

第8章 必要投資額及び資金計画

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本プロジェクトを実行するために必要な投資額の見積と資金計画について本章で取扱う。

8.1 基本条件

投資所要額見積のための基本条件は次の通りとする。

1. 貨幣の交換レート

US\$1 = ¥ 240 = Rp. 695

2. 投資額の見積時期

1983年1月現在の価格

3. 機器の調達方法

国際競争入札

4. 契約形態

ターン・キー・ランブサム契約

5. プライス・エスカレーション(年率)

外貨分: 5%

内貨分: 10%

8.2 プロジェクト・コストの見積(1983年1月)と範囲

プロジェクト・コストは下記の範囲について1983年1月現在で見積られた。

1. 土地

本プロジェクトでは、ComalのEx Comal Sugar Factoryの敷地をサイトとすることとしたので、土地の新規購入は不要とした。

2. 機械設備費(FOB)

エタノール日産45キロ・リットルとコリネン日産56キロ・グラムを生産するために必要な機械設備の購入価額。これは外貨及び内貨に分けて見積られた。

3. 海上輸送・海上保険料

海上輸送及び海上保険費用。1983年1月現在の料金表により見積られた。

機械設備の揚フレート・トンは約5,000である。

4. 内陸輸送及び港湾荷揚費用

Jakartaに於いて荷揚げし、サイトComalまでのトラック輸送費用

5. 据付費用

機械設備据付と配管、保温、塗装、架構、電気、電話等の工事に必要な延べ総工数は、
46,650人工数(man·doy)である。

6. 建設・運転指導費

建設工事の指導と操業指導のため、日本人技術指導員の延べ人工数は5,800人工数である。
40人で指導するものとし、航空賃、報酬等が見積られた。

7. 建築及び土木工事費

Ex Comal Sugar Factoryの既存の基礎の撤去、既存廃水路の修復、建屋の改修および機械設備の基礎(Foundation)、取水路の新設等の工事に必要な資材費と労務費

8. 雑費

工場運営に必要な什器備品等の購入費用。

9. ノーハウ・フィー

発酵技術の導入に要する費用。

10. 操業前費用

1) コンサルティング・フィー

入札仕様書の作成と応札書類の内容の技術・経済評価のためコンサルタントを採用することとした。

2) トレーニング

技術修得のため、研修者(Trainee)の派遣費用。

3) テスト・ラン費用

テスト・ランに必要な原材料、燃料等の購入費用。

11. 予備費(Physical Contingency)

本見積では、Foreign Currency Portionについて5%、Local Currency Portionについて10%の現在予期困難な費用が発生するものと仮定し、予備費が見積られた。

以上の見積の結果を表8-1に示す。

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

Unit: 1,000

Item	Foreign Currency Portion		Rupiah Portion Rp.	Total 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 所要プロジェクト・コスト

1983年1月現在のプロジェクト・コストの見積(表8-1)について、プロジェクト・スケジュールに従って費目ごとに支出計画を立て、外貨部分は年率5%また内貨部分は年率10%で価格上昇するものとして支出時点の所要額を算出し、総所要プロジェクト・コストを求める。

算定式は次の通りとした。

$$P = P_0 (1 + r)^n$$

P_0 : 1983年1月現在の見積価格

r : 年間プライス・エスカレーション・レート(%)

n : 1983年1月からの経過年数

上記算定式により計画した結果は、表8-2、また1986年3月31日までの支出合計は表8-3に示されている。

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		27,104	27,104
	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	692,444
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 Rp.	Total 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 S-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 資金調達計画

本プロジェクトの資金調達計画は表 8 - 4 表に示す通りである。

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.

Note: 長期借入金の条件は次の通りである。

据置期間: 4年

返済期間: 据置後10年半年賦

金利: 13.5%

自己資本と長期借入金の比率は35:65である。

第 9 章 財 務 分 析

第9章 財務分析

本調査の目的は、インドネシアが実施している砂糖増産計画に伴って発生する余剰糖蜜を有効利用するため Scope of Work に記載された7つの候補発酵製品の中から市場性のある数製品を選びそれらを生産するために実現可能な工場建設計画を立案することである。

調査団はインドネシアでの市場分析の結果を踏まえ、エタノール、飼料用イースト、抗性物質のコリネシンを選定し、技術的、経済的検討を進めた。しかし、本章の後半に詳述するように、これら3製品を生産するための工場建設計画は財務的に破綻することが判明したので、高収益性のあるエタノールとコリネシンとを組合わせ生産することにより財務的にも成り立つ工場建設計画が立案された。本章では以下述べるように、エタノールとコリネシンを生産する案が基本案として取り上げられている。

9.1 一般条件

1. 本プロジェクトは、1984年4月にプラント建設の準備を開始し、1986年4月に操業開始するプロジェクトである。
2. プロジェクト・ライフは操業開始後15年間である。
3. 財務分析のための価格は現地調査を実施した1982年12月の価格を基準とし、1986年3月までの間輸入品は年率5%また国産品は年率10%価格が上昇すると仮定されている。1986年4月から2000年3月までの価格は固定価格とする。

算定式は次の通りである。

$$P = P_0 (1 + r)^n$$

P_0 : 1982年12月価格

r : 価格上昇率

n : 1982年12月以降の経過年数

9.2 基本案の財務計算のための条件

基本案とは、日産45キロ・リットルのエタノールと日産56キロ・グラムのコリネシンを生産する計画である。

1. 生産・販売条件

生産・販売条件は Table 9-1 に示す通りである。

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. 変 動 費

エタノール1キロ・リットル，コリネシン1トンをそれぞれ生産するのに必要な変動費の条件はTable 9-2に示す通りである。

変動費に係わる原材料，その他の在庫水準は，次の通りである。

糖 蜜	1 カ月分
燃料オイル	1 カ月分
薬 品 等	1.5 カ月分

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		5,801
- 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. 固定費条件

1) 減価償却費

固定資産及び繰延資産の償却資産の償却年数

機械設備： 8年

建物・構築物： 20年

その他固定資産： 5年

換装前費用： 5年

建中金利： 5年

予備費： 8年

2) 保守・修繕費

年間の保守・修繕費は次の項目の購入価格に対して次の割合で算定する。

建物： 2%

機械設備： 3%

予備費： 3%

3) 火災保険料

年間火災保険料は次の項目の購入価格に対し次の割合で算定する。

建物： 1%

機械設備： 1%

予備費： 1%

その他固定資産： 1%

4) 人件費

月間人件費はTable 9-3に示す通りとする。

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) その他の固定費

上記以外のその他の固定費は年間180百万ルピア発生することと仮定する。

3. 長期借入金金利

借入条件

据置期間：4年

返済期間：据置後10年間

年 金 利：13.5%

年間返済回数：2回

借入返済スケジュールはTable 9-4に示す通りである。

Table 9-4. Repayment Schedule

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

PAGE = 1

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

REPAYMENT SCHEDULE FOR LONG TERM LOAN & BOND
INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT

PAGE = 3

(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. 税 金

法人税は、操業開始後4年間の免税期間後、税引前利益に対し課税される。税率は15%である。

5. 配 当

税引後利益が生ずる場合、配当金は払込資本の15%とする。ただし、配当金合計は税引後利益を超えない。

9.3 基本案の財務諸表

9.3.1 製造原価計算書

1. エタノールの製造原価

借入金金利を除くアルコールの製造原価はTable 9-5に示す通りである。エタノール1キロ・リットル当りの製造原価は、1988年3月期の230,100ルピアを最高として、機械設備の償却が完了する2000年3月期には165,900ルピアまで低下する。

エタノールの1キロ・リットル当りの販売価格は361,200ルピアであり、アルコールの収益性は非常に高い。

また、アルコールとコリネシンの設備投資額の割合で長期借入金の金利分を配賦し、エタノールの金利込製造原価を計算すると、金利負担、償却負担の最大の1987年3月期のエタノール1キロ・リットル当り273,300ルピアである。

2. コリネシンの製造原価

コリネシンの借入金の金利を除く製造原価はTable 9-6に示す通りである。コリネシンの1トン当り製造原価は1987年3月期での121,551,700ルピアを最高に、2000年3月期の61,669,000まで低下する。

しかし、コリネシンの1トン当りの販売価格が32,521,000ルピアでコリネシンの収益性はない。従って、コリネシン単独の生産ではプロジェクトは財務的に成り立たない。

コリネシンに収益性の高いアルコールを組合せることにより、精蜜利用を可能にすることにより本プロジェクトの意義が見出せる。

9.3.2 生産販売計画

各年別生産販売計画はTable 9-7に示されている。

9.3.3 損益計算書

機械設備の減価償却年数が8年であるため、その償却が続く1995年3月期までは売上利益率が7%以下であるが、それ以降17.4%~21.36%と非常に高く、15年間平均で48.4%である。先進国の償却の進んだ製造業の売上利益率が2~3%程度であることと比較しても、本プロジェクトの収益性は優れている。

エタノールの市場が確保されるならば、コリネシンの生産を組合せても、本プロジェクトが魅力的であることが再確認されている。

損益計算書はTable 9-8の通りである。

9.3.4 資金繰表 Fund Flow Statement

Table 9-9の資金繰表を検討した結果、操業開始から15年間各年とも生産活動と借入金の返済に必要な資金が製品販売によって得られる。

資金不足によって経営活動に支障が生じ、政府の資金援助を必要とする企業が少なからずあるインドネシアで、資金面で不安の少ない本プロジェクトは有意義であろう。

9.3.5 貸借対照表 (Balance Sheet)

Table 9-10の貸借対照表を検討すると、操業開始後6年間配当を支払えないが、1992年3月期から配当が支払可能となる。2000年3月期までの累積配当額は当初の払込資本金4,450百万ルピアの約95%に達する。

また、15年間の平均当座比率 (Current Ratio) 482%、酸性比率 (Quick Acid Ratio) 446%と財務状態は非常に健全である。

9.3.6 損益分岐点分析 (Break Even Point Analysis)

エタノールとコリネシンとをほぼ同じ程度の操業度で生産すると仮定すれば、各年の損益分岐点はTable 9-11に示す通りである。

損益分岐点図表をFig 9-1に示す。15年間の各年の損益分岐点は、BEP^{*1}とBEP^{*2}との間の売上線上に存在する。

9.3.7 内部収益率 (Internal Rate of Return)

1. Table 10-12が示す通り、内部収益率は下記の通りである。

ROI before Tax : 15.15%

ROI after Tax : 13.37%

ROE after Tax : 11.42%

PTP自身が本プロジェクトの販売計画のようなアルコールの販売実績を達成するならば、本プロジェクトはフィージブルである。

2. 感度分析 (Sensitivity Analysis)

本調査では、販売価格、変動費、投資額が10%上下する場合の感度分析を実施した。

感度分析の結果は、Fig 9-2, Fig 9-3, Fig 9-4に示されている通りである。

本調査では、投資額の見積を詳細に行っており、投資額の中には外貨ポジションについては5%、ルピア・ポジションについては10%の臨時費が含まれている。従って、投資額の増額の要素は少ない。

しかし、エタノールとコリネシンの販売価格の維持のため、政府関係当局は保護策を講じることが望ましい。

9.3.8 ケース・スタディー

SBPNの強い要請に基づき、9-2で述べた基本案の条件のうち、1982年12月現在の価格で精蜜1トン当り30,000ルピア、燃料オイル1リットル当り150ルピアと変更した場合のケース・スタディーを実施した。

上記の条件の場合、変動費が基本案より約50%上昇するため、収益性が大巾に低下し、その結果内部収益率は下記のように低下し、その結果内部収益率は下記のように低下する。

ROI before Tax : 3.34%

ROI after Tax : 3.27%

ROE after Tax : No solution

このケースでは15年間資金不足が生じ、経営活動が破綻する。

精蜜は価格変動の激しい品目であり、精蜜を原料とする醸造工業の健全育成のため、精蜜価格の安定が必須である。

9.4 3製品生産工場建設計画

基本案に先立ち、エタノール日産30キロリットル、飼料用イースト日産10トン、コリネシン日産56キロ・グラムを生産する工場建設計画について財務分析を行なったが、飼料用イースト、コリネシンとも変動費比率が非常に高く、また設備費が高いため、アルコールの収益性が高くても、プロジェクトはフィージブルではない。

この3製品生産案の内部収益率は次のように低い

ROI before Tax : -10.3316%

ROI after Tax : -10.3316%

従って、本調査レポートでは、実現可能な案として、9-2で記述されているアルコール日産45キロ・リットル、コリネシン56キロ・グラムを生産する案が採用されている。

参考として3製品生産の場合の財務諸表がAppendixに添付されている。

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					
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					
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
RAW POWER COST					
RAW POWER COST	0	0	0	172	172
OTHER FIXED COST					
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. & AMOTIZAT.	0	0	0	901	901
EX-FACTORY PRO. 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					
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					
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
FIXED COST					
FIXED 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. & AMOTIZAT.	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	49,896	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					
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					
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					
MAN POWER COST	172	172	172	172	172
OTHER FIXED COST					
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. & AMOTIZAT.	736	31	31	31	31
EX-FACTORY PRD.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

RAW 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. & AMOTIZAT.	31	31

EX-FACTORY PRD. 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	1,780
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 PRD.COST	0	0	0	1,601	1,748
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	368	368	368	368	368
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. & AMOTIZAT.	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. & AMOTIZAT.	599	25	25	25	25
EX-FACTORY PRO. 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. & AMOTIZAT.	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
NIKONIA	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
AMH. 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
AMORTIZATION	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

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
DEPRECIATION	1,252	1,042	56	56	56
AMORTIZATION	87	51	0	0	0
DEPR. OF ISSUE COST	0	0	0	0	0
HAN 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)

PAGE = 4

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
AMOTIZATION	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 O.	156	50
ON BOND	0	0
ON SHORT TERM O	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

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

PAGE = 1

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
AMORTIZATION	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	455	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
AMORTIZATION	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	266
INTEREST ON BOND	0	0	0	0	0
INT. ON S-TERM DEBT	0	0	0	0	0
INCOME TAX PAYMENT	138	188	348	364	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
AMORTIZATION	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. CONTINGENCY	0	287	692	692	692
OTHER ASSETS	0	0	59	59	59
DEFERRED ASSETS	0	0	0	0	0
DEPREC. & AMOTIZ.	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
ACCOUNTS PAYABLE	0	0	0	0	0
INCOME TAX PAYABLE	0	0	0	0	0
CURRENT PORTION OF DEBT	0	0	0	0	0
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	-636	-590
DIVIDENDS PAYABLE	0	0	0	0	0
BEGINNING BALANCE	0	0	0	0	-636
RETAINED EARNINGS	0	0	0	-636	-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. CONTINGENCY	692	692	692	692	692
OTHER ASSETS	59	59	59	59	59
DEFERRED ASSETS	0	0	0	0	0
DEPREC. & AMOTIZ.	-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
ACCOUNTS PAYABLE	0	0	0	0	0
INCOME TAX PAYABLE	0	0	0	4	138
CURRENT PORTION OF DEBT	293	847	847	847	847
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 EARNINGS	-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)

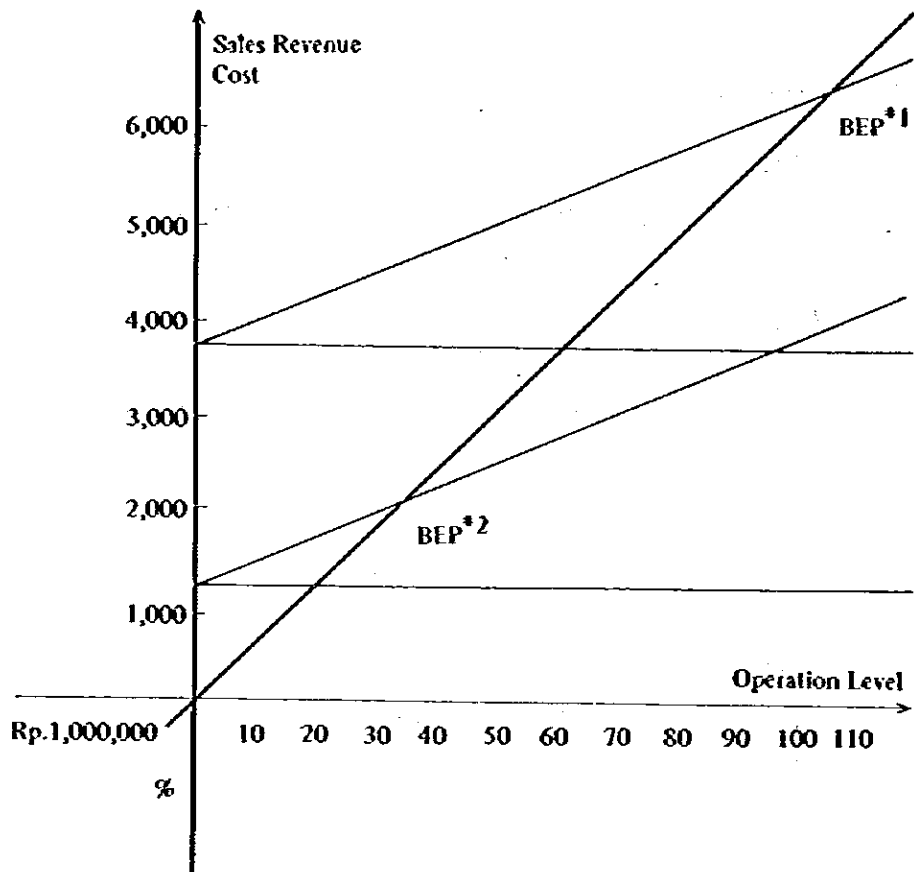
YEAR	1994	1995	1996	1997	1998
ASSETS	7,418	6,731	6,789	6,441	6,154
CURRENT ASSETS	6,931	7,337	7,451	7,159	6,929
CASH	6,473	6,878	6,992	6,701	6,470
ACCT. RECEIVABLE	0	0	0	0	0
PRODUCTS INVENTO.	226	226	226	226	226
MATERIALS INVENT.	232	232	232	232	232
FIXED ASSETS INV.	12,874	12,874	12,874	12,874	12,874
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. & AMOTIZ.	-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
ACCOUNTS PAYABLE	0	0	0	0	0
INCOME TAX PAYABLE	188	348	364	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	-662	-662	-662
BEGINNING BALANCE	-2,012	-2,012	-2,012	-1,623	-1,173
RETAINED EARNINGS	-2,012	-2,012	-1,623	-1,173	-662

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. CONTINGENCY	692	692
OTHER ASSETS	59	59
DEFERRED ASSETS	0	0
DEPREC. & AMOTIZ.	-13,705	-13,761
LIABILITY & EQUITY	5,928	6,051
LIABILITIES	1,569	1,062
CURRENT LIABILITY	1,569	1,062
ACCOUNTS 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 EARNINGS	-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	102.65
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	2024	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	34.20



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 DISCOUNT TAX	DISCOUNT RATIO	PRESENT VALUE INVEST.	PRESENT VALUE RETURN
1984	0	0	0	0	0	1.32695	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	0.42287	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	0.21160	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				33900		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 DISCOUNT 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	0.86226	0	1848
1988	0	-590	1637	1144	0	2192	0.77892	0	1705
1989	0	-223	1637	1144	0	2559	0.68628	0	1756
1990	0	-299	1637	1127	0	2465	0.60592	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	2227	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	458
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

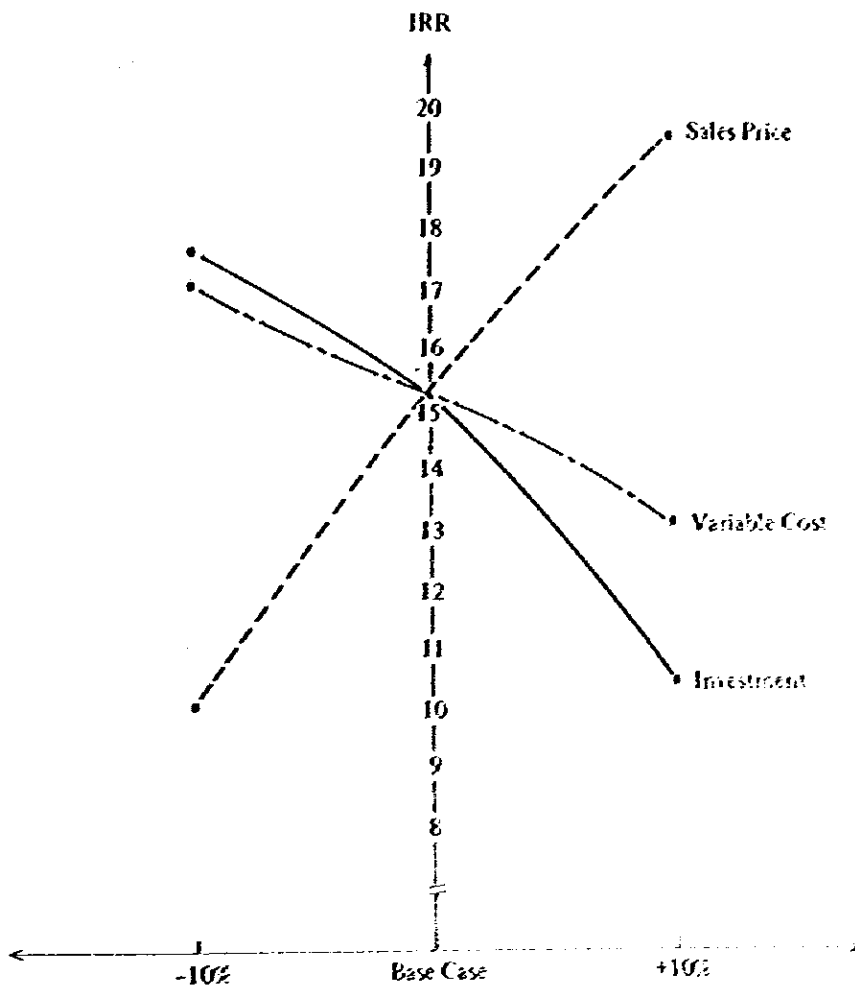
IRR CALCULATION TABLE INDONESIA SUGAR BY-PRODUCT INDUSTRY PROJECT
 RP. 1,000,000

IRR CALCULATION ON EQUITY (ROE AFTER TAX)

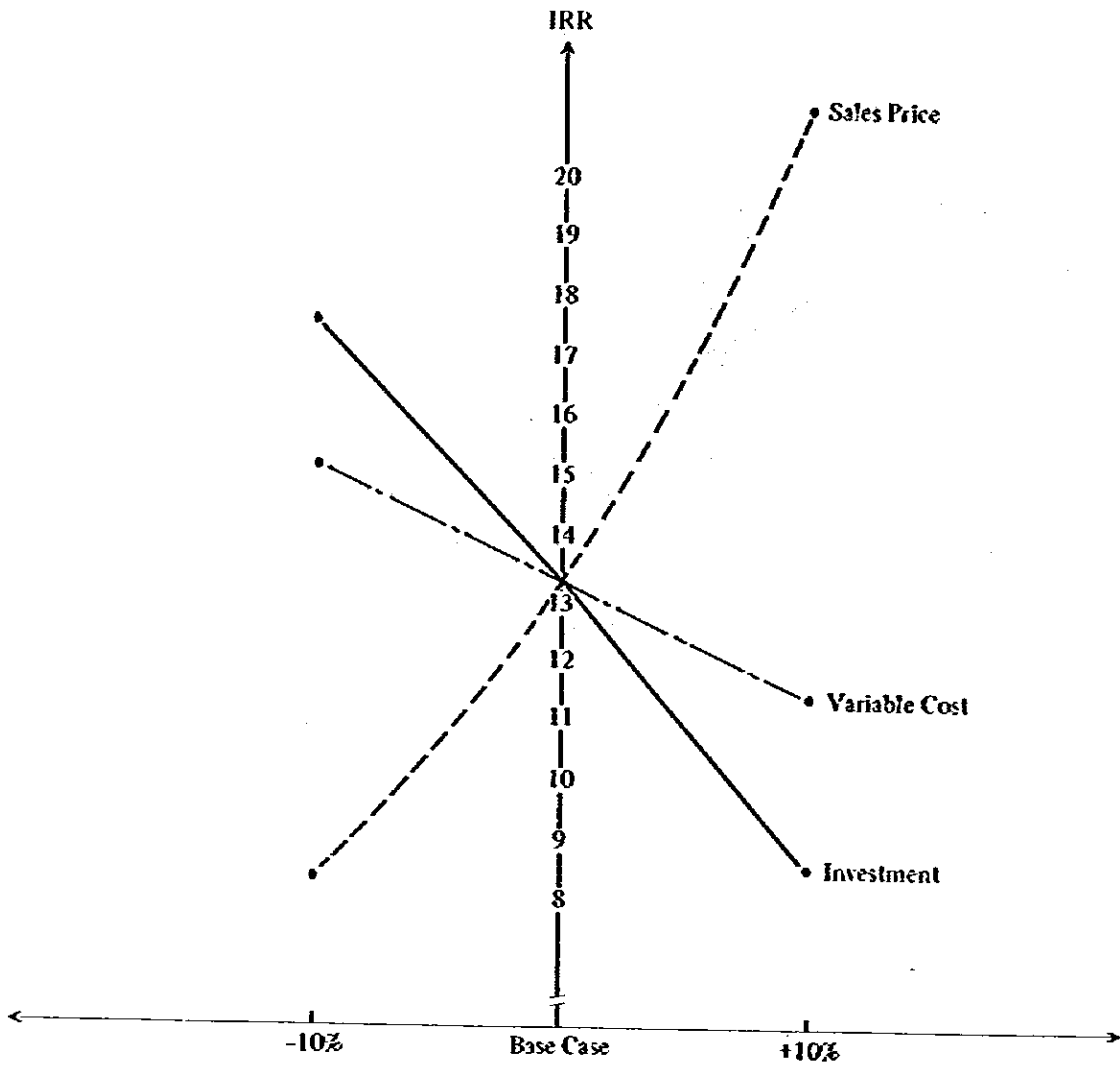
YEAR	TOTAL EQUITY	PROFIT AFTER TAX	DEPRECIATION	REPAYMENT OF DEBT	RETURN AFTER TAX	DISCOUNT RATIO	PRESENT VALUE INVEST.	PRESENT VALUE RETURN
1984	0	0	0	0	0	1.24139	0	0
1985	4150	0	0	0	0	1.11418	4958	0
1986	395	0	0	0	0	1.00000	395	0
1987	0	-686	1637	0	951	0.89752	0	854
1988	0	-590	1637	0	1047	0.80555	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	729	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**

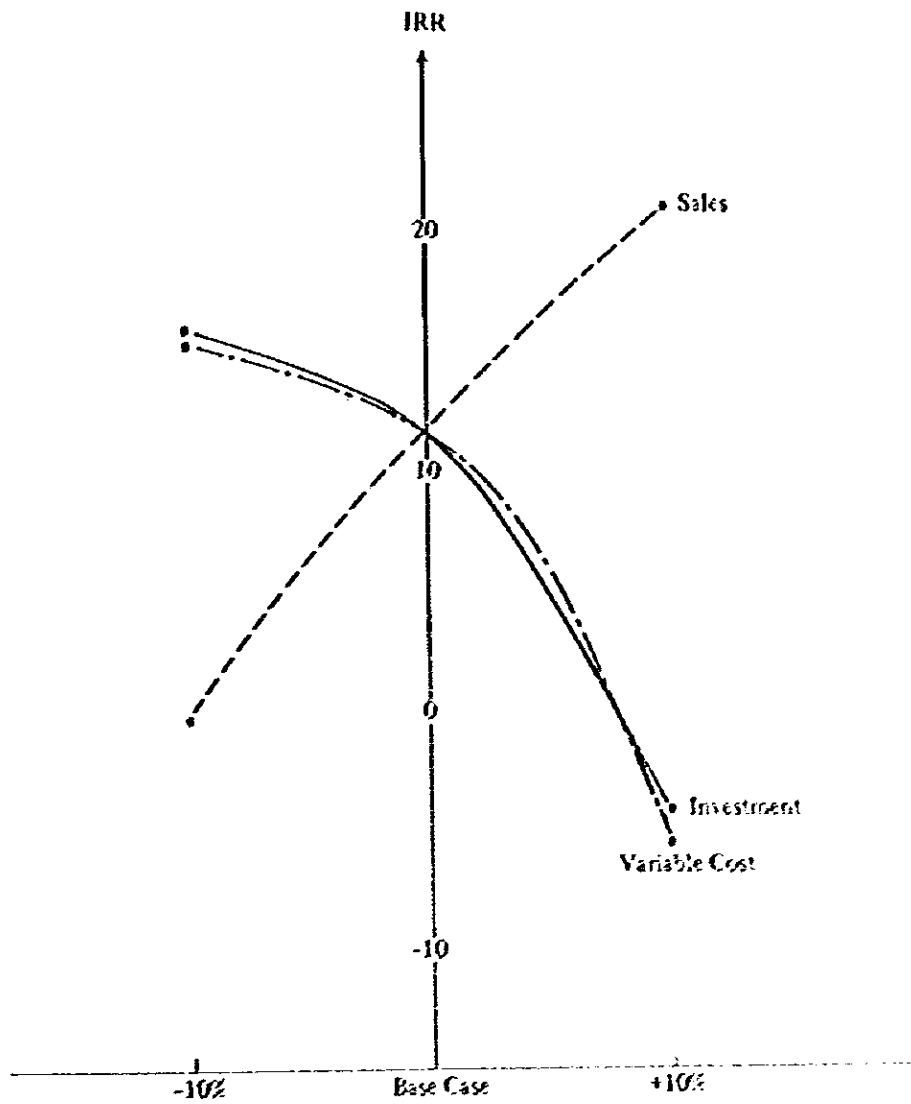
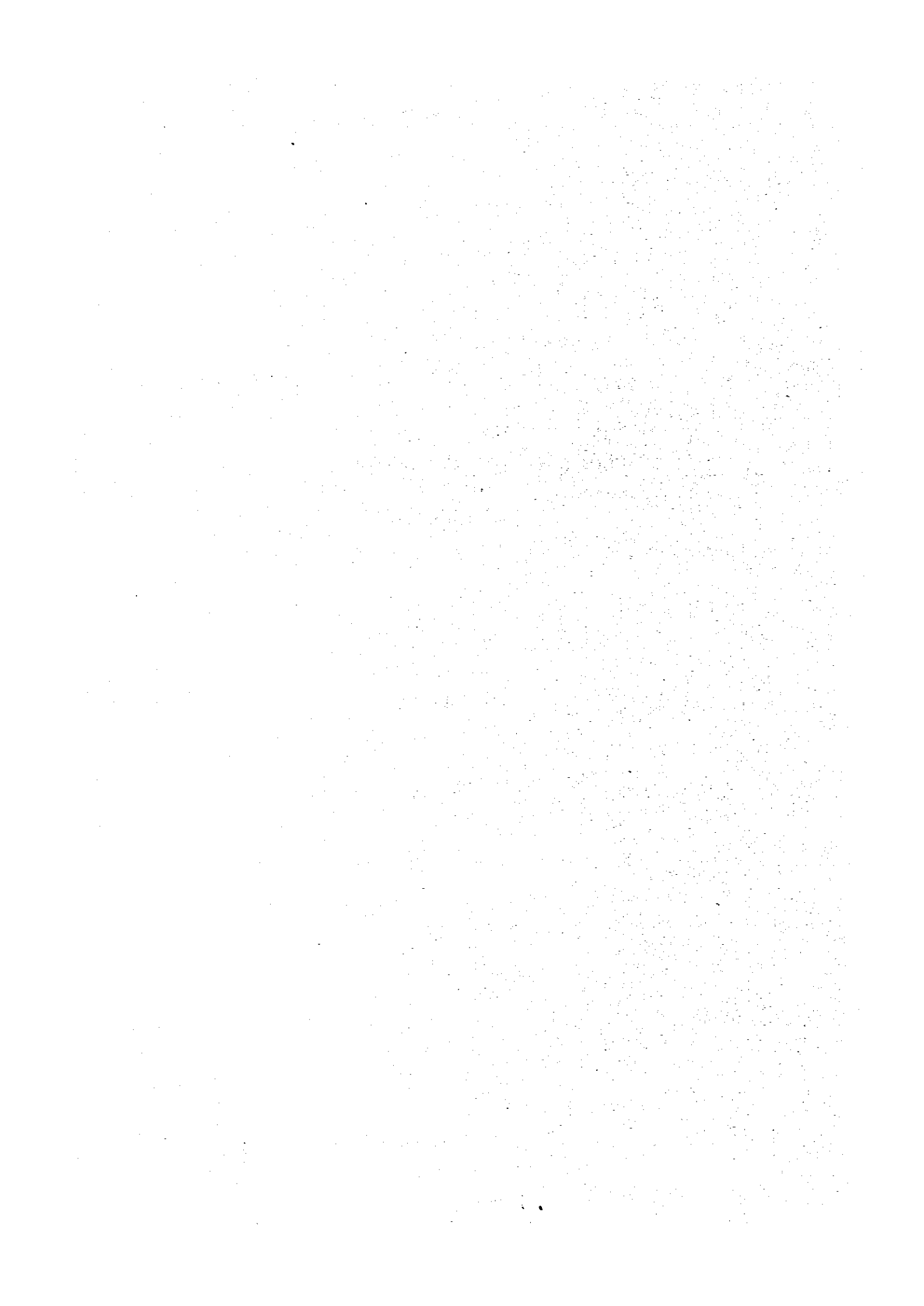


Fig. 9-4. Sensitivity Analysis
ROE After Tax

第10章 經濟評價



第10章 経済評価

本章では、本プロジェクトの経済評価が実施される。

10.1 経済的収益性

10.1.1 シャドウ・プライス

経済内部収益率を算出するため、各項目についてシャドウ・プライスを把握する必要がある。

1. アルコール販売価格

第10章の10-2の基本案の条件では、アルコールの価格は1982年12月現在のアルコールの販売価格は下記のProvenueのみを採用した。この理由は計書のPTPの財務上の収入がProvenueだけであり、Pajak, MPO, Iuran BKS, Kompensasは租税公課でありPTPの収入からは除外されるべきであるためである。

しかし、国民経済上からは、Pajak, MPO, Iuran BKS, Kompensasは集金の一部である。

従って経済内部収益率計算のためアルコールの1982年12月現在の販売価格は、1リットル当り303.45ルピアである。

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

2. 糖蜜の価格

砂糖増産計画を実行中のインドネシア政府は、砂糖きびの買取価格を高く維持することで砂糖きび生産農家を保護している。

このため、1982年12月の1トン当りの糖蜜価格は、国内市場価格のUS\$ 22

(Rp. 15,290)と比較して、国内統制価格は20,000ルピアと高い。この差額は、砂糖及び生産農家に対する政府の生産奨励金であり、国民経済上の観点からみると便益である。従って、経済内部収益率の算定では、1トン当りの糖蜜価格は、1982年12月現在の価格で15,290ルピア(1986年3月末価格で20,841ルピア)を採用する。

3. 人 件 費

インドネシアでは、1976年の就業人口が約4,730万人で、求職者数が約4,843万人となっており、現在労働者に支払われている賃金は労働奨励金を含んでいると考えられる。従って、経済内部収益率の算定には9-2の4)の人件費の85%を人件費のシャドー・プライスとする。

10.1.2 経済内部収益率(EIRR) Economic Internal Rate of Return

本プロジェクトの経済内部収益率は、Table 11-1に示されるように非常に高い。

EIRR: 23.44%

従って、本プロジェクトは国民経済的な見地からもフィージブルである。

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)

YEAS	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 経済効果および意義

本プロジェクトの経済効果及び意義について品目別に以下に述べる。

10.2.1 エタノール

このエタノール生産については、その特徴は、原単位の優位性にある。従来の設備・製法による場合の精蜜原単位は、アルコール1L1に對し4kgを必要としたが、今回の製法による場合は3.3kgを必要とするだけである。この設備でフル稼働して、年間15,120KLのアルコールを生産した場合には、10,584Tの精蜜が節約されることになり、精蜜価格を20,000 Rp 1 Tとして計算した場合212百万ルピアになる。

アルコールの場合、問題は市場性にあるが、1981年の輸入統計資料によると、ガソリン309千トン＝116百万USドルおよび、メタノール29,714トン＝11百万USドルの輸入実績が発生している。ガソリン、メタノールの単価は各々261ルピア/L、253ルピア/Lと算出される。メタノールの市況は、その後下落しているが、ここまでの比較では充分競争可能な原価となる。しかし、これら品目との置換には各々問題点を抱えている。ガソリンについては、BPPTで開発中のガソホルン計画の実現である。これが完成された場合には、5-2で述べたようにエタノールの市場性の問題は全く解決する。逆にエタノール生産能力の大幅な増強が必要となってくる。その場合にも、今回の設備は断定的に最も有利な方式となろうし、そのモデルケースとしての意義も増大する。メタノールについては、最近中国、カナダ、サウジアラビア等からの輸出が勢強しく、国家的に市況が暴落しているが、インドネシア国内についてみると、それ以上に大きな問題は税制にある。工業原料以外の目的に使われる場合エタノールには350ルピア/Lの物品税が賦課される。ながら依然265ルピア/Lに對し100%以上の物品税を賦課されては賦課税のメタノールに抗すべくもない。まして、そのメタノールたるや糖蜜産業の副産物とか輸入品が殆どである。副産物の場合は、価格はいくらかでも売れさえすれば良いとさえ考えられるし、輸入の場合、輸出する気になれば、稼働率向上の為には、多額多価さえカバーされれば良いとも考えられる。こうした同等条件といえない競争に、更に100%以上の物品税をエタノールだけに賦課されたのでは、たまったものではない。砂糖自給の為の増産を国策とし、そこから必然的に発生してくる糖蜜の、最大の消化策としてエタノールを採った場合、現在の税制は、不合理の一途につき、その改正を強く訴えていくべきである。改正がなされた場合には、まだ競争が可能となつてこよう。今回の方式によるエタノール設備の意義は、その為の強い力となるであろう。

10.2.2 コリネシン

コリネシンについてはその意義は、全く違ってくる。

採算面のみから捉えて見た場合には、コリネシンは、薦めることはできない。当面利益面で貢献できる見通しは立たない。しかし、このプロジェクトの持つ意義は大きい。1981年のクロラムフェニコールの輸入実績は、99,723Kg、約5百万USドルである。この数字は量としては、テトラサイクリンの182,123Kgに次いで第2位、金額ではテトラサイクリンの6.4百万US\$, ペニシリンの5.4百万USドルに次いで第3位である。当プロジェクトのコリネシン18,816Kg/年は、クロラムフェニコール換算で27,270Kg/年となり、年1.35百万US\$の外貨節約ということになる。

しかし、コリネシン生産の意義は、外貨節約より他にも採ることができる。

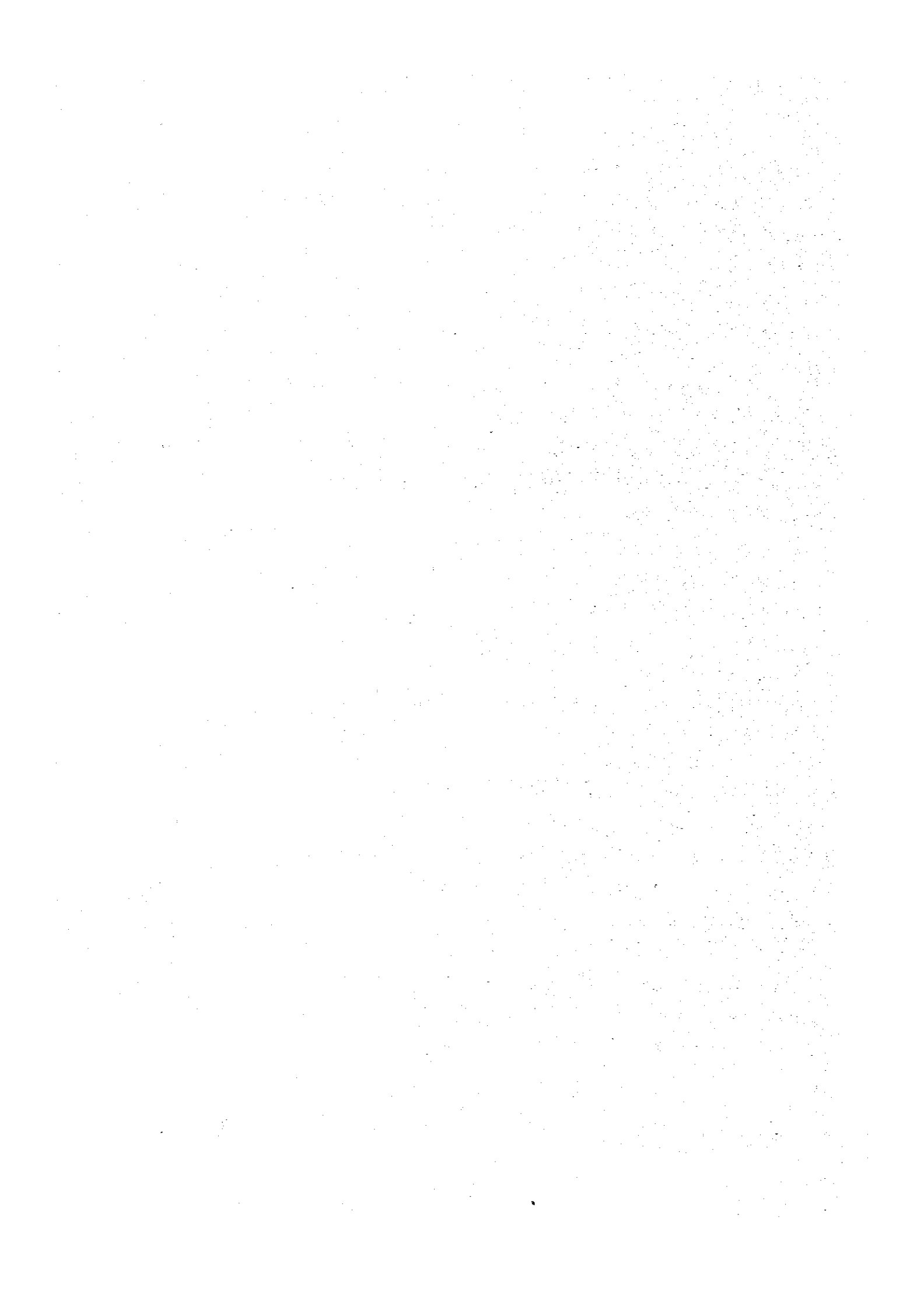
インドネシア政府は、WHOの説えるエッセンシャル・ドラッグの勧告にそい、国策として主要抗生物質、ビタミン剤、抗ヒスタミン剤、サルファ剤等の国産化の推進を図っている。しかし、国内市場の大きさからくる採算性の問題、技術的な問題等から、その実現は遅々として進まない。抗生物質についてみても、本格的な培養工程から完全に国産化されている品目は殆ど見つからない。

今回のコリネシンプラントは、恐らくインドネシアで初めての本格的抗生物質酸酵の設備となろう。ただ、PTPにはこれまで、医薬品原料製造・販売の経験がないことでもあるのでコリネシンからクロラムフェニコールへの簡単な変換工程は、国営インドファルマもしくはキミアファルマへ委ねるといった業界との協力体制を目図し、保健省のバックアップのもとに企業化の推進を図ることを薦めたい。因みにクロラムフェニコールの製造設備については、保健省の抗生物質国産化政策に沿うものであり、BKPMの82年投資優先順位表の中でも、第一優先順位に次ぐ位置にランクされている。

なおクロラムフェニコール原料のインドネシア国内の市場価格が把握できなかつたため、国際価格により財務計算を行なった。実際は、輸入の際の関税、通関料等で約40%程度の費用が上乗せされてくるものと思われるので、その分若干採算が好転するものと推測される。

コリネシンについては、もう少し採算の良いプロジェクトとする目算であったが、予定サイトで入手可能な用水の水温が28~30℃と高く多量の冷却水を必要とすることとなり、そのため用水費が異常に高くなり、採算が悪化したのは遺憾であった。今後、高温耐性菌の開発等システムの改良によって、原価の引き下げが図れるよう期待したい。又、そういった一つ一つの工程改良等の積み上げの努力が、高度な抗生物質酸酵の技術習得、向上の為の場として、このコリネシンプラントは、大きな意義を持つものと確信する。

附 錄



附 録 1

統計学的手法によるインドネシアの発酵工業製品の需要予測

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1. 発酵製品に係る需要予測

本調査で得られた発酵製品に係るデータを基にして短・中期需要予測を行う。データ収集に当って、本来は現在に至るまでの数十年のデータを基にして予測を行う方が良い結果を得ることができるが、十分の統計資料の入手が困難であったので、発酵製品の消費量からの需要予測を行うことが不可能であった。従って、本調査での分析は、入手可能であった発酵製品の輸入量など間接的な量を基にして予測期間を5年程度に設定して予測を行うものとする。しかし、数理的手法により求められた予測値の結果は、発酵産業に係るそれぞれの専門家の立場で検討された後、より明確な提案をするための基礎資料となるものである。

1.1 需要予測の目的と意義

発酵製品の原料である糖蜜の現在に至る迄の生産量、発酵製品の輸入量あるいは近い将来、発酵製品として参入が可能と思われる飼料用イーストの市場となるぶたや鶏の頭羽数、カンリソンの代替として利用が可能なエタノールの市場となるカンリソ消費量の変動関数を数理的手法により求めて分析する。その結果、いくつかの変動関数の中から、ある法則を見出し、近い将来の発酵製品の需要動向の想定と需要量の推定をすることは、糖蜜の有効利用と合わせて発酵産業の動向を知るために重要な問題であろう。このように現在に至る迄のデータを基にして傾向自線などの変動関数を求める分析手法を時系列分析と呼ぶ。

1.2 数理的手法による需要予測

需要予測を行う場合は、一般経済の状況、政府の政策、新製品開発や既存製品の新しい使用法から得られる新市場など、需要と供給に影響を及ぼす多くの要因を考慮しなければならない。しかし、需要と供給に影響を与える多くの要因は定性的なものである。従って、本分析で用いる数理的方法による需要予測では、計量可能な部分について行うものとする。

発酵製品に関する予測方法も他の製品の予測と同様に、いくつかの方法が考えられるが、本調査では、次に示す2通りの方法で予測を行う。ここで行う計量的分析は全て電子計算機で行った。

1.2.1 傾向線分析

何年間かの需要データに直線を当てはめると、中点は平均需要の推定値を与え、直線の勾配の系列が得られる。平均需要値は移動平均として知られている。一般的に期間は少なくとも5年間は必要であろう。勾配の推定の弊には使用した期間の長さ、需要データの変動性の

ため誤差を伴う。従って、得られた傾向線の信頼性を確認するために検定を行う必要がある。

発酵製品の過去数年間の需要あるいは輸入量が、個々の年では減少していても、全体では成長していることがある。この成長を傾向曲線や傾向直線により計量的に示す方法が傾向線分析である。傾向線分析を用いて短・中期的な予測を行う方法を考える。過去数年間の需要を示す時系列データに対してあてはめの良い曲線あるいは直線を描く方法である。予測は、あてはめの良い曲線あるいは直線を傾向線として後年に拡張して行う。本分析では、この傾向線を最小自乗法により求める。最小自乗法は、与えられた n 個の時系列データ (t_1, X_1) , (t_2, X_2) , \dots , (t_n, X_n) に対して、あてはめの良い方程式として次の式を考える。

$$X = (t, a_1, a_2, \dots, a_n) \quad (1)$$

式(1)において、 $S = \sum_{i=1}^n (X_i - x_i)^2$ で表わされる S (予測誤差) を最小にする係数 a_1 , a_2 , \dots , a_n を求めれば良い。ここで、 X_i は需要を示す時系列データであり、 x_i は方程式により推定された需要である。

本分析では以下に示す 12 通りの傾向線を上記の考え方に基づいて求める。その結果、 Y で示されたところの最もあてはめの良い式が傾向線として採用される。

$$\textcircled{1} \quad Y = A_1 + A_2 (t) \quad (2)$$

$$\textcircled{2} \quad Y = A_1 + A_2 \sqrt{t} \quad (3)$$

$$\textcircled{3} \quad Y = A_1 + A_2 \log (t) \quad (4)$$

$$\textcircled{4} \quad Y = A_1 + A_2 (1/t) \quad (5)$$

$$\textcircled{5} \quad Y = A_1 + A_2 (t) + A_3 (1/t) \quad (6)$$

$$\textcircled{6} \quad Y = A_1 + A_2 (t) + A_3 (t \times t) \quad (7)$$

$$\textcircled{7} \quad A \log (Y) = A_1 + A_2 (t) \quad (8)$$

$$\textcircled{8} \quad A \log (Y) = A_1 + A_2 (A \log (t)) \quad (9)$$

$$\textcircled{9} \quad A \log (Y) = A_1 + A_2 \sqrt{t} \quad (10)$$

$$\textcircled{10} \quad A \log (Y) = A_1 + A_2 (1/t) \quad (11)$$

$$(11) \quad A \log(Y) = A_1 + A_2 (A \log(t)) + A_3 (1/t) \quad (12)$$

$$(12) \quad A \log(Y) = A_1 + A_2 (A \log(t)) + A_3 (A \log(t) \times A \log(t)) \quad (13)$$

ここで、 A_1 、 A_2 、 A_3 は定数で、1年目は $t = 1$ である。 A_1 、 A_2 、 A_3 の値は式(1)で説明した最小自乗法で求める。

$A \log$ は常用対数を示す。特に式(2)の①は多項式として傾向直線式(7)の⑥は単純指数関数として傾向曲線に良く用いられる。

1.2.2 重回帰分析

重回帰分析による方法は、現在に至る迄の傾向を傾向分析だけで行うのではなく、発酵製品に関する需要あるいは輸入量が所得と価格あるいは他の要因の関数であると考えられる方法である。従って、単純な関係式で表わされた需要関数では需要の変動を説明するには不十分であり、多元的關係が必要となる。

そこで、需要関数は、需要がどのような要因によって、どのように決定されるかを表わすために用いられる経済学的概念である。このような経済学的概念に基づいて行なわれる分析の1つとして考えられるのが、重回帰分析である。重回帰分析は、1つの目的変数(従属変数)を最も良く説明するような複数個の説明変数(独立変数)との関係を1つの線形式で表わす方法である。例えば、目的変数 Y を需要量、説明変数 X_1 と説明変数 X_2 を用いた場合の線形式は以下のように示される。

$$Y = a + b X_1 + c X_2 \quad 96$$

ここで、式(14)における Y は、特定の1つの製品の需要量である。

ただし、 a は定数であり、 b と c は需要量 Y に影響を与える説明変数 X_1 と説明変数 X_2 の単位当りの変化を示す係数である。

本分析では、説明変数として、人口の他にインドネシア政府により毎年、発行されている Year Book of National Statistics の中の主な経済指標として示されている National Accounts と External Trade を用いることにする。

1.3 予測方法のフローチャートと検定の意味

1.2.1 節および 1.2.2 節で示した 2通りの方法で得られた発酵製品の需要に関するデータの分析を行う。その分析のフローチャートを図1に示す。

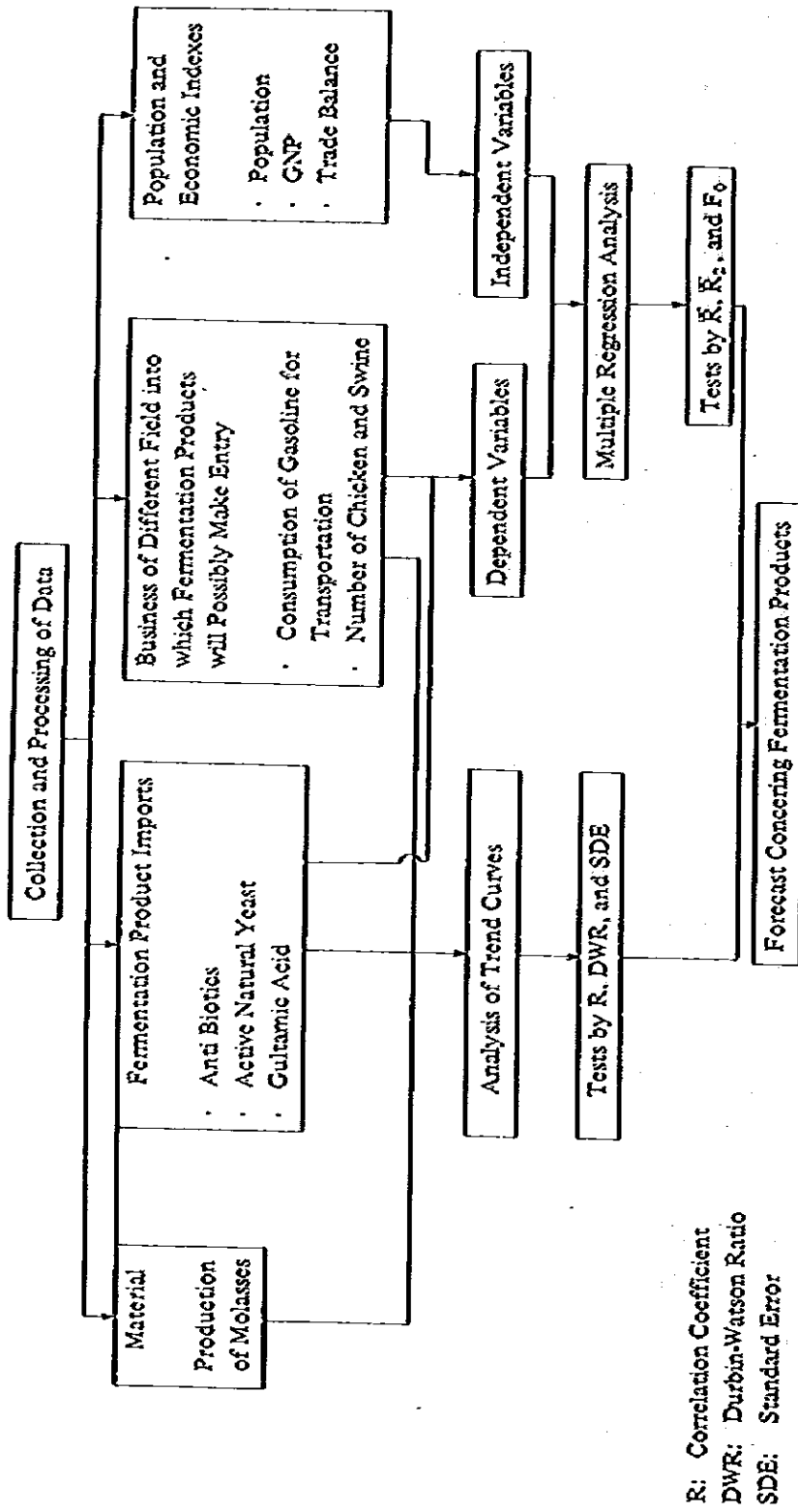


Fig. 1 Flow-Chart for the Method of Demand Forecast

図1において示された予測式の検定に用いられる言葉の定義は以下の通りである。

(a) 相 関 係 数 (R)

2つの変量X, Yが相互にどんな関連をもちつつ変動するかを知るために相関係数がある。つまり、予測式で推定された値と実績値とのあてはめの良さを判断する係数である。Rは $0 \leq R \leq 1$ であり、1に近い程よい。

(b) ダービン・ワトソン比 (DWR)

本分析で取り扱ったような時系列データに対しては、誤差の独立性を調べるためにダービン・ワトソン比の検定を行う必要がある。経済事象などでは誤差がお互いに独立でないことがあるために、ダービン・ワトソン比の検定が特に必要である。残差の間に相関がなければDWR値は2に近くなる。DWR値が2より大きいと負の相関があり、逆に、2より小さいと正の相関がある。

(c) 標 準 誤 差 (SDE)

実績値YとYの推定値 \hat{Y} との標準偏差で当てはまりが良い程、この値は小さくなる。

(d) 分 散 比 (F_o : F - observed)

分散比は分散分析表において求められる比として良く知られている。分散比F_oは、 $F_o = \text{回帰の不偏分散値} / \text{残差の不偏分散値}$ (残差 = 実績値 - 推定値)として求められる。

ここで、分散分析表におけるF検定は以下の通りである。

i) $F_o \geq F(k, n-k-1; 0.01)$ の場合は、有意水準1%で有意と判定する。この場合、F_oに**印をつけ、F_o**とする。

ii) $F(k, n-k-1; 0.01) < F_o < F(k, n-k-1; 0.05)$ の場合は、有意水準5%で有意と判定する。この場合、F_oに*印をつけ、F_o*とする。

ここで、kは説明変数の数、nはデータ数であり、n-k-1は自由度を示す。

(e) 重 相 関 係 数 (R)

目的変数と説明変数の間の関係が直線的であるかどうかを判断する係数であり、 $0 \leq R \leq 1$ の関係を有している。Rが1に近い程よい。

(f) 決定係数(\bar{R}^2)

回帰式により得られた推定値 \hat{Y} がいかに良く実績値に合うかを説明したかを示す係数である。

\bar{R}^2 は $0 \leq \bar{R}^2 \leq 1$ の関係を有し、1に近い程式のあてはめがよい。

1.4 傾向線分析の計算機出力例

重回帰分析の計算機出力例はやや複雑なため例示しない。ここでは傾向線分析で示した12通りの方法の出力例を示す。図2は12通りの傾向線と検定に必要なパラメータを示している。図3は実績値と12通りの傾向線により求められた推定値および予測値を示している。

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

MULTIPLE REGRESSION ANALYSIS (NO.1)

DEPENDENT VARIABLE 1
SAMPLE SIZE 7

PROBLEM	A1 (")	REGRESSION COEFFICIENT 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	0.21214399E+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	0.27599492E-01	0.39044724E+02	1.52405
8	0.54913635E+01 (346.277)	0.29423523E+00 (11.064)		0.980288	0.19974971E-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)	-0.27400208E+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)	0.23364238E+00 (1.554)	0.70800781E-01 (0.420)	0.959345	0.30943312E-01	0.23107574E+02	2.38317

(**)
Y=A1+A2*T
Y=A1+A2=SQRT (T)
Y=A1+A2=ALOG (T)
Y=A1+A2=1/T
Y=A1+A2=T+A3=1/T
Y=A1+A2=T+A3*(T*T)
ALOG(Y)=A1+A2*T
ALOG(Y)=A1+A2=SQRT (T)
ALOG(Y)=A1+A2=SQRT (T)
ALOG(Y)=A1+A2=1/T
ALOG(Y)=A1+A2=ALOG (T)+A3=1/T
ALOG(Y)=A1+A2=ALOG (T)+A3*(ALOG (T))*ALOG (T))

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

※ 12通りの予測式に対応する係数

(**) それぞれの予測式の係数に対する標準誤差を示す。本分析では、予測式の検定として用いない。

(***) 本分析では、F検定を予測式の検定として用いない。

(****) 12通りの予測式を示す。例えば、蜂蜜生産の予測式は $DWR = 2.078$, $R = 0.972$ が他の式と比較した場合には、あてはめが良いことが分かる。従って(1)式を採用する。よって、傾向線は $Y = 291.336 + 40.02301$ となる。

*****PRODUCTION OF MOLASSES(NOT INCLUDING PLAINING,BOTH SECTOR)*****

SEN	Y	ACTUA Y (%)	(1)	(X-%)	(2)	(3)	(4)	(5)	(6)
1	1	0.31348200E+06	0.31404000E+06	0.29709000E+06	0.28911094E+06	0.28911094E+06	0.28911094E+06	0.28911094E+06	0.28911094E+06
2	2	0.37843700E+06	0.37552569E+06	0.38579175E+06	0.41756294E+06	0.41756294E+06	0.41756294E+06	0.41756294E+06	0.41756294E+06
3	3	0.42476200E+06	0.42272519E+06	0.43680949E+06	0.46111362E+06	0.46111362E+06	0.46111362E+06	0.46111362E+06	0.46111362E+06
4	4	0.47026200E+06	0.46250400E+06	0.47249250E+06	0.48288894E+06	0.48288894E+06	0.48288894E+06	0.48288894E+06	0.48288894E+06
5	5	0.49129400E+06	0.49143100E+06	0.49292570E+06	0.50089325E+06	0.50089325E+06	0.49595412E+06	0.49489825E+06	0.49489825E+06
6	6	0.49382400E+06	0.52147400E+06	0.52923107E+06	0.54281075E+06	0.54281075E+06	0.50466425E+06	0.52911066E+06	0.52911066E+06
7	7	0.56792700E+06	0.57149700E+06	0.538375E+06	0.54281075E+06	0.54281075E+06	0.51088181E+06	0.56307981E+06	0.56307981E+06
8	8	0.61154000E+06	0.58549562E+06	0.55919519E+06	0.5555194E+06	0.5555194E+06	0.51555194E+06	0.59665437E+06	0.59665437E+06
9	9	0.65154000E+06	0.61096800E+06	0.57928806E+06	0.51918112E+06	0.51918112E+06	0.51918112E+06	0.62997957E+06	0.62997957E+06
10	10	0.69156000E+06	0.65506032E+06	0.63730694E+06	0.52208450E+06	0.52208450E+06	0.52208450E+06	0.66312481E+06	0.66312481E+06
11	11	0.72158900E+06	0.65797535E+06	0.69922869E+06	0.52446000E+06	0.52446000E+06	0.52446000E+06	0.69815255E+06	0.69815255E+06
12	12	0.77161200E+06	0.67987037E+06	0.69922869E+06	0.52643956E+06	0.52643956E+06	0.52643956E+06	0.72908137E+06	0.72908137E+06
13	13	0.81163500E+06	0.70087062E+06	0.61992450E+06	0.52811462E+06	0.52811462E+06	0.52811462E+06	0.76193925E+06	0.76193925E+06
14	14	0.85165800E+06	0.7210775E+06	0.62919425E+06	0.52955037E+06	0.52955037E+06	0.52955037E+06	0.79473556E+06	0.79473556E+06
15	15	0.89168100E+06	0.74057450E+06	0.63782394E+06	0.53079462E+06	0.53079462E+06	0.53079462E+06	0.82748481E+06	0.82748481E+06
16	16	0.93170400E+06	0.75943206E+06	0.6458964E+06	0.53188344E+06	0.53188344E+06	0.53188344E+06	0.86019869E+06	0.86019869E+06
17	17	0.97172700E+06	0.77770875E+06	0.65348012E+06	0.53288406E+06	0.53288406E+06	0.53288406E+06	0.89288169E+06	0.89288169E+06
18	18	0.99990306E+06	0.7138906E+06	0.60336287E+06	0.51787437E+06	0.51787437E+06	0.51787437E+06	0.58066202E+06	0.58066202E+06
19	19	0.70128850E+06	0.59174335E+06	0.64221169E+06	0.52243225E+06	0.52243225E+06	0.52243225E+06	0.60397269E+06	0.60397269E+06
20	20	0.76836250E+06	0.61037650E+06	0.67912425E+06	0.52610706E+06	0.52610706E+06	0.52610706E+06	0.62576262E+06	0.62576262E+06
21	21	0.4422925E+06	0.62775619E+06	0.71619925E+06	0.52913331E+06	0.52913331E+06	0.52913331E+06	0.6423212E+06	0.6423212E+06
22	22	0.2309050E+06	0.6440131E+06	0.75351581E+06	0.53366894E+06	0.53366894E+06	0.53366894E+06	0.65565212E+06	0.65565212E+06
23	23	0.10116419E+07	0.65936244E+06	0.79212975E+06	0.53582381E+06	0.53582381E+06	0.53582381E+06	0.68391019E+06	0.68391019E+06
24	24	0.1108680E+07	0.6738906E+06	0.82909606E+06	0.5367681E+06	0.5367681E+06	0.5367681E+06	0.70138706E+06	0.70138706E+06
25	25	0.12150440E+07	0.68771737E+06	0.86745456E+06	0.53728837E+06	0.53728837E+06	0.53728837E+06	0.71809062E+06	0.71809062E+06
26	26	0.13316020E+07	0.70090206E+06	0.90624348E+06	0.53870369E+06	0.53870369E+06	0.53870369E+06	0.73410462E+06	0.73410462E+06
27	27	0.14593410E+07	0.72331495E+06	0.94548900E+06	0.53995451E+06	0.53995451E+06	0.53995451E+06	0.74949150E+06	0.74949150E+06

(*) Actual values of production of molasses

(**) Estimates obtained through equation (1). Here, t=1 in 1976. Therefore, NEX=0 is the estimate (61,152 tons) in 1983.

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

2. 傾向線分析による糖蜜の生産量および発酵製品の輸入量と参入可能な分野の予測

1で示した傾向線を求めて後年の推定を行う方法により糖蜜、発酵製品の輸入量、輸送用機器に対するガソリンの消費量、ぶたと鶏の頭羽数の1986年度までの予測を行う。

2.1 糖蜜の生産量の予測

糖蜜は発酵製品の原料であるので、原料の生産量の予測をしておくことは将来の原料供給と発酵製品の製造についての基礎資料となり得る。インドネシアにおける糖蜜の生産は民営と官営とがある。ここで両者の生産量を別々に予測すると共に両者の生産量の合計値に対しても予測を行う。更に、ここでは生産実績値について分析を行うものとする。

採用された傾向線は以下の通りである。

(1) 民営の生産量

$$PM_1 = 256378.0 + 28666.3 t \quad 09$$

$$DWR = 2.0456 \quad R = 0.9455 \quad SDE = 23369.03$$

ただし、1976年を $t = 1$ とする。

(2) 官営の生産量

$$PM_2 = 34995.5 + 11350.4 t \quad 00$$

$$DWR = 1.5062 \quad R = 0.8934 \quad SDE = 13506.91$$

ただし、1976年を $t = 1$ とする。

(3) 民営と官営の合計生産量

$$PMT = 291336.0 + 40023.0 t \quad 00$$

$$DWR = 2.0782 \quad R = 0.9724 \quad SDE = 22741.11$$

ただし、1976年を $t = 1$ とする。

予測結果は表1、図4に示す。

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	285.044	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	389.436	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: PTP

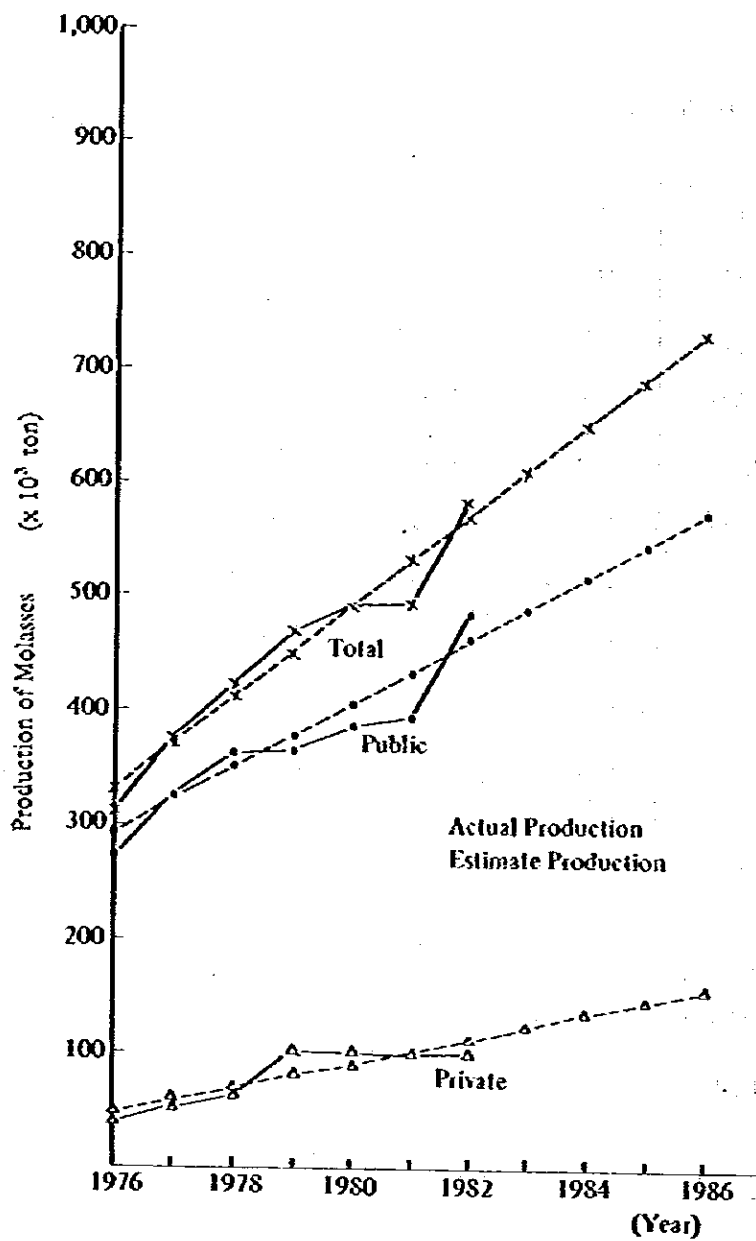


Fig. 4. Estimate of the Production of Molasses

2.2 発酵製品の輸入量の予測

輸入された発酵製品の中で統計資料が入手可能であった製品および本調査で近い将来、有望と思われる製品について予測を行う。

採用された傾向線は以下の通りである。

(1) ACTIVE NATURAL YEAST

① 輸入重量(TON)の予測

$$YET = 1067.3 + 239.3t \quad 03$$

$$DWR = 1.3219 \quad R = 0.9042 \quad SDE = 236.37$$

② 輸入額(US\$)の予測

$$YES = 117.1 + 101.4t \quad 03$$

$$DWR = 2.1272 \quad R = 0.8479 \quad SDE = 150.12$$

ただし、1975年を $t=1$ とする。

(2) 抗生物質

① 輸入重量(TON)の予測

$$YAT = 117.1 + 101.4t \quad 24$$

$$DWR = 2.1272 \quad R = 0.8479 \quad SDE = 150.12$$

② 輸入額(US\$)の予測

$$YAS = 3824.9 + 4949.7t \quad 24$$

$$DWR = 1.2345 \quad R = 0.9613 \quad SDE = 3358.51$$

ただし、1975年を $t=1$ とする。

(3) グルタミン酸

① 輸入重量(TON)の予測

$$YGT = 2686.91 - 766.47t + 115.31(t^2) \quad 24$$

$$DWR = 2.5469 \quad R = 0.7180 \quad SDE = 650.48$$

② 輸入額(US\$)の予測

$$YGS = -2791 + 915.97(t) + 4813.28(1/t) \quad 24$$

$$DWR = 1.9906 \quad R = 0.8140 \quad SDE = 912.23$$

ただし、1975年を $t=1$ とする。

ACTIVE NATURAL YEASTの予測結果は表2、図5、抗生物質の予測結果は表3、図5そしてグルタミン酸の予測結果は表4、図6にそれぞれを示す。

Table 2: Estimate of Active Natural Yeast (Imports)

Year	Active Natural Yeast (Unit: Ton)		Active Natural Yeast (Unit: US\$X10 ⁵)	
	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

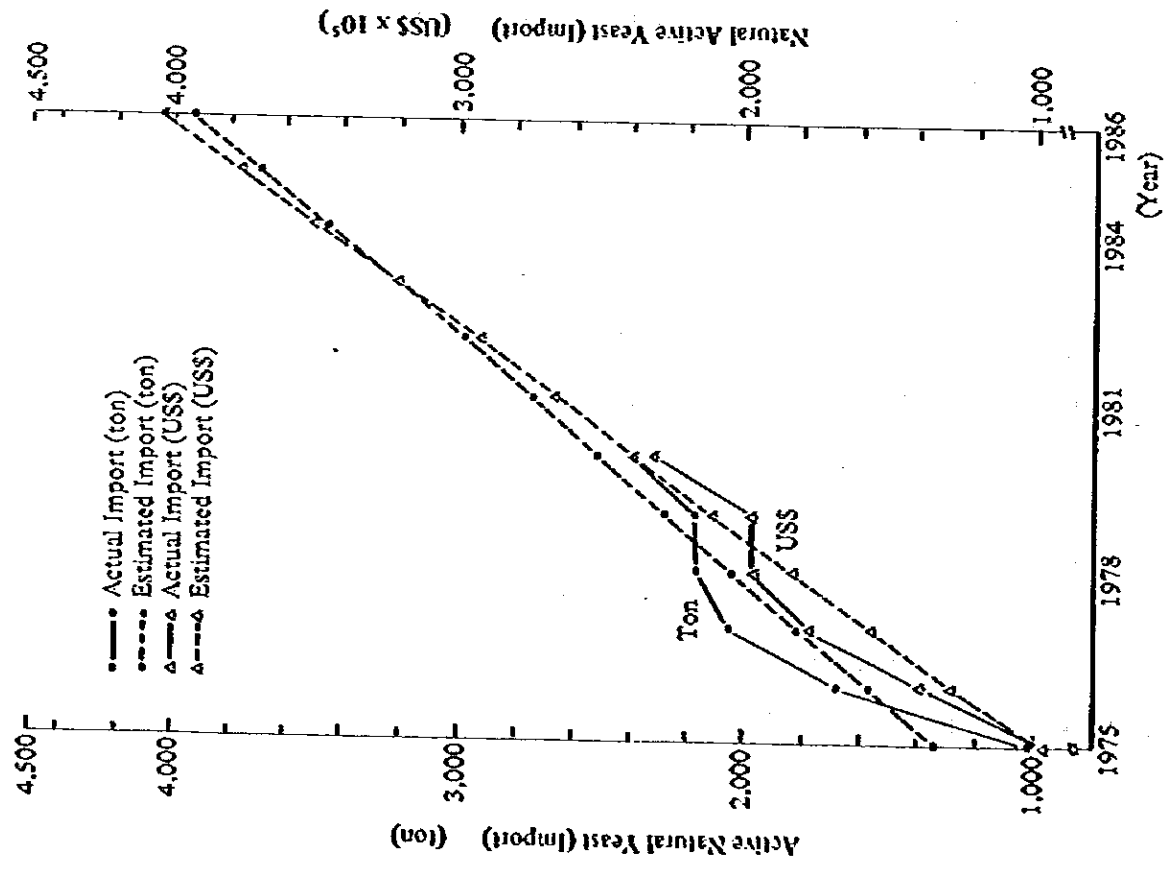


Fig. 5. Forecast of Active Natural Yeast (Imports)

Table 3. Estimate of Antibiotics (Imports)

Year	Antibiotics (Unit: Ton)		Antibiotics (Unit: US\$X10 ³)	
	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	556.2	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		53,522.1
1985		1,233.0		58,271.8
1986		1,334.4		63,221.5

A: Actual Import
 E: Estimated Import
 Data Source: BTN

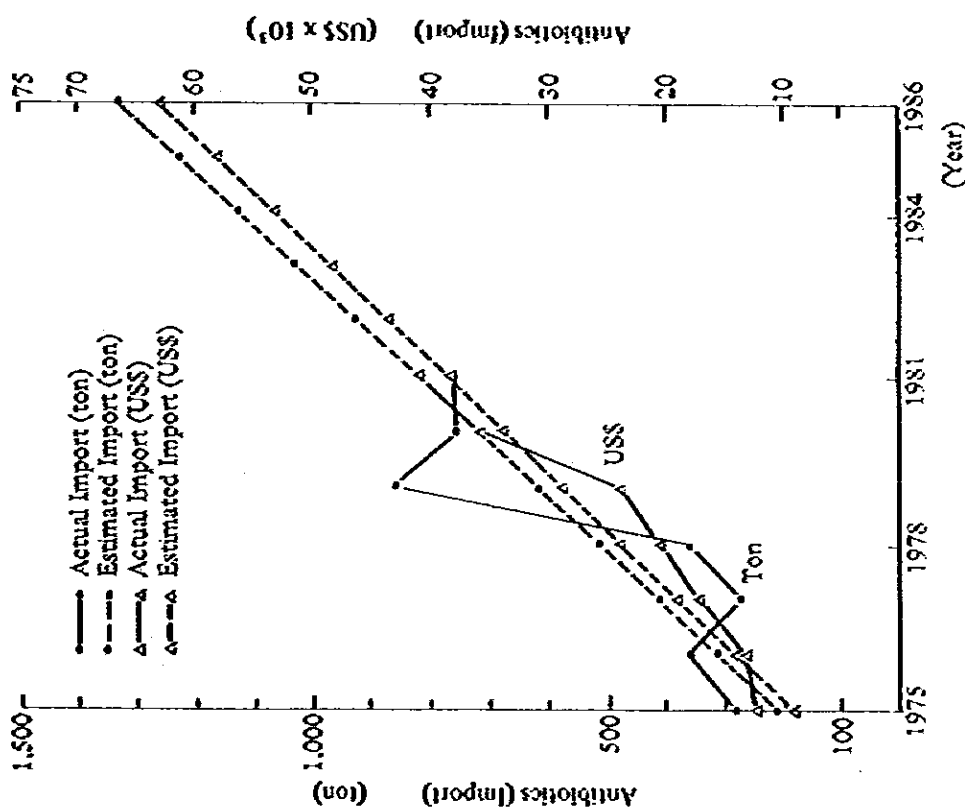


Fig. 6. Estimate of Antibiotics (Imports)

Table 4. Estimate of Gultarnic Acid (Imports)

Year	Gultarnic Acid (Unit: Ton)		Gultarnic Acid (Unit: US\$X10 ³)	
	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

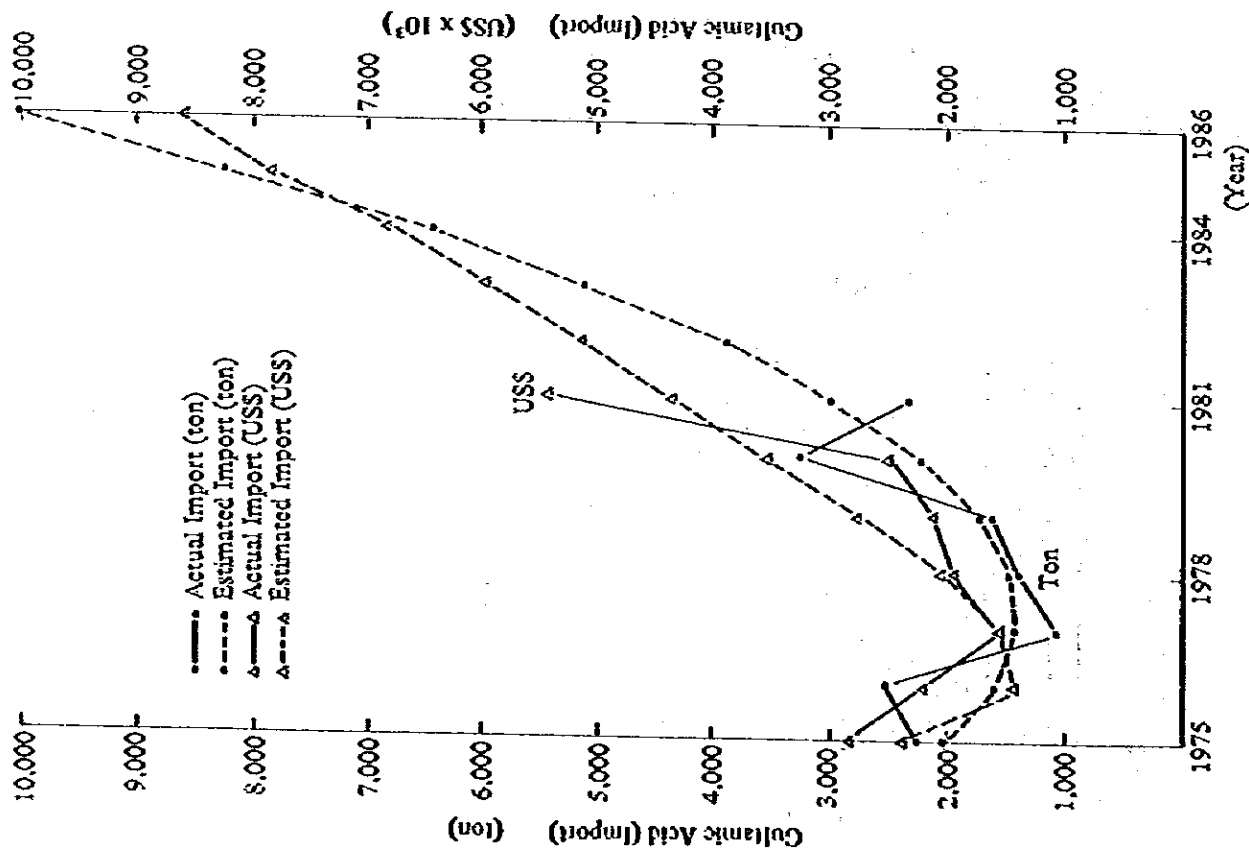


Fig. 7. Estimate of Gultarnic Acid (Imports)

2.3 参入可能な分野の予測

発酵製品が近い将来に参入可能な分野として2つの分野を考慮する。第1は、輸送用機器に対するガソリンにエタノールを混入する場合としてガソリンの消費量の予測を行う。第2は、ぶたと鶏の頭羽数の予測を行い、飼料用イーストの予測に関連づけるものである。

しかし、ガソリンへのエタノールの混入割合やぶたと鶏の飼料に何%のイーストを混ぜるかは、それぞれの専門家の知見を得た上で判断するものであり、ここでは発酵製品に換算した場合の具体的な量を示さないものとする。

採用された傾向線は以下の通りである。

(1) 輸送用機器によるガソリンの消費量(LITRE)

$$YQS = 1916.19 - 143.69 t + 33.4899 t^2 \quad \text{㉔}$$

$$DWR = 2.6491 \quad R = 0.9882 \quad SDE = 308.76$$

ただし、1963年を $t=1$ とする。

(2) ぶたと鶏の頭羽数

① ぶたの頭数

$$YS = 2581.21 + 635.66 \log(t) \quad \text{㉕}$$

$$DWR = 2.0218 \quad R = 0.8523 \quad SDE = 130.30$$

② 鶏の羽数

$$YC = 79081 + 3451 t + 276.38 t^2 \quad \text{㉖}$$

$$DWR = 1.8225 \quad R = 0.9882 \quad SDE = 2332.27$$

ただし、1973年を $t=1$ とする。

輸送用機器によるガソリンの消費量の予測結果は表5、図8に、ぶたと鶏の頭羽数の予測結果は表6、図9にそれぞれ示す。

**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:

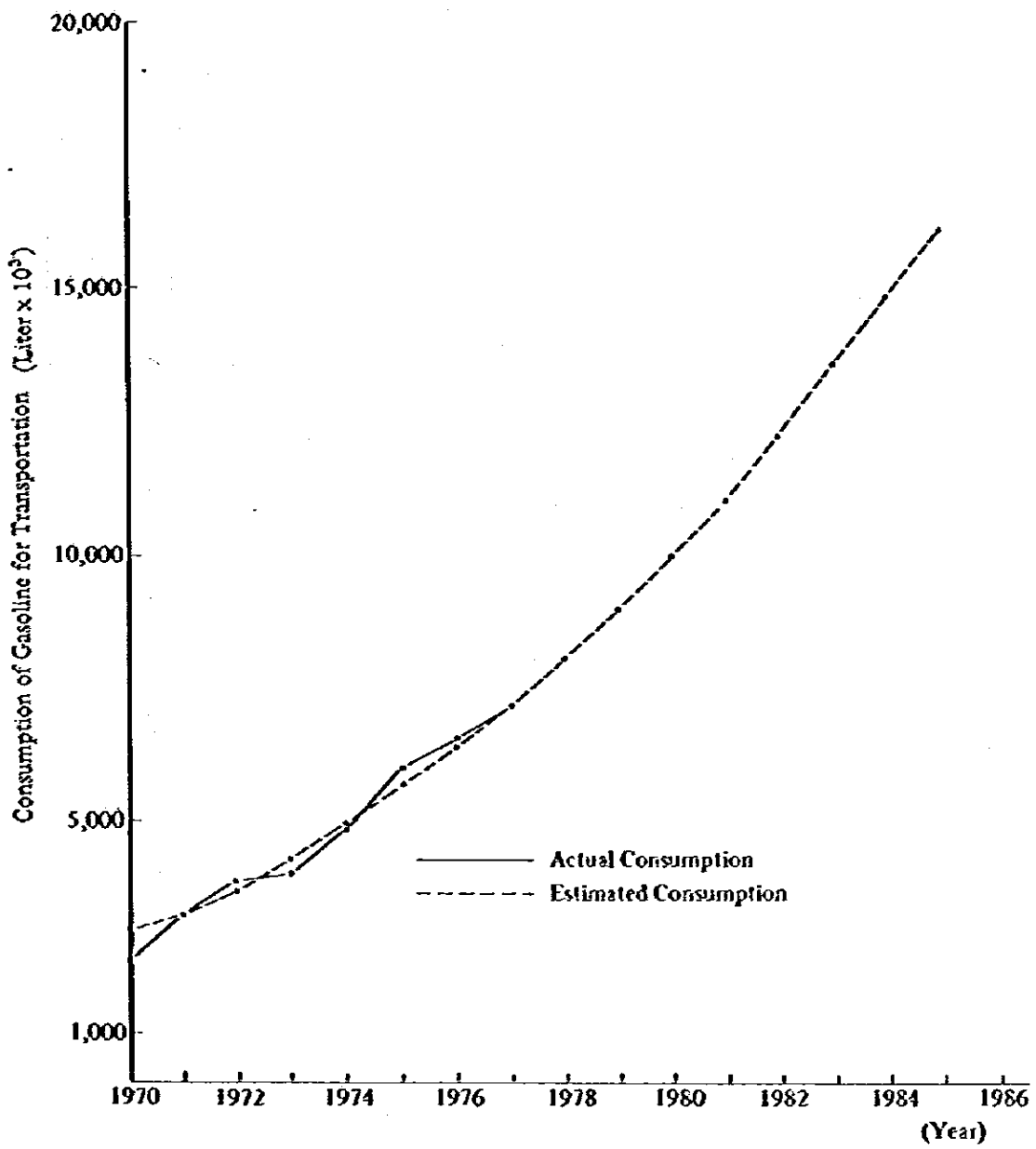


Figure 8. Forecasts of the Consumption of Gasoline for Transportation

Table 6. Estimate of the Number of Chicken and Swine

(Unit: X 10³)

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

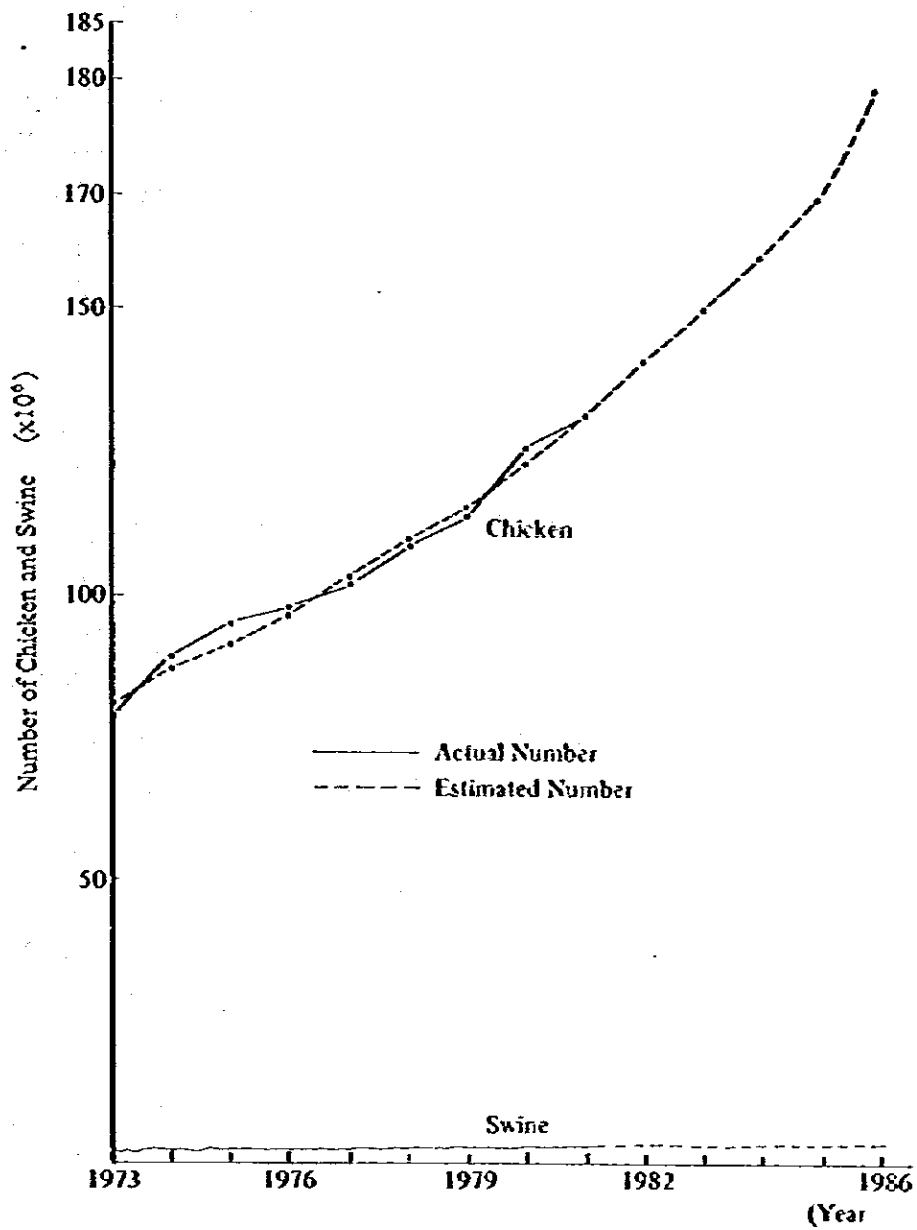


Figure 9. Forecasts of the Numbers of Chicken and Swine

3. 重回帰分析による発酵製品の輸入量と 発酵製品として参入が可能な分野の予測

本章では、1.2.2節で概説された重回帰分析を用いて、発酵製品の需要が社会的あるいは経済的要因により影響を受けるものとして予測を行う。従って、発酵製品の輸入量、輸送用機器によるガソリンの消費量、ぶたと鶏の頭羽数が目的変数となり、目的変数に影響を与える要因が説明変数となる。

3.1 説明変数に用いられた変数

本分析では、次に示す3つの要因を説明変数とする。

X_1 : 人口 (単位 ; 1000人)

X_2 : GNP (Gross National Products.) (単位 ; Rp . Bn)

X_3 : Trade Balance (単位 ; Rp . Mn)

ここで、3つの説明変数の変動を把握するために、1972年から1980年または1981年までの変動を図示しておく。表7と図10は人口の推移を示す。表8と図11はNational Accountsを示す。本分析では、National Accountsの中のGNPを説明変数とする。表9と図12はExternal Tradeを示す。本分析では、External Tradeの中のTrade Balanceを説明変数とする。

従って、1つの目的変数(例えば、抗生物質の輸入量)に対して、違った説明変数(X_1 ; 人口, X_2 ; GNP, X_3 ; Trade Balance)を持つ3通りの回帰式、つまり、 $Y = A + BX_1$, $Y = A + BX_2$, $Y = A + BX_3$ が求められる。その結果、3通りの回帰式が検定で有意と判断された場合、3通りの回帰式より得られた推定値の間には差異がある。この問題については、3通りの回帰式の内、どの回帰式が最も良い推定値を与えているかは専門家の判断が必要であろう。本章においては、3通りの回帰式により求められる推定値を全て示す。更に、検定で有意と判断された回帰式については考察を行う。

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

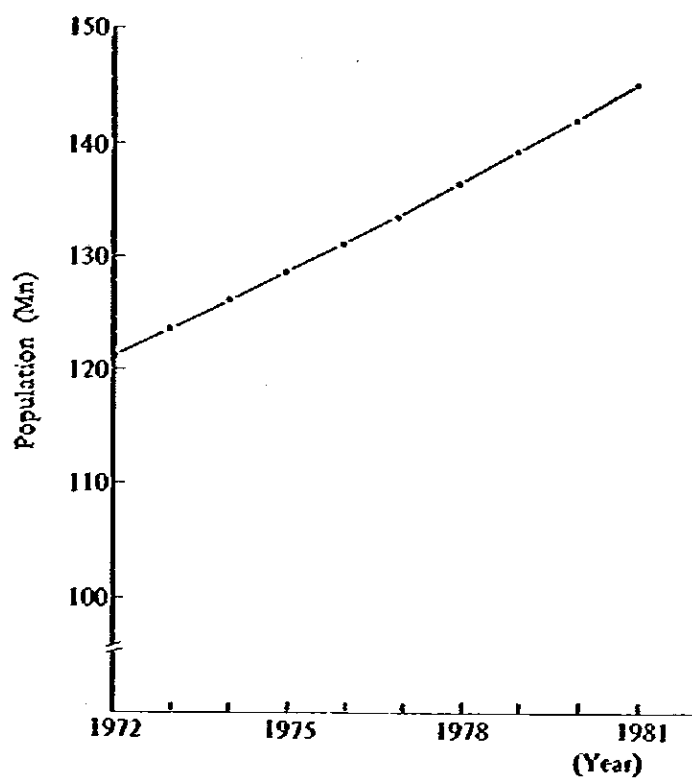


Fig. 10. Population Trend

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

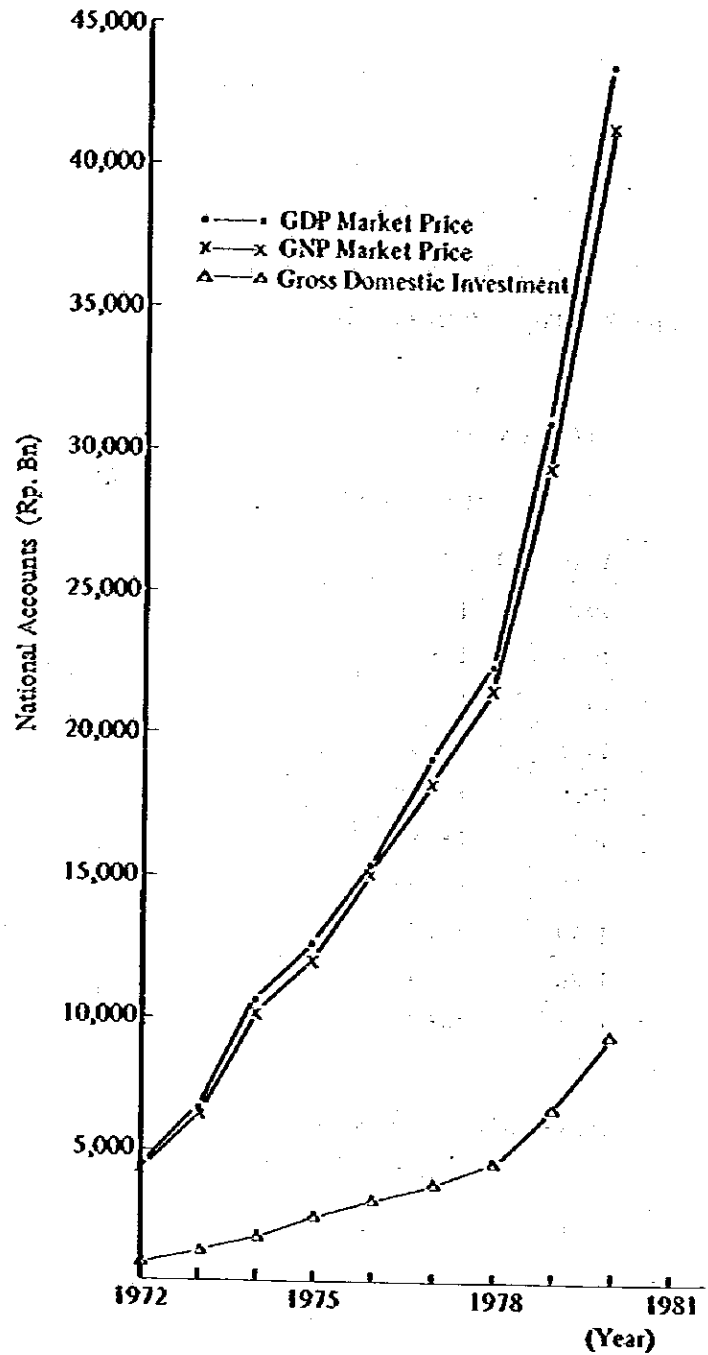


Fig. 11. Trend of National Accounts

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

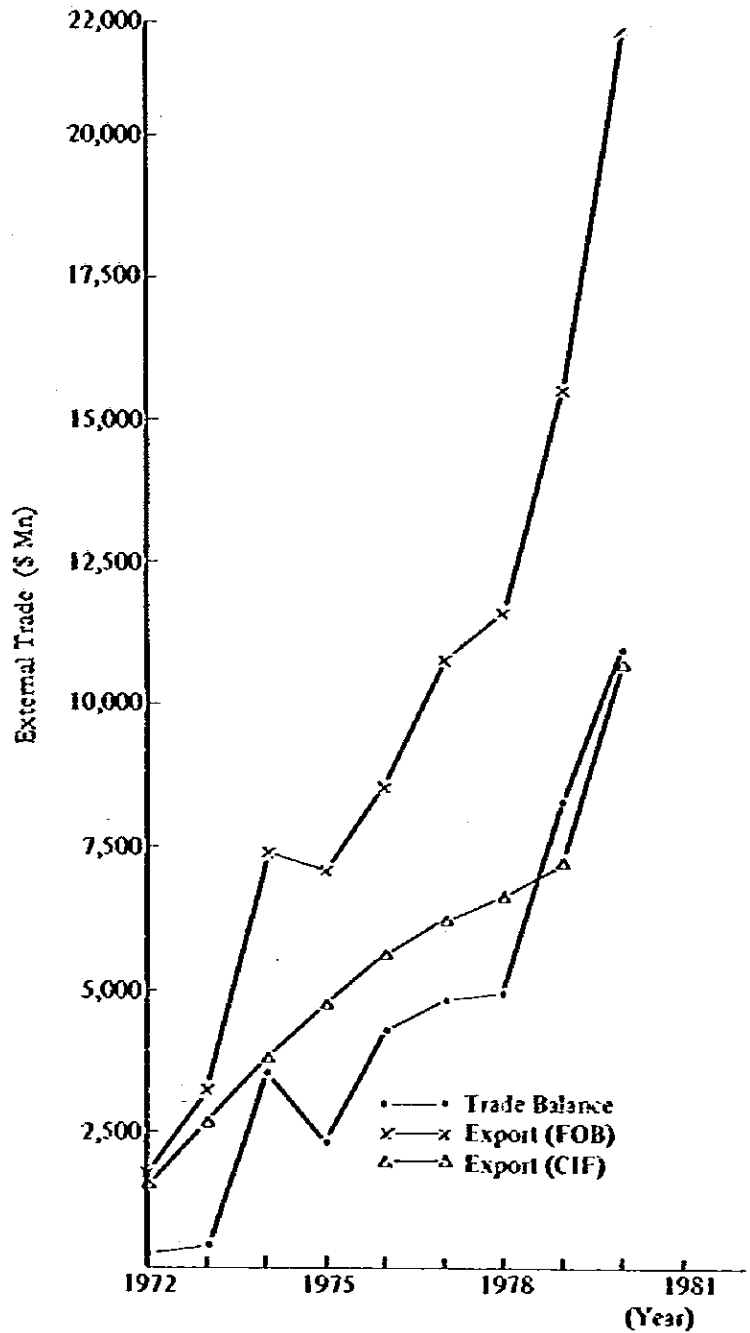


Fig. 12. External Trade Trend

3.2 回帰式の検定方法

輸入された発酵製品の予測を重回帰分析により行う。それぞれの説明変数 (X_1, X_2, X_3) を用いて分析した結果を示す。つまり、

$$Y = A + B X_1 \cdots \cdots \text{人口を説明変数とした場合} \quad (a)$$

$$Y = A + B X_2 \cdots \cdots \text{GNPを説明変数とした場合} \quad (b)$$

$$Y = A + B X_3 \cdots \cdots \text{Trade Balanceを説明変数とした場合} \quad (c)$$

の3通りの回帰式を同一の目的変数 (Y) に対して推定する。

ここで、F検定において F_0^* 印は5%で有意、 F_0^{**} 印は1%で高度に有意であることは既に1.3節で述べた。本分析では、 n (データの数) = 5, k (変数の数) = 1である。つまり、求められた回帰式の1%および5%における検定で有意義と認められるためには、以下に示すF値を満足しなければならない。

$$F_0 \geq F(k, n - k - 1; 0.01) \geq 34.12$$

あるいは、

$$F(k, n - k - 1; 0.01) > F_0 \geq F(k, n - k - 1; 0.05)$$

$$34.12 > F_0 \geq 10.13$$

3.3 発酵製品の輸入量の回帰式

3.3.1 人口 (X_1) を説明変数とした場合

(1) ACTIVE NATURAL YEAST

① 輸入量 (TON) の回帰式

$$YETX_1 = -5578.09 + 0.0560 X_1 \quad (a)$$

$$F_0^* = 34.4369 \quad \bar{R} = 0.9075 \quad \bar{R}^2 = 0.8782$$

② 輸入金額 (US\$) の回帰式

$$YESX_1 = -9472.12 + 0.0830 X_1 \quad (b)$$

$$F_0^* = 24.2532 \quad \bar{R} = 0.9434 \quad \bar{R}^2 = 0.8900$$

①および②とも有意水準5%で有意義である。

(2) 抗生物質

① 輸入量 (TON) の回帰式

$$YATX_1 = -6452.559 + 0.0510 X_1 \quad (a)$$

$$F_0 = 6.3946 \quad \bar{R} = 0.8250 \quad \bar{R}^2 = 0.6806$$

② 輸入金額 (US\$) の回帰式

$$YASX_1 = -24093.01 + 1.9259 X_1 \quad (b)$$

$$F_0^{**} = 3.44369 \quad \bar{R} = 0.9591 \quad \bar{R}^2 = 0.9199$$

②は有意水準1%で有意である。

(3) グルタミン酸

① 輸入量 (TON) の回帰式

$$YOTX_1 = -19347.56 + 0.1545 X_1 \quad 64$$

$$F_0 = 4.1441 \quad \bar{R} = 0.7616 \quad \bar{R}^2 = 0.5800$$

② 輸入金額 (USS) の回帰式

$$YOSX_1 = -3747.617 + 0.0427 X_1 \quad 65$$

$$F_0 = 1.1122 \quad \bar{R} = 0.5217 \quad \bar{R}^2 = 0.0722$$

①および②とも棄却される。

3.3.2 ONP (X_2) を説明変数とした場合

(1) ACTIVE NATURAL YEAST

① 輸入量 (TON) の回帰式

$$YETX_2 = 15523.11 + 0.21 X_2 \quad 66$$

$$F_0 = 7.1970 \quad \bar{R} = 0.8401 \quad \bar{R}^2 = 0.7057$$

② 輸入金額 (USS) の回帰式

$$YESX_2 = 1090.775 + 0.031 X_2 \quad 67$$

$$F_0 = 9.4405 \quad \bar{R} = 0.8711 \quad \bar{R}^2 = 0.7588$$

①および②とも棄却される。

(2) 抗生物質

① 輸入量 (TON) の回帰式

$$YASX_2 = 2.6238 + 0.0206 X_2 \quad 68$$

$$F_0 = 6.2476 \quad \bar{R} = 0.8219 \quad \bar{R}^2 = 0.6755$$

② 輸入金額 (USS) の回帰式

$$YASX_2 = 2029.172 + 0.8047 X_2 \quad 69$$

$$F_0^{**} = 144.54 \quad \bar{R} = 0.9898 \quad \bar{R}^2 = 0.9797$$

②は有意水準1%で有意である。

(3) グルタミン酸

① 輸入量 (TON) の回帰式

$$YOTX_2 = -90.1604 + 0.0736 X_2 \quad 70$$

$$F_0^* = 12.3098 \quad \bar{R} = 0.8967 \quad \bar{R}^2 = 0.8041$$

② 輸入金額 (US\$) の回帰式

$$YGSX_2 = 1545.16 + 0.0217X_2$$

$$F_0 = 2.2419 \quad \bar{R} = 0.6540 \quad \bar{R}^2 = 0.4278$$

②は有意水準5%で有意である。

3.3.3 Trade Balance (X_3) を説明変数とした場合

(1) ACTIVE NATURAL YEAST

① 輸入量 (TON) の回帰式

$$YETX_3 = 1650.632 + 0.0676X_3$$

$$F_0 = 7.1703 \quad \bar{R} = 0.0397 \quad \bar{R}^2 = 0.7051$$

② 輸入金額 (US\$) の回帰式

$$YESX_3 = 1231.958 + 0.1005X_3$$

$$F_0 = 9.9187 \quad \bar{R} = 0.8762 \quad \bar{R}^2 = 0.7677$$

①および②とも棄却される。

(2) 抗生物質

① 輸入量 (TON) の回帰式

$$YATX_3 = 78.1906 + 0.0695X_3$$

$$F_0 = 8.6654 \quad \bar{R} = 0.8619 \quad \bar{R}^2 = 0.7429$$

② 輸入金額 (US\$) の回帰式

$$YASX_3 = 6152.184 + 2.533X_3$$

$$F_0^{**} = 44.5427 \quad \bar{R} = 0.9679 \quad \bar{R}^2 = 0.9368$$

②は有意水準1%で有意である。

(3) グルタミン酸

① 輸入量 (TON) の回帰式

$$YGTX_3 = 3658.196 + 0.2195X_3$$

$$F_0 = 6.6557 \quad \bar{R} = 0.8302 \quad \bar{R}^2 = 0.6892$$

② 輸入金額 (US\$) の回帰式

$$YGSX_3 = 1697.328 + 0.0618X_3$$

$$F_0 = 1.5150 \quad \bar{R} = 0.5793 \quad \bar{R}^2 = 0.3356$$

①および②とも棄却される。

3.4 参入可能な分野の予測

3.4.1 人口 (X_1) を説明変数とした場合

(1) 輸送用機器に対するガソリンの消費量の回帰式

$$YGSX_1 = -3785.546 + 0.3374X_1 \quad 57$$

$$F_0^{**} = 739.84 \quad \bar{R} = 0.9980 \quad \bar{R}^2 = 0.9960$$

この回帰式は1%で高度に有意である。

(2) ふたと鶏の頭羽数の回帰式

① ふたの頭数の回帰式

$$YSX_1 = -97.0098 + 0.0229X_1 \quad 58$$

$$F_0 = 4.4599 \quad \bar{R} = 0.7732 \quad \bar{R}^2 = 0.5978$$

② 鶏の羽数の回帰式

$$YCX_1 = -24444.27 + 25913X_1 \quad 59$$

$$F_0^{**} = 101.427 \quad \bar{R} = 0.9855 \quad \bar{R}^2 = 0.9712$$

②は有意水準1%で有意である。

3.4.2 GNP (X_2) を説明変数とした場合

(1) 輸送用機器に対するガソリンの消費量の回帰式

$$YGSX_2 = 4904.141 + 0.1330X_2 \quad 60$$

$$F_0^* = 51.3869 \quad \bar{R} = 0.9720 \quad \bar{R}^2 = 0.9448$$

この回帰式は有意水準5%で有意である。

(2) ふたと鶏の頭羽数の回帰式

① ふたの頭数の回帰式

$$YSX_2 = 2789.041 + 0.0097X_2 \quad 61$$

$$F_0 = 5.6166 \quad \bar{R} = 0.8074 \quad \bar{R}^2 = 0.6519$$

② 鶏の羽数の回帰式

$$YCX_2 = 83230.25 + 1.0516X_2 \quad 62$$

$$F_0^{**} = 121.9129 \quad \bar{R} = 0.9819 \quad \bar{R}^2 = 0.9759$$

②は有意水準1%で有意である。

3.4.3 Trade Balance (X_3) を説明変数とした場合

(1) 輸送用機器に対するガソリンの消費量の回帰式

$$YGSX_3 = 5519.312 + 0.4293X_3 \quad 63$$

$$F_0^* = 55.9235 \quad \bar{R} = 0.9742 \quad \bar{R}^2 = 0.9491$$

有意水準 5% で有意である。

(2) ぶたと鶏の頭羽数の回帰式

① ぶたの頭数の回帰式

$$YSX_3 = 2819.373 + 0.0335X_3 \quad \text{69}$$

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

② 鶏の羽数の回帰式

$$YGX_3 = 88435.81 + 3.3401X_3 \quad \text{69}$$

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

②は有意水準 1% で有意である。

3.5 発酵製品の輸入量と輸入金額の予測

3.3 および 3.4 節で求められた回帰式より得られた推定値を発酵製品別に表で示す。次いで有意と判断された回帰式について考察を行う。

(1) ACTIVE NATURAL YEAST の輸入量と輸入金額の予測

ACTIVE NATURAL YEAST の輸入量と輸入金額に関する回帰式より得られた推定値を表 10 に示す。

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)			
	AT.	YETX ₁ *	YETX ₂	YETX ₃	As	YE\$X ₁ *	YE\$X ₂	YE\$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

AT: Actual Imports (Ton)

ET (X₁): Estimate Imports (Ton) (X₁: Population)

ET (X₂): Estimate Imports (Ton) (X₂: GNP)

ET (X₃): Estimate Imports (Ton) (X₃: Trade Balance)

As: Actual Imports (US\$)

E\$ (X₁): Estimate Imports (US\$) (X₁: Population)

E\$ (X₂): Estimate Imports (US\$) (X₂: GNP)

E\$ (X₃): Estimate Imports (US\$) (X₃: Trade Balance)

表 10 において 5% で有意と判断されたのは式①で求められた YETX₁ と式②で求められ

た $YESX_1$ である。例えば、式の $YETX_1$ に関して、説明変数として用いた人口の予測値を 150000 (単位 1000 人) とすれば、式は

$$YETX_1 = -5578.09 + 0.0560(150000) = 2821.91 \quad 60$$

となり、人口が 150000 (単位 1000 人) になった時は、約 2821 トンの ACTIVE NATURAL YEAST が輸入されることが予測できる。YESX₁ も同様にして、人口を 150000 (単位 1000 人) とした時、輸入される ACTIVE NATURAL YEAST の金額は約 2978 (単位 US\$ × 10³) となる。つまり、人口 1000 人に対して輸入量 0.056 トン、輸入金額 0.083 (単位 US\$ × 10³) の ACTIVE NATURAL YEAST が輸入されることが回帰式より予測される。

② 抗生物質の輸入量と輸入金額の予測

抗生物質の輸入量と輸入金額の予測に関する回帰式より得られた推定値を表 11 に示す。

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

Year	Antibiotics (Ton)				Antibiotics (US\$ × 10 ³)			
	A	YATX ₁	YATX ₂	YATX ₃	A	YA [*] TX ₁	YA ^{**} TX ₂	YA ^{**} TX 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

AT: Actual Imports (Ton)

ET (X₁): Estimate Imports (Ton) (X₁: Population)

ET (X₂): Estimate Imports (Ton) (X₂: GNP)

ET (X₃): Estimate Imports (Ton) (X₃: Trade Balance)

AS: Actual Imports (US\$)

ES (X₁): Estimate Imports (US\$) (X₁: Population)

ES (X₂): Estimate Imports (US\$) (X₂: GNP)

ES (X₃): Estimate Imports (US\$) (X₃: Trade Balance)

表 11 において、1 多または 5 多で有意と判断されたのは式 63 で求められた YASX₁、式 64 で求められた YASX₂、式 65 で求められた YASX₃ である。YASX₁ によれば人口 1000 人に対して約 1.93 (単位 US\$ × 10³) 同様に、YASX₂ によれば GNP (単位 Rp · Bn) に対して約 0.80 (単位 US\$ × 10³) の抗生物質が、YASX₃ によれば Trade Balance (単位 US\$ Mn) に対して約 2.13 (単位 US\$ × 10³) の抗生物質が輸入されることが予測さ

れる。

(3) グルタミン酸の輸入量と輸入金額の予測

グルタミン酸の輸入量と輸入金額の予測に関する回帰式より得られた推定値を表12に示す。

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)			
	AT	YGIX ₁	YGIX ₂	YGIX ₃	AS	YGIX ₁	YGIX ₂	YGIX 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

AT: Actual Imports (Ton)

ET (X₁): Estimate Imports (Ton) (X₁: Population)

ET (X₂): Estimate Imports (Ton) (X₂: GNP)

ET (X₃): Estimate Imports (Ton) (X₃: Trade Balance)

AS: Actual Imports

ES (X₁): Estimate Imports (US\$) (X₁: Population)

ES (X₂): Estimate Imports (US\$) (X₂: GNP)

ES (X₃): Estimate Imports (US\$) (X₃: Trade Balance)

表12において、5%で有意であると判断されたのは式的で求められたYGIX₂だけである。YGIX₂によればGNP(単位Rp·Bn)に対して約0.07トンのグルタミン酸が輸入されることが予測される。

3.6 参入可能な分野の予測

この節においては、3.3節で求められた回帰式より得られた推定値を示し、更に、発酵製品の参入可能な分野で有意と判断された回帰式について考察を行う。

(1) 輸送用機器に対するガソリンの消費量の予測

輸送用機器に対するガソリンの消費量の予測に関する回帰式より得られた推定値を表13に示す。

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

(Unit: Litre X 10³)

Year	The Consumption of Gasoline for Transportation			
	AG	YGSX ₁ ^{**}	YGSX ₂ [*]	YGSX 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 (X₁): Estimated Consumption (X₁: Population)

EG (X₂): Estimated Consumption (X₂: GNP)

EG (X₃): Estimated Consumption (X₃: Trade Balance)

表13において、1号および5号で有意と判断されたのは①で求められたYGSX₁、②で求められたYGSX₂、③で求められたYGSX₃である。YGSX₁によれば人口1000人に対して約0.34(単位10³LITRE)、YGSX₂によればGNP(単位Bp・Bn)に対して約0.13(単位10³LITRE)、YGSX₃によればTrade Balance(単位US\$・Mn)に対して約0.43(単位10³LITRE)のガソリンが消費されることが予測される。

② ぶたと鶏の頭羽数の予測

ぶたと鶏の頭羽数の予測に関する回帰式より得られた推定値を表14に示す。

Table 14. Actual and Estimated Numbers of Swine and Chicken

Year	Chicken				Swine			
	Ac	YCX ₁ **	YCX ₂ **	YCX ₃ **	As	YSX ₁	YSX ₂	YSX ₃
1976	97,504	95,796	99,041	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 (X₁): Estimate Number of Chicken (X₁: Population)

Ec (X₂): Estimate Number of Chicken (X₂: GNP)

Ec (X₃): Estimate Number of Chicken (X₃: Trade Balance)

As: Actual Number of Swine

Es (X₁): Estimate Number of Swine (X₁: Population)

Es (X₂): Estimate Number of Swine (X₂: GNP)

Es (X₃): Estimate Number of Swine (X₃: Trade Balance)

表14において、1多で高度に有意であったのは鶏の羽数の予測に関する式①のYCX₁、式②のYCX₂、式③のYCX₃であった。YCX₁によれば人口1000人に対して約259羽、YCX₂によればGNP(単位Rp・Bn)に対して約1.05羽、YCX₃によればTrade balance(単位US\$×10³)に対して約3.34羽の鶏の羽数増加があるものと予測される。

ま と め

本調査において収集された発酵製品に関する統計資料を基にして、傾向線分析と重回帰分析の2つの方法を用いて需要予測を行った。本調査では、①発酵製品の原料となる糖蜜の生産量の予測、②発酵製品の輸入量および輸入金額の予測、③近い将来、発酵製品が参入できる分野の需要予測、の3点について分析を行った。第2項の傾向線分析の結果より、次の所見を得た。2.1節で示した傾向線分析によれば、今後とも糖蜜の生産量は増加し、発酵製品の原料は十分に確保されるであろう。2.2節で示した傾向線分析では、本分析で取り扱った発酵製品であるACTIVE NATURAL YEAST, 抗生物質, グルタミン酸について、大きな潜在需要が推定された。2.3節で示した傾向分析では、発酵製品の参入が可能な2つの分野の需要を分析した。その結果、輸送用機器によるガソリンへの混入が可能なエタノールと、鶏に与える飼料用イーストの市場は有望であると判断された。次に、第3項の重回帰分析の結果より、次の所見を得た。3.5節で示した重回帰分析によれば、本分析で取り扱った発酵製品であるACTIVE NATURAL YEAST, 抗生物質, グルタミン酸について、大きな潜在需要が推定された。3.6節で示した重回帰分析の結果より、エタノールと飼料用イーストの市場は有望であることが確認された。この結果は、第2項で用いられた傾向線分析の結果と一致する。

附 録 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

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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	.....	†
<hr/>		
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.

	<u>1981</u>	<u>1984</u>
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 B₁ 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. 90/1
(including transportation charge)		Rp. 15/1
iii) Premium	:	Rp. 240/1

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 Soejodono 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.F.M. de Pretes, 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	: Sugar	Budget Actual
		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	.....
(+) <hr/>		
	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. Teknik
Mr. Soeharto Assist. Teknik
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°C
River water temperature : 27 to 29°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

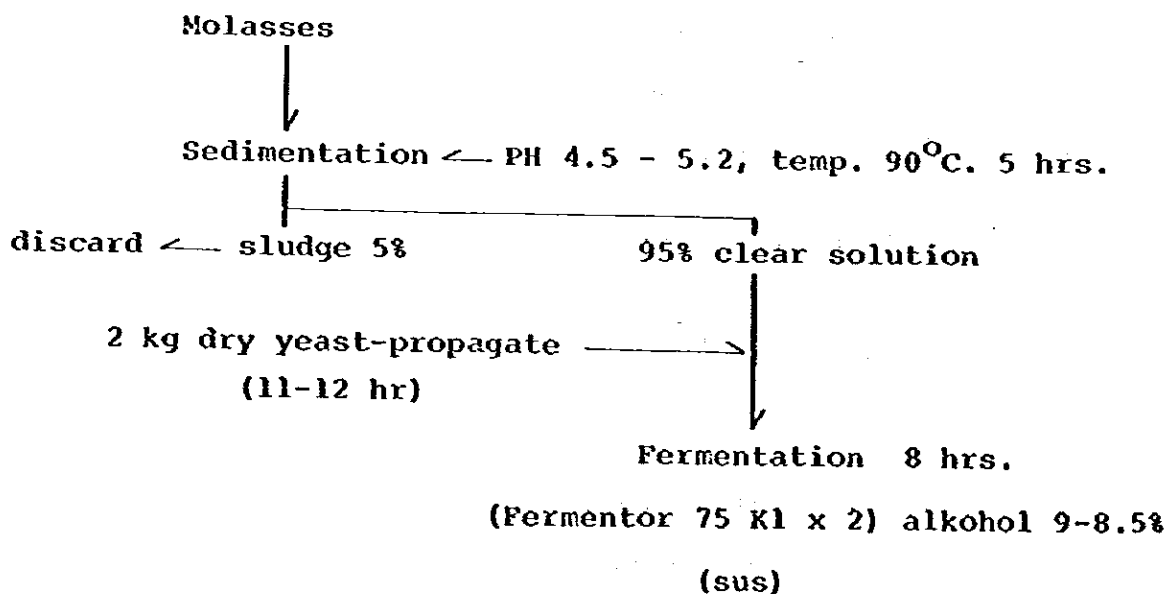
1. Alcohol factory

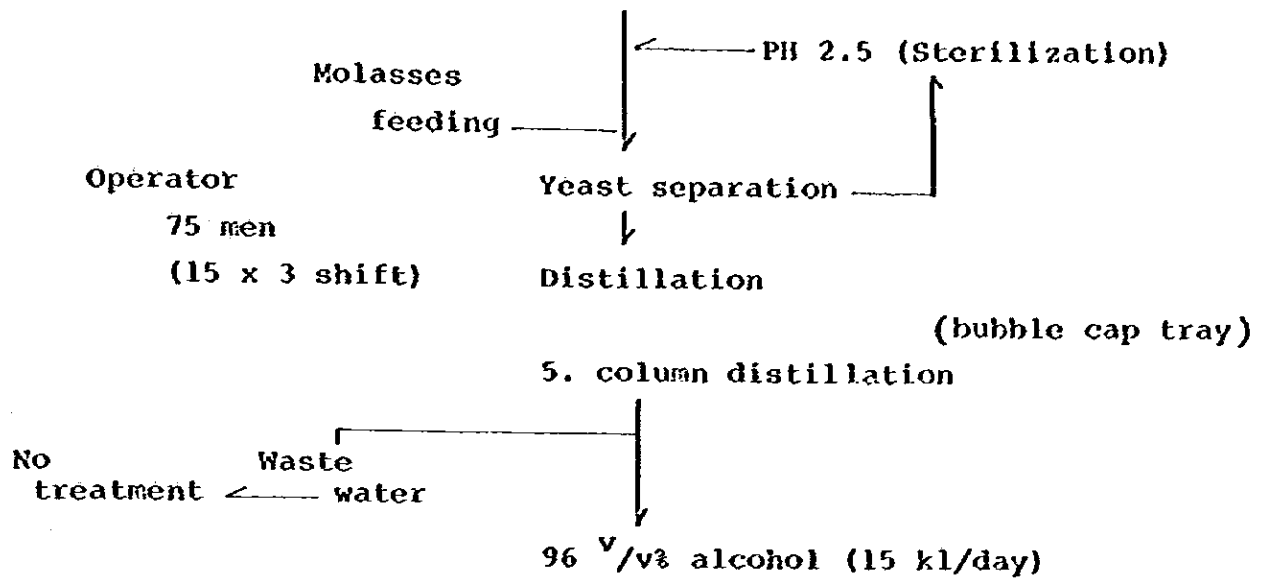
Designed by Vogelbusch, Austria

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^oC for cooling

Fermentation temperature : 30 - 32^oC

Boiler : 8 ton/hour, 6.5 Kg/cm² (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.

附 錄 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 Government 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 P/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. Forecast2

- 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

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 accommodation 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 personnel effects brought into the Republic of Indonesia for the purpose of the Study,

6. exempt the F/S Team_v5

6. exempt the F/S Team members from income taxes and charges of any kind imposed on or in connection 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 occurring 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

Year 6 month Item	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															

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

3-0-804 216 MIYU Bldg
2-1, Kojimachi 2-chome, Chiyoda-ku, TOKYO
100 JAPAN

Jakarta, September 8th, 1962

Mr. Soedjai Kartasasmita
Ketua
Staf Bina Perusahaan Negara
Departemen Pertambangan 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) VSG 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 T-5 of the S/A 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 connection with the T-5 of the S/A, all the starting 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 (T in S/A), feasibility study team will be dispatched at the beginning of December 1962 and the final report will be submitted to you by the end of July 1963.

The Indonesian2

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

P.O BOX 718 MITSUI BLDG
2-1, NISHI-SHINJUKU, SHINJUKU-KU TOKYO
163 JAPAN

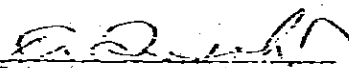
-2-

The Indonesian side strongly requested to us for earlier submission of draft report than is scheduled in the Annex bar chart 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 ENDO
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 Cendekia No. 11 - Telepon 343540 - 343149, JAKARTA PUSAT
Teleks : 45781 SBPN,SI - Kabel : Kebunragara - Jakarta - Telex/cable : 3421/PII.

Nomor : 4026 /ID.Y/O/1982

Jawa, September 8, 1982.

Lampiran :

Pada :

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

Dear Sir,

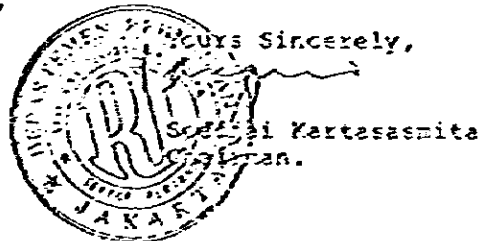
Re : Feasibility Study on The Development of
Sugarcane Molasses Fermentation Industry.

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,



附 錄 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

DEPRECIATION-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
DEPRECIATION-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
DEPRECIATION-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. 21,000,000
 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. 21,000,000
 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. 21,000,000
 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. 21,000,000

.....
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. 21,000,000

.....
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.21.000.000

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.21.000.000

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.21,000,000

 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.21,000,000

 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.21,000,000

 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.21,000,000

.....
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.21,000,000

.....
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. 21,000,000

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. 21,000,000

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

THE INVENTORY = 0.00 MONTHS

THE ACCOUNTS PAYABLE = 0.0 MONTHS LATER

.....
 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.21,000,000

 YEAR(1986) MONTH(4) ---> YEAR(2000) MONTH(3) = 24,507000

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

MONTHLY COST REQUIRED OF OTHER FIXED COST
 RP.21,000,000

 YEAR(1986) MONTH(4) ---> YEAR(2000) MONTH(3) = 18,000000

=====

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ANALIZED BY YASUJI NAGA

.....
(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.

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

PAGE = 1

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
EUTANOL	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
DEPRECIATION	1,846	1,846	1,846	1,846	1,846
AMORTIZATION	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	6,553	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 ACIO	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
AMOTIZATION	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	613	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
AMH. 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
AMOTIZATION	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
AMORTIZATION	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 (A) (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 BEF. 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	2,289	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
AMOTIZATION	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. CONTINGENCY	0	2	322	836	886
OTHER ASSETS	0	0	0	36	36
DEFERRED ASSETS	0	0	0	0	0
DEPREC. & AMOTIZ.	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	0	0	0	0	0
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 & LNC.	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 EARNINGS	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, EQUIPH.	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. CONTINGENCY	886	886	886	886	886
OTHER ASSETS	36	36	36	36	36
DEFERRED ASSETS	0	0	0	0	0
DEPREC. & AMOTIZ.	-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
ACCOUNTS PAYABLE	0	0	0	0	0
INCOME TAX PAYABLE	0	0	0	0	0
CURRENT PORTION OF DEBT	0	263	1,051	1,051	1,051
LONG TERM DEBT	0	0	0	0	0
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 EARNINGS	-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. OUR. CONSTRUCT	355	355	355	355	355
PHYSI. CONTINGENCY	886	886	886	886	886
OTHER ASSETS	36	36	36	36	36
DEFERRED ASSETS	0	0	0	0	0
DEPREC. & AMOTIZ.	-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
ACCOMTS PAYABLE	0	0	0	0	0
INCOME TAX PAYABLE	0	0	0	0	0
CURRENT PORTION OF DEBT	1,051	1,051	1,051	1,051	1,051
LONG TERM DEBT	0	0	0	0	0
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 & LNC.	6,041	4,990	3,940	2,889	1,839
BOND BALANCE	0	0	0	0	0
STOCK HOLDERS EQUI.	-15,177	-18,348	-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 EARNINGS	-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. CONTINGENCY	886	886	886
OTHER ASSETS	36	36	36
DEFERRED ASSETS	0	0	0
DEPREC. & AMOTIZ.	-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
ACCOMTS 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 EARNINGS	-37,975	-41,295	-8,593

IRR CALCULATION TABLE ALTERNATIVE (A)
 RP. 1,000,000

IRR CALCULATION ON TOTAL INVESTMENT (ROI AFTER TAX)

YEAR	TOTAL INVESTMENT	PROFIT BEFORE TAX	DEPRECIATION	INTEREST ON COST	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	243	1.36447	0	1151
1990	0	-3347	2266	1764	0	683	1.51340	0	1034
1991	0	-3428	2266	1845	0	683	1.67858	0	1147
1992	0	-3511	2188	2006	0	683	1.86178	0	1272
1993	0	-3463	1957	2129	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

