TOTAL AMOUNT(       1,234 )
 THE METHOD OF DEPRECIATION OR AMOTIZATION  =   1.STRAIGHT LINE METHOD
    DEPTRECIATION-AMOTIZATION YEARS =   20 YEARS
THAT STARTS FROM OPERATION
THE SALVAGE PRICE RATIO (%) AFTER 20 YEARS  =    0.00 %
ANNUAL AMOUNT OF DEPRECIATION-AMOTIZATION  =          62


-------------------------------------------------------------------------------
```

```
  INPUT ---  3.MACHINERY & EQUIPMENT                RP.1000000

 NUMBER OF MACHINERY & EQUIPMENT =  1

 INVESTMENT TIMES OF THE  1 MACHINERY.EQUIPMENT =  2
-------------------------------------------------
YEAR(  1984 )  MONTH(  9 )  AMOUNT(       4,747 )
YEAR(  1985 )  MONTH(  9 )  AMOUNT(       9,531 )
-------------------------------------------------
                     TOTAL AMOUNT(      14,278 )
 THE METHOD OF DEPRECIATION OR AMOTIZATION  =   1.STRAIGHT LINE METHOD
    DEPTRECIATION-AMOTIZATION YEARS =    8 YEARS
THAT STARTS FROM OPERATION
THE SALVAGE PRICE RATIO (%) AFTER  8 YEARS  =    0.00 %
ANNUAL AMOUNT OF DEPRECIATION-AMOTIZATION  =       1,785


-------------------------------------------------------------------------------


  INPUT ---  4.PRE-OPERATING EXPENSES              RP.1000000

  PREPARATION TIMES  =  4
-------------------------------------------------
YEAR(  1983 )  MONTH( 10 )  AMOUNT(          36 )
YEAR(  1984 )  MONTH(  6 )  AMOUNT(          37 )
YEAR(  1985 )  MONTH(  6 )  AMOUNT(         846 )
YEAR(  1986 )  MONTH(  2 )  AMOUNT(         233 )
-------------------------------------------------
                     TOTAL AMOUNT(       1,152 )
 THE METHOD OF DEPRECIATION OR AMOTIZATION  =   1.STRAIGHT LINE METHOD
    DEPTRECIATION-AMOTIZATION YEARS =    5 YEARS
THAT STARTS FROM OPERATION
THE SALVAGE PRICE RATIO (%) AFTER  5 YEARS  =    0.00 %
ANNUAL AMOUNT OF DEPRECIATION-AMOTIZATION  =         230


-------------------------------------------------------------------------------


  INPUT ---  5.INTEREST DURING CONST.              RP.1000000

  PREPARATION TIMES  =  1
-------------------------------------------------
YEAR(  1985 )  MONTH( 12 )  AMOUNT(         355 )
-------------------------------------------------
                     TOTAL AMOUNT(         355 )
 THE METHOD OF DEPRECIATION OR AMOTIZATION  =   1.STRAIGHT LINE METHOD
    DEPTRECIATION-AMOTIZATION YEARS =    5 YEARS
THAT STARTS FROM OPERATION
THE SALVAGE PRICE RATIO (%) AFTER  5 YEARS  =    0.00 %
ANNUAL AMOUNT OF DEPRECIATION-AMOTIZATION  =          71


-------------------------------------------------------------------------------
```

```
-------------------------------------------------------------------------------

  INPUT ---  6.PHYSICAL CONTINGENCY                RP.1000000

  PREPARATION TIMES  =   3
-------------------------------------------------
YEAR(  1983 )  MONTH( 11 )  AMOUNT(          2 )
YEAR(  1984 )  MONTH(  9 )  AMOUNT(        320 )
YEAR(  1985 )  MONTH(  9 )  AMOUNT(        564 )
-------------------------------------------------
                      TOTAL AMOUNT(        886 )
 THE METHOD OF DEPRECIATION OR AMOTIZATION  =   1.STRAIGHT LINE METHOD
    DEPTRECIATION-AMOTIZATION YEARS =    8 YEARS
THAT STARTS FROM OPERATION
THE SALVAGE PRICE RATIO (%) AFTER  8 YEARS  =    0.00 %
ANNUAL AMOUNT OF DEPRECIATION-AMOTIZATION  =         111

-------------------------------------------------------------------------------

  INPUT ---  7.OTHER ASSETS                      RP.1000000

  PREPARATION TIMES  =   1
-------------------------------------------------
YEAR(  1986 )  MONTH(  2 )  AMOUNT(         36 )
-------------------------------------------------
                      TOTAL AMOUNT(         36 )
 THE METHOD OF DEPRECIATION OR AMOTIZATION  =   1.STRAIGHT LINE METHOD
    DEPTRECIATION-AMOTIZATION YEARS =    5 YEARS
THAT STARTS FROM OPERATION
THE SALVAGE PRICE RATIO (%) AFTER  5 YEARS  =    0.00 %
ANNUAL AMOUNT OF DEPRECIATION-AMOTIZATION  =          7

-------------------------------------------------------------------------------

  INPUT ---  8.REPAIR & MAINTENANCE              RP.1000000

THAT COST IS NECESSARY FROM OPERATION

THE RATIO (%) OF THE FOLLOWING ITEMS YEAR ( 1987 ) --> YEAR ( 2000 )
2.CONSTRUCTED FACILITIES  -->    2.00 %
3.MACHINERY & EQUIPMENT   -->    3.00 %
4.PRE-OPERATING EXPENSES  -->    0.00 %
5.INTEREST DURING CONST.  -->    0.00 %
6.PHYSICAL CONTINGENCY    -->    3.00 %
7.OTHER ASSETS            -->    0.00 %

-------------------------------------------------------------------------------

  INPUT ---  9.INSURANCE                         RP.1000000

THAT COST IS NECESSARY FROM OPERATION

THE RATIO (%) OF THE FOLLOWING ITEMS YEAR ( 1987 ) --> YEAR ( 2000 )
2.CONSTRUCTED FACILITIES  -->    1.00 %
3.MACHINERY & EQUIPMENT   -->    1.00 %
4.PRE-OPERATING EXPENSES  -->    0.00 %
5.INTEREST DURING CONST.  -->    0.00 %
6.PHYSICAL CONTINGENCY    -->    1.00 %
7.OTHER ASSETS            -->    1.00 %
```

```
 INPUT OF PRODUCTION AND SALES PLAN
              PROJECT  --- ALTERNATIVE PROJECT (ALCOHOL
NUMBER OF MAIN PRODUCTS =   3
.....
MAIN PRODUCT  NO  1 = ALCOHOL              *
MONTHLY RATED CAPACITY (UNIT) =          840
.....
      CAPACITY UTILIZATION
 YEAR( 1986 ) MONTH(  4 ) --->  YEAR( 1987 ) MONTH(  3 )  =          80.000
 YEAR( 1987 ) MONTH(  4 ) --->  YEAR( 1988 ) MONTH(  3 )  =          90.000
 YEAR( 1988 ) MONTH(  4 ) --->  YEAR( 2000 ) MONTH(  3 )  =         100.000
.....
     UNIT SALES PRICE  RP.%1,000,000
 YEAR( 1986 ) MONTH(  4 ) --->  YEAR( 2000 ) MONTH(  3 )  =           0.361

THE INVENTORY =  0.50 MONTHS OF THE PRODUCTION
  AT THE RATE OF THIS YEAR

THE ACCOUNTS RECEIVABLE =   0.0  MONTHS LATER



.....
MAIN PRODUCT  NO  2 = YEAST                *
MONTHLY RATED CAPACITY (UNIT) =          280
.....
      CAPACITY UTILIZATION
 YEAR( 1986 ) MONTH(  4 ) --->  YEAR( 1987 ) MONTH(  3 )  =          80.000
 YEAR( 1987 ) MONTH(  4 ) --->  YEAR( 1988 ) MONTH(  3 )  =          90.000
 YEAR( 1988 ) MONTH(  4 ) --->  YEAR( 2000 ) MONTH(  3 )  =         100.000
.....
     UNIT SALES PRICE  RP.%1,000,000
 YEAR( 1986 ) MONTH(  4 ) --->  YEAR( 2000 ) MONTH(  3 )  =           0.328

THE INVENTORY =  0.50 MONTHS OF THE PRODUCTION
  AT THE RATE OF THIS YEAR

THE ACCOUNTS RECEIVABLE =   0.0  MONTHS LATER



.....
MAIN PRODUCT  NO  3 = CORYNECIN            *
MONTHLY RATED CAPACITY (UNIT) =            2
.....
      CAPACITY UTILIZATION
 YEAR( 1986 ) MONTH(  4 ) --->  YEAR( 1987 ) MONTH(  3 )  =          70.000
 YEAR( 1987 ) MONTH(  4 ) --->  YEAR( 1988 ) MONTH(  3 )  =          85.000
 YEAR( 1988 ) MONTH(  4 ) --->  YEAR( 2000 ) MONTH(  3 )  =         100.000
.....
     UNIT SALES PRICE  RP.%1,000,000
 YEAR( 1986 ) MONTH(  4 ) --->  YEAR( 2000 ) MONTH(  3 )  =          32.521

THE INVENTORY =  0.50 MONTHS OF THE PRODUCTION
  AT THE RATE OF THIS YEAR

THE ACCOUNTS RECEIVABLE =   0.0  MONTHS LATER
```

```
**********************************************************************

   INPUT OF VARIABLE COSTS
            PROJECT ---   ALTERNATIVE PROJECT (ALCOHOL
**********************************************************************

 NAME OF RAW MATERIAL = MOLASSES

   THE UNIT OF NECESSARY VOLUME TO THE MAIN PRODUCTS    MOLASSES
-------------------------------------
   PRODUCTS NAME    NECESSARY UNIT VOLUME
-------------------------------------
ALCOHOL            *          3.30000
YEAST              *          4.00000
CORYNECIN          *        111.30000
-------------------------------------

**********************************************************************
 *** PRICE OF UNIT VOLUME ***RP.%1.000.000
**************************************************
 YEAR( 1986 ) MONTH(  4 ) --->  YEAR( 2000 ) MONTH(  3 )  =          0.027620
**************************************************

   ( AT THE RATE OF THIS YEAR )
THE INVENTORY =  1.00 MONTHS

 THE ACCOUNTS PAYABLE  =   0.0 MONTHS LATER


**********************************************************************

 NAME OF RAW MATERIAL = AMM.SULFATE

   THE UNIT OF NECESSARY VOLUME TO THE MAIN PRODUCTS    AMM.SULFATE
-------------------------------------
   PRODUCTS NAME    NECESSARY UNIT VOLUME
-------------------------------------
ALCOHOL            *          0.00000
YEAST              *          0.06300
CORYNECIN          *          4.35700
-------------------------------------

**********************************************************************
 *** PRICE OF UNIT VOLUME ***RP.%1.000.000
**************************************************
 YEAR( 1986 ) MONTH(  4 ) --->  YEAR( 2000 ) MONTH(  3 )  =          0.206460
**************************************************

   ( AT THE RATE OF THIS YEAR )
THE INVENTORY =  1.50 MONTHS

 THE ACCOUNTS PAYABLE  =   0.0 MONTHS LATER


**********************************************************************
```

NAME OF RAW MATERIAL = UREA

THE UNIT OF NECESSARY VOLUME TO THE MAIN PRODUCTS UREA

PRODUCTS NAME	NECESSARY UNIT VOLUME
ALCOHOL	0.00000
YEAST	0.11100
CORYNECIN	0.00000

*** PRICE OF UNIT VOLUME ***RP.%1,000,000

YEAR(1986) MONTH(4) ---> YEAR(2000) MONTH(3) = 0.292960

(AT THE RATE OF THIS YEAR)
THE INVENTORY = 1.50 MONTHS

THE ACCOUNTS PAYABLE = 0.0 MONTHS LATER

NAME OF RAW MATERIAL = BUTANOL

THE UNIT OF NECESSARY VOLUME TO THE MAIN PRODUCTS BUTANOL

PRODUCTS NAME	NECESSARY UNIT VOLUME
ALCOHOL	0.00000
YEAST	0.00000
CORYNECIN	5.80400

*** PRICE OF UNIT VOLUME ***RP.%1,000,000

YEAR(1986) MONTH(4) ---> YEAR(2000) MONTH(3) = 0.727710

(AT THE RATE OF THIS YEAR)
THE INVENTORY = 1.50 MONTHS

THE ACCOUNTS PAYABLE = 0.0 MONTHS LATER

NAME OF RAW MATERIAL = AMMONIA

THE UNIT OF NECESSARY VOLUME TO THE MAIN PRODUCTS AMMONIA

PRODUCTS NAME	NECESSARY UNIT VOLUME
ALCOHOL	0.00000
YEAST	0.00000
CORYNECIN	4.46400

```
*** PRICE OF UNIT VOLUME ***RP.%1,000,000
YEAR( 1986 ) MONTH(  4 ) --->  YEAR( 2000 ) MONTH(  3 )  =          0.199010

   ( AT THE RATE OF THIS YEAR )
THE INVENTORY =  1.50 MONTHS

 THE ACCOUNTS PAYABLE  =   0.0 MONTHS LATER


 NAME OF RAW MATERIAL = CSL

   THE UNIT OF NECESSARY VOLUME TO THE MAIN PRODUCTS    CSL
-------------------------------------
   PRODUCTS NAME    NECESSARY UNIT VOLUME
-------------------------------------
ALCOHOL           *          0.00000
YEAST             *          0.00000
CORYNECIN         *          2.17900
-------------------------------------

*** PRICE OF UNIT VOLUME ***RP.%1,000,000
YEAR( 1986 ) MONTH(  4 ) --->  YEAR( 2000 ) MONTH(  3 )  =          0.420690

   ( AT THE RATE OF THIS YEAR )
THE INVENTORY =  1.50 MONTHS

 THE ACCOUNTS PAYABLE  =   0.0 MONTHS LATER


 NAME OF RAW MATERIAL = OLEIC ACID

   THE UNIT OF NECESSARY VOLUME TO THE MAIN PRODUCTS    OLEIC ACID
-------------------------------------
   PRODUCTS NAME    NECESSARY UNIT VOLUME
-------------------------------------
ALCOHOL           *          0.00124
YEAST             *          0.00000
CORYNECIN         *          0.00000
-------------------------------------

*** PRICE OF UNIT VOLUME ***RP.%1,000,000
YEAR( 1986 ) MONTH(  4 ) --->  YEAR( 2000 ) MONTH(  3 )  =          1.746030

   ( AT THE RATE OF THIS YEAR )
THE INVENTORY =  1.50 MONTHS

 THE ACCOUNTS PAYABLE  =   0.0 MONTHS LATER
```

NAME OF RAW MATERIAL = ALGINATE

THE UNIT OF NECESSARY VOLUME TO THE MAIN PRODUCTS ALGINATE

PRODUCTS NAME	NECESSARY UNIT VOLUME
ALCOHOL	0.00034
YEAST	0.00000
CORYNECIN	0.00000

*** PRICE OF UNIT VOLUME ***RP.%1,000,000

YEAR(1986) MONTH(4) ---> YEAR(2000) MONTH(3) = 7.746760

(AT THE RATE OF THIS YEAR)
THE INVENTORY = 1.50 MONTHS

THE ACCOUNTS PAYABLE = 0.0 MONTHS LATER

NAME OF RAW MATERIAL = OTHER CHEMICAL

THE UNIT OF NECESSARY VOLUME TO THE MAIN PRODUCTS OTHER CHEMICAL

PRODUCTS NAME	NECESSARY UNIT VOLUME
ALCOHOL	0.00502
YEAST	0.00286
CORYNECIN	3.53637

*** PRICE OF UNIT VOLUME ***RP.%1,000,000

YEAR(1986) MONTH(4) ---> YEAR(2000) MONTH(3) = 1.000000

(AT THE RATE OF THIS YEAR)
THE INVENTORY = 1.50 MONTHS

THE ACCOUNTS PAYABLE = 0.0 MONTHS LATER

NAME OF VARIABLE COST = FUEL OIL

THE UNIT OF NECESSARY VOLUME TO THE MAIN PRODUCTS FUEL OIL

PRODUCTS NAME	NECESSARY UNIT VOLUME
ALCOHOL	0.25200
YEAST	2.09800
CORYNECIN	168.00000

*** PRICE OF UNIT VOLUME ***RP.%1,000,000

YEAR(1986) MONTH(4) ---> YEAR(2000) MONTH(3) = 0.122680

(AT THE RATE OF THIS YEAR)

THE INVENTORY = 1.00 MONTHS

THE ACCOUNTS PAYABLE = 0.0 MONTHS LATER

NAME OF VARIABLE COST = WATER

THE UNIT OF NECESSARY VOLUME TO THE MAIN PRODUCTS WATER

PRODUCTS NAME	NECESSARY UNIT VOLUME
ALCOHOL	0.14400
YEAST	1.96800
CORYNECIN	129.00000

*** PRICE OF UNIT VOLUME ***RP.%1,000,000

YEAR(1986) MONTH(4) ---> YEAR(2000) MONTH(3) = 0.000310

THE INVENTORY = 0.00 MONTHS

THE ACCOUNTS PAYABLE = 0.0 MONTHS LATER

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   INPUT OF FIXED COSTS
            PROJECT ---   ALTERNATIVE PROJECT (ALCOHOL
......................................................................

 NAME OF FIXED COST   ( A PART OF PRODUCTION COST ) = MAN POWER COST

 MONTHLY COST REQUIRED OF MAN POWER COST
         RP.%1,000,000
-------------------------------------------------
 YEAR( 1986 ) MONTH(  4 ) --->  YEAR( 2000 ) MONTH(  3 )  =          36.507000
.................................................


......................................................................

 NAME OF FIXED COST   ( A PART OF PRODUCTION COST ) = OTHER FIXED COST

 MONTHLY COST REQUIRED OF OTHER FIXED COST
         RP.%1,000,000
-------------------------------------------------
 YEAR( 1986 ) MONTH(  4 ) --->  YEAR( 2000 ) MONTH(  3 )  =          18.000000
.................................................


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( INPUT ITEMS )  --- PROJECT.ALTERNATIVE PROJECT (ALCOHOL
INCOME TAX·DIVIDENDS PAYMENT·MINIMUM CASH ON HAND·INTEREST OF SHORT TERM DEBT

THE RELATION BETWEEN TAXATION & CASH DIVIDENDS IS THAT     1.CASH DIVENDS ARE PAY
ABLE AFTER TAXATION

THE TAXATION SYSTEM IS THAT
   2.INPUT THE RATIO TO NET PROFIT

TAX PAYMENT IS    2.NEXT YEAR

 REF.)  THE PROJECT IS EXEMPT FROM TAXATION UNTIL  1990

THE TAXATION RATIO IS FIXED
THE TAXATION RATIO  =     45.00 %


THE START YEAR OF CASH DIVIDENDS = 1987

THE WAY OF DIVIDENDS PAYMENT
   1.A %  OF SHARE CAPITAL
A %   =    15.000 %


MINIMUM CASH ON HAND AFTER OPERATION  =              0

THE INTEREST OF SHORT TERM LOAN =  13.5000 % P.A.
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INCOME STATEMENTS ALTERNATIVE(AL (RP. 1,000,000)
ACCOUNTING DATE --- MONTH(3) DATE(31)

YEAR	1983	1984	1985	1986	1987
SALES REVENUE	0	0	0	0	4,047
TOTAL COST OF SALES	0	0	0	0	5,309
VARIABLE COST TOTAL	0	0	0	0	1,976
MOLASSES	0	0	0	0	804
AMM.SULFATE	0	0	0	0	35
UREA	0	0	0	0	66
BUTANOL	0	0	0	0	42
AMMONIA	0	0	0	0	9
CSL	0	0	0	0	9
OLEIC ACID	0	0	0	0	13
ALGINATE	0	0	0	0	16
OTHER CHEMICAL	0	0	0	0	71
FUEL OIL	0	0	0	0	909
WATER	0	0	0	0	2
CREDIT OF BY-PROD.	0	0	0	0	0
FIXED COST TOTAL	0	0	0	0	3,564
DEPRICIATION	0	0	0	0	1,846
AMORTIZATION	0	0	0	0	419
DEPR. OF ISSUE COST	0	0	0	0	0
MAN POWER COST	0	0	0	0	438
OTHER FIXED COST	0	0	0	0	216
REPAIR-MAINTENANCE	0	0	0	0	480
INSURANCE	0	0	0	0	164
TAX & LICENCE FEE	0	0	0	0	0
INC.INVENTORY(PROD)	0	0	0	0	-231
PROFIT ON SALES	0	0	0	0	-1,262
OPERATING PROFIT	0	0	0	0	-1,262
INT.ON LONG TERM D.	0	0	0	0	1,418
ON BOND	0	0	0	0	0
ON SHORT TERM D	0	0	0	0	0
SUBSIDY	0	0	0	0	0
NET PROFIT BFR.TAX	0	0	0	0	-2,680
INCOME TAX	0	0	0	0	0
NET PROFIT AFT.TAX	0	0	0	0	-2,680

INCOME STATEMENTS ALTERNATIVE(AL . (RP. 1,000,000)
ACCOUNTING DATE --- MONTH(3) DATE(31)

YEAR	1988	1989	1990	1991	1992
SALES REVENUE	4,766	5,332	5,355	5,355	5,355
TOTAL COST OF SALES	6,413	6,754	6,938	6,938	6,860
VARIABLE COST TOTAL	2,881	3,220	3,374	3,374	3,374
MOLASSES	1,164	1,290	1,348	1,348	1,348
AMM.SULFATE	51	58	61	61	61
UREA	95	105	109	109	109
BUTANOL	64	75	79	79	79
AMMONIA	13	16	17	17	17
CSL	14	16	17	17	17
OLEIC ACID	19	21	22	22	22
ALGINATE	23	26	27	27	27
OTHER CHEMICAL	105	120	127	127	127
FUEL OIL	1,330	1,491	1,564	1,564	1,564
WATER	3	3	3	3	3
CREDIT OF BY-PROD.	0	0	0	0	0
FIXED COST TOTAL	3,564	3,564	3,564	3,564	3,486
DEPRICIATION	1,846	1,846	1,846	1,846	1,846
AMOTIZATION	419	419	419	419	341
DEPR. OF ISSUE COST	0	0	0	0	0
MAN POWER COST	438	438	438	438	438
OTHER FIXED COST	216	216	216	216	216
REPAIR·MAINTENANCE	480	480	480	480	480
INSURANCE	164	164	164	164	164
TAX & LICENCE FEE	0	0	0	0	0
INC.INVENTORY(PROD)	-32	-30	0	0	0
PROFIT ON SALES	-1,648	-1,422	-1,583	-1,583	-1,504
OPERATING PROFIT	-1,648	-1,422	-1,583	-1,583	-1,504
INT.ON LONG TERM D.	1,418	1,418	1,407	1,305	1,167
ON BOND	0	0	0	0	0
ON SHORT TERM D	102	239	357	540	839
SUBSIDY	0	0	0	0	0
NET PROFIT BFR.TAX	-3,168	-3,080	-3,347	-3,428	-3,511
INCOME TAX	0	0	0	0	0
NET PROFIT AFT.TAX	-3,168	-3,080	-3,347	-3,428	-3,511

INCOME STATEMENTS ALTERNATIVE(AL (RP. 1,000,000)
ACCOUNTING DATE --- MONTH(3) DATE(31)

YEAR	1993	1994	1995	1996	1997
SALES REVENUE	5,355	5,355	5,355	5,355	5,355
TOTAL COST OF SALES	6,629	6,629	6,558	4,734	4,734
VARIABLE COST TOTAL	3,374	3,374	3,374	3,374	3,374
MOLASSES	1,348	1,348	1,348	1,348	1,348
AMM.SULFATE	61	61	61	61	61
UREA	109	109	109	109	109
BUTANOL	79	79	79	79	79
AMMONIA	17	17	17	17	17
CSL	17	17	17	17	17
OLEIC ACID	22	22	22	22	22
ALGINATE	27	27	27	27	27
OTHER CHEMICAL	127	127	127	127	127
FUEL OIL	1,564	1,564	1,564	1,564	1,564
WATER	3	3	3	3	3
CREDIT OF BY-PROD.	0	0	0	0	0
FIXED COST TOTAL	3,255	3,255	3,184	1,360	1,360
DEPRICIATION	1,846	1,846	1,846	62	62
AMORTIZATION	111	111	40	0	0
DEPR. OF ISSUE COST	0	0	0	0	0
MAN POWER COST	438	438	438	438	438
OTHER FIXED COST	216	216	216	216	216
REPAIR·MAINTENANCE	480	480	480	480	480
INSURANCE	164	164	164	164	164
TAX & LICENCE FEE	0	0	0	0	0
INC.INVENTORY(PROD)	0	0	0	0	0
PROFIT ON SALES	-1,274	-1,274	-1,203	622	622
OPERATING PROFIT	-1,274	-1,274	-1,203	622	622
INT.ON LONG TERM D.	1,030	893	755	618	481
ON BOND	0	0	0	0	0
ON SHORT TERM D	1,159	1,505	1,878	2,283	2,724
SUBSIDY	0	0	0	0	0
NET PROFIT BFR.TAX	-3,463	-3,671	-3,836	-2,279	-2,583
INCOME TAX	0	0	0	0	0
NET PROFIT AFT.TAX	-3,463	-3,671	-3,836	-2,279	-2,583

INCOME STATEMENTS ALTERNATIVE(AL (RP. 1,000,000)
ACCOUNTING DATE --- MONTH(3) DATE(31)

YEAR	1998	1999	2000
SALES REVENUE	5,355	5,355	5,355
TOTAL COST OF SALES	4,734	4,734	4,734
VARIABLE COST TOTAL	3,374	3,374	3,374
MOLASSES	1,348	1,348	1,348
AMM.SULFATE	61	61	61
UREA	109	109	109
BUTANOL	79	79	79
AMMONIA	17	17	17
CSL	17	17	17
OLEIC ACID	22	22	22
ALGINATE	27	27	27
OTHER CHEMICAL	127	127	127
FUEL OIL	1,564	1,564	1,564
WATER	3	3	3
CREDIT OF BY-PROD.	0	0	0
FIXED COST TOTAL	1,360	1,360	1,360
DEPRICIATION	62	62	62
AMORTIZATION	0	0	0
DEPR. OF ISSUE COST	0	0	0
MAN POWER COST	438	438	438
OTHER FIXED COST	216	216	216
REPAIR-MAINTENANCE	480	480	480
INSURANCE	164	164	164
TAX & LICENCE FEE	0	0	0
INC.INVENTORY(PROD)	0	0	0
PROFIT ON SALES	622	622	622
OPERATING PROFIT	622	622	622
INT.ON LONG TERM D.	343	206	69
ON BOND	0	0	0
ON SHORT TERM D	3,206	3,735	4,317
SUBSIDY	0	0	0
NET PROFIT BFR.TAX	-2,928	-3,320	-3,764
INCOME TAX	0	0	0
NET PROFIT AFT.TAX	-2,928	-3,320	-3,764

FUNDS FLOW STATEMENTS
ALTERNATIVE(AL (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1983	1984	1985	1986	1987
SOURCE OF FUNDS	0	7,500	0	10,506	1,760
CASH FROM OPERATION	0	0	0	0	1,004
PROFIT BFR.TAX & I.	0	0	0	0	-1,262
DEPRECIATION	0	0	0	0	1,846
AMOTIZATION	0	0	0	0	419
DEPR. OF ISSUE COST	0	0	0	0	0
FINANCIAL RESOURCES	0	7,500	0	10,506	756
SHARE CAPITAL	0	7,500	0	0	0
LONG TERM DEBT	0	0	0	10,506	0
BOND	0	0	0	0	0
SUBSIDY	0	0	0	0	0
SHORT TERM DEBT	0	0	0	0	756
INCR.IN ACCT PAYAB.	0	0	0	0	0
USES OF FUNDS	0	38	6,337	11,567	1,824
INV. IN FIXED ASSET	0	38	6,337	11,567	0
LAND & SITE IMPROV.	0	0	0	0	0
CONSTRUC.FACILITIES	0	0	1,234	0	0
MACHINERY,EQUIPMENT	0	0	4,747	9,531	0
PRE-OPERATION EXP.	0	36	37	1,079	0
INT. DURING CONST.	0	0	0	355	0
PHYSICAL CONTINGEN.	0	2	320	564	0
OTHER ASSETS	0	0	0	36	0
ISSUE COST	0	0	0	0	0
INC.IN CURRENT AST.	0	0	0	0	406
INC.ACCT RECEIVABLE	0	0	0	0	0
INC.IN PRODUCTION	0	0	0	0	231
INC.IN MATERIALS	0	0	0	0	175
DEBT SERVICES	0	0	0	0	1,418
REPAY. L-TERM DEBT	0	0	0	0	0
REPAYMENT OF BOND	0	0	0	0	0
REPAY. S-TERM DEBT	0	0	0	0	0
INT.ON L-TERM DEBT	0	0	0	0	1,418
INTEREST ON BOND	0	0	0	0	0
INT.ON S-TERM DEBT	0	0	0	0	0
INCOME TAX PAYMENT	0	0	0	0	0
DIVIDENDS PAYMENT	0	0	0	0	0
CASH INCREASED	0	7,462	-6,337	-1,061	-65
BEGINNING CASH BAL.	0	0	7,462	1,126	65
ENDING CASH BALANCE	0	7,462	1,126	65	0

FUNDS FLOW STATEMENTS
ALTERNATIVE(AL (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1988	1989	1990	1991	1992
SOURCE OF FUNDS	2,388	3,488	4,685	6,897	9,271
CASH FROM OPERATION	618	843	683	683	683
PROFIT BFR.TAX & I.	-1,648	-1,422	-1,583	-1,583	-1,504
DEPRECIATION	1,846	1,846	1,846	1,846	1,846
AMOTIZATION	419	419	419	419	341
DEPR. OF ISSUE COST	0	0	0	0	0
FINANCIAL RESOURCES	1,770	2,644	4,002	6,214	8,588
SHARE CAPITAL	0	0	0	0	0
LONG TERM DEBT	0	0	0	0	0
BOND	0	0	0	0	0
SUBSIDY	0	0	0	0	0
SHORT TERM DEBT	1,770	2,644	4,002	6,214	8,588
INCR.IN ACCT PAYAB.	0	0	0	0	0
USES OF FUNDS	2,388	3,488	4,685	6,897	9,271
INV. IN FIXED ASSET	0	0	0	0	0
LAND & SITE IMPROV.	0	0	0	0	0
CONSTRUC.FACILITIES	0	0	0	0	0
MACHINERY,EQUIPMENT	0	0	0	0	0
PRE-OPERATION EXP.	0	0	0	0	0
INT. DURING CONST.	0	0	0	0	0
PHYSICAL CONTINGEN.	0	0	0	0	0
OTHER ASSETS	0	0	0	0	0
ISSUE COST	0	0	0	0	0
INC.IN CURRENT AST.	112	60	14	0	0
INC.ACCT RECEIVABLE	0	0	0	0	0
INC.IN PRODUCTION	32	30	0	0	0
INC.IN MATERIALS	81	30	14	0	0
DEBT SERVICES	2,174	3,189	4,314	6,357	8,432
REPAY. L-TERM DEBT	0	0	263	1,051	1,051
REPAYMENT OF BOND	0	0	0	0	0
REPAY. S-TERM DEBT	756	1,770	2,644	4,002	6,214
INT.ON L-TERM DEBT	1,418	1,418	1,407	1,305	1,167
INTEREST ON BOND	0	0	0	0	0
INT.ON S-TERM DEBT	102	239	357	540	839
INCOME TAX PAYMENT	0	0	0	0	0
DIVIDENDS PAYMENT	0	0	0	0	0
CASH INCREASED	0	0	0	0	0
BEGINNING CASH BAL.	0	0	0	0	0
ENDING CASH BALANCE	0	0	0	0	0

FUNDS FLOW STATEMENTS
ALTERNATIVE(AL (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1993	1994	1995	1996	1997
SOURCE OF FUNDS	11,828	14,592	17,593	20,861	24,433
CASH FROM OPERATION	683	683	683	683	683
PROFIT BFR.TAX & I.	-1,274	-1,274	-1,203	622	622
DEPRECIATION	1,846	1,846	1,846	62	62
AMORTIZATION	111	111	40	0	0
DEPR. OF ISSUE COST	0	0	0	0	0
FINANCIAL RESOURCES	11,145	13,909	16,910	20,178	23,750
SHARE CAPITAL	0	0	0	0	0
LONG TERM DEBT	0	0	0	0	0
BOND	0	0	0	0	0
SUBSIDY	0	0	0	0	0
SHORT TERM DEBT	11,145	13,909	16,910	20,178	23,750
INCR.IN ACCT PAYAB.	0	0	0	0	0
USES OF FUNDS	11,828	14,592	17,593	20,861	24,433
INV. IN FIXED ASSET	0	0	0	0	0
LAND & SITE IMPROV.	0	0	0	0	0
CONSTRUC.FACILITIES	0	0	0	0	0
MACHINERY,EQUIPMENT	0	0	0	0	0
PRE-OPERATION EXP.	0	0	0	0	0
INT. DURING CONST.	0	0	0	0	0
PHYSICAL CONTINGEN.	0	0	0	0	0
OTHER ASSETS	0	0	0	0	0
ISSUE COST	0	0	0	0	0
INC.IN CURRENT AST.	0	0	0	0	0
INC.ACCT RECEIVABLE	0	0	0	0	0
INC.IN PRODUCTION	0	0	0	0	0
INC.IN MATERIALS	0	0	0	0	0
DEBT SERVICES	10,668	13,088	15,715	18,578	21,709
REPAY. L-TERM DEBT	1,051	1,051	1,051	1,051	1,051
REPAYMENT OF BOND	0	0	0	0	0
REPAY. S-TERM DEBT	8,588	11,145	13,909	16,910	20,178
INT.ON L-TERM DEBT	1,030	893	755	618	481
INTEREST ON BOND	0	0	0	0	0
INT.ON S-TERM DEBT	1,159	1,505	1,878	2,283	2,724
INCOME TAX PAYMENT	0	0	0	0	0
DIVIDENDS PAYMENT	0	0	0	0	0
CASH INCREASED	0	0	0	0	0
BEGINNING CASH BAL.	0	0	0	0	0
ENDING CASH BALANCE	0	0	0	0	0

FUNDS FLOW STATEMENTS
ALTERNATIVE(AL (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1998	1999	2000
SOURCE OF FUNDS	28,350	32,659	37,149
CASH FROM OPERATION	683	683	683
PROFIT BFR.TAX & I.	622	622	622
DEPRECIATION	62	62	62
AMORTIZATION	0	0	0
DEPR. OF ISSUE COST	0	0	0
FINANCIAL RESOURCES	27,667	31,976	36,466
SHARE CAPITAL	0	0	0
LONG TERM DEBT	0	0	0
BOND	0	0	0
SUBSIDY	0	0	0
SHORT TERM DEBT	27,667	31,976	36,466
INCR.IN ACCT PAYAB.	0	0	0
USES OF FUNDS	28,350	32,659	37,149
INV. IN FIXED ASSET	0	0	0
LAND & SITE IMPROV.	0	0	0
CONSTRUC.FACILITIES	0	0	0
MACHINERY,EQUIPMENT	0	0	0
PRE-OPERATION EXP.	0	0	0
INT. DURING CONST.	0	0	0
PHYSICAL CONTINGEN.	0	0	0
OTHER ASSETS	0	0	0
ISSUE COST	0	0	0
INC.IN CURRENT AST.	0	0	0
INC.ACCT RECEIVABLE	0	0	0
INC.IN PRODUCTION	0	0	0
INC.IN MATERIALS	0	0	0
DEBT SERVICES	25,144	28,924	32,832
REPAY. L-TERM DEBT	1,051	1,051	788
REPAYMENT OF BOND	0	0	0
REPAY. S-TERM DEBT	23,750	27,667	31,976
INT.ON L-TERM DEBT	343	206	69
INTEREST ON BOND	0	0	0
INT.ON S-TERM DEBT	3,206	3,735	4,317
INCOME TAX PAYMENT	0	0	0
DIVIDENDS PAYMENT	0	0	0
CASH INCREASED	0	0	0
BEGINNING CASH BAL.	0	0	0
ENDING CASH BALANCE	0	0	0

BALANCE SHEET
ALTERNATIVE(AL (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1983	1984	1985	1986	1987
ASSETS	0	7,500	7,500	18,006	16,081
CURRENT ASSETS	0	7,462	1,126	65	406
CASH	0	7,462	1,126	65	0
ACCT. RECEIVABLE	0	0	0	0	0
PRODUCTS INVENTO.	0	0	0	0	231
MATERIALS INVENT.	0	0	0	0	175
FIXED ASSETS INV.	0	38	6,374	17,941	17,941
LAND	0	0	0	0	0
CONST.FACILITIES	0	0	1,234	1,234	1,234
MACHINERY.EQUIPM.	0	0	4,747	14,278	14,278
PRE-OPERATION EXP	0	36	72	1,152	1,152
INT.DUR.CONSTRUCT	0	0	0	355	355
PHYSI. CONTIGENCY	0	2	322	886	886
OTHER ASSETS	0	0	0	36	36
DEFERRED ASSETS	0	0	0	0	0
DEPREC. & AMORTIZ.	0	0	0	0	-2,266
LIABILITY & EQUITY	0	7,500	7,500	18,006	16,081
LIABILITIES	0	0	0	10,506	11,262
CURRENT LIABILITY	0	0	0	0	756
ACCONTS PAYABLE	0	0	0	0	0
INCOME TAX PAYABLE	0	0	0	0	0
CURRENT PORTION OF DEBT					
LONG TERM DEBT	0	0	0	0	0
BOND PAYABLE	0	0	0	0	0
SHORT TERM DEBT	0	0	0	0	756
FIXED LIABILITIES	0	0	0	10,506	10,506
L-TERM DEBT BLNC.	0	0	0	10,506	10,506
BOND BALANCE	0	0	0	0	0
STOCK HOLDERS EQUI.	0	7,500	7,500	7,500	4,820
SHARE CAPITAL	0	7,500	7,500	7,500	7,500
NET PROFIT AFT. TAX	0	0	-0	-0	-2,680
DIVIDENDS PAYABLE	0	0	0	0	0
BEGINNING BALANCE	0	0	0	0	-0
RETAINED ERNINGS	0	0	0	-0	-2,680

BALANCE SHEET
ALTERNATIVE(AL (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1988	1989	1990	1991	1992
ASSETS	13,928	11,722	9,470	7,204	5,017
CURRENT ASSETS	518	579	592	592	592
CASH	0	0	0	0	0
ACCT. RECEIVABLE	0	0	0	0	0
PRODUCTS INVENTO.	263	292	292	292	292
MATERIALS INVENT.	256	286	300	300	300
FIXED ASSETS INV.	17,941	17,941	17,941	17,941	17,941
LAND	0	0	0	0	0
CONST.FACILITIES	1,234	1,234	1,234	1,234	1,234
MACHINERY,EQUIPM.	14,278	14,278	14,278	14,278	14,278
PRE-OPERATION EXP	1,152	1,152	1,152	1,152	1,152
INT.DUR.CONSTRUCT	355	355	355	355	355
PHYSI. CONTIGENCY	886	886	886	886	886
OTHER ASSETS	36	36	36	36	36
DEFERRED ASSETS	0	0	0	0	0
DEPREC. & AMORTIZ.	-4,532	-6,798	-9,063	-11,329	-13,517
LIABILITY & EQUITY	13,928	11,722	9,470	7,204	5,017
LIABILITIES	12,276	13,150	14,245	15,407	16,730
CURRENT LIABILITY	1,770	2,907	5,052	7,265	9,638
ACCONTS PAYABLE	0	0	0	0	0
INCOME TAX PAYABLE	0	0	0	0	0
CURRENT PORTION OF DEBT					
LONG TERM DEBT	0	263	1,051	1,051	1,051
BOND PAYABLE	0	0	0	0	0
SHORT TERM DEBT	1,770	2,644	4,002	6,214	8,588
FIXED LIABILITIES	10,506	10,243	9,193	8,142	7,091
L-TERM DEBT BLNC.	10,506	10,243	9,193	8,142	7,091
BOND BALANCE	0	0	0	0	0
STOCK HOLDERS EQUI.	1,651	-1,428	-4,775	-8,203	-11,713
SHARE CAPITAL	7,500	7,500	7,500	7,500	7,500
NET PROFIT AFT. TAX	-3,168	-3,080	-3,347	-3,428	-3,511
DIVIDENDS PAYABLE	0	0	0	0	0
BEGINNING BALANCE	-2,680	-5,849	-8,928	-12,275	-15,703
RETAINED ERNINGS	-5,849	-8,928	-12,275	-15,703	-19,213

BALANCE SHEET
ALTERNATIVE(AL (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1993	1994	1995	1996	1997
ASSETS	3,059	1,102	-784	-846	-908
CURRENT ASSETS	592	592	592	592	592
CASH	0	0	0	0	0
ACCT. RECEIVABLE	0	0	0	0	0
PRODUCTS INVENTO.	292	292	292	292	292
MATERIALS INVENT.	300	300	300	300	300
FIXED ASSETS INV.	17,941	17,941	17,941	17,941	17,941
LAND	0	0	0	0	0
CONST.FACILITIES	1,234	1,234	1,234	1,234	1,234
MACHINERY,EQUIPM.	14,278	14,278	14,278	14,278	14,278
PRE-OPERATION EXP	1,152	1,152	1,152	1,152	1,152
INT.DUR.CONSTRUCT	355	355	355	355	355
PHYSI. CONTIGENCY	886	886	886	886	886
OTHER ASSETS	36	36	36	36	36
DEFERRED ASSETS	0	0	0	0	0
DEPREC. & AMORTIZ.	-15,474	-17,431	-19,318	-19,379	-19,441
LIABILITY & EQUITY	3,059	1,102	-784	-846	-908
LIABILITIES	18,236	19,950	21,900	24,118	26,639
CURRENT LIABILITY	12,195	14,960	17,960	21,229	24,801
ACCONTS PAYABLE	0	0	0	0	0
INCOME TAX PAYABLE	0	0	0	0	0
CURRENT PORTION OF DEBT					
LONG TERM DEBT	1,051	1,051	1,051	1,051	1,051
BOND PAYABLE	0	0	0	0	0
SHORT TERM DEBT	11,145	13,909	16,910	20,178	23,750
FIXED LIABILITIES	6,041	4,990	3,940	2,889	1,839
L-TERM DEBT BLNC.	6,041	4,990	3,940	2,889	1,839
BOND BALANCE	0	0	0	0	0
STOCK HOLDERS EQUI.	-15,177	-18,848	-22,684	-24,964	-27,547
SHARE CAPITAL	7,500	7,500	7,500	7,500	7,500
NET PROFIT AFT. TAX	-3,463	-3,671	-3,836	-2,279	-2,583
DIVIDENDS PAYABLE	0	0	0	0	0
BEGINNING BALANCE	-19,213	-22,677	-26,348	-30,184	-32,464
RETAINED ERNINGS	-22,677	-26,348	-30,184	-32,464	-35,047

BALANCE SHEET
ALTERNATIVE(AL (RP. 1,000,000)
ACCOUNTING DATE --- MONTH (3) DATE (31)

YEAR	1998	1999	2000
ASSETS	-969	-1,031	-1,093
CURRENT ASSETS	592	592	592
CASH	0	0	0
ACCT. RECEIVABLE	0	0	0
PRODUCTS INVENTO.	292	292	292
MATERIALS INVENT.	300	300	300
FIXED ASSETS INV.	17,941	17,941	17,941
LAND	0	0	0
CONST.FACILITIES	1,234	1,234	1,234
MACHINERY,EQUIPM.	14,278	14,278	14,278
PRE-OPERATION EXP	1,152	1,152	1,152
INT.DUR.CONSTRUCT	355	355	355
PHYSI. CONTIGENCY	886	886	886
OTHER ASSETS	36	36	36
DEFERRED ASSETS	0	0	0
DEPREC. & AMORTIZ.	-19,503	-19,564	-19,626
LIABILITY & EQUITY	-969	-1,031	-1,093
LIABILITIES	29,506	32,764	0
CURRENT LIABILITY	28,718	32,764	0
ACCOUNTS PAYABLE	0	0	0
INCOME TAX PAYABLE	0	0	0
CURRENT PORTION OF DEBT			
LONG TERM DEBT	1,051	788	0
BOND PAYABLE	0	0	0
SHORT TERM DEBT	27,667	31,976	0
FIXED LIABILITIES	788	0	0
L-TERM DEBT BLNC.	788	0	0
BOND BALANCE	0	0	0
STOCK HOLDERS EQUI.	-30,475	-33,795	-1,093
SHARE CAPITAL	7,500	7,500	7,500
NET PROFIT AFT. TAX	-2,928	-3,320	32,702
DIVIDENDS PAYABLE	0	0	0
BEGINNING BALANCE	-35,047	-37,975	-41,295
RETAINED ERNINGS	-37,975	-41,295	-8,593

IRR CALCULATION TABLE ALTERNATIVE(AL
RP. 1,000,000

IRR CALCULATION ON TOTAL INVESTMENT (ROI AFTER TAX)

YEAR	TOTAL INVESTMENT	PROFIT BEFORE TAX	DEPRECIATION	INTEREST ON DEBT	INCOME TAX	RETURN AFTER TAX	DISCOUNT RATIO	PRESENT VALUE INVEST.	PRESENT VALUE RETURN
1983	0	0	0	0	0	0	0.73288	0	0
1984	7500	0	0	0	0	0	0.81287	6097	0
1985	0	0	0	0	0	0	0.90160	0	0
1986	10151	0	0	0	0	0	1.00000	10151	0
1987	0	-2680	2266	1418	0	1004	1.10914	0	1113
1988	0	-3168	2266	1520	0	618	1.23020	0	760
1989	0	-3080	2266	1657	0	843	1.36447	0	1151
1990	0	-3347	2266	1764	0	683	1.51340	0	1034
1991	0	-3428	2266	1845	0	683	1.67853	0	1147
1992	0	-3511	2188	2006	0	683	1.86178	0	1272
1993	0	-3463	1957	2189	0	683	2.06499	0	1411
1994	0	-3671	1957	2397	0	683	2.29037	0	1565
1995	0	-3836	1886	2633	0	683	2.54035	0	1736
1996	0	-2279	62	2901	0	683	2.81762	0	1925
1997	0	-2583	62	3205	0	683	3.12514	0	2135
1998	0	-2928	62	3550	0	683	3.46624	0	2368
1999	0	-3320	62	3941	0	683	3.84456	0	2627
2000	1620	-3764	62	4385	0	683	4.26417	6909	2913
TOTAL	19271					9980		23156	23156

----- INTERNAL RATE OF RETURN ----- = -9.8404 %

PAY-OUT PERIOD AFT.START OF OPERATION = 999.9999 YEAR