THE REPUBLIC OF INDONESIA SURVEY REPORT

ON

PETROCHEMICAL INDUSTRY DEVELOPMENT

VOL. VI PLASTICS PROCESSING

OCTOBER 1974

Prepared for
JAPAN INTERNATIONAL
COOPERATION AGENCY
by
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Abbreviations

AB	Alkylbenzene
ABS	Acrylonitrile-butadiene-styrene for polymer
ABS	Alkyl Benzene Sulfonate
AD	Acetic Acid
AG	Aromatic Gasoline (Pyrolysis Gasoline)
BR	Butadiene Rubber
B-B	Butan, Butadiene Residue
BTX	Benzene, Toluene, Xylene
CHP	Cumene Hydroperoxide
CCW	Circulating Cooling Water
CPP	Cast Polypropylene Film
CR	Chloroprene Rubber
C-X(CHX)	Cyclohexane
DEG	Diethylene Glycol
DMT	Dimethyl Terephthalate
DOP	Dioctyl Phthalate
E	Ethylene
EG(MEG)	Ethylene Glycol
EO	Ethylene Oxide
EP	Electric Power
EPDM	Ethylene-propylene-diene-methylene Linkage
EDC	Ethylene Di-chloride
EVA	Ethylene-vinyl Acetate Copolymer
FG	Fuel Gas
FO	Fuel Oil
FRP	Fiber Reinforced Plastic
FW	Filtered Water
GP	General Purpose (Polystyrene)
HDPE	High Density Polyethylene
HI	High Impact (Polystyrene)
IR	Isoprene Rubber
IIR	Butyl Rubber
LAB	Linear Alkylbenzene

LDPE	Low Density Polyethylene	
LNG	Liquefied Natural Gas	
LPG	Liquefied Petroleum Gas	
MI	Melt Index	
M-xylene (Xylene)	Mixed Xylene	
NBR	Nitril Rubber	
NG	Natural Gas	
NGL	Natural Gas Liquid	
NR	Natural Rubber	
OPP	Oriented Polypropylene Film	
PP	Polypropylene	
PS	Polysterene	
PTA	Pure Terephthalic Acid	
PVC	Polyvinyl Chloride	
PW	Polished Water	
p-Xylene (P-X)	Paraxylene	
SBR	Styrene-butadien Rubber	
SM	Styrene Monomer	
TPA (TA)	Terephthalic Acid	
UV	Ultra-violet	
VCM	Vinyl Chloride Monomer	
DCF	Discounted Cash Flow	
Exchange Rate	1971	1US$=360 Yen
		1US$=415 Rupiah
	After the End of 1973	1US$=300 Yen
		1US$=415 Rupiah
GDP	Gross Domestic Product	
GNP	Gross National Product	
IRR	Internal Rate of Return	
$(DL.)	U.S.$, unless Particularly Remarked	
ROI	Return on Investment	

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PART I GENERAL INTRODUCTION

Chapter 1. Conclusion and Recommendation

1-1 Conclusion

As a result of surveys and investigations on the current status for Indonesian plastics processing industries, the following subjects were found:

1-1-1 Resin-wise demand structure

Estimated demand of plastic raw materials in Indonesia was approximately 80 thousand tons (excluding plastics products) in 1972. Polyethylene shared more than 50% of the total, and added with the recently grown polypropylene, the share exceeded 60%, the dependence on polyolefin showed very intensive.

1-1-2 Product-wise demand structure

Household wares share 22% and packaging materials share 56% in quantity; the remaining is industrially used.

1-1-3 Territorial distribution of plastic processing industries

Plastic processing industries are concentrated in Jakarta, 29% in numbers and 43% of the total production quantity. Besides Jakarta, other concentrated territories are Surabaya, Medan and Bandung.

1-1-4 Capital origin and scale of processing industries

Regardless of whether the firms are run under Domestic Investment Law or Foreign Investment Law of Indonesia, the greater majority of firms duly registered with the Indonesian Government authorities are on a scale of 100 - 500 million Rp. However, taking many other smaller industries which are not registered into consideration, the greater majority is only about several percent of the total.

According to the data prepared by the Department of Light Industry, 16 foreign firms had already started production activities, and it is noteworthy to state that the products manufactured by these foreign firms such as PVC compounds, PVC pipes, PVC calender sheet, leather, and cloth bags, all of which require a huge amount of capital investment into facilities for production and very high technical standard.

1-1-5 Problematic points of plastics processing industries

These points may be summarized as:

(1) Instability of raw material supply

(2) Shortage of engineers and skilled workers

(3) Low efficiency of operation

As a result of unstable supply of raw materials, the stocks on hand of said raw materials become very large, which results in heavy burden of capital and monetary interest. Moreover, there is a great difference in the prices between the market price for raw materials and the imported price (C & F).

The shortage of engineers and skilled workers results in low productivity, and even though the wages and salaries are low, personnel costs become high.

The cause of low operational efficiency is due to the narrow market in Indonesia, and at the same time due to the dominance of commercial brokerage firms with long historical backgrounds.

1-1-6 Capital investment and employees required

Potential market demand of approximately 300,000 tons of plastics materials in Indonesia in 1980 is predicted by UNIDO. As present plastic consumption is about 80,000 tons, huge amounts of capital investment and employees will be required for development of plastics processing industries to meet this demand.

(1) Capital investment required

According to our preliminary estimation, about 123 million US$ for plastics processing equipments and 278 million US$ for the total including working capital will be required.

(2) Employees required

About 200,000 workers will be additionally required by 1980. At this time labour productivity should become 1,500 US$/person/year, which is about 3.5 times the present. A training program for at least 1,000 persons/year will be required for improvement of labour productivity.

1-2 Recommendation

For the settlement of the above problems and for the upgrading of plastics industries, it is mandatory to perform the following measures:

1-2-1 Establishment of National Plastics Industry Guidance Institute

From the standpoint of the Government, it is desirable to establish a National Plastics Industry Guidance Institute required for the upgrading of plastics processing industries. The subjects that should be handled by said institute are as follows:

(1) Standardization of raw materials for plastics and the products

(2) Design improvement and R&Ds thereto of the plastics products

(3) Development of molding and processing techniques

(4) Upgrading of engineers

(5) Acceptance of R&D request from the plastics molding industries, and further developmental activities concerning manufacturing technique on plastics products.

1-2-2 Establishment of industrial complex

Plastics processing industries are by nature apt to become the source of public nuisances such as noises, strange odors, and plant waste disposal, etc. Therefore, the plant site should be sought in areas away from the housing district; and, at the same time, a sufficient level of utilities should be available.

1-2-3 Investment policy

Required funds for the plastics processing industries will amount to a huge sum of money as mentioned above, thus a part of said funds shall have to be introduced from foreign capital sources.

It is also necessary to examine the financial policy in case of management and operation of the plant with domestic capital.

Chapter 2. General Introduction

2-1 Background and Problematic Points of the Survey and Investigation

In the survey of UNIDO Phase I, the forecasts of Indonesian plastics demand up until 1985 were performed, which hints at the possibility of the establishment of a petrochemical complex by 1980.

However, the demands indicated in said UNIDO Phase I report solely indicate the potential demands, thus there still are many things to be done to visualize these demands before the petrochemical complex begins operation.

In view of requirement of material for various industries which Indonesia must develop in the near future--viz., agriculture, food processing, building and construction, electric appliances manufacturing and etc.--without upgrading of the plastics processing industry, development of said industries might not be realized.

In light of the above, the present surveys and investigations attempt to study the current status of Indonesian plastics industries, find problematic points therein, and to prepare required countermeasures in a draft formula.

Furthermore, it considers the correlations between the 1st and 2nd 5 year Development Plans and examines the most effective utilization of funds which is the greatest problem for Indonesia at present.

2-2 Policies and Method of Performance of Surveys

A summary was given in the Figure VI-1.

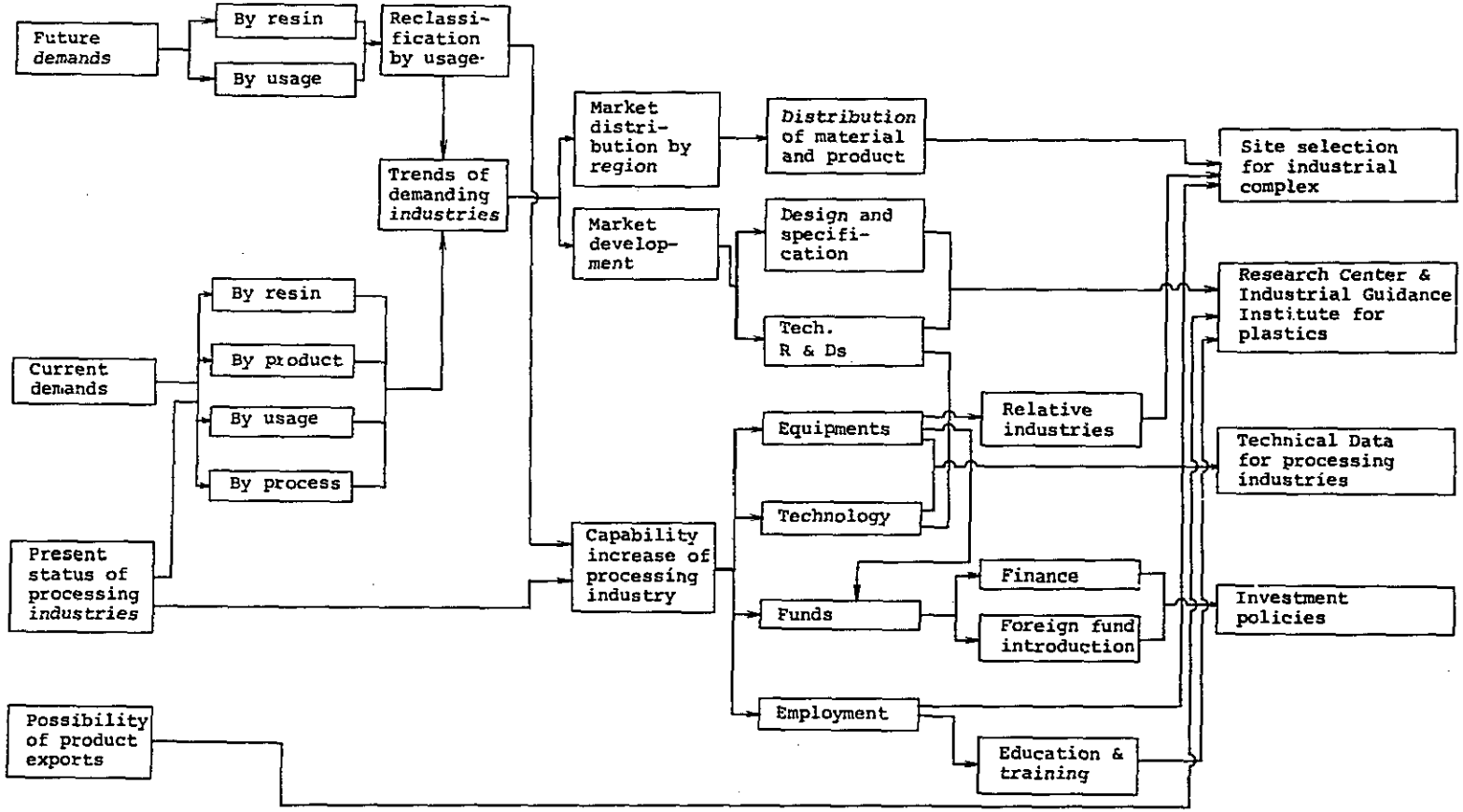


Figure VI-1 Schematic Diagram of Methodology of the Survey

2-2-1 Surveys on the status will be made for:

(1) Processing industries

(2) Product market (consuming industries)

The names of industries were listed prior to the study, but in regards to the consuming industries, sufficient time was not available to perform a complete study.

The survey was made through a questionnaire prepared in advance, in which efforts were made to acquire required information as conversations and discussions were carried out covering as many general topics as possible. The results are described in the Part II.

2-2-2 Estimation on the market gap

In regard to the 1975 - 1985 plastics demand forecasts, those values given in UNIDO Phase I report are used as they are, and, the difference between the current status is called the 'market gap' which is being caught as follows:

(1) Processing industries

Quantitative aspect - Numbers of processing facilities and their capacities

Qualitative aspect - Productivity, quality and service

In connection with the above, studies were made on processing facilities, supply system of molds, pigment, coloring agents and other auxiliary materials inclusive of all peripheral industries.

(2) Product market

Quantitative aspect - Expansion of market

Qualitative aspect - Diversification of products

The above are described in Part III.

2-2-3 Upgrading measures for plastics industries

(1) Based on the aforementioned status surveys, discussions were made concerning of plastics processing techniques that might be required in the future, these are listed in Annex IV.

(2) Preparation of a draft for the establishment of National Plastics Industry Guidance Institute

(3) Others

Industrial complex, investment and financial policies thereto.

PART II STATUS OF INDONESIAN PLASTICS INDUSTRY

Chapter 1. Plastics Market Survey

1-1 Estimation for the Plastics Demand

Generally the plastics demand is expressed by the following equation.

(Demand) = (Production) + (Imports) - (Exports) - (Stock on hand)

Plastics production in Indonesia started in the latter part of 1973, so the production statistics prior to this period are not required. Also the stock on hand is only the stock on the market, there is no producer's stock on hand, thus it is impossible to get actual figures. Exports can almost be ignored. Therefore, as far as Indonesia is concerned prior to 1972, we can assume the imports to be the demand.

The import figures are known through trade statistics issued by the Central Statistics Bureau of the Indonesian Government. For the purpose of complementing these figures, comparisons were made by tabulating the statistics prepared by the exporting countries.

1-1-1 Indonesian statistics

Indonesian plastics import statistics are classified in 2 major groups:

2780 Cellulose and plastics material for molding purposes except cellophane

11230 Plastic molded articles

thus, theirs are not classified by types of plastics. However, since there are such classification of the exporting countries, the tabulation of the export shares of each country could be made.

Raw material for plastics and product importations since 1963 are indicated in the Table VI-1. No publication was made for the years of 1971 and 1972, we had to use those tabulations prepared by the Central Statistics Bureau concerning plastic materials. However, no statistical values on plastic products were available.

Imports of plastic materials were indicative of a rapid increase from about 1966 as shown in the Figure VI-1, giving an average annual increase rate of more than 20%, which amounted to 80,000 tons for the all plastics during 1972. Table AVI-7 shows the figures of the exporting countries, from which it could be seen that:

(a) Major exporting countries are five, Japan, Hong Kong, U.S.A., West Germany and Singapore. However, the material imports from Hong Kong are gradually decreasing, but imports from Singapore are on the increase. The greater majority of imports from Hong Kong are plastic products rather than the raw material itself.

Table VI-1 Indonesian Plastics Import

(Unit: tons)

Year		1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Code No.	2780	9,954	4,378	7,391	4,701	14,314	28,137	60,788	47,567	59,748	79,169
	11230	607	1,061	1,454	1,691	4,765	4,190	6,359	7,999	n.a.	n.a.
Total		10,561	5,439	8,845	6,392	19,089	32,327	67,147	55,566	-	-

Notes: 2780 Cellulose and plastics molding materials

11230 Plastics products

Source: Central Bureau of Statistics, Indonesia

(b) Imports from Japan appeared extremely large for the year of 1969, which is a little questionable in the handling of the statistics, viz., it seems that re-exported items via Hong Kong and Singapore are added to the statistics of Japan and so on.

Importation from Japan has been holding around 80% since 1969, and they are highly dependent upon imports from Japan, which may drop from 1973 onward.

1-1-2 Statistics prepared by the exporting countries

Total plastics material production of 6 countries such as Japan, U.S.A., West Germany, Italy, France and England has amounted to approx. 77% of the entire production of the world, and the remaining 23% is shared among 35 countries, U.S.S.R., Holland, etc. Under the circumstances, it may suffice for us to look at only the above mentioned 6 countries from the standpoint of the exports. For example, exports to Indonesia from these 6 countries are almost 90%.

Hong Kong and Singapore are so-called transit trading ports, from which much re-exporting is done. The re-exports to Indonesia by these two countries are gradually decreasing, but it is still approximately 10%. The amount of transactions with Indonesia is not announced by Singapore so Hong Kong is the only country that we can use to measure exports. Subsequently for the purpose of tabulating statistical values of exporting countries, utilization of 7 exporting countries' statistics was made adding Hong Kong to the 6 developed industrial countries.

Table AVI-8 indicates the exportations to Indonesia from these 7 countries. These values include plastics raw materials, film, sheet, pipes and any other intermediate products, which are more than the raw material tabulations prepared by Indonesia and are less than the total value. Therefore, it may be said that the Indonesia statistics and that of the exporting countries compare favorably.

Exports from Japan are increasing at a smooth rate as given in Table AVI-8, but the increase for 1973 is flattened, although the quantity has not decreased as ever may allow a special attention. The reason for the mentioned supply reduction in areas of Indonesia seems to be a market expansion of more than 20% compared with the previous year, and that the supply increase could not fully satisfy market demand.

1-1-3 Classification of the formula of plastics imports

Plastics imports can be classified into 3 formulae - raw material, intermediate products and the finished products. As mentioned earlier, the Indonesian Government only incorporates raw material and products in its preparation of the statistics. Viewed as imports of the total products, it has gradually increased since 1963, and as given in Table VI-1, amounted to 80,000 tons in 1970, mainly imported from Japan followed by Hong Kong and Singapore.

Viewed next with the statistics prepared by exporting countries, the detailed contents will be clarified, where film,

sheet, pipe, etc. that require further secondary processing before they go to the consumer are called 'intermediate products'. However, these products are classified in the category of raw materials according to the statistics of the major exporting countries. By separating these from raw materials and sorting them independently, Table AVI-3 will result, from which it can be seen that the imports are gradually increasing year after year similar to results in Table VI-1.

However, reviewing only the Japanese statistics, exports to Indonesia of intermediate products are decreasing, e.g., 5,405 tons in 1972 and 1,664 tons in 1973. This is as a result of the drastic decrease of the export allowance of Japan due to the shortage of raw materials for the products and at the same time due to increased independence or self-sustenance of intermediate products in the Indonesian market.

Japan, Hong Kong and West Germany are the major exporting countries of the products shown in Table AVI-4. The unit of respective quantity is different in case of different products, so these are all expressed in the monetary amount. Products import amounts from 1966 and 1971 are sorted in the Table as viewed by the exporting country, which shows a large increase ratio, and an increase of substantial imports is observed even if the influence of inflation is taken into account. The exports from Japan was kept nearly the same in 1973.

By properly developing the processing industries in Indonesia gradually decrease the imports of intermediate products and the products.

1-1-4 Comparison of statistics of various countries, and estimation of domestic demands for plastics

(1) Market shares of all the exporting countries

As given in Table AVI-1 respectively the export shares to Indonesia from Japan, U.S.A., West Germany, France, Italy, England and Hong Kong (altogether 7 countries) are changing each year while there is not remarkable change in the total quantity of all the 7 countries' exports. According to the Indonesian statistics percentage of raw materials imports from 7 countries is given below showing an annual average of 91.0%.

	(%)
1968	93.7
1969*	96.2
1970	90.6
1971	91.2
1972	88.4

Note: * Because of its abnormally large imports, this particular figures does not have reliability.

(2) Comparison of statistics of various countries

Compared Indonesian import statistics and exports from the above 7 countries to Indonesia are given in the below table. A

reference figure estimated with the inference that the exports of said 7 countries would be sharing 91% of the Indonesian imports. However, in 1971 and 1972, 10% of the entire imports was estimated to be products, (90% are raw materials and intermediary products), and which was added thereto.

	Indonesian statistics		7-country statistics (Raw material)	
	Raw Material	Raw material & products total	Actuals	Estimation (actuals ÷ 0.91)
1968	28,136	32,326	26,601	29,232
1969	60,788	67,234	39,344	43,235
1970	47,567	55,566	45,207	49,678
1971	59,748	(66,387)	56,071	65,657
1972	79,169	(87,966)	87,531[1)]	98,349

Note: 1) Total of 5 countries except Italy and Hong Kong

Figures for Italy and Hong Kong in 1972 are unknown, and the exports from these two countries are annually decreasing, thus the exports are estimated for these two countries to be less than 2% in total for 1972. Therefore, the shares of remaining 5 countries are taken to be 89%.

Raw material imports of Indonesia estimated from the statistics of these 7 countries and the statistics of Indonesian side comparatively well correspond each other for the years of 1968 and 1970. However, Indonesian side is excessively large for 1969, and for the years of 1971 and 1972 there are respectively about 9% and 20% difference between the two. Reason for said difference is not clear, but it may be due to the discrepancy in the classification. Such being the case, the year of 1969 was omitted from the present consideration, Indonesian statistics were utilized for the raw material imports, and the figure of 43,235 tons estimated from the 39,344 tons of raw material exports (Table AVI-6) given in the 7-country statistics for the year 1969 was taken for the present case. In regard to the products, actuals are estimated as given below by using Indonesian figures as they are.

(Unit: tons)

	Raw material imports	Products imports	Totals
1968	28,136	4,190	32,326
1969	43,200	6,446	49,646
1970	47,567	7,999	55,568
1971	59,748	(6,639)	66,387
1972	79,169	(8,797)	87,966

1-2 Resin-wise Demand Structure

As mentioned earlier in reference to the Indonesian import

statistics, they are not categorized by respective resins. Therefore estimations on the resin demand structure were made utilizing the statistics prepared by the exporting countries.

For the year 1971 and 1972, specially prepared resin-wise and country-wise statistics were obtained from the Indonesian Statistics Bureau - these are sorted in Tables AVI-1 through AVI-6, where the figures given in "others" are exceptionally large as these are not classified with specific resins, thus these statistics are not without a tinge of inaccuracy.

Table AVI-6, Export statistics of major countries for plastics resins. Table VI-2 shows the structural rates exports of each plastic raw material from major countries, which, we feel, clearly expresses the current demand structure of Indonesian plastics, viz.:

Table VI-2 Percentage of Commodity-wise Importation from Major Countries (Unit: %)

	1966	1967	1968	1969	1970	1971
Phenolics	5.0	0	0	0.1	0.2	0.2
Polyester	-	0	0	0	0.4	1.2
Silicone	-	-	0	0	0	0
Melamin	-	0	-	-	0	0
Urea	-	0	0.1	0.4	0.5	0.3
Other products of condensation, polycondensation polyaddition	7.2	1.5	1.3	2.8	3.4	4.9
Sub-total	12.3	1.6	1.5	3.3	4.5	6.6
PVC compounds	17.7	15.7	23.7	22.8	11.5	7.3
PVc resin	8.3	15.5	5.7	6.0	7.3	7.4
Polyvinyl acetate	-	0	0	0.3	1.4	0.6
Polyethylene	43.5	52.7	54.0	51.8	57.1	53.9
Polystyrene	8.4	9.5	7.6	7.6	6.7	6.7
Acrylics	-	-	-	-	-	-
Polypropylene	-	-	2.6	1.3	2.2	7.8
Other products of polymerisation and copolymerisation	9.4	4.9	4.9	6.8	9.1	9.5
Sub-total	87.4	98.4	98.4	96.6	95.4	93.2
Other artificial plastic material	0.3	0	0	0	0.1	0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Trade statistics of major countries

(1) Polyethylene is more than 50% of imports, and when added with polypropylene, which has shown a recent increase, the structural ratio of polyolefin exceeds 60%.

(2) The ratio for PVC compound is decreasing yearly and in its place, PVC resin is gradually increasing, which shows the appearance of compound maker in the Indonesia proper and the extrusion of the pipe in the domestic market. However, there has been no change during the past several years in PVC, and the ratio is decreasing.

(3) The ratio for polymerization resin is decreasing when viewed in its entirety (mainly thermoplastics), but condensation resin (mainly thermosets) is increasing, from which it is observed that demand diversification is progressing, and it is considered to have further development potential, thus the resin-wise demand structure may change as related industries develop. For reference, resin-wise production quantity structure of developed industrial countries is shown in the Table VI-3. The greatest difference in comparison with Indonesia is the much lower dependence on polyolefins. In the future, the demand for PVC and polystyrene is expected to increase in Indonesia. However, at present, these types of plastics are in short supply world-wide, and supplies will still remain tight in Indonesia for the time being.

Table VI-3 Percentage of Commodity-wise Production in Major Countries (1971)

(Unit: %)

	U.S.A.	UK	W. Germany	Italy	France	Japan	Indonesia[1)]
Phenolics	5.4	4.7	32.4	4.8	1.4	4.2	0.2
Urea and melamin	3.2	10.7	1.9	9.5	-	12.5	0.3
PVC	16.3	21.2	19.3	29.6	27.6	19.9	11.4
Polyethylene	30.4	23.3	19.5	26.7	30.2	25.8	56.0
Polypropylene	6.0	4.9	-	3.2	1.5	12.1	8.1
Polystyrene	17.8	9.1	-	10.5	8.9	9.6	6.9
Others	20.9	26.1	26.9	15.7	30.4	16.0	17.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: The Japan Plastics Industry Association

Notes: 1) After converted the amount of compound in Table VI-2 to PVC resin multipled by 0.50, and percentage was recalculated.

Resin-wise consumption ratio obtained from the statistics (Table VI-4) of the exporting countries was applied to the 1972 imports of 79,169 tons and obtained following results:

(Unit: tons)

Sub-total of condensation resin	5,900	
PVC Compound, PVC Resin	7,500 (converted to resin)	
Polyethylene	40,600	LDPE 25,400 HDPE 15,200
Polystyrene	6,700	
Polypropylene	8,900	
Other polymerization resin	9,600	
Total:	79,200	

Table VI-4 Importation of Plastic Materials from Major Countries (1972)

	Material		Intermediate products		Total	
	tons	%	tons	%	tons	%
Thermosetting resin	6,244	7.5	79	2.3	6,323	7.3
PVC[1),2),3)]	7,861	9.5	2,847	84.6	10,708	12.4
Polyethylene	42,491	51.3	208	6.2	42,699	49.5
Polypropylene	9,280	11.2	10	0.3	9,290	10.8
Polystyrene	6,966	8.4	49	1.5	7,015	8.1
Other thermoplastic resin	6,498	7.8	172	5.1	6,670	7.7
Other plastics and resins	3,536	4.3	-	-	3,536	4.1
Total	82,876	100.0	3,365	100.0	86,241	100.0

Source: Trade Statistics of Each Country

Notes: 1) Resin content in PVC compound and film is assumed as 0.50.

2) Resin content in PVC supported sheet is assumed as 0.25.

3) Resin content in regid PVC intermediate product is assumed as 1.00.

1-3 Product-wise Demand Structure

Table VI-5 is the result of the arrangement of product-wise, area-wise and scale-wise sorting, based on data issued by the Department of Light Industry, Ministry of Industry of Indonesia, from which an approximate product-wise demand structure could be made for Indonesia, viz., in view of the small exports of products, production and the apparent demand are regarded to be the same. Table VI-6 is a summary of Table VI-5 arranging it into product-wise and area-wise classifications, from which, total production amount to a small quantity, about 36,000 tons, the results shown below are obtained as the macroscopic demand structure.

Table VI-5 Recapitulation of Plastic Industries (1972)

Notes:

0 = Number
1 = Region
2 = Number of firms
3 = Classification - Big
4 = " - Medium
5 = " - Small
6 = Unit per year
7 = Production Capacity
8 = Others

Plastic Sacks

0	1	2	3	4	5	6	7	8
1.	North Sumatra	9	2	7	-	ton	1,500	
2.	D.K.I. Jakarta Raya	10	1	3	4	ton	373.6	2 of them no explanation
3.	West Java	25	2	8	15	ton	1,185.6	
4.	Central Java	25	2	4	19	ton	1,564.1	
5.	East Java	25	6	5	13	ton	1,277.5	1 of them no explanation
	Total	94	13	27	51	ton	5,902.8	

Rope

1.	North Sumatra	4	3		1	ton	880	
2.	D.K.I. Jakarta Raya	10	6		1	ton	1,599	3 of them no explanation
3.	East Java	18	6	2	9	yard ton	3,300,000 1,208	
		32	15	2	11	ton yard	3,687 3,300,000	

Household Ware

1.	North Sumatra	2	-	2	-	ton	150	
2.	D.K.I. Jakarta Raya	6	3	3	-	piece	2,789,000	
3.	West Java	1	1	-	-	ton	500	
4.	East Java	2	2	-	-	ton	575	
		11	6	5	-	ton piece	1,225 2,789,000	

Flexible & Rigid Urethane Foam

0	1	2	3	4	5	6	7	8
1.	D.K.I. Jakarta	4	3	-	-	bale sheet ton	4,500 330 300	1 of them no explanation
2.	Jawa Timur	1	-	1	-	ton	360	
		5	3	1	-	bale sheet ton	4,500 330 660	

Electric Wire Covering

1.	Jawa Timur	1	-	1	-	ton	75.6	

Plastic Bottons

1.	D.K.I. Jakarta	10	2	-	1	gross	77,000	7 of them no explanation

Various Plastic Products

1.	Sumatra Utara	37	-	2	35	ton	201.6	
2.	D.K.I. Jakarta	26	4	7	2	piece pair ton	31,624,849 572,796 1,200	13 of them no explanation
3.	Jawa Barat	42	-	4	37	ton	849.5	
4.	Jawa Tengah	3	-	-	3	ton	60	1 of them no explanation
5.	Jawa Timur	58	5	4	45	ton	1,770.55	4 of them no explanation
		166	9	17	122	ton piece pair	3,001.65 31,624,849 572,796	

Plastic Sandals

1.	Sumatra Utara	8	2	5	1	ton	754	
2.	D.K.I. Jakarta	21	13	4	3	pair	30,114,796	1 of them no explanation
3.	Jawa Barat	4	4	-	-	ton	780	
4.	Jawa Timur	5	3	2	-	ton	1,395	
		38	22	11	4	ton pair	2,923 30,114,796	

Woven Plastic Bags

1.	Sumatra Utara	2	2	-	-	sheet	4,300,000	
2.	D.K.I. Jakarta	6	6	-	-	sheet	24,500,000	
3.	Jawa Barat	7	7	-	-	sheet	18,000,000	
4.	Jawa Timur	8	8	-	-	sheet ton	11,000,000 1,752	
		22	22	-	-	sheet ton	58,243,000 1,752	

Tooth Brush

0	1	2	3	4	5	6	7	8
1.	D.K.I. Jakarta	3	1	1	1	piece	7,840,000	
2.	Jawa Tengah	1	1	-	-	ton	245	
						piece	7,840,000	
						ton	245	

Plastic Bottles & Cap Seals

1.	D.K.I. Jakarta	2	1	1	-	piece	12,000,000	
						ton	60	
		2	1	1	-	piece	12,000,000	
						ton	60	

Corrugated Sheets

1.	D.K.I. Jakarta Raya	1	1	-	-	sheet	600,000	

Plastic Pipes

1.	D.K.I. Jakarta Raya	2	2	-	-	ton	1,626	

Plastic Sheet/Carpet/Artificial Leather

1.	D.K.I. Jakarta Raya	11	10	-	-	yard	2,580,000	1 of them no explanation
						ton	1,079	
		11	10	-	-	yard	2,580,000	
						ton	1,079	

P.V.C. Compound & Plastic Wares

1.	D.K.I. Jakarta Raya	6	6	-	-	ton	26,000	
						piece	360,000	
		6	6	-	-	ton	26,000	
						piece	360,000	

Plastic Board

1.	D.K.I. Jakarta Raya	3	3	-	-	sheet	540,000	
						ton	1,000	
		3	3	-	-	sheet	540,000	
						ton	1,000	

Table VI-6 Region-wise, Product-wise Distribution of Plastic Industry in Indonesia

(Unit: tons)

	Sumatra	Jawa				Total
	North	Jakarta	West	Central	East	
Household ware	150	1,580[1)]	500	-	575	2,805
Tooth brush	-	392[4)]	-	245	-	637
Plastic sandal	754	1,500[2)]	780	-	1,395	4,429
Carpet, imitation leather	-	1,079	-	-	-	1,079
Corrugated board	-	600[5)]	-	-	-	600
Plastic board	-	1,000	-	-	-	1,000
Pipe and fittings	-	1,626	-	-	-	1,626
Electric wire coating	-	-	-	-	76	76
Plastic foam	-	300	-	-	360	660
Plastic bag	1,500	374	1,186	1,564	1,278	5,902
Woven bag[3)]	690	3,920	2,880	-	1,752	9,242
Rope and net	880	1,599	-	-	1,208	3,687
Plastic bottle cap seal	-	60	-	-	-	60
Plastic button	-	77[7)]	-	-	-	77
Miscellaneous	202	1,200	850	60	1,771	4,083
Total	4,176	15,307	6,196	1,869	8,415	35,963
%	11.6	42.6	17.2	5.2	23.4	100.0

Source : Table VI-5

Notes: 1) 500g x 2,789,000
2) 50g x 30,114,796
3) 160g/lember
4) 50g/buah
5) 1000g/lember
6) 500g/lember
7) 1000g/gross

Classified the above application-wise demand structure, while it lacks some accuracy, the following table could be obtained:

Compared these figures with 1972 resin-wise demands as given in the preceding paragraph, tabulation of LDPE is extremely small, and others are giving a coverage of about 60%.
Reason for the extremely poor coverage for said LDPE seems to be due to the fact that it is being used mainly for packaging film, household wares and sundry goods, and all of which are being manufactured by small-scale makers so that getting hold of them statistically is rather difficult.

Supposing that the high-density polyethylene coverage is 60% too, 1972 demands for said resin becomes 15,200 tons, and if deducted this from polyethylene total of 42,672 tons, the demands for LDPE becomes 27,472 tons. Accordingly, the ratio between LDPE and HDPE is about 5:3.

Considering the fact that most of LDPE are used for household wares, sundry goods and packaging films, a trial Table VI-7 is obtained as the demand structure with some corrections on the above application-wise demands.

Compared Table VI-8 which rearranged for convenience with 1969 Japanese synthetic resin demand structure surveys (Table VI-9), it is found that as far as household wares, packaging film and other packaging materials are concerned, the ratio of Indonesia is approximately the same as that of Japan, but the major differences are higher sandal ratio in Indonesia and lower ratio on industrial materials.
For the purpose of analyzing demand structure of plastics products from the monetary aspect, tabulations were made compiled in Table VI-10 from the industrial statistics issued by the Central Statistic Bureau of the Indonesian Government.

Home use items	62.6%
Industrial use	8.0
Packaging use	29.3

Thus, the production of home use items, vs, demand is in the majority. It seems that in the future a higher demand for packaging material and industrial uses should be developed. Sandals are put into the category of home use items, the total amount is higher than 36% which shows strong demand.

1-4 Area-wise and Scale-wise Distributions of Processors

1-4-1 Area-wise distribution of processors

In Table VI-11, the area-wise and product-wise statistics are given by sorting the figures in Table VI-5. Plastics processors are said to be either 1,000 or 1,200 in number, while the numbers of officially registered processors are about 400. Because of the arrangement by product of Table VI-5, some of the processors are recorded in duplication. However, in view of the necessity of knowing the location of product-wise processors, the tabulations were made all inclusive. Number of processors and the distributuion of production quantity are as follows:

Table VI-7 Product-wise Plastic Demand Structure in Indonesia (1972)

Unit: tons (%)

	PVC (Converted to Resin)	P E		PS	PP	Others	Total
		LDPE	HDPE				
Household Utensils	120	1,170	960	1,000		350	3,600
	(0.3)	(2.8)	(2.3)	(2.4)		(0.8)	(8.7)
Tooth Brush				600		37	637
				(1.5)		(0.8)	(1.5)
Plastic Sandal	1,993	443					2,436
	(4.8)	(1.1)					(5.9)
Carpet Leather	270						270
	(0.7)						(0.7)
Corrugated Board	600						600
	(1.5)						(1.5)
Plastic Board	800					200	1,000
	(1.9)					(0.5)	(2.4)
Pipe	1,626						1.626
	(3.9)						(3.9)
Electric Wire	38						38
	(0.1)						(0.1)
Urethane Foam						660	660
						(1.6)	(1.6)
Plastic Bag	11,800				472		12,272
	(28.6)				(1.1)		(29.7)
Woven Bag		3,400			5,842		9,242
		(8.2)			(14.1)		(22.4)
Rope and Net		3,300			387		3,687
		(8.0)			(0.9)		(8.9)
Cap for Bottle		20			10	30	60
		(0.0)			(0 0)	(0.1)	(0.1)
Plastic Button						77	77
						(0.2)	(0.2)
Others	180	1,760	1,440	1,500		238	5,118
	(0.4)	(4.3)	(3.5)	(3.6)		(0.6)	(12.4)
Totals	5,627	15,173	9,120	3,100	6,711	1,592	41.323
	(13.6)	(36.7)	(22.1)	((7.5)	(16.2)	(3.9)	(100.0)

Table VI-8 Application-wise Demand Structure of Plastics Materials in Indonesia (1972)

(Unit: tons)

		PVC (resin)	PE		PS	PP	Total (%)
			LDPE	HDPE			
Film Sheet	Plastic bag Woven bag Rope (pp) Carpet Leather	270	11800	3400		6701	22171 (55.8)
Daily utensils Sundry goods	Household utensils Caps Tooth brush Others	300	2930	2420	3100	10	8760 (22.0)
Construction materials	Pipe Corrugated board Board	3026					3026 (7.6)
Industrial use	Electric wire Urethane foam Rope & net (PE) Botton			3300			3338 (8.4)
Footwear	Plastic sandal	1993	443				2436 (6.1)
		5627	15173	9120	3100	6711	39731

Table VI-9 Application-wise Demand Structure of Plastics in Japan (1969)

(Unit: %)

	Thermo-setting resin	Thermo-plastic resin	Synthetic resin	Domestic molded article 2)
Packaging	0.8	21.4	17.1	24.2
House building & construction	11.4	14.6	13.9	20.0
Autmobile & vehicle	0.9	2.1	1.8	2.6
Ships & boats	0.3	0.1	0.1	0.1
Electric & communi-cation equipment	4.2	9.6	8.5	12.1
(of which household electric equipment)	(1.3)	(5.3)	(4.5)	(6.4)
Other mining industries	1.2	1. 1.7	1.6	2.3
Agricultural film	-	2.3	1.8	2.6
Daily utensils & sundry goods	7.2	8.7	8.4	11.9
Export	0.5	15.8	12.6	-
Adhesives	42.7	1.9	10.4	-
Paints (general)	14.8	0.5	3.5	-
Resin processing	7.2	2.2	3.2	-
Others 1)	8.8	19.1	17.1	24.2
Total	100.0	100.0	100.0	100.0

Notes: 1) Inclusive of stretched tapes, yarns, monofilament, fibers, leathers, etc.

2) Except for exports, adhesives, paints, resin processing

Source : Survey Report on synthetic resin demand structure for 1970

Table VI-10 Production Amount of Plastic Products (1971) (Unit: 10^3 Rp)

	Establishment		Total
	Large	Medium	
No. of establishment	30	196	226
Household ware	170,298	44,224	214,522
Tooth brush	159,260	2,079	161,339
Sandal and shoes	448,502	83,467	531,969
Toy	896	9,669	10,565
Plastic sheet	7,473	34,291	41,764
Carpet	10,393	2,125	12,518
Hose		9,499	9,499
Pipe and fitting	48,318	3,854	52,172
Plastic bag		244,016	244,016
Jelly can	612	15,372	15,984
Bottle		33,364	33,364
Case for packaging	389	10,026	10,415
Rope and lace	3,048	126,006	129,054
Plastic foam		2,036	2,036
Button	514	2,902	3,416
Records and casette	7,705		7,705
Auxiliary products	262	2,961	3,223
Total	857,670	625,891	1,483,561

Table VI-11 Distribution of Plastic Processing Firms (1972)

	Sumatra North	Java				Total
		Jakarta	West	Central	East	
Household ware	2	6	1		2	11
Tooth brush		3		1		4
Plastic sandal	8	21	4		5	38
Carpet, imitation leather		11				11
Corrugated board		1				1
Plastic board		3				3
Pipe and fittings		2				2
Electric wire-coating					1	1
Plastic foam		4			1	5
Plastic bag	9	10	25	25	25	94
Woven bag	2	6	7		8	23
Rope and net	4	10			18	32
Plastic bottle cap seal		2				2
Plastic button		10				10
Miscellaneous[1)]	37	32	42	3	58	172
Total	62	121	79	29	118	409
%	15.2	29.6	19.3	7.1	28.9	100.0

Source: Table VI-5

Notes : 1) Including PVC compound

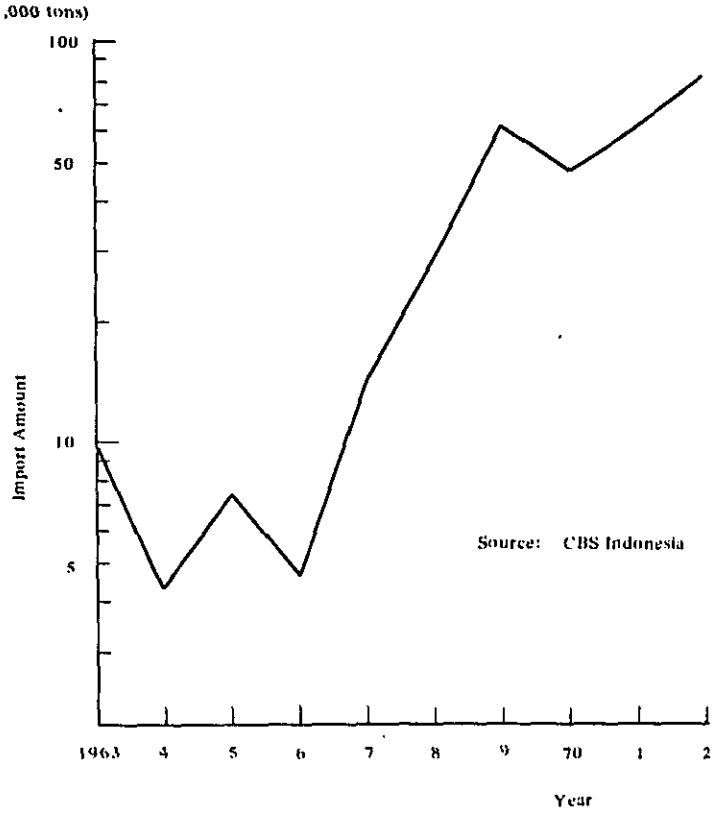


Figure VI-2 Importation of Plastic Materials in Indonesia

	Distribution of processors (%)	Distribution of production (%)	Output per processor (t/y)
North Sumatra	15.2	11.6	67
Jakarta	29.6	42.6	127
West Java	19.3	17.2	78
Central Java	7.1	5.2	64
East Java	28.9	23.4	71
Indonesia	100.0	100.0	88

Most processors are concentrated in Jakarta and East Java especially in the Suravaya vicinity, each of them occupying 30% of the total producers, followed by West Java (Bandung and Bogor) approx. 20%, then North Sumatra (Medan) about 15%, and last by Central Java (Semalan) with 7%. There are more processors which do not appear in the statistics, in other cities, Palembang, Jogjakarta, etc., which are only small percentage compared with the 5 areas mentioned.

Distribution of production does not necessarily show the distribution of product demand, but it may be considered that it indicates the demand for plastics material and may assist in determining the size of the market. Production distribution is considerably different from the distribution of processors - Jakarta has more than 40%, however, all other areas have smaller production ratios than the number of processors would indicate. This is due to the fact that production output of each processor differs by area.

It is noted that the average production output of processors in Jakarta is larger than any other area as shown in Figure VI-3.

Plastics products, those items which are manufactured throughout Indonesia are:

Plastic films and bags
Ropes
Household items
Sandals
Cloth bags

other products are still limited to the city of Jakarta and vicinity.

1-4-2 Scale-wise distribution of processors

Processors listed in Table VI-5 are classed as large, medium and small:

	Large	Medium	Small	Unknown
Number of processors	114	66	189	39

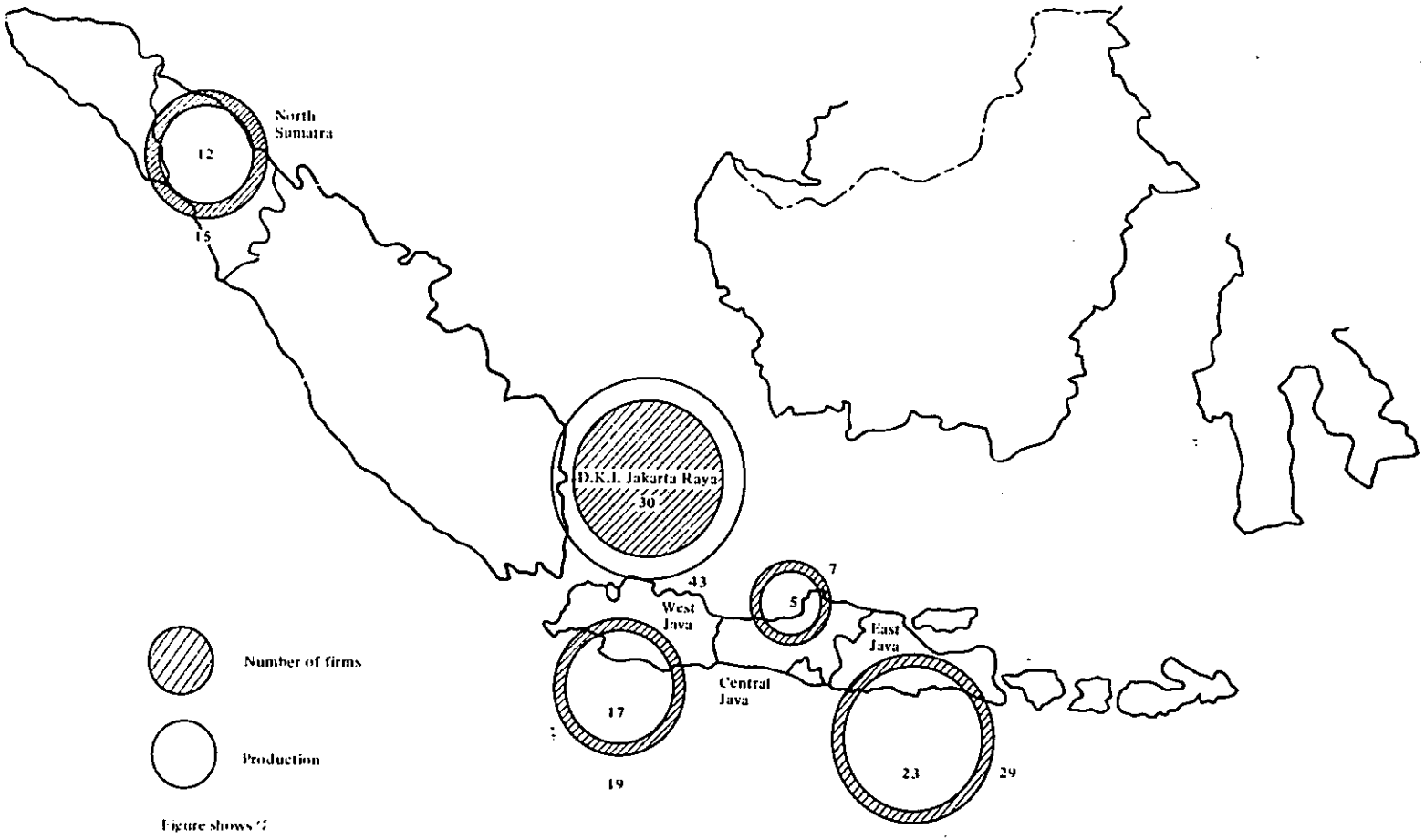


Figure VI-3 Distribution of Plastic Processing Firms and Production of Plastic Products

The above classification was accomplished on production output on the basis of this criteria - more than 101 t/y capacity - large processors, 100 - 50 t/y medium and less than 50 t/y smaller. There are about 10 processors who are making more than 500 t/y.

The list of plastics molding plants obtained from the Department of Light Industry, Ministry of Industry of Indonesia is classified by the largeness of the capital amount.

According to the above data, regardless of Domestic Law or Foreign Investment Law, those processors having a capital amount of Rp. 100 - 500 million (US$240 - 1,200 thousand) are in the majority. Those processors which are not registered are smaller (approximately 1,000), hence the processors having capital amounts of more than Rp. 100 million are slightly over 70 (approximately 5%).

Indonesian plastics processors having a comparable scale to those in Japan, may be grouped in medium and smaller categories (with a capital amount of less than ¥50,000,000). Therefore, it may be considered that most of them have not yet grown out of the small classification.

1-4-3 Distribution on the basis of capital formula

According to Indonesian Foreign Investment Law, no foreign investment in the plastics processing industries is permitted, yet it seems that some special groups allowed to invest foreign capital.

According to the aforementioned data issued by the Department of Light Industry, sixteen (16) foreign corporations are involved in plastics production already. As shown earlier, most investments of foreign capital are in this range, Rp. 10,000,000 - 30,000,000 (8 firms). These foreign corporations are involved in highest technical fields requiring a large amount of capital and equipment for the production of PVC compound, PVC pipe, PVC calender sheet, leather, cloth bag, etc.

Chapter 2. Status of Plastics Processing Industries

2-1 Survey of Present Status

Based on the data issued by the Department of Light Industry, visitations were made selecting the parties for investigation and survey. We appreciate all the assistances and courtesies shown us by the officers in charge at the Department of Chemical Industry and the District Office as all the courtesies extended to us were very beneficial. Through the entire visit, these officers accompanied us and this resulted in the acquisition of detailed and accurate status and up-to-date information from the visited parties.

We might and herewith that on the performance of the present investigations and surveys, we are much indebted to the able cooperation given us by Industrial & Legal Consultants Ltd. (ILC) for the selection of and exchange of various information.

2-1-1 Selection of the visiting processors

Companies to be surveyed were selected not only from large-scale industries but also from all levels of processors on a random basis. Number of firms to be surveyed in each region was decided according to the number of registered firms from the same type of processing group.

Some of the randomly selected processors did not exist at the described location or had already gone out of business. On such occasions, some changes had to be made accepting the opinions of the officers who were well informed of the actual situation.

In Annex II the list of registered Indonesian processors is given and also notes those firms visited.

2-1-2 Result of status surveys and investigation

These results are described in Annex III. In this section, they were summarized.

(1) Access to information

There were differences in the degree of accessibility of information by region.

(a) Jakarta

Most of the smaller and medium sized processors are located in the old city called "Kota", thus some of them no longer exist at the described location, and searches were unsuccessful, even after enquiries from the neighbours.

Since it is time-consuming to set an appointment through telephone calls, we had to make a pre-visit prior to the main visit. On some occasions, even though we had an appointment with them, they refused to give us the information we enquired about.

There were some occasions that the visited parties listened to all our questions, promising us that they would reply to us in writing, yet no answer has been received.

The acquisition of information about Jakarta was very hard, due to students riots, etc., thus the results were poor.

(b) West Java

Information collection activities were performed concentrating in Bandung city, where, by virtue of the very accurate information already acquired by the competent officers by the District Office, thus required information was obtained within a short period and full of very valuable data.

(c) East Java

Six visitations were made centering around the Surabayan area. All of them were very cooperative to the present surveys and investigations, and we can say that the information obtained therefrom is well-balanced compared with other areas.

(d) Central Java

Three firms were visited who were engaging in the plastics processing in Semaran city and a sufficient amount of information was obtained in a short period of time, which was presumably due to the recent establishments of these firms.

(e) North Sumatra

All the involved officers from the District Office must have been very busy due to the duplication of surveys and investigation missions for the industrial complex project and other projects. However, all of them who accompanied us, dispatched by the Department of Chemical Industry and District Office, were very favorable and cooperative enabling us to accomplish most of our purposes. Throughout these visitations, we would observe the fact that each firm was rather cautious about answering questions we put on them.

(2) Plastics raw materials

(a) Quantity

Supply of raw materials for plastics are mainly from Japan, as high as 80% for the Indonesian plastics industries, as given in the Figure VI-4, from which it will be noted, a very rapid increase occurred from about 1968 to 1972 when, as a result of the Japanese production cartel formation and also due to the increase of the demand from the Japanese domestic market, the exports during 1973 dropped from 1972 or showed a decreasing trend. Therefore, the development and growth of plastics industries in developing countries were rather inhibited.

The dissatisfaction in these plastics processing industries are more against supply shortage of raw materials rather than on the rise of the prices.

However, we should point out that many of the firms replied that they do have a stock level of materials for about 3-6 months. We do not know, whether such a stock level is their ordinary stock or whether the stock resulted from the supply tightness. It may be safe for us to consider the replied level of stock to be their ordinary stock level in light of the size of the operating fund.

(b) Pricing

Also in Figure VI-4, indications were made on the fluctuations of FOB Japan prices for the past several years, from which it will be noted that there have been a lot of rapid price increases they were set in 1973. It was one of our major purposes to find out the effect was on the latest Indonesian plastics products market, resulting from such a rapid price rise, but, as mentioned in the preceding paragraph, many firms have material stocks on hand and were not so dissatisfied while commenting that the price of the product could not keep pace with the rise in raw material prices.

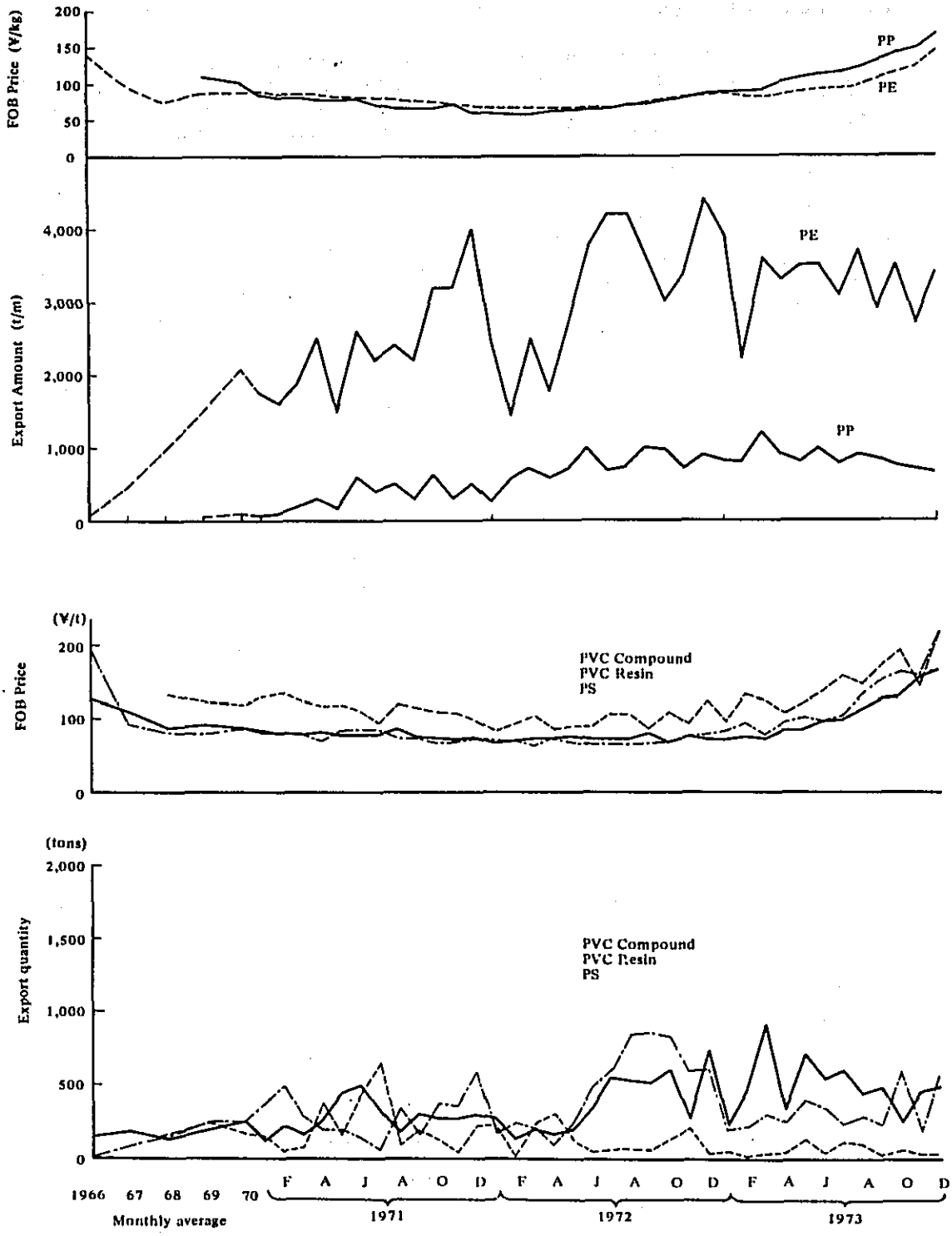


Figure VI-4 Export Amount and FOB Price of Plastic Materials from Japan

In the leading processing firms, it was found that they were engaging in importations, and also acting as material suppliers. Some are making imports of raw materials directly, utilizing importers located in Singapore. But generally purchases of plastics raw material are being made through distribution channels such as wholesalers, thus the market price is high, about 2 times that of the C&F price. In Figure VI-5, an example of the market price of polyolefin and polystyrene is given note).

Note: Obtained from Berlina (Surabaya)

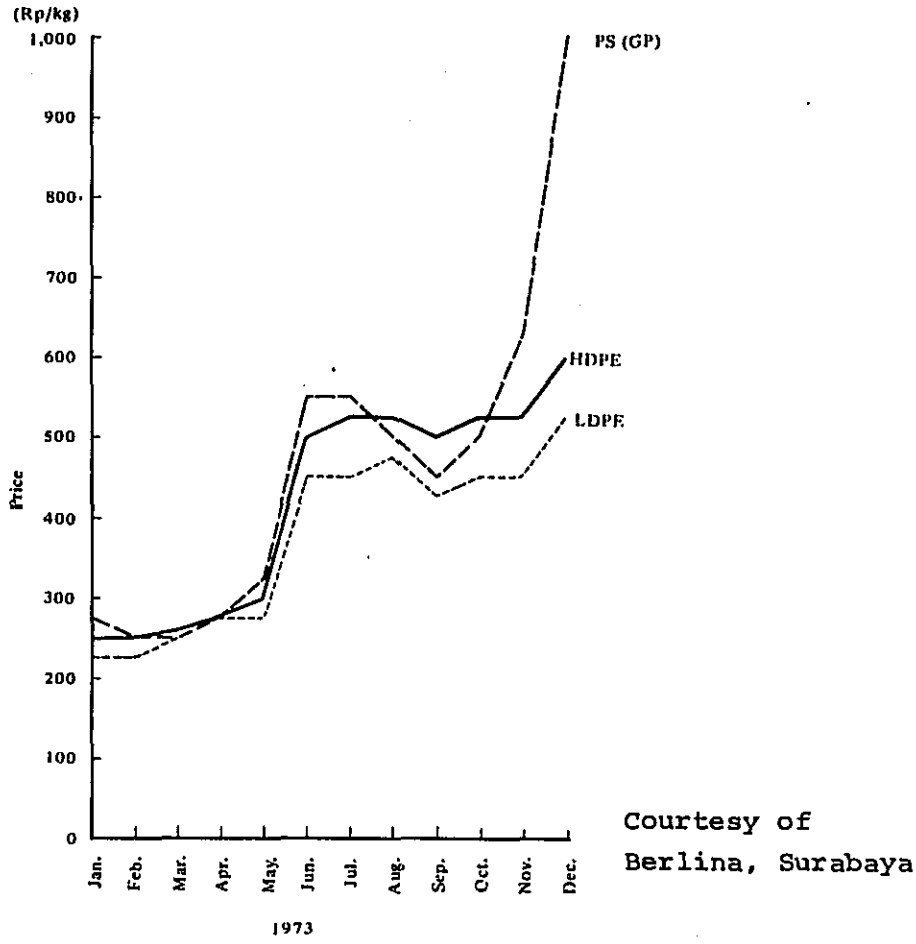


Figure VI-5 Market Price Change of Plastic Materials in Indonesia

According to the Figure VI-5, compared with January 1973, polyethylene price has doubled and polystyrene price, imagine, 4 times quadrupled in December. The FOB prices in Japan as given in Figure VI-4 are also indicative of a similar rising trend with a relatively smooth increase, but the rapid rise in market prices in June, in Indonesia, is presumed to be due to the distribution situation in the domestic market. The prices until November had not fluctuated much, but showed a jump in December.

All the information obtained on plastics raw material are listed as follows.

	C&F(Rp/kg)		Market price (Rp/kg)		
	1973		1973		1974
	Mid-year	Year-end	Mid-year	Year-end	January
LDPE	150	300		500 - 600	700
HDPE		300		500	700
PP		300		600	700
PVC 1)	290	400	500	600	1,500
PS		290		500	800

NOTES: 1) Compound

2) Median prices are given

(c) Quality

In reference to polyolefin, the demand for polypropylene was less than that of polyethylene, most use of them are directed to film, stretched tape, and there is not much used for injection molded items, which is due to the fact that most of related concerns in Indonesia consider polypropylene molded items are lacking in mechanical strength. However, it is presumed that the reason is not due to raw material but due to the molding conditions, of which, a further study should be made.

According to PVC compounds when directed to special applications such as electric wire and/or cable, it is said that the Indonesian compound makers are still incapable of making a good compound viewed from the quality guarantee aspect.

(3) Molding and processing facilities

The Indonesian plastics industry has a long historical background, however, it is only in the last several years that it shown rapid growth. Subsequently, most of the machinery, equipment and other devices are being imported either from Japan or Hong Kong, or Formosa.

The majority of imported machinery from Japan is manufactured by the medium-scale machine makers who are specialized in such fields. All of them have comparatively lower prices for the excellent features and performances. However, for lower prices no longer exist in Japan the number of plastic molding machines from Japan is very low (as shown in Table VI-12), and in place of the Japanese equipment, we note a lot of equipment made in Hong Kong or Formosa are coming into Indonesia. However, the latter is not so popular in view of poor manufacturing experiences resulting in a lower productivity level.

Table VI-12 Exports of Plastics Molding Machines from Japan to Indonesia

	Numbers					10^3¥				
	1969	1970	1971	1972	1973	1969	1970	1971	1972	1973
Hydraulic presses	16	20	93	23	48	40,459	28,349	40,360	94,827	61,408
Parts of hydraulic presses	100	10	969	125	2,020	331	82	1,807	457	5,301
Extruders	2	8	33	27	21	3,264	43,094	148,276	130,645	267,157
Transfer moulding machines	1	-	-	-	-	7,129	-	-	-	-
Injection moulding machines	15	24	20	63	59	62,227	133,916	144,151	503,056	368,282
Presses (excluding hydraulic presses), moulding machines, kneading machines and extruding machines	46	27	29	18	7	136,741	21,079	44,949	86,930	18,228
Parts of presses (excluding hydraulic presses), moulding machines, kneading machines or of extruding machines	1,337	1,089	35,382	10,972	7,438	2,656	1,759	24,015	27,025	7,479
Total	-	-	-	-	-	252,807	228,279	403,558	842,940	727,855

Source: Japan Foreign Trade Statistics

Mold for use in injection molding are presently being imported, from Japan and Hong Kong, both new and used. However, larger processing concerns are capable of making mold repairs and are able to make medium-size molds by themselves as they are engaged in various diversified fields under their managerial control.

(4) Man power and wages

Lower rate of production quantity vs. unit working hour of the processing facilities is generally adequate until such time the product market grows. For the purpose of exhibiting maximum available productions by given molding and processing facilities, it is needless to mention that selection of required production facilities, engineers to be assigned, training of the workers in the line, etc. are mandatory.

One of the remarkable characteristics of the Japanese plastics processing industries is their horizontal structure, viz., plastics film makers would produce only the film, printing thereon is done by the printing companies, then given to the bag makers, and finally delivered to the wholesalers. Moreover, molders would engage only in molding work, the secondary work of processing which would require rather labor-concentrating steps, would be subcontracted to smaller firms.

In Indonesia, there is no such a vertical assignment and no related industry is developed yet, hence they shall have to do secondary processing in the same plant. As a result, they shall have to employ a large number of workers on daily basis, besides the regular employees. These temporary, daily workers will get the wages of those actually worked days, and may be called part-timers.

Based on the information obtained through present survey, latest wage scales are sorted as below while there are some differences by the area:

	Rp/mth
Foreman	20,000
Skilled workers	7,000 - 15,000
Unskilled workers (male)	5,000 - 10,000
(female)	4,000 - 8,000
Part-timers (male)	3,000 - 4,000
(female)	2,000 - 3,000

provided, however, the wages for part-timers are based on 25 workdays in a month, and the daily wages are converted to the monthly salary.

(5) Utilities

Some of the smaller firms are purchasing electric power from the national corporation, PLN, but generally most of the firms use a system of purchases and power generation by their own generating facilities.

Power generators are primarily made in European countries and in the U.S.A. A comparatively large amount of heat is required for the plastics processing, the facilities cost for power generating

equipment is not small compared with cost of the facilities required for the molding and processing.

However, because of low fuel cost, the self power generating cost is less than the power purchased from PLN if a sufficient time for depreciation of equipment is set.

Cooling water plays an important role in plastics processing. From our surveys and investigations, the required water is pumped from wells in sufficient quantity.

(6) Plastics product

Major products and kinds of plastics produced in Indonesia are already given in the column 1 - 3, of which most are home use items:

(i) Basin
(ii) Baby bath tub
(iii) Face-washing basin, buckets
(iv) Tablewears
(v) Bowls
(vi) Ladle
(vii) Fruit and candy container or box
(viii) Shopping basket

(a) Quality

Design and quality are on an acceptable level as far as the articles for home uses are concerned.

Sandals made by plastics are still limited in kinds, and it is said, that in the future, better quality items made from PVC leather will be increasing. However, at present no PVC leather is produced in Indonesia.

Demand for PVC pipe is also expected to increase when quality improves, some uses are electrical conduit, water pipe, etc., and the production of more than 50mmø PVC pipes would be the major items in these fields. At present, however, no production setup is ready yet.

Electric wire sheathing is still in the initial stage. Therefore, demand for PVC insulated wire will continue for the time being. Earlier remarks were made about the fact that production of a quality compound has not been reached.

There are only LDPE and polypropylene for plastics film, and the usage is a simple bag.

The woven bag has been the most popular item, since its introduction in Indonesia, and such 'cloth bag' is being utilized for the packaging of fertilizers, rice, and various cereals. It should be pointed out that there is still a lot of room for further quality improvement paying more attention to fluctuation in strength and denier. A similar situation exists in the case of monofilament, used in the manufacture of rope.

(b) Prices of plastic products

Information on current product prices was obtained from various firms. In view of the recent wide fluctuation in raw material prices, information may not be regarded to be complete.

Price information obtained from a firm in Medan about the sales price calculation method is very simple and interesting. Allow us to introduce it:

$$\text{(Sales price)} = \Big\{ \text{(main raw material)} \times (1 + 0.1)_{\text{processing cost}} + \text{(auxiliary raw material)} \Big\} \times (1 + 0.1)_{\text{profit}}$$

viz., the processing cost is 10% of the main raw material, and the profit is 10% of the total. Suppose that the cost for the auxiliary step (packaging cost, etc.) is now assumed to be 10%, the added value obtainable from this equation is only 17% which is extremely low. Therefore, the actual selling price might have, or, must have been set at a much higher level, depending on the market situation. For those items that require long secondary processing step, such as the woven bag, having to go through weaving, sewing, etc. after the stretched tape is produced, the cost of the secondary processing steps are approximately 20% of the price on the stretched tape, which is the raw material.

2-2 Managerial Parameter for the Plastics Processing Industries

Based on the industrial survey data on each industry issued by the Central Statistics Bureau, studies were made on cost parameter and productivity of the processing industries in Indonesia, which was then compared with that of Japan and Singapore.

2-2-1 Cost parameter

Table VI-13 was prepared from the industrial survey report rearranging it into each cost element so that the comparison would be easily performed. By mentioning "big firm" and "medium firm", they were meant to have more than 50 employees or less than 49 employees, or by the size of the driving power, in which a small number of home industry (no salary payment is done) is included.

Compared Indonesian cost parameters with those of Japan and Singapore, the constituent ratio about 1971 data are as follows:

Table VI-13 Average Cost Estimation of Plastic Processing Industries in Indonesia

Year		1970				1971			
Class		Large		Medium		Large		Medium	
Number of firms		23		171		30		196	
		US$	%	US$	%	US$	%	US$	%
Material cost	Material	44,804	45.2	5,093	50.4	36,678	38.2	5,125	65.4
	Auxiliary material	1,888	1.9	1,002	9.9	5,988	6.2	116	1.5
	Packing material	1,653	1.6	60	0.5	2,384	2.5	34	0.4
	Sub-total	48,345	48.7	6,155	60.8	45,050	46.9	5,275	67.4
Labour cost	Wages and salaries	18,234	18.4	2,223	22.0	15,458	16.1	1,309	16.7
	Cost of work done by others	12	0.0	54	0.5	46	0.0	20	0.2
	Sub-total	18,246	18.4	2,277	22.5	15,504	16.2	1,329	17.0
Machine cost	Depreciation	3,764	3.8	113	1.1	4,792	5.0	89	1.1
	Repair and maintenance	1,194	1.2	116	1.1	3,350	3.5	96	1.2
	Rent for building & equipment	287	0.3	25	0.2	191	0.2	30	0.4
	Sub-total	5,245	5.3	254	2.5	8,333	8.7	215	2.7
Utility cost	Fuel	2,599	2.6	557	5.5	2,889	3.2	240	3.1
	Electricity	-	-	288	2.8	709	0.8	161	2.1
	Gas	749	0.7	-	-	-	-	-	-
	Water	-	-	-	-	-	-	-	-
	Sub-total	3,348	3.3	845	8.4	3,598	4.0	401	5.1
General administration cost	Administration & distribution cost	4,062	4.1	112	1.1	2,916	3.2	272	3.5
	Interest paid	8,717	8.8	112	1.2	10,328	11.4	40	0.5
	Tax (excl. profit tax)	3,220	3.2	221	2.2	2,545	2.8	259	3.3
	Others	8,045	8.1	128	1.3	2,398	2.6	42	0.5
	Sub-total	24,044	24.2	583	5.8	18,187	20.1	613	7.8
Grand Total		99,228	100.0	10,114	100.0	90,672	100.0	7,833	100.0
Sales Amount		114,201	115.1	12,204	120.7	95,997	105.9	9,159	116.9

Source: Statistik Industri 1970, 1971 Biro Pusat Statistik
Hasil Pengolahan Data Perusahaan 2 Industri Besar & Sedang

Notes: Figures show average cost of firm in US$/year
1 US$ = 378 Rp.

(Unit: %)

	Indonesia	Singapore	Japan
Raw materials cost	64.8	67.6	50.0
Personnel cost	17.0	15.7	25.0
Facilities cost	3.6	8.6	5.6
Utilities cost	5.1	2.7	1.3
General administration cost	9.5	5.4	18.1

Indonesian figures are the average of "big" and "medium" firms, mentioned above, which are the total average of the processing industries. In the comparisons of three countries as given in the above table, Indonesia is characteristics of lower facilities cost and higher utilities cost. Furthermore, personnel cost is not so low in spite of the lower wages and salaries.

Difference between the sales price and total costs, viz., the comparison of estimated profit in percentages are as follows:

Indonesia (total average)	15.4%
Singapore	15.5
Japan	14.4

thus, as is seen from the above, there is almost no difference at all.

According to Table VI-13,it is observed that in Indonesia there is a lot of scale difference between "big" firms and "medium" firms. Comparisons of these two groups for the year 1971:

(Unit: %)

	Big firms	Medium firms
Raw materials cost	46.9	67.4
Personnel cost	16.2	17.0
Facilities cost	8.7	2.7
Utilities cost	4.0	5.1
General administration and sales cost	20.1	7.8
Estimated profit	5.9	16.9

thus, "big" firms have lower raw materials cost, and higher facilities cost and general administration and sales cost. Reason for higher general administration and sales costs with "big" firm is that they have to pay a monetary interest of 11.4%. On the contrary, "medium" firms have only 0.5% and as far as viewed from the statistics, the latter is in a more beneficial position in connection with required funds.

Compared 1970 and 1971 cost parameters for Indonesian processing industries, it is noteworthy that the estimated profit ratio lowered from 15.1% to 5.9% with the "big" firms, and "medium" firms from 20.7% to 16.9%. The year 1971 had the lowering of raw materials price compared with the previous year, so that the decrease in the profit ratio is considered due to the lowering of the product prices.

2-2-2 Productivity

(1) Labor productivity

Japanese personnel cost ratio is the highest which is due to the inclusion of subcontracting cost with personnel cost, when this is separated, the situation changes, viz., comparisons on 1971 are:

(%)

	Indonesia	Singapore	Japan
Wages and salaries	16.6	15.2	15.2
Sub-contract costs	1.7	0.5	9.7

thus, it will be observed that there is not much difference among the firms of 3 countries in the ratio of wages and salaries. Per capita production amount of direct laborer is much different, the comparisons of which are given in Table VI-14. Compared Indonesian average additive value per firm with that of Singapore and Japan, it is about 1/5 of Singapore and about 1/80 of Japan. Moreover, the comparisons of additive value direct laborer per capita resulted for Indonesia about 1/3 of Singapore and 1/27 of Japan.

Table VI-14 Labour Productivity of Plastic Processing Firms in Indonesia, Singapore and Japan (1971)

	Indonesia[1)]	S'pore	Japan
(1) Additive value[3)] (US$/firm/y)	10,106	48,026	801,092
(2) Direct labourers (persons/firm)	24	36	70
(3) Additive value per head (US$)	421	1,334	11,444
(4) Wages per head of direct labourer (US$/y	112[2)]	275	2,121
(5) (3)/(4) (US$/US$)	3.8	4.9	5.4

	"Big" firms	"Medium" firms
Additive value per one firm	50,902	3,864
Number of direct laborer per one firm (persons)*	95	13
Additive value per one direct laborer (US$)	536	297
Wages per one direct laborer (US$)	142	81
Additive value per unit wage (US$/US$)	3.8	3.7

Note: *) Average of the entire employees

Additive value per firm considerably differs depending on the firm's scale of activities. However, due to the existence of wage difference, the additive value per unit wage becomes almost the same.

(2) Capital productivity

In the present study, we have decided to make our studies on the productivity of tangible fixed asset out of the capital productivity. 'Tangible fixed asset' is herewith defined to include land lot, buildings, structures, machinery, equipment, office, machines, etc. and all the acquiring funds thereof. Theoretically and logically speaking, making a comparison of additive value amount with the capital outlay of the same year is an error. However, in view of the considerably higher venture effectivity of the plastics processing industries, such a comparison may become a certain kind of yardstick or criterion.

Table VI-15 shows the comparison of annual fluctuation amount of tangible fixed asset in Indonesia, and Table VI-16 shows the same of capital productivity in 1971 for 3 countries, Indonesia, Singapore and Japan. There is not much difference and Indonesia is a little higher.

Comparisons between the "big" firms and "medium" firms in Indonesia revealed the results of 8.0 for "big" firms and 14.1 for "small" firms in 1971, thus those "small" firms having less facilities cost have naturally higher capital productivity. Said situation is the same in Japan indicating extremely high capital productivity with the "small" firms having only less than 19 employees (> 30).

Table VI-15 Capital Transaction of Plastic Processing Firms in Indonesia

(Unit: 10^3Rp)

		1970			1971		
		Large	Medium	Total	Large	Medium	Total
Purchased from others	Machines and equipments including installation charges	139,714	86,746	226,460	146,701	25,526	172,227
	Major alternations & improvements	22,273	3,852	26,125	946	281	1,227
	Used fixed assets (domestic)	3,855	15,592	19,447	953	16,251	17,204
Total		165,842	106,190	272,032	148,600	42,058	190,658
Sales value of used fixed assets		70	24,503	24,573	21,803	15,015	36,818
Depreciation		32,720	7,277	39,997	54,344	6,579	60,923
Capital transactions		133,052	74,411	207,463	72,453	20,464	92,917
Number of firms		23	171	194	30	196	226
Capital transaction per firm		5,785	435	1,069	2,415	104	411

Table VI-16 Capital Productivity of Plastic Processing Firms in Indonesia, Singapore and Japan (1971)

	Indonesia[1)]	S'pore	Japan[2)]
(1) Capital transactions per firm (US$)	1,087	6,023	53,631
(2) Additive value per firm (US$)	10,106	48,062	415,343
(3) Capital productivity (2)/(1) (US$/US$)	9.3	8.0	7.7

Notes: 1) Average

2) Average of firms more than 20 employees

Chapter 3. Problematic Points with Indonesian Plastics Industry

3-1 Problematic points with Processing Industries

The points could be summarized to the following 3 points:

(1) Instability due to the supply shortage of raw material

(2) Shortages of engineers and skilled workers

(3) Low operational efficiency

3-1-1 Instability of material suppliability

Essentially the plastics market in South East Asian countries has hitherto been the outlet of excessive productions of Japanese plastics materials, which we consider is undesirable phenomenon, thus up until 1972 the transactions were carried out at a lower C&F prices than the prices in the domestic market in Japan. However, as a result of both production cartel in Japan and export cartel among exporting countries occurred in 1972, the quantity increase in South East Asian countries became no longer expected, and not only that the prices were constantly rising up exorbitantly.

(1) Increase of working capital

Instability of raw material suppliability leads naturally to the increase of stocks, and there is one example where the working capital amounts to 50% of the entire capital including the accounts receivables of the products. Reason for the large amount of interest payables of the "big" firms as given in Table VI-5 is not only due to the high monetary interest rate but also due to the large amount of working capital.

Among some small scale firms, our observations are that they are in difficulty to make proper funds scheduling, and some are receiving an advance payment from the order issuers.

(2) Double pricing system for raw materials

This is not only the fact with Indonesia only but in some large and leading processors establish Letter of Credit by themselves or make direct importations of raw materials required through utilizing importers in Singapore or Hong Kong. In such cases, the final delivery price becomes approximately 1.4 times of the C&F price. However, so-called market price is more than double the C&F price. Such being the case, the existence of double pricing system for raw materials puts small scale firms in a rather difficult position to maintain the company managements to keep up both ends meet.

As far as the sales of plastics products, sticking to the importations of only a limited amount of raw materials would result higher product price to keep good margin of profit, which, however, does not assist a healthy development and prosperity of the plastics industries in Indonesia. It is preferable to manufacture raw materials domestically as soon as possible for mutual benefits.

3-1-2 Shortage of engineers and skilled workers

Some leading processors, for example, are bringing capable and qualified engineers either from Formosa and/or Holland, etc. to assist their works. Also many firms are, as far as our observations are concerned, in lack of fully trained engineer. However, we might stress the absolute need of such engineers for the performance of design improvement, development of new products, for the purpose of which national-scale concentrated education of engineers and opening of various kinds of seminars are preferable.

Plastics processing is usually performed under 3 shifts system for the prevention of heat losses. However, most of the firms we visited were operating under two-shifts or no-shift system. This is due to the scale of market size, but some have opened that they had not enough skilled workers with them.

3-1-3 Low operational effieiency

It is frankly being admitted that some of the current facilities capability of Indonesian plastics processing industries are considerably huge compared with their output. This is due to, we might mention again, the smallness of the market size and lack of skilled workers in Indonesia,but it would be more attributable to the poor arrangement of the logistics of product distribution system. One another reason for the low operational efficiency is the shortage of raw material suppliability.

Generally processing industries are not good at availing themselves of up-to-date market information and are poor at R&D capability of new products. Besides these factors, they are not cooperation-minded among themselves resulting in frantic and dire competitions in the narrow market, only inviting hopeless lowering of product prices.

Indonesian processing industries are still under strong influence of so-called 'commercial capitals', thus they would still tend to procure production facilities and raw material when they are still in easy accessability to their hands of funds or capitals, and would manufacture products in good market situation for the good

sales, but they will suspend production once the market turns out to be contrary to their interests, which is also due to the reason for lower operational efficiency of the plant.

Once the market expands, specialized makers would appear in the market and general productivity inclusive of the operational efficiency will rapidly augment in all, thus the feasibility, profitability or other economics from the standpoint of industrial capital could become examinable. However, under the present situations there in Indonesia, contemplating to get such an industrial managerial parameter is almost impossible to be very frank.

3-2 Problematic Points of the Product Market

Those essential commodities designated by the Government under its 5 year economic program, for example, electric wire, pipe, etc. and other materials required by such industries established by the foreign capital of through introduction of techniques, etc. are subjected to a certain tax-holiday system for a decided duration. Most of these products are being imported, but the reasons are as follows:

3-2-1 Smallness in purchasing lot

For example, taken an example with the PVC pipes for the purpose of telephone conduit, these pipes are covered by the 5 year economic program under its category of 'telephone circuit increase' which is, however, mostly dependent upon the loans from overseas countries, thus no construction timing is clear in advance, loans from different countries to different locality of Indonesia result in the usage of specification of such telephone circuits of the borrowing overseas countries, which also result in the situation that Indonesia would not be in a position to manufacture on mass scale the same raw material for their own use, thus it is more advantageous for Indonesia to make importations of these raw materials inclusive of the pipes.

3-2-2 Processing techniques

Earlier mention was made as to the necessity of design and processing techniques improvements for the demand increase of plastics products. For example, packaging films for so-called 'instant noodle', said film is a composit film of cellophane/polyethylene, are being imported from Japan after printed. PVC leather consumed by automobile industry and furnitures requires high degree of technical standards and higher investment in the production facilities, and more important point is that the unit production quantity is extremely great. In the light of these factors prevailing therein, it might be necessary to unify the specification as far as feasible to lower the production cost.

Furthermore, an excessive acclimatization on the processing work of household articles, makes it difficult to put hands on the production of dimensionally accurate and rigorous items or industrial materials requiring highest mechanical strengths and properties, thus it would be necessary to establish good countermeasures and fundamental policies to concentratively upgrading the processing techniques of the highest standards to prevent such unbalanced growth of plastics industry.

PART III FUTURE OF INDONESIAN PLASTIC INDUSTRY AND THE CHANGE OF INDUSTRIAL STRUCTURE

Chapter 1. Forecast of Indonesian Plastics Market

1-1 Demand Forecast

Demand forecast on Indonesian plastics industry is described in UNIDO's Report. In this present chapter, a summarization thereof is made and will make some studies on the results.

1-1-1 Method of demand forecast

Methods taken up by said UNIDO's Report are:

(1) Cross section method

Per capita demand on resin-wise is compared with various other South East Asian countries and thereafter made the forecast for Indonesia in the year 1980. While no clear statement in the report is given, it seems that said comparison was made in correlation with per capita GNP or GDP.

(2) Application-wise accumulative method

By this method, plastics application fields are being classified into:

Household wares, others
Footwears
Films & sheets
Civil engineering and construction
Industrials
Agricultural, forestral & aqua-marines

6 fields. Through respective potential demand growth rate of each application field and plastics demand rate of each field (substituting rate), the growth rate of plastics demand in every field is being calculated, viz.:

A (t): Ratio of plastics demand to potential market scale during a period of t

b (t): Growth rate of potential market scale during a period of t

Y (t): Plastics demand during a period of t

X (t): Potential market scale during a period of t

a (t): $\frac{A(t)}{A(t-1)} - 1$: Changing ratio
A kind of substitution ratio of plastics.

in each end use $Y(t) = A(t) \cdot X(t)$

$$Y(t+1) = A(t+1) \cdot X(t+1) = \{1 + a(t+1)\}\{1 + b(t+1)\} Y(t)$$

$$\frac{Y(t+1)}{Y(t)} = \{1 + a(t+1)\}\{1 + b(t+1)\}$$

Growth rate, b(t), for each application area is being estimated under the inference of the growth rates for GNP and industrial sector to be respectively 7% and 12 - 13%, and the substituting rate growth, a(t), was also inferred resulting Table VI-17 indicating the application-wise plastics demand growth.

Table VI-17 Average Annual Growth Rates of Major Plastics Demand in Each End Use

(Unit: %)

Parameter user fields	1972 - 1980			1980 - 1985		
	a(t)	b(t)	$\frac{y(t+1)}{y(t)} - 1$	a(t)	b(t)	$\frac{y(t+1)}{y(t)} - 1$
Householder articles & Miscellaneous Goods	2.5	14	17	2	14	16
Footwear	1	12	13	-	10	10
Sheets & Film	3.5	15	19	2.5	15	18
Construction & Civil engineering	4.5	13	18	6	13	20
Industrial use	7	17	25	7	17	25
Agriculture, Forestry & Fishery	-	5	5	-	5	5

1-1-2 Results of demand forecast

(1) Comparison of forecast results between cross section method and accumulative method.

Table VI-18 made comparisons of the macroscopic forecast by above mentioned cross section method and microscopic forecast by the accumulative method were given for the year 1980, provided however, Indonesian per capita GNP is inferred to be US$150 and the population thereof is to be 150 million in the year 1980.

(2) Results of forecast by accumulative method

As a result of comparisons between the above macro- and microscopic forecasts, the forecast done by accumulative method are indicating a reasonable value, so that it is taken as the future forecast in Indonesia.

Table VI-18 Result of Forecast

(Unit: 10^3 tons)

	Macroscopic	Microscopic
LDPE	100 - 130	90
HDPE	23 - 32	20
PVC	75 - 90	80
PS	22 - 27	25
PP	45 - 75	60

Tables VI-19 and VI-20 are application-wise demand forecasts in Indonesia.

1-2 Influence of Market Gap

It is more convenient to divide plastics market into internal market and external market. The former represent such a market where petrochemical products as polyethylene, PVC, etc. are being purchased by the processors who would put these raw materials into products through varied processes, the latter represent such a market where desired market is being formed through the products sales and consumptions. Figure VI-6 shows a fundamental structure of both internal and external markets.

In this chapter, an observations on the present Indonesian market and 1980 market are made, and subsequently in the next chapter a summarized description will be made from the standpoint of necessities of facilities investment and power mainly of processing industries for the above internal market, and from the standpoint of major industries for the above external market.

1-2-1 Comparison between forecast and actuals

(1) Resin-wise demands

Table VI-21 shows the comparison between forecast and actual for 1972 on resin-wise demands.

The biggest difference between the forecasts and actuals lies: with the PVC forecasted to be 25,000 tons, but actuals with the inclusion of imported intermediates totalled only 10,400 tons which did not even to half the forecasted amount; on the contrary, as against the polyethylene forecast, 9,000 tons, actuals thereof amounted to 15,200 tons.

Table VI-19 The Plastic Demand in Major End Uses in Indonesia

(Unit: tons)

	1970	1972	1980	1985
Household Articles & Miscellaneous goods	11,000 (25%)	19,000 (26%)	65,000 (23%)	130,000 (21%)
Footwear	6,000 (14%)	10,000 (13%)	26,000 (9%)	42,000 (7%)
Sheets & Film	23,500 (55%)	40,500 (55%)	164,000 (60%)	378,000 (62%)
Construction & Civil Engineering	1,800 (4%)	2,700 (4%)	10,000 (4%)	25,000 (4%)
Industrial Use	1,000 (2%)	1,500 (2%)	10,000 (4%)	30,000 (5%)
Agriculture, Forestry & Fishery	- (-)	- (-)	- (-)	- (-)
Total	43,300 (100%)	73,700 (100%)	275,000 (100%)	605,000 (100%)

* Including 10^3 t/y of imported plastics products

Table VI-20 The Resin-wise Plastic Demand in Major End Uses in Indonesia

(Unit: 1,000 tons)

	LDPE			HDPE			PVC			PS			PP			Total		
	1972	1980	1985	1972	1980	1985	1972	1980	1985	1972	1980	1985	1972	1980	1985	1972	1980	1985
Household articles & Miscellaneous	3.5	9	18	8	15	20	0.5	1	2	4	20	40	2	20	50	19	65	130
Footwear	0.5	1	2				9.5	25	40				-	-	-	10	26	42
Film & Sheets	22.5	80	180	1	5	10	11.5[1]	39	98				6	40	90	40.5	164	378
Construction & Civil engineering							2.7[2]	10	25				-	-	-	2.7	10	25
Industrial Use							0.8	5	10	0.7	5	20	-	-	-	1.5	10	30
Total	26.5	90	200	9	20	30	25	80	175	4.7	25	60	8	60	140	73.7	275	605

Source: UNIDO's report

Notes: 1). 5,000 tons will be imported in the form of products
2) 2,000 tons will be imported in the form of products

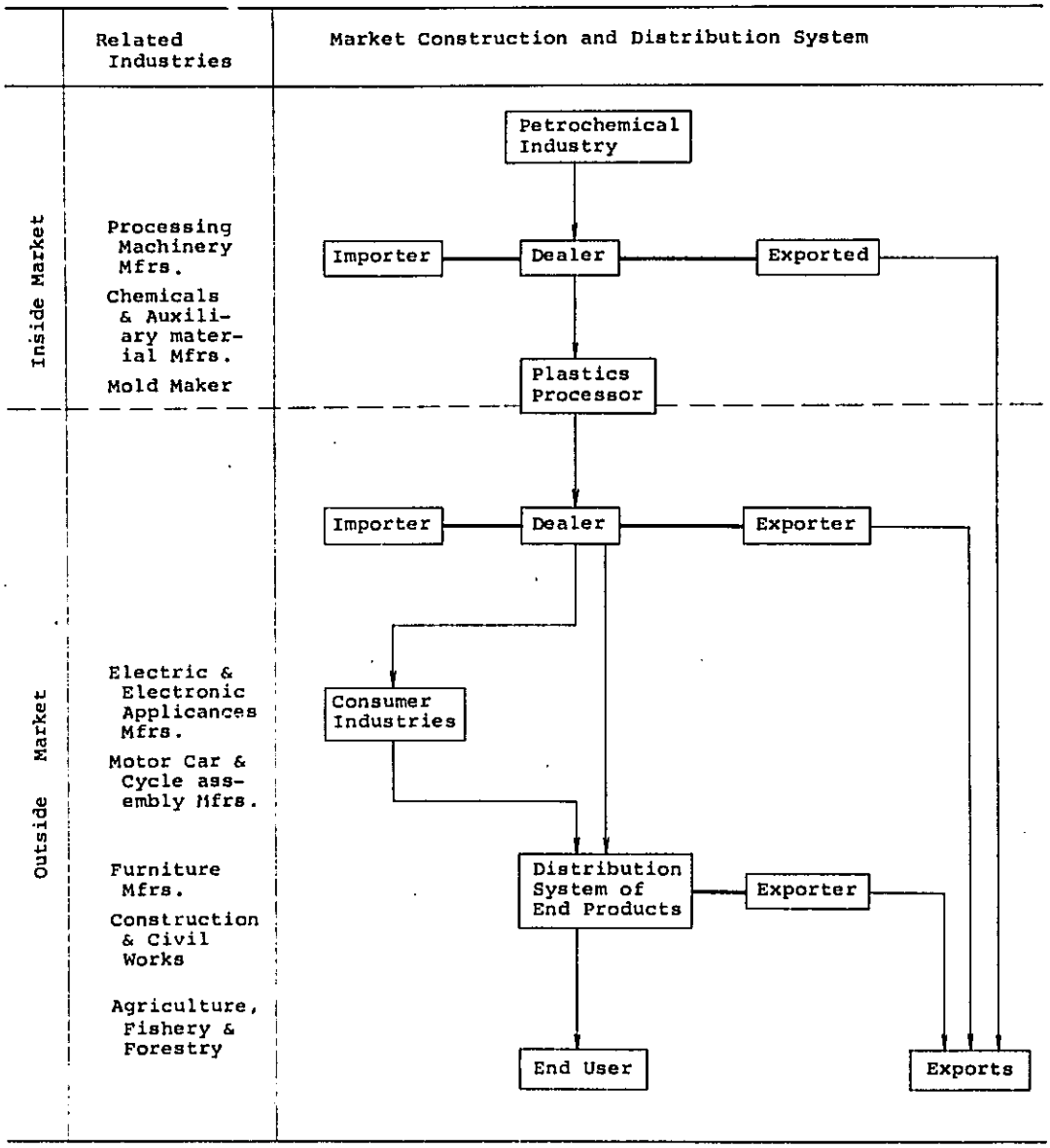


Figure VI-6 Schematic Explanation about Inside and Outside Market

Table VI-21 Resin-wise Demand Structure (1972)

(Unit: 10^3tons)

	Actuals	Forecasts
Low density polyethylene	25,600[1)]	26,500
High density polyethylene	15,200	9,000
Polypropylene	8,900	8,000
Polystyrene	6,800[2)]	4,700
Polyvinyl chloride	10,400[3)]	25,000
Total	66,900	73,200

Note:

1) Inclusive of imported 200 tons in the form of the intermediates.
2) Inclusive of imported 100 tons in the form of the intermediates.
3) Inclusive of imported 2,900 tons (converted to resin) in the form of the intermediates.

(2) Application-wise demands

Table VI-22 indicates the 1972 comparison between the forecast and actual figures on application-wise demands. Judged from this result, the ratio of actuals for construction materials and industrial uses are made rather higher. In the industrial applications, the tabulations for ropes, nets, and other forestral and aqua-marine uses are made.

Table VI-22 Application-wise Demand Structure of Major Plastics (Unit: tons)

	Domestic production	Imports	Total	(%)	UNIDO's estimates	(%)
Films and sheets	35,600	1,500	37,100	55.5	40,500	55
Daily utensils & sundry goods	14,000	-	14,000	20.9	19,000	26
Construction materials	4,800	1,700	6,500	9.7	2,700	4
Industrial uses	5,400	-	5,400	8.1	1,500	2
Footwear	3,900	-	3,900	5.8	10,000	13
TOTAL	63,700	3,200	66,900	100.0	73,700	100

On the other hand, the smallness in the demands for plastic sandals in the category of footwear is due to the extreme difficulty of getting hold of actual demands in said field of PVC and low density polyethylene (EVA). Raw materials of sandals are varied as natural rubber, synthetic rubber ("high-styrene"), PVC, EVA, etc., and actual consuming ratio of these materials not only belongs to each company's know-how, but is influenced by market situation.

Production of sandal made from PVC only are gradually decreasing, which is being assumed from the fact that most of the rotary-type molding machines used for PVC sandal manufacture are put down to idle state. Therefore, most of PVC are used for the straps of sandals, and rapid increasing of consumption in this field is not expected.

1-2-2 Market gap inference

Through the above mentioned observations, there are some differences among forecasts and the actual thereof which, therefore, require some corrections and/or adjustments. These 5 kinds of major plastics (or, maybe called 'commodity plastics') are, viewed from the application fields, mutually in competitive relations, thus as far as analyzed from the total amount of these 5 plastics, not much corrections and/or adjustments are required.

Subsequently, in the present report, the below mentioned studies were performed from the standpoint of total demands for plastics and we have decided to quote these forecasted values given in UNIDO's Report as they are.

(1) Estimation for total plastics demands

According to UNIDO's demand forecasts, 5 major plastics' total demands in 1980 are estimated to be 275,000 tons. If estimated the ratio of major resins as against the entire plastics to be about 80% note), the total plastics demands will amount to approximately 340,000 tons, from which if a deduction of 1972 actual demands, about 88,000 tons (Ref. Part II,1-1-4), market gap in 1980 for Indonesia viewed from the macroscopic standpoint becomes 252,000 tons.

(2) Market gap viewed from application-wise standpoint

Calculated the application-wise market gap for the total major 5 plastics through the forecasted values given in Table VI-18 and the actual figures given in Table VI-22, the results obtained therefrom are given in Table VI-23 for 1980.

Table VI-23 End Use Market Gap of Major Plastics between 1972 and 1980

(Unit: tons)

	1980	1972	Market Gap
Household articles & Miscellaneous	65,000	14,000	51,000
Footwear	26,000	3,900	22,100
Film & Sheets	164,000	37,100	126,900
Construction & civil engineering	10,000	6,500	3,500
Industrial Use	10,000	5,400	4,600

Note: Changes in ratios of commodity plastics as against the domestic demands in Indonesia, South Korea and Japan are as follows:

(%)

	Japan	South Korea	Indonesia (imports)
1968	65	76	93
1969	64	78	88
1970	64	76	84
1971	67	83	83
1972	67	87	79

Chapter 2. Change in Industrial Structure

2-1 Structural Change in Internal Market

To meet macroscopic market gap in internal market, expansion and improvement of production facilities of plastics processing industries and man power should be performed.

2-1-1 Fund requirements of internal market

(1) Investment for facilities

Amount of investment for facilities can be calculated by the following equation:

$$\text{(Amount of investment for facilities)} = \text{(Annual process amount)} \times \frac{1}{\text{(Efficiency of investment for facilities)}} \times \frac{1}{1 - \text{(Residual book value of facilities)}}$$

Therefore, it is first necessary to calculate annual process amount (annual added value) and effectiveness of investment for facilities.

(a) Annual process amount

Shall be calculated by the following equation:

$$\text{(Annual process amount)} = \text{(Raw material price)} \times \frac{1 - \text{(Material cost ratio)}}{\text{(Material cost ratio)}} \times \text{(materials consumption)}$$

Materials cost ratio against total cost is as follows:

Japan	1971	44.6%
	1973	49.9%
South Korea	1969	45.8%
Singapore	1971	64.8%
Indonesia	1970	45.6%
	1971	45.0%

Note: Materials cost represents only major raw material but does not include auxiliary material, nor packaging cost.

With the exceptions of Japan 1973 and Singapore, the ratio of major raw materials against total cost is approximately 45% which could be deemed as reasonable and was taken to be the basis.

Raw materials price is assumed in total average to be US$600/ton.

With all the above assumptions, Indonesian annual process amount in 1980 would be as follows:

$$600 \times \frac{i - 0.45}{0.45} \times 252000 = 185 \times 10^6 \text{ (US\$)}$$

(b) Efficiency of investment for facilities

As given in Tables VI-24 and VI-25, the Japanese plastics industry's efficiency of investment for facilities is around 3.

Table VI-24 Efficiency of Investment of Plastic Processing Firms in Japan

Plastics moulding industry	1967	----	3.1
Average ------	1968	----	3.0
	1969	----	3.0
	1970	----	3.3
	1971	----	3.1
	1972	----	3.3

Table VI-25 Efficiency of Investment of Various Plastic Processing Firms in Japan

Injection molding:	
Industrial items	3.4
Daily utensils	2.8
Compression injection moulding:	
Industrial items	3.4
Household wares	4.3
Compression moulding:	
Industrial items	3.8
Household wares	4.5
Polystyrene expansion moulding	3.3
Packaging film moulding	3.0
Other moulding & processing	3.5

Also the value for Korea is 2.9. However, the basis of calculation on effectiveness of investment for facilities of Japan and Korea are with the deductions from the total costs of such items as major raw materials, auxiliary materials, other materials cost, and sub-contract cost, all of which amount to about 15% of the total costs. Therefore, if the process amount had only the major raw materials as the deduction, then the value for efficiency of investment for facilities would become higher than this.

In case of Indonesia, it is conceivable that the sub-contract cost would be considerably small also in the future. On the contrary, however, because of the abundant amount of man power there the operational efficiency is not required to raise so high as the case of Japan where a keen man power shortage is felt.

Being affected by all these elements among themselves, the efficiency of investment for facilities after all could be deemed 3 which is the same as with Japan after all.

(c) Calculation on investment for equipments

Investment efficiency of facilities is calculated by the residual book value with a deduction of depreciated amount. Large firm could tabulate individual book value respectively, but for smaller and medium enterprises like plastics molding industry we have no accurate data of depreciation and it is unknown that to what extent such is being done by them. However, if the number of firms subjected to the present studies are sufficiently large, then there will be no inconvenience in our regarding of the residual book value to be 50% of the initial investment amount.

Taken these conditions into our account, the initial total investment required to accomplish the process amount of 185 x 10^6 tons in 1980 will be:

$$185 \times 10^6 \times \frac{1}{3} \times \frac{1}{1 - 0.5} = 123 \times 10^6 \text{ (US\$)}$$

(2) Estimation of total capital requirement

For the sake of our reference, inclusive of the above amount for investment on facilities, a further estimation was made about the investment on fixed capital such as land, buildings, etc. and on the working capital, viz., the investment amount on the land, buildings is in average 50% of the facilities investment amount, and the working capital to be 50% of the fixed capital, then the total capital amount becomes as given below approximately US$280,000,000:

	Million US$
Facilities investment amount	123
Land & building acquired amount	62
Fixed capital	185
Working capital	93
Total capital amount:	278

2-1-2 Security of man power and the quality improvement

Man power required for the plastics processing can be obtained by the following equation, viz.:

$$\text{(Number of employees)} = \text{(Annual process amount)} \times \frac{1}{\text{(Annual process amount per employee)}}$$

Table VI-26 shows annual process amount per employee in various Asian countries:

Table VI-26 Annual Additive Value Per Employee in Asian Countries

(US $)

Japan ----------	1967	3,171
	1968	3,830
	1969	4,430
	1970	5,413
	1971	6,844
	1972	8,156
Korea ----------	1972	754
Singapore ---------	1971	1,334
Indonesia ---------	1970	402
	1971	421

At present, Indonesian per head output cost is being considered high due to a low operational rate. Therefore, it is an extremely easy task to double the present processing amount per head, US$800, with present man power and the facilities.

For our reference, Table Ⅵ-27 exhibited the number of Japanese plastics firms and the man power trends in comparison with domestic demands. In Japan, at the beginning of the 1960s there were plastics demands of 700,000 tons, the number of firms were approx. 5,000 and man power was approx. 120,000. During said 10 years, plastics demands have risen 5.8 times, the number

Table VI-27 Trend of Persons Employed by Plastic Industry in Japan

	Plastic[1] Consumption (ton)	No. of[2] Establishments	No. of Employees[2]
1961	701,349	4,853	118,356
1962	778,180	5,009	126,318
1963	985,170	7,649	156,871
1964	1,279,472	7,793	164,747
1965	1,373,533	8,244	171,403
1966	1,661,872	9,775	191,648
1967	2,318,814	10,227[3]	208,442[3]
1968	2,988,270	11,241[3]	228,378[3]
1969	3,505,580	13,787[3]	264,078[3]
1970	4,080,315	15,303	278,374[3]

Sources: 1) Japan Plastics Industry Annual (Plastics Age Ltd. 1974)

2) Industrial Statistic Yearbook of Japan (1972)

Notes: 3) Including Plastic Sandals

of firms 3.2 times, but man power went up only 2.4 times, shown in Figure VI-7. All of these factors signify scale-up of firms and more meaningful is the per head processing increase. A man power shortage is being felt in Japan.

In view of the fact that Indonesia has a similar population to that of Japan, the situation of easy availability and cheap labor will gradually change as the pace of industrialization accelerates. Accordingly, as plastics demands increase, it will be necessary to greatly improve labor productivity in Indonesia.

Taking Japan as an example, through Table Ⅵ-27 and Figure Ⅵ-7, the employee numbers corresponding to 340,000 tons which are the estimated demands in Indonesia in 1980, a number of approximately 95,000 persons is obtainable. Japanese firm's sub-contracting, or outside contracting rate, is approximately 50 - 60% of the direct labor cost and as employee numbers increase it will become

greater. Subsequently, the total employee numbers of the plastics molding industry, inclusive of the sub-contractors, may reach 160,000 - 170,000 persons. When this occurs, the per head processing amount in accordance with the above calculation will be:

$$600 \times 340{,}000 \times \frac{1 - 0.45}{0.45} \times \frac{1}{165{,}000} \fallingdotseq 1{,}500 \text{ (US\$)}$$

which means that about 3.5 times the present productivity could be achieved. The obtained figure is slightly higher than the case of Singapore in 1971 but is still on approximately on the same. This calculation means, that the Indonesian domestic plastics market in 1980 will be, at least, the same as Singapore's present level.

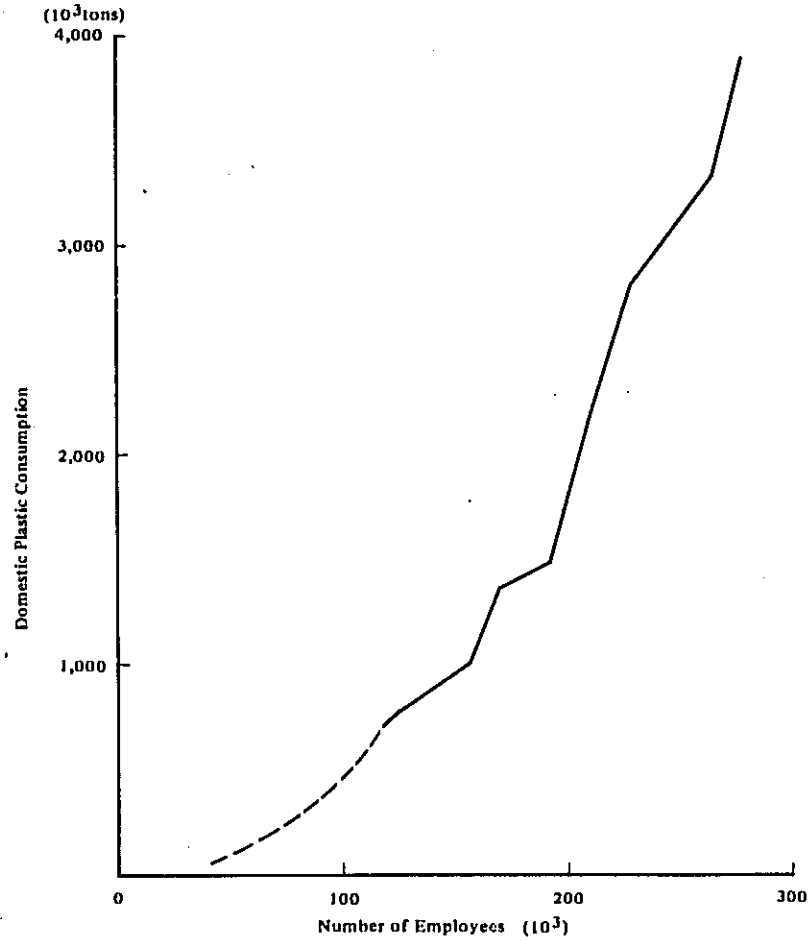


Figure VI-7 The Relationship between Consumption of Plastics and Employees in Japan

At present, in Indonesia there are 60,000 - 70,000 persons employed in the plastics industry, and of this estimation, permanent employees are presumed to be about half.

The Japanese plastics industry has grown since 1950s taking a relatively long time. However, a rapid development is expected in Indonesia. Therefore, a rapid increase of demand for a work force compatible with the rapidly increasing plastics molding industry is predicted. The current easy access to cheap labor will gradually reduce, and this will require much better labor productiv-

ity. This can be achieved by the improvement of production facilities and improvement in the quality of laborers in Indonesia. To achieve the latter, there will be insufficient time to wait for the workers to become proficient enough through on-the-job training. This necessitates a good training program not only for the workers, technicians and engineers engaging in the production work, but also for the skilled workers at the plant.

Suppose that 100,000 persons would be the permanent employees, newly required for the plastics industry, the training of approximately 5,000 skilled workers by 1980 is mandatory, and if this is required to achieve by a 5-year plan, a training system of 1,000 persons/year should be developed.

2-2 Structural Change in the Outside Market

In regard to the outside market situation and future, predictions are made in the UNIDO Phase I Report. A summary and explanation are as follows.

2-2-1 Household articles

The demand for household articles will increase in conformity with the changes in the living style and improvement of living standards resulting from an increase of the national income. Domestic production of household articles in 1972 was approximately 1,400 tons, and, in addition, there were product imports exceeding US$2,500,000 from Hong Kong and Japan. The product imports, as given in Table AVI-4, have been increasing since 1970, and as the demands increase more, these imports can be switched over to domestic production.

The demand for household articles in 1980 is forecast to become 6,500 tons. For purposes of expanding the market, the upgrading of design and the development of new products are necessary. Figure Ⅵ-8 exhibits, in a general manner, the relations between the living standard and plastics household articles, from which it is desirable to find products that would be compatable with the Indonesian life style.

Toys mainly made of metal, wood, cloth, rubber, paper, etc. are still being produced. However, because of the ease of coloration, choice of configuration with complexity through injection molding or blow molding, these toys are gradually being replaced by plastics. In the production of various toys for export markets, the merits of plastics toys are contributing much to the growth. Toys should be desirable not only to babies and infants but also to adults of all walks of life, thus the toys should be sanitary, harmless, beautifully made, lightweight, strong, and non-combustible. Subsequently, it is preferable note) to establish some national standard for product function and quality.

Note: Japan Toy R&D Cooperative Association is performing this kind of activity on its own volition.

2-2-2 Footwear

Sandals prepared by using PVC leather will become the major footwear made from plastics and quality sandals will be spread

Daily household life	Living conducts	Forecasts on plastics household articles & utensils
Foods	Material purchase	Shopping cage and cart
	stock	Rice-chest, vegetable box, preserving container other stockers, refrigeration containers
	Cooking - measure	Kitchen scale, measure spoon, measure cup
	washing	Washing keg, water-cutting box, corner-trash box, swab, drainboard, sponge, cup washer, brush, dish-cloth hanger, bowl, cleanser putter
	cutting	cutting board, kitchen knife putter, cork-screw, grater, cheese grater, lemon squeezer
	mixing	bowl, cage, foamer
	boiling grilling roasting steaming frying	
	seasoning	condiments container (cooking set)
	Eating - tableware	
	table services	soy bean source server, source server, honey server, chopstick putter, straw putter, spoon case, napkin stand, caster stand, coaster stand, tray, sugar container, salt container
	Post-treatment - washing, storing	Food box, water-cutting cage, Piling cage
Clothes	Washing	Basin, bucket, washing board, brush, cleaning slipper
	Drying	Washing cage, hanger, washing clips, hanger,
	Storing	Cloth brush, cloth box, comb-type cleaner
Housing	Cleaning	Bucket, deck brush, sponge brush, trash box, water ladle
Sanitary utensil	Bathing & face washing	Vanity case, hot water keg, pail, hot-water agitator, cloth cage, bath-mat, tooth brush, soap box, soap stand, towel hanger, bath brush
	Toilet utensil	Stool, western-style stool, hand-washer, towel hanger, paper holder, deodorant container, paper box, toiler brush

Figure VI-8 Prediction of Plastic Household Wares from the Viewpoint of Living Conditions

over the nation as the domestication of PVC leather advances, hence said field will also be one of the most promising fields for exports in the future.

2-2-3 Sheet and film

As given in above, the demands for supported sheets with clothes, papers, etc. will be increasing in the sheet field, these are called either 'imitation leather' or 'synthetic leather', and are widely being utilized for leather bag, furniture, automotive sheet and above mentioned sandals, etc. On the other hand, non-supported PVC sheet can find new usage in fields such as automotive mat, toys, buoys for sea swimming, balls and other secondary processed products, thus it can also become one of the leading export items.

Films may be classified into two kinds, one, general purpose film and food packaging film. In Indonesia, agricultural products are grown and these necessitate good packing material. Moreover, development of refrigeration system, distribution channels and the logistics of agricultural products will demand most suitable packaging materials. Films needed, and requiring new industrilization are, polyethylene/celophane laminated film, polypropylene cast film (CPP), biaxially oriented polypropylene film (OPP), HDPE tissue-like film, etc.

It is most probable that demand for heavy duty packaging of thick film made from LDPE and ethylene-vinyl acetate copolymer (EVA) will be felt also. The latter products are mainly utilized for fertilizer packaging. In Japan, about half of the fertilizers are packed in the heavy duty plastics bags, especially the high analysis compound fertilizers of which 80% are being packed into said plastics bags of polyethylene. Wooven bags are mainly used as the substitute for hemp bags, and will be increasingly used for not only fertilizer bags but also for packaging of rice, cereals, etc. in the future. Furthermore, as the export industrial complex and export products inspection system are fully established, wool packs (annual total needs are 6,000,000 bags, 6,000 t/y.) now being produced in Japan, Korea, Singapore, etc. to be shipped to Australia and New Zealand; sugar bag for South American countries are expected to be advantageous articles viewed from the geographical position of Indonesia.

2-2-4 Industrial use

(1) Electric wire

According to the survey carried out by UEEC (United Economic & Engineering Consultants, Ltd.) requested by Association of Electric Wire & Cable Industries, Indonesia (APKABEL), the demands for electric wire in Indonesia are as follows:

(Unit: tons)

Year	Telephone & telegraphic cables			Cables for power lines			Totals		
	Production	Imports	Demands	Production	Imports	Demands	Production	Imports	Demands
1969	-	485	485	-	4,178	4,178	-	4,663	4,663
1970	250	2,324	1,066	760	7,016	7,776	1,010	9,340	8,842
1971	252	806	1,091	860	9,701	10,561	1,112	10,507	11,652
1972	247	1,114	1,071	1,215	7,307	8,522	1,462	8,417	9,593

Furthermore, the demands from 1973 down to 1978 are forecast as follows:

Year	Telephone & telegraphic cables			Cables for power lines
	I	II	III	
1973	643	643	643	8,450
1974	1,228	1,744	3,654	12,480
1975	1,275	1,791	3,701	8,450
1976	1,322	1,838	3,748	24,050
1977	1,279	1,796	3,706	25,220
1978	812	1,329	3,239	29,055

Production capacities of existing 5 companies are annually approximately 15,000 tons, per 1 shift. Therefore, if they should operate under 3 shifts, the demands up until 1978 would fully be covered by the currently existing capacities and facilities.

The types of electric wires and cables now being manufactured in Indonesia are still limited. Therefore, to meet diversified usages and expanding demands of the future, the situation requires introduction of new production techniques, production facilities, and developments of high-voltage electric wires, high-frequency electric wires, undersea cables, electric wires for mines, etc. In line with the above requirements, it is preferable to improve quality and productivity to compete with imported goods.

(2) Home electric products and communication instruments

As home electrical products, communication instruments (radio, TV set, stereo set, casette tape-recorder with radio), etc., the knock-down system or production in Indonesia also increase requiring domestic production of the corresponding parts. The important subjects in said field are as follows:

(a) A proper guidance should be given to all the assembly makers so that all of them will use as much common parts as possible for acquiring better productivity of parts production

(b) Various measures should be established to improve the techniques of plastics processors to have the product quality stabilized and dispense with the production of inferior and poorly productive parts by the assembly makers themselves.

Furthermore, in said field, mainly in the United States, countermeasures of flame retarding are being stressed for the home electrical products, which is now gradually spreading to various European countries and Japan, hence more attention is being paid to the selection of raw materials to meet with such flame retarding treatment, improvement on the molding and processing methods, etc.

(3) Automobiles

Plastication trend in the world's automotive parts is still growing and the trend is most phenomenal in the United States since the inauguration of MVSS safety standards was finally put into force.

Plastics consumption per one automobile, average, follows:

Small passenger cars	20.7 kg
Light passenger cars	19.0
Ordinary trucks	14.1
Light trucks	10.4
Small trucks	6.9

Of which, 50 - 60% are PVC, 10 - 15% are polypropylene, the remainings are ABS resin, polyurethan, and others. PVC is mainly used for sheet leather, floor mat, trim, etc.; polypropylene for steering wheel, heater case, etc.; polyurethan for sheet cushion pad, packing, etc.

The important point with automotive parts is betterment of dimensional stability of interior parts, durability, but also the same for secondary processing techniques as coloration technique, galvanizing, welding and joining methods. The latest trend is that automotive parts are being made more with FRP's.

It is forecast that, in Indonesia, 200,000 automobiles will be produced in 1980, but preparatory steps and proper arranging for required production setups for molding and secondary processings of more than 100 kinds of parts are not easy tasks to achieve.

(4) Ships

Small ships and vessels in Japan and various European countries are currently being built of about 85% or so by FRP, and also fishing boats are made of FRP by about 15%. It is, therefore, presumed that also in Indonesia, most of the fishing boats required to promote future coastal fishing activities would be made of FRP's. In Japan, during 1972, about 60 boats of more than 18 tons were built by FRP. FRP ships total 8,500 and totally 18,000 tons are now actively engaging in the cuttle fish and bonito catchings. The largest FRP ship for fishing is on the 100 ton level at present but in England it is said that a 450 ton torpedo destroyer was built. note)

Note: Inspections and guidance for production techniques to maintain FRP-made ships' safety are performed by Japan Small Ships Industry Association.

2-2-5 Civil engineering and construction work

In the latter part of 1970s, the proper arrangement of infrastructure in Indonesia advances a lot, and, moreover, re-development of big city and the urbanization of medium and smaller cities are predicted to make rapid growth. Accordingly, along with the conventional construction and civil engineering materials, plastic materials will be briskly and actively utilized.

(1) Civil engineering materials

Most demanded materials of all the civil engineering materials are the PVC pipes which are being widely used, not only for water supply and sewage purposes, but also for conduit of telephone cable, gas supply pipes, waste water and waste liquid pipes of chemical plants as well.

In addition to the above, examples of application of plastics materials for civil engineering are:

Water stopping plate

Water stopping film and sheet

Resin concrete

(2) Construction material

The most remarkable trend in Jakarta, these days, is the building of skyscrapers. This trend will be spread to other cities in the not too distant future. As a result, the form of general housing will be gradually changed.

Plastics construction materials are broadly classified as follows:

Surface construction material:

Roofing materials

Exterior materials

Ceiling materials

Interior materials

Flooring materials

Housing parts

Housing Fixtures and accessories

Of which most important items are interior materials for the construction of skyscraping buildings (melamin laminated sheet, PVC film and leather), flooring materials (PVC asbestos tyles), housing fixture (plastic bath tubs), housing accessories (plastics doors, PVC duct for interior wiring, rain-water gutter, etc.). Most of these materials are now being imported from Japan. However, as the demands in Indonesia gradually increase, they may be put to domestic production sooner or later.

2-2-6 Agriculture, forestry & agua-marine industry

(1) Agriculture

The most important field of plastics demand in Indonesia for agricultural activities is the irrigation pipe, for which PVC pipes and HDPE pipes are being utilized. Moreover, these pipes may be spread into the irrigation facilities of sprinklers for the wide agricultural area in the outer islands such as Sumatra, Surabeshi, Kalimantan, etc., young rice plant nursing box resulting from the spreading of rice planting machine, 'multi-panel' for the rice paddy note) will also be promoted.

Note: Purpose of using the 'multi-panel' into rice paddy -

1) Reduce the evaporation of water and the usage of the water

2) Reduce the number of water discharge which simplifies the water administration

3) Lessen the changes in earth temperature,

4) Prevent the growth of weeds.

(2) Forestry industry

Futher increase of the demand of timber binding ropes which have been used is expected.

(3) Aqua-marine industry

Besides fishing boats mentioned above, there are fishing nets, ropes, buoys, etc. made from plastics materials. There will be extremely brisk demands for plastics materials for future oceanic development such as artificial fishing areas.

2-2-7 Equipment for chemical industry

It also relates to the industrial use as given in 2-2-4, some representative plastics products are introduced hereinafter which are required for the future of the petrochemical industry and other chemical industries as they continue to grow.

Plastics are being widely utilized in the chemical industry because of excellent corrosion resistance, and the usage of pollution prevention equipment is phenomenal.

(1) Ambiente air pollution prevention apparatus

Small scale absorbing tower for low temperature waste gas containing highly corrosive gases as chlorinated gas, sulfurous gas, cyanic gas, fluorine gas, etc. are made from PVC. Those packings to be filled in said tower are also made from HDPE and PP because of excellent gas absorbing capabilities of these materials, and are contributing much to lessen the size of the absorbing tower.

(2) Water pollution prevention apparatus

RBC (rotating biological contactor), TPI (tiled plate intersepter) or CPI (corrugated plate intercepter) are all using, as the separater pack, bisphenol resin, isophthal resin by arranging the corrugated plates on multi-parallel basis for the purpose of separating oil and water.

Furthermore, in waste water chemical treatment facilities, a tank made from plastic is always used.

These chemical industry appratuses are manufactured in varieties but in smaller quantities, mostly depending on the secondary processing of plastics intermediate products, viz: plates, sheet and pipes. This means that it is necessary to establish a solid synthetic industry in Indonesia performing the production of raw material for plastics, through final processing. This production is, preferably, to be performed in Indonesia, together with the FRP-made tanks, which are greatly utilized for chemical industries.

PART IV VARIOUS MEANS OF UPGRADING PLASTICS INDUSTRIES IN INDONESIA

Chapter 1. Guidance of Plastics Processing Method

In Part III, Chapter 2, a description was given about the need for diversification of plastics products as a result of predicted future changes in outer market conditions. In Annex IV, plastics products which should be upbrought are selected and the summarized process of produing them is described.

In regard to household wares, the current level of molding techniques would suffice only if some design improvement and new product development are carried out, thus an additional detail is also given on the manufacture of molds which are considered to be most important factor.

Chapter 2. Establishment of National Plastics Industry Guidance Institute of Indonesia

2-1 Purpose

National Plastics Industry Guidance Institute of Indonesia will perform required testings and R&Ds for the most appropriate method of improving the plastics processing industries in Indonesia. The detailed contents are as follows:

(1) Standardization & specification

Testings and R&Ds for the plastics raw materials and products therefrom.

(2) Design

Design improvement and R&Ds thereto of the plastics products.

(3) Personnel upgrading

Education and training of molding worker and engineer engaging in the plastics industries.

(4) Management guidance

Management improvement on plastics molding industries.

(5) R&Ds

Acceptance of R&D request from the plastics molding industries and further developmental activities concerning manufacturing technique on plastics products.

(6) Information collection and transmission

a) Proper arrangement & filing of technical data and patent information.

b) Library - Presentation and/or perusal of magazines.

c) Publication of organ.

2-2 Project Planning

2-2-1 Concept of National Plastics Industry Guidance Institute of Indonesia

With regard to the concepts and/or thoughts inclusive of the basic philosophy of the National Plastics Industry Guidance Institute of Indonesia, the following three ideas are conceivable:

(1) Majoring concepts in the plastics market development, viz., developmental activities concerning manufacturing technique on plastics products as previously mentioned in (5) of 2-1, where the major purposes will be the expansion of availability of plastics raw materials with which to make domestic production in the future. Therefore, those large-scale demand sources such as automobile makers, household electric equipment makers, cable and wire organizations, some national research organizations shall be selected to cooporate in the various R&Ds on plastics products.

For the accomplishment of the above purposes, test molding facilities on a practical scale and many skilled workers are required, for which a large amount of funds will have to be raised. Also sales tests will have to be made on trial products to recover capital outlay and the tested facilities will be sold to interested processing industries.

These market developments are usually carried out, as one portion of technical services, by the individual plastics raw materials makers. Hence the items of plastics products that Government organizations could take up would be limited to the following items:

a) Required materials for Government ventures; telephone cable and military materials, etc.

b) Product development requiring huge amounts of funds that no private enterprise could handle on its own, for example, irrigation systems, aqua-marine products promotional system, development of refrigeration systems, etc.

c) Common item, for example, waste plastics disposal system, etc.

Various technical data concerning plastics products development mentioned above are given in Annex IV.

(2) Major concept in administrative guidance, viz., the major purposes herewith will be technical and managerial guidance in line with financial administration to facilitate a sound development of plastics industries.

Most of the smaller and minor processing concerns do not have any testing or R&D facilities, thus the quality guarantee of their products is rather difficult to attain. In general, these enterprises have scant development capability, nor are they in a position to obtain required information.

Accordingly, major assignments of said institute will be the following:

1) Analytical services - Inspection and measurement of toxicity of foodstuff packaging materials.

2) Properties measurement services - Measurements on dynamic strength and durability, etc.

3) Trial molding services - Trial making of a product and performance measurement, etc.

4) Information service - Technical information, new product information, etc.

5) Merchandise development services - Guidance and instructions on product design and molding techniques, etc.

6) Training of engineers - Education, practical experience, etc.

And subsequently, for full execution of the above functions, the following is required:

a) Preparation of specifications on plastics raw materials and the products therefrom.

b) Performance of basic research

thus, request for long-term dispatching of experts from well experienced industrial countries is also an important subject to thoroughly consider.

The draft establishment plan for the subject National Plastics Industry Guidance Institute of Indonesia, as given hereunder, was prepared considering the latter major concept of administrative guidance. However, it may be more practical to use both the combined plan of market development and administrative guidance.

2-2-2 Draft of National Industrial Institute of Indonesia

(1) Organization and personnel

Department	Man power (persons) Researcher	Asst.	Required equipment etc.
Analytical services	4	5	IR,UV,X-ray, DSC, MI, d, tensile strength
Properties measuring services	3	10	
Trial molding services	5	5	Inj., Blow, Ext.
Molding engineer training	-	-	
Information services	1	2	Library
Product developing services	-	-	
Original R&Ds	-	-	
Others (administrative, etc.)	1	2 + α	
Totals:	14	24 + α *	

* ♂ represents personnel to be responsible for utilities and machinery, etc.

(2) Required measuring instruments & molding machines

To be shown in the attachment table.

(3) Utilities

Electricity:	Facilities volume (KW)	700
	Load volume (KW)	420 (60% operation)
Industrial water (m^3/h)		30
Drinking water (m^3/h)		2
Air (m^3/h)		50 kg/m^2 50
		10 " 100
Nitrogen (m^3/h)		several cylinders

(4) Building dimensions

1) Dimensions and layout of research building are shown in Figures VI-9(1) - VI-9(3).

2) Dimensions of other departments:

a) Conference rooms:

For accommodating 20 persons -

$5^m \times 8^m = 40m^2$ ..... 2 rooms

For accommodating 40 persons -

$10^m \times 8^m = 80m^2$ ..... 1 room

b) Library $15 \times 8 = 120m^2$ ..... 1 room

c) Utilities room (for air-conditioning & power room)

$10 \times 8 = 80m^2$ ..... 1 room

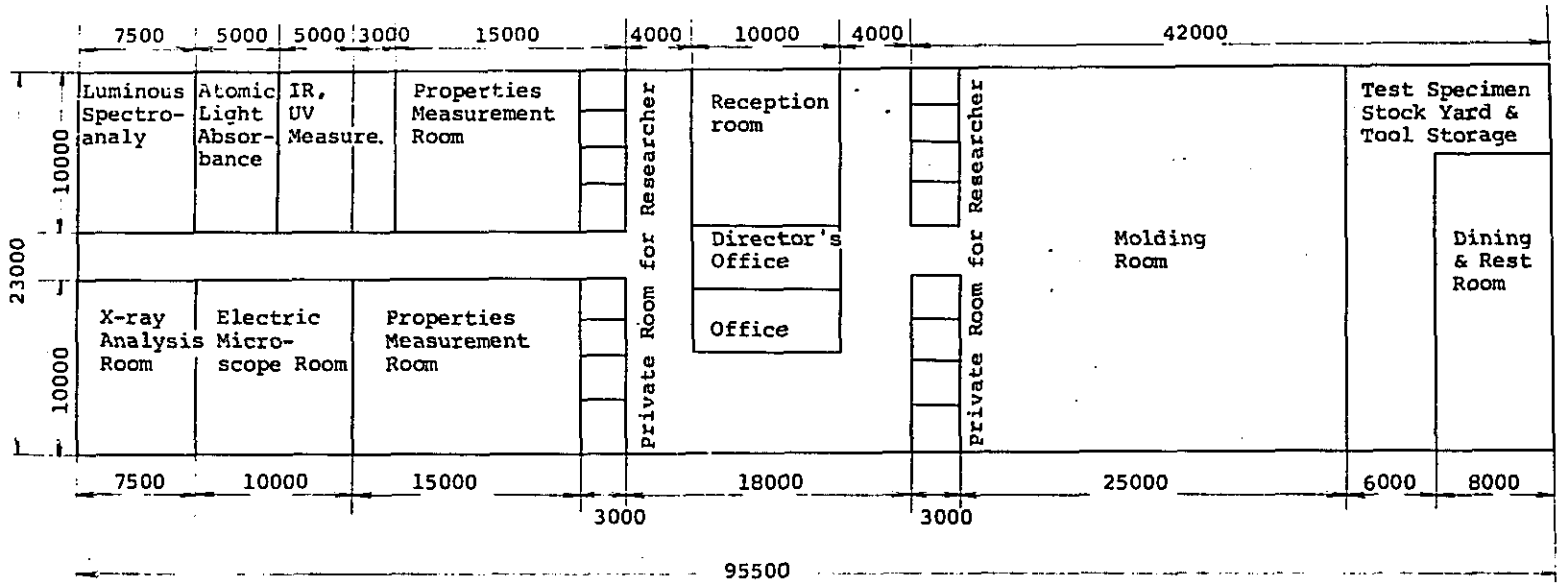
d) Machine shop

$15 \times 8 = 120m^2$ ..... 1 room

Chapter 3. Industrial Complex

3-1 Demand for Installation of an Industrial Complex

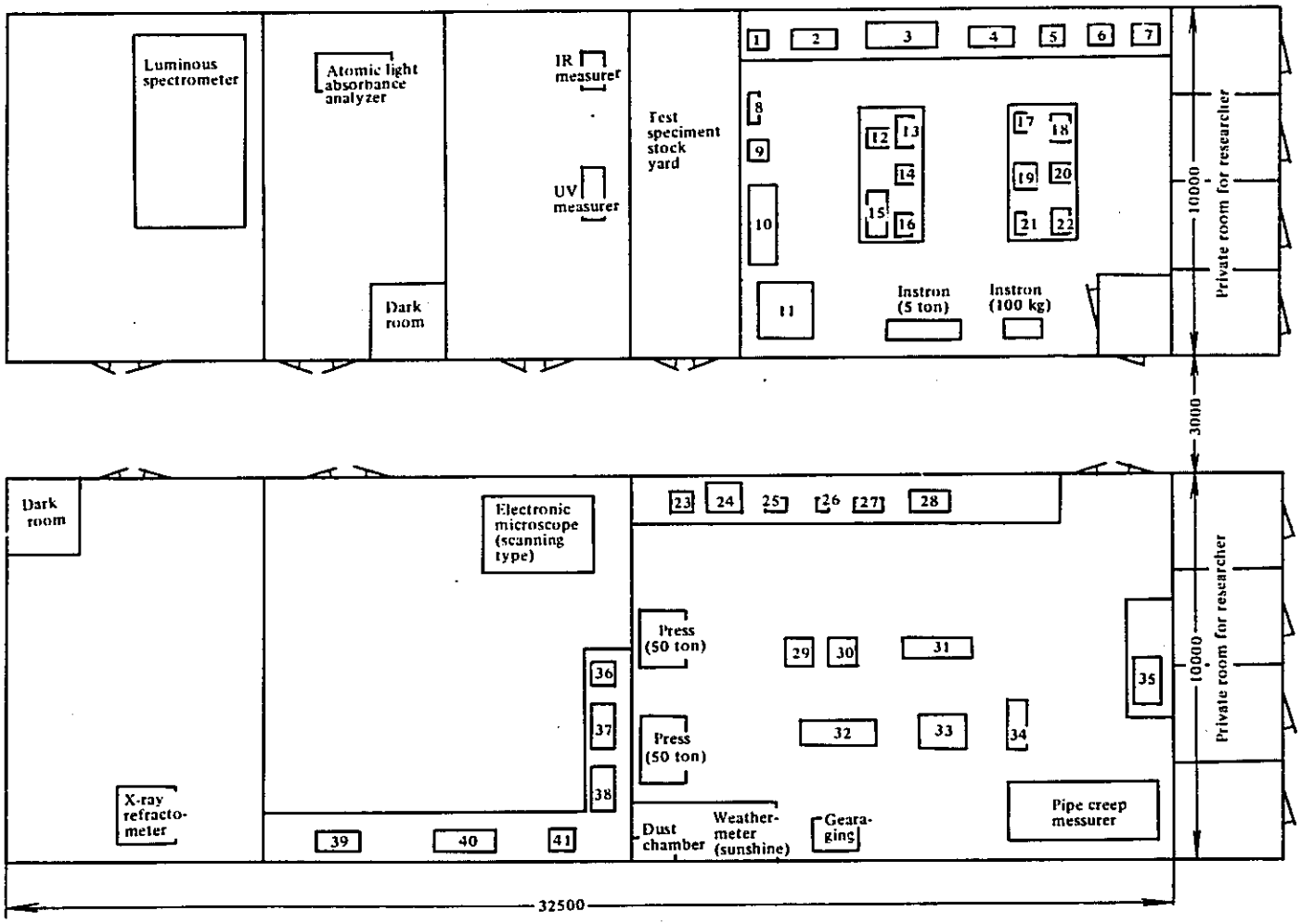
Building an industrial complex in a well planned manner to meet current and future demands for the plant, supported by good land utilization to insure functional production activities is necessary. Further, we must assure a comfortable living environ-



Notes: Dimension for every room given above indicates only required minimum space, thus air-conditioning equipment, utilities room, conference room, toilet room, columns, etc. are not included.

(Scale: 1/800)

Figure VI-9(1) Layout for Each Room of National Industrial Institute of Indonesia



Note) 1. Room with * has no need to make it a thermostat room.
Room with ** shall be constant humidity and temperature.
Others shall be a constant temperature room.
2. Machinery analytical room shall have large-size experimental bench.

Figure VI-9(2) Layout for Thermostat Room and Equipment

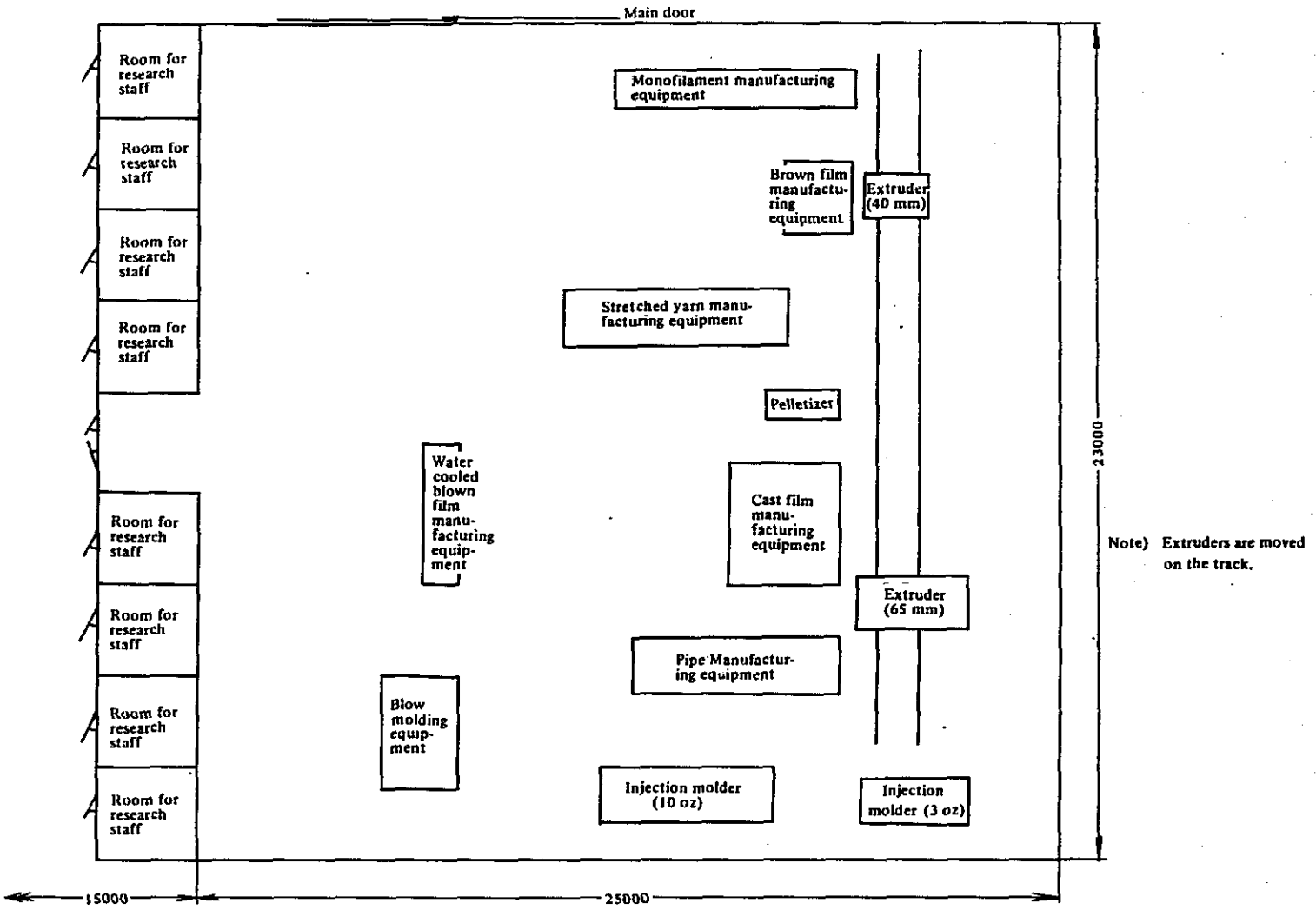


Figure VI-9(3) Layout of Test Molding Plant

ment for the inhabitants, through pollution free operation. Urbanization in a disorderly manner results in the confusion of two city functions, production site and the home. Therefore, a well planned installation, aims for the removal of aggravation in the living environment and at the same time tries to properly provide balanced industrialization.

As the economy grows the national income will also improve, which means consumption demands will grow, especially the demand for durable industrial products. Accordingly, industrial production activities will expand. As a result, existing plant facilities will no longer meet the demands for industrial products, which will necessitate the expansion of production facilities. Furthermore, as scientific techniques grow, development of new industry, etc. becomes active, and effective operation of production activities becomes mandatory, so is the requirement for installation of a planned industrial complex. Besides the above, the demand factors in developing countries are mainly as follows:

(1) The framework of industries lacks clear leasehold and ownership. Even if these are clarified, land which is obtainable at a reasonable price is scarce.

(2) Also, electricity, water supply facilities and communication systems are not yet well arranged.

The industrial complex, therefore, will alleviate the load of the above mentioned fundamental defects and will add an incentive, to a considerable extent, for investment in various industries.

The Government authorities should have the right of utilization of the land lots, who should offer the land lots to those industrial firms who desire to use the land lot, thereby easing the complex administrative procedures in the land lot acquisition, by the private firm, and, moreover, should offer the land lots, which are scarce to small and medium size industries.

Next, land acquisition by a private firm; arrangements for electricity, water supply, road construction, installation of communications systems, and other necessary investments are very costly for private concerns entailing great social costs and risks, thus the competent authorities should select required land lots to alleviate this problem, properly arrange various utilities and other facilities, and offer these conveniences to the private industrial concerns, or the aforementioned fundamental problems would not be alleviated.

In short, in Indonesia they are faced with the great necessity of formation of an industrial complex as a collective facility, aiming at cumulated profits which signify here convenience in transaction, better direction of public funds, such as road, ports, harbors, etc., an ease of information collection, easy accessibility of quality man power, etc.

3-2 Merits of Installation of an Industrial Complex

Installation of an industrial complex will result in the following effects:

(1) By a proper combination of various industries, the related

industries can enjoy cumulative profits.

(2) The resultant good arrangement of the traffic and transportation system will improve product movement.

(3) If a vocational training center is established for workers in the industrial complex, a more highly skilled worker will result, thus better quality and increased production.

(4) Effective stock control and warehousing.

(5) If the installation of the industrial complex results in the good arrangement of the industrial foundation, it will increase the investment opportunity to all interested parties. To achieve this goal, the Government should provide assistance in the procurement of required funds from abroad, or offer some favorable measures on taxation.

(6) Development in the best geographical location will minimize the infrastructural costs for industry coming into the complex.

(7) Such an industrial complex may be attached with export directivity by political considerations, which is so-called concept of an export industrial complex, and this makes it obligatory to produce domestic supplies at the same time export products produced in the complex.

In Indonesia, labor oriented light industry might be more stressed than others that would be permitted to advance into the industrial complex, because these light industries have a shorter investment period with a faster return, less amount of investment, and if export directivity is accomplished it will contribute much to the acquisition of foreign currency.

Let us now make the required analysis of factors for the industrial site if the plastics industry is to be established in the above mentioned industrial complex.

The words 'industrial geographical condition' signify whether plant site conditions are acceptably functional for production activities, to final sales, or whether simultaneous plant constructions in said place would cause no damage to the surrounding environment. The studies on the suitability of the industrial complex include all these factors.

For the introduction of plastics industry in such an industrial complex, the factors that should be considered are: accessibility to utilities, ease of raw materials acquisition, completeness of transportation facilities, continuing availability of man power.

3-3 Facilities in the Industrial Complex

Required facilities for the industrial complex are transportation, electricity, water supply services (city water and sewage), gas, communications, warehouses, harbor facilities, social facilities such as restaurants, shopping centers, banks, schools, pools, hospitals, clinics, dispensaries, parking,nurseries, community center, parks, green zones, streets and roads, sporting facilities, housing area and administration building.

3-4 Incentive for the Export Industry Complex

For the purpose of upgrading the industrial complex to an export-directed one, some privileges and incentives such as exports should be provided for manufacturers in the industrial complex. Special treatments may be enumerated as follows:

(1) Tax relief - No Customs Law and no other domestic laws or regulations shall apply to any imported items coming into the industrial complex. Business tax, fixed asset tax shall be exempted for a certain duration.

(2) Financing for land - Export industry shall have a reduced rate on land to be used, or a part of the land purchase shall be subsidized.

(3) Simplification or unification of procedural matters on export/import documentations, so that all transactions may be made at a central location.

(4) Favorable treatment on export financing.

(5) Supply of water and electricity at a lower cost.

(6) Unified system for warehouse, stock point, transports, and efficient handlings on materials transport, distribution and cargo shipment.

(7) Houses to be leased at a lower rate for local employees should be built.

(8) Long-term low-rate construction loans should be made available for plant construction.

(9) Allocation of resources and/or investments should be increased to a greater level.

(10) Establishment of an Export Promotion Center

Overseas market surveys, information presentations for exporters, opening of an international fair, standardization of products, quality control and inspection.

Chapter 4. Financial Policy

4-1 Improvements of Financial System

Development funds have been procured through investment, loans from Bank Indonesia and direct investment from overseas, financial aids, etc. However, in view of industrial diversification and increased activities, the demands on industrial funds are rapidly increasing, thus difficulty in acquiring required investment funds is confronting all concerned.

In Indonesia, the industrial financial organizations are not well established, and the stock market is still immature. Therefore, in compatibility with the economic structure and development policy, it is mandatory to rapidly modernize banking facilities.

4-1-1 Development of the stock market

A securities transaction organization is established in Indonesia, but transactions carried out there are limited to the sales and securing of the foreing stocks, and, moreover, the number of securities transacted is limited. At present, several joint ventures are being formed through Government aid and encouragement by some foreign financial organizations who do not have a branch in Indonesia. Under the circumstances, the start of stock market activities and rapid growth would be rather difficult to attain at this time, but it is desirable to prepare, at the earliest possible date, a securities market development program through the cooperation of countries with large brokerage organization.

4-1-2 Development of medium and long term industrial financing organizations

For the purpose of firmly establishing monetary channels with lower rates for longer terms to develop promising industries, it is mandatory to arrange the structure of the existing National Development Bank properly, and other medium and long term industrial financial organizations per se.

4-1-3 Indonesian capital

The absence of national capital formation is especially apparent, but in recent years, by virtue of the restoration of economic stabilization, the influx of foreign capital has increased. Therefore, the future point is how to increase required funds and how to accumulate Indonesian capital.

It is also necessary to stimulate the development of economics in the agricultural and rural areas.

4-2 Shortages of Capable Executives

With the exception of Chinese capital, there has been no national capital in Indonesia, thus industrialization has been pushed forward through the inducement of foreign capital. However, such industrialization should be made not only with participation of foreign capital, but also with increased participation by the Indonesians. However, in light of an absolute shortage of the capable executives, it is mandatory that the Government, per se, would expand participation, or organize a Business Association, subsidizing it to such an extent that interested Indonesians could participate in business activities.

4-3 Others

Other than the above, various measures for the development of the plastics industry in Indonesia are as follows:

(1) Establishment of most appropriate service life for short-term depreciation of important facilities.

(2) Foreign exchange allocations for importation of required machinery and equipment, and the exemption from import duties and

other impositions.

(3) Measures from financial standpoints:

(a) Improvement of medium and small financial organizations.

(b) Loan system for facilities modernization.

(c) Facilities rental system.

(d) Special loan system for modernization of distribution logistics - Allocate for distribution modernization such as the construction of the collection and distribution center, etc.

(e) Credit complementary system.

(4) Measures on labor affairs

(a) Firm security and the improvement of the capabilities of man power

(i) Increased vocational training

(ii) Improved education and social education (improvement by higher educations)

(b) Employee benefits

(i) Betterment of labor conditions

(ii) Financing and other measures for the welfares

(iii) Employee insurance, medical treatment, safety programs to reduce injuries, etc.

(5) Acceptance of business with government and public agencies for the purpose of increasing municipal and/or Government business opportunities for medium and small enterprises.

(6) Export promotion

(a) Promotion of unified brand name

For the purpose of preventing infringement on the unified brand in overseas markets, a part of expenditures required for the registration application, in overseas countries of said unified trade name, will be subsidized by the Government.

(b) Exploitation of overseas markets

Overseas economic information, technical information service, opening of sample trade fair, etc.

ANNEX

ANNEX I Trade Statistics of Plastics

Table AVI-1 Indonesian Plastics Materials Import in 1970 (April to December)

(Unit: tons)

	LDPE	HDPE	PP	PS	PVC Compound	PVC Resin	PE	Others	Others	Total	%
Japan	7,209	3,495	479	701	1,479	1,358				14,722	72.2
Hong Kong					1,398	60				1,458	7.1
Korea						113				113	0.6
Taiwan					190	265				454	2.2
China											
Singapore					1,841	211				2,053	10.1
Malaysia											
India											
Australia	26					4			45	75	0.4
U. S. A.						617				617	3.0
U. Kingdom											
Netherland						196				196	1.0
Finland											
France											
West Germany					450	158				608	3.0
Belgium											
Italy											
Others					70				36	106	0.5
Total	7,235	3,495	479	701	5,429	2,982			81	20,402	100.0
%	35.5	17:1	2.3	3.4	26.6	14.6			0.4	100.0	

Table AVI-2 Indonesian Plastics Materials Import in 1971

(Unit: tons)

	LDPE	HDPE	PP	PS	PVC Compound	PVC Resin	PE Others	Others	Total	%
Japan	12,590	8,033	1,626	3,165	782	1,460		20,540	48,195	80.7
Hong Kong					801	138		1,602	2,541	4.3
Korea						127		134	261	0.4
Taiwan	463				63	489		243	1,258	2.1
China								16	16	0
Singapore	432				2,040	50	51	891	3,464	5.8
Malaysia					61			45	106	0.2
India										
Australia					5			20	25	0
U. S. A.	3		766	9	42	14		533	1,366	2.3
U. Kingdom				20	72			23	116	0.2
Netherland								143	143	0.2
Finland										
France										
West Germany	431	533		34	2	125		1,056	2,183	3.7
Belgium								74	74	0.1
Italy										
Others										
Total	13,919	8,536	2,391	3,237	3,863	2,403	51	25,383	59,748	100.0
%	23.3	14.3	4.0	5.4	6.5	4.0	0	42.5	100,0	

Table AVI-3 Indonesian Plastics Materials Import in 1972

(Unit: tons)

	LDPE	HDPE	PP	PS	PVC Compound	PVC Resin	PE Others	Others	Total	%
Japan	19,814	9,391	6,649	4,637	1,009	1,414	2,011	17,112	62,037	78.4
Hong Kong				3	143	304	2	406	860	1.1
Korea				102		465		102	668	0.8
Taiwan	512		123	79	119	867		35	1,735	2.2
China								15	15	0
Singapore	436	71	50		3,085	1,509	50	338	5,539	7.1
Malaysia					78				79	0.1
India										
Australia					14			11	25	0
U. S. A.	2,181	1,578						160	3,918	5.0
U. Kingdom				15	48			188	251	0.3
Netherland										
Finland								510	510	0.6
France	105								105	0.1
West Germany	659	930		165	10	131	51	943	2,888	3.7
Belgium							70		70	0.1
Italy										
Others				20	22	407			450	0.5
Total	23,707	11,970	6,822	5,021	4,547	5,098	2,184	19,820	79,169	100.0
%	30.1	15.0	8.6	6.3	5.8	6.4	2.8	25.0	100.0	

Table AVI-4 Indonesian Plastics Materials Import in 1970 (April to December)

(Unit: 10^3US$)

	LDPE	HDPE	PP	PS	PVC Compound	PVC Resin	PE Others	Others	Total	%
Japan	1,892	977	157	300	502	397			4,225	68.4
Hong Kong					481	16			497	8.0
Korea						29			29	0.5
Taiwan					58	73			130	2.1
China										
Singapore					608	88			697	11.3
Malaysia										
India										
Australia	6					2		26	34	0.5
U. S. A.						242			242	3.9
U. Kingdom										
Netherland						68			68	1.1
Finland										
France										
West Germany					156	57			214	3.5
Belgium										
Italy										
Others						29		17	46	0.7
Total	1,898	977	157	300	1,835	971		42	6,180	100.0
%	30.7	15.8	2.5	4.9	29.7	15.7		0.7	100.0	

Table AVI-5 Indonesian Plastics Materials Import in 1971

(Unit: 10^3 US$)

	LDPE	HDPE	PP	PS	PVC Compound	PVC Resin	PE	Others	Others	Total	%
Japan	2,629	1,777	387	782	244	529			5,436	11,785	76.8
Hong Kong					375	32			413	820	5.3
Korea						46			32	78	0.5
Taiwan	115				19	103			70	307	2.0
China									4	4	0
Singapore	107				607	9		10	237	971	6.3
Malaysia					22				8	30	0.2
India											
Australia					3				11	14	0.1
U. S. A.	1		204	2	22	8			178	415	2.7
U. Kingdom				13	29				15	57	0.4
Netherland									76	76	0.5
Finland											
France											
West Germany	106	143		14		65			425	753	4.9
Belgium									39	39	0.3
Italy											
Others											
Total	2,959	1,920	592	811	1,321	792		10	6,944	15,349	100.0
%	19.3	12.5	3.9	5.3	8.6	5.1		0.1	45.2	100.0	

Table AVI-6 Indonesian Plastics Materials Import in 1972

(Unit: 10^3US$)

	LDPE	HDPE	PP	PS	PVC Compound	PVC Resin	PE Others	Others	Total	%
Japan	4,655	2,207	1,608	1,111	287	341	484	4,313	15,006	76.8
Hong Kong				1	46	67	1	103	217	1.1
Korea				25		91		22	138	0.7
Taiwan	99		26	19	34	171		13	363	1.9
China								5	5	0
Singapore	101	16	8		891	315	51	85	1,466	7.5
Malaysia					28				28	0.1
India										
Australia					8			7	16	0.1
U. S. A.	405	388						38	832	4.3
U. Kingdom				9	19			55	83	0.4
Netherland					10				10	0.1
Finland								125	125	0.6
France	27								27	0.1
West Germany	145	269		50	10	73	7	526	1,080	5.5
Belgium							31		31	0.2
Italy										
Others				10	5	87			102	0.6
Total	5,433	2,881	1,642	1,225	1,338	1,145	574	5,291	19,529	100.0
%	27.8	14.7	8.4	6.3	6.9	5.9	3.0	27.0	100.0	

Table AVI-7 Country-wise Export to Indonesia

(Unit: tons)

Year	1968				1969				1970				1971		1972	
Export	Material	Product	Total	Share %	Material	Product	Total	Share %	Material	Product	Total	Share %	Material	Share %	Material	Share %
Japan	17,021	2,597	19,618	60.7	48,512	4,081	52,593	78.2	37,430	5,434	42,864	77.1	48,195	80.7	62,037	78.4
Hongkong	5,174	997	6,171	18.1	6,304	1,050	7,354	10.9	2,898	766	3,664	6.6	2,541	4.3	860	1.1
S. Korea	36	-	36	0.1	209	7	216	0.3	113	127	240	0.4	261	0.4	668	0.8
Taiwan	102	5	107	0.3	155	28	183	0.2	692	247	939	1.7	1,258	2.1	1,735	2.2
China	31	42	73	0.2	47	84	131	0.2	11	88	99	0.2	16	0.0	15	0.0
Thailand	-	1	1	0.0	12	5	17	0.0	13	37	50	0.1	-	-	430	0.5
Singerpore	368	112	480	1.4	1,269	223	1,492	2.2	2,535	319	2,854	5.1	3,464	5.8	5,539	7.1
Malaysia	1	3	4	0.0	-	13	13	0.0	89	40	129	0.2	106	0.2	79	0.1
India	52	-	52	0.2	278	-	278	0.4	70	21	91	0.2	-	-	-	0.1
Australia	1,397	4	1,401	4.3	48	63	111	0.2	108	208	316	0.6	25	0.0	25	0.0
U. S.	2,022	61	2,083	6.4	960	465	1,425	2.1	1,650	30	1,680	3.0	1,366	2.3	3,918	5.0
U. K.	470	-	470	1.4	162	-	162	0.2	116	125	241	0.4	116	0.2	251	0.1
Netherlands	678	244	922	2.9	284	181	465	0.7	663	70	733	1.3	143	0.2	19	0.0
France	-	-	-	-	3	-	3	0.0	140	-	140	0.3	-	-	105	0.1
W. Germany	796	27	823	2.5	1,811	87	1,898	2.8	1,002	233	1,235	2.2	2,183	3.7	2,888	3.7
Belgium	-	-	-	-	-	-	-	-	-	202	202	0.4	74	0.1	70	0.1
Italy	13	-	13	0.0	730	-	730	1.1	1	6	7	0.0	-	-	-	-
Others	-	114	114	0.4	2	159	161	0.2	36	46	82	0.1	143	0.2	19	0.0
Total	28,136	4,190	32,326	100.0	60,788	6,446	67,234	100.0	47,567	7,999	55,566	100.0	59,748	100.0	79,169	100.0

Source: Central Bureau of Statistics, Indonesia

Table AVI-8 Country-wise Export to Indonesia

(Unit: tons)

	1966	1967	1968	1969	1970	1971	1972	1973
Japan	2,530	11,781	21,154	33,270	44,704	55,244	76,509	82,706
U. S.	24	156	2,001	1,293	1,001	2,392	4,694	n.a.
W. Germany	443	1,299	1,204	2,337	2,403	2,143	6,924	n.a.
Italy	56	142	692	8	13	0	n.a.	n.a.
U. K.	0	0	0	0	0	0	168	n.a.
France	5	-	0	20	126	48	607	n.a.
Hongkong	957	4,559	5,608	8,060	3,666	4,572	n.a.	n.a.
Total	4,008	17,936	30,659	44,989	51,913	64,413	-	-

Table AVI-9 (1) Plastic Materials Export from Major Countries to Indonesia

	Quantity (ton)						Value (1,000 US$)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
Phenolics	122	7	21	58	95	94	44	3	9	20	35	40
Polyester	—	1	3	7	184	695	—	—	3	7	74	299
Silicone	—	—	8	6	6	16	—	3	3	6	7	36
Melamin	—	5	—	—	12	8	—	4	—	—	9	5
Urea	—	8	28	145	216	178	—	4	12	33	43	53
Others	175	210	343	1,094	1,523	2,733	155	104	196	570	768	1,341
Sub-Total	297	231	403	1,310	2,036	3,724	200	117	223	635	936	1,774
PVC (Compound)	428	2,259	6,300	8,973	5,202	4,101	176	858	2,225	3,087	1,726	1,437
PVC (Resin)	201	2,244	1,505	2,380	3,321	4,125	67	664	374	602	800	1,088
Polyvinyl Acetate	—	4	8	118	628	364	—	1	2	37	176	129
Polyethylene	1,052	7,608	14,359	20,380	25,823	30,233	420	2,239	2,943	4,917	6,275	7,501
Polystyrene	204	1,377	2,009	3,002	3,031	3,729	99	368	456	676	690	926
Acrilics	—	4	—	—	—	—	1	14	—	—	—	—
P P	—	—	692	498	1,007	4,401	—	—	278	151	287	1,073
Others	228	701	1,315	2,664	4,113	5,347	188	530	1,000	1,790	2,547	3,814
Sub-Total	2,112	14,197	26,188	38,015	43,124	52,299	951	4,674	7,278	11,260	12,500	15,969
Other Plastics and Resins	7	3	10	20	46	48	48	5	27	36	49	66
TOTAL	2,416	14,431	26,601	39,344	45,207	56,071	1,199	4,796	7,528	11,931	13,485	17,809

Table AVI-9 (2) Total Plastic Resin Export from Major Countries

	Quantity (ton)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
JAPAN	1,110	9,266	17,884	29,182	38,327	47,589	491	2,789	4,760	8,328	10,839	14,161
HONG KONG	797	3,843	4,847	6,616	3,447	3,935	296	1,304	1,624	2,226	1,091	1,259
U.S.A.	22	135	2,001	1,246	1,001	2,392	48	77	484	426	465	1,070
W. GERMANY	433	1,046	1,177	2,272	2,293	2,094	294	520	383	913	1,002	1,289
FRANCE	5	—	—	20	126	48	43	—	—	9	66	28
ITALY	56	142	692	8	13	—	26	107	278	28	22	—
TOTAL	2,416	14,431	26,601	39,344	45,207	56,071	1,199	4,796	7,528	11,931	13,485	17,809

Table AVI-9 (3) Thermosetting Resin Export from Major Countries

	Quantity (ton)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
JAPAN	128	199	52	249	504	1,846	44	77	32	113	228	847
HONG KONG	—	6	8	30	14	106	—	3	3	19	16	99
U.S.A.	—	—	5	299	904	1,547	—	—	12	137	395	669
W. GERMANY	119	20	337	727	614	212	132	33	175	343	297	149
FRANCE	—	—	—	—	—	13	—	—	—	—	—	10
ITALY	50	6	—	5	—	—	24	4	—	24	1	—
TOTAL	297	231	403	1,310	2,036	3,724	200	117	223	635	936	1,774

Table AVI-9 (4) Thermoplastic Resin Export from Major Countries

	Quantity (ton)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
JAPAN	980	9,066	17,829	28,916	37,801	45,702	442	2,712	4,720	8,183	10,594	13,266
HONG KONG	797	3,837	4,836	6,583	3,418	3,822	296	1,300	1,614	2,203	1,066	1,143
U.S.A.	22	135	1,996	947	98	845	48	77	472	290	70	400
W. GERMANY	307	1,023	835	1,546	1,679	1,882	162	482	194	571	706	1,140
FRANCE	—	—	—	20	117	35	—	—	—	9	45	19
ITALY	6	136	692	3	12	—	3	103	278	4	20	—
TOTAL	2,112	14,197	26,188	38,015	43,124	52,299	951	4,674	7,278	11,260	12,500	15,969

Table AVI-9 (5) PVC Compound Export from Major Countries

	Quantity (ton)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
JAPAN	—	—	1,850	2,839	2,021	1,868	—	—	682	982	680	671
HONG KONG	428	1,933	4,238	5,822	2,947	2,027	176	730	1,485	2,002	943	663
U.S.A.	—	—	101	100	48	54	—	—	21	21	23	25
W. GERMANY	—	223	111	192	69	152	—	86	38	73	35	79
FRANCE	—	—	—	20	117	—	—	—	—	9	45	—
ITALY	—	103	—	—	—	—	—	41	—	—	—	—
TOTAL	428	2,259	6,300	8,973	5,202	4,101	176	858	2,225	3,087	1,726	1,437

Table AVI-9 (6) . PVC Resin Export from Major Countries

	Quantity (ton)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
JAPAN	159	2,129	1,468	2,262	2,931	3,239	56	639	359	568	709	804
HONG KONG	42	115	1	118	382	709	12	25	—	30	88	195
U.S.A.	—	—	—	—	—	—	—	—	—	—	—	—
W. GERMANY	—	—	36	—	—	178	—	—	15	—	—	90
FRANCE	—	—	—	—	—	—	—	—	—	—	—	—
ITALY	—	—	—	1	8	—	—	—	—	3	3	—
TOTAL	201	2,244	1,505	2,380	3,321	4,125	67	664	374	602	800	1,088

Table AVI-9 (7) Polyethylene Resin Export from Major Countries

	Quantity (ton)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
JAPAN	567	5,338	11,308	17,935	24,916	29,019	221	1,437	2,352	4,306	6,054	7,203
HONG KONG	252	1,536	543	560	25	830	87	465	116	142	5	205
U.S.A.	—	—	1,872	819	—	93	—	—	393	210	—	16
W. GERMANY	232	735	635	1,064	882	291	112	337	82	259	216	76
FRANCE	—	—	—	—	—	—	—	—	—	—	—	—
ITALY	—	—	—	2	—	—	—	—	—	1	—	—
TOTAL	1,052	7,608	14,359	20,380	25,823	30,233	420	2,239	2,943	4,917	6,275	7,501

Table AVI-9 (8) Polystyrene Resin Export from Major Countries

	Quantity (ton)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
JAPAN	123	996	1,949	2,854	2,942	3,464	65	253	438	622	654	826
HONG KONG	74	247	51	83	52	144	21	73	12	28	20	37
U.S.A.	—	109	—	—	—	—	—	23	—	—	—	—
W. GERMANY	6	25	10	65	36	122	12	20	6	26	15	63
FRANCE	—	—	—	—	—	—	—	—	—	—	—	—
ITALY	—	—	—	—	—	—	—	—	—	—	1	—
TOTAL	204	1,377	2,009	3,002	3,031	3,729	99	368	456	676	690	926

Table AVI-9 (9) Polypropylene Resin Export from Major Countries

	Quantity (ton)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
JAPAN	—	—	—	498	1,007	3,995	—	—	—	151	287	886
HONG KONG	—	—	—	—	—	—	—	—	—	—	—	—
U.S.A.	—	—	—	—	—	406	—	—	—	—	—	187
W. GERMANY	—	—	—	—	—	—	—	—	—	—	—	—
FRANCE	—	—	—	—	—	—	—	—	—	—	—	—
ITALY	—	—	692	—	—	—	—	—	278	—	—	—
TOTAL	—	—	692	498	1,007	4,401	—	—	278	151	287	1,073

Table AVI-10 (1) Plastic Intermediate Products Export from Major Countries to Indonesia
(Country-wise)

	Quantity (ton, 1,000 m^2)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
JAPAN ton	1,420	2,515	3,270	4,088	6,377	7,655	1,039	1,904	2,468	3,377	4,920	7,026
(1,000 m^2)	(109)	(401)	(357)	(497)	(311)	(462)						
HONG KONG	160	716	761	1,444	219	637	87	369	507	956	139	479
U.S.A.	2	21	—	47	—	—	14	32	—	23	—	—
WEST GERMANY	10	253	27	65	110	49	19	126	52	72	115	69
FRANCE	—	—	—	—	—	—	—	—	—	—	—	—
ITALY	—	—	—	—	—	—	—	—	—	—	—	—
TOTAL ton	1,592	3,505	4,058	5,645	6,706	8,342	1,158	2,432	3,026	4,428	5,174	7,573
(1,000 m^2)	(109)	(401)	(357)	(497)	(311)	(462)						

Table AVI-10 (2) Plastic Intermediate Products Export from Major Countries to Indonesia
(Product-wise)

	Quantity (ton, 1,000 m^2)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
Phenol resin intermediate products	—	—	—	—	—	1	—	1	—	—	1	1
Polyester resin intermediate products	17	14	1	1	2	1	11	13	2	2	5	5
Melamin resin decorated sheets (1,000 m^2)	(109)	(401)	(357)	(497)	(311)	(462)	151	324	442	504	378	629
Thermosetting resin intermediate products	7	246	—	5	88	24	6	114	1	8	110	31
Sub-Total : ton	24	261	1	6	90	26	168	452	445	515	494	666
(1,000 m^2)	(109)	(401)	(357)	(497)	(311)	(462)						
Polyvinyl chloride resin film, sheets and supported sheets	1,213	2,237	3,488	4,525	5,229	5,935	745	1,416	2,619	3,673	4,558	5,879
Polyvinyl chloride resin rigid pipes, fittings, plate and others	300	860	408	953	1,229	1,656	189	436	235	433	557	829
Polyvinyl acetate resin intermediate products	—	3	—	—	7	—	—	3	—	—	17	18
Polyethylene intermediate products	8	21	19	79	79	210	4	33	5	64	129	193
Polystyrene intermediate products	7	12	12	15	18	129	6	6	15	24	37	79
Acrylic resin intermediate products	1	1	—	—	2	1	4	2	—	—	2	2
Thermoplastic resin intermediate products	41	109	128	68	53	382	42	84	97	59	40	354
Sub-Total	1,570	3,245	4,057	5,639	6,616	8,314	990	1,979	2,582	3,913	4,679	6,906
TOTAL ton	1,592	3,505	4,058	5,645	6,706	8,342	1,158	2,432	3,026	4,428	5,174	7,573
(1,000 m^2)	(109)	(401)	(357)	(497)	(311)	(462)						

Table AVI-10 (3) Plastic Intermediate Products Export from Japan to Indonesia

	Quantity (ton, 1,000 m^2)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
Phenol resin intermediate products	—	—	—	—	—	1	—	1	—	—	1	1
Polyester resin intermediate products	17	9	1	1	2	1	11	6	2	2	5	4
Melamin resin decorated sheets (1,000 m^2)	(109)	(401)	(357)	(497)	(311)	(462)	151	324	442	504	378	629
Thermosetting resin intermediate products	1	—	—	4	80	23	1	—	—	7	102	30
Sub-Total : ton	18	9	1	5	82	25	163	331	444	514	486	664
(1,000 m^2)	(109)	(401)	(357)	(497)	(311)	(462)						
Polyvinyl chloride resin film and sheets	602	425	943	974	1,420	1,436	333	270	553	635	759	988
Polyvinyl chloride resin supported sheets	556	1,492	1,933	2,146	3,519	4,199	382	1,003	1,282	1,760	2,940	4,235
Polyvinyl chloride resin rigid pipes and fittings	57	108	29	63	394	417	60	55	18	51	226	273
Polyvinyl chloride resin rigid plate, plain and corrugated	169	458	333	858	827	1,233	88	230	156	359	315	552
Polyvinyl acetate resin intermediate products	—	3	—	—	7	—	—	3	—	—	17	18
Polyethylene intermediate products	8	—	19	31	79	209	4	—	5	40	129	193
Polystyrene intermediate products	3	11	10	4	7	119	3	4	10	3	18	60
Thermoplastic resin intermediate products	9	8	1	7	43	15	6	9	1	16	29	41
Sub-Total	1,403	2,506	3,269	4,083	6,295	7,629	876	1,572	2,025	2,863	4,433	6,361
TOTAL ton	1,420	2,515	3,270	4,088	6,377	7,655	1,039	1,904	2,468	3,377	4,920	7,026
(1,000 m^2)	(109)	(401)	(357)	(497)	(311)	(462)						

Table AVI-10 (4) Plastic Intermediate Products Export from West Germany to Indonesia

	Quantity (ton)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
Polyester resin intermediate prducts	—	5	—	—	—	—	—	7	—	—	—	—
Thermosetting resin intermediate products	—	246	—	—	—	—	—	114	—	—	—	—
Sub-Total	—	252	—	—	—	—	—	121	—	—	—	—
Polyvinyl chloride resin film, sheets and supported sheets	8	2	17	63	98	46	14	5	16	62	90	54
Polyvinyl chloride resin rigid pipes and fittings	—	—	7	3	4	—	—	—	28	10	13	—
Polystyrene intermediate products	—	—	—	—	7	—	—	—	—	—	12	—
Thermoplastic resin intermediate products	2	—	3	—	—	4	5	—	8	—	—	14
Sub-Total	10	2	27	65	110	49	19	5	52	72	115	69
TOTAL	10	253	27	65	110	49	19	126	52	72	115	69

Table AVI-10 (5) Plastic Intermediate Products Export from the U.S.A. to Indonesia

	Quantity (ton)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
Polyethylene intermediate products	—	21	—	47	—	—	—	32	—	23	—	—
Thermoplastic resin intermediate products	2	—	—	—	—	—	14	—	—	—	—	—
TOTAL	2	21	—	47	—	—	14	32	—	23	—	—

Table AVI-10 (6) Plastic Intermediate Products Export from Hong Kong to Indonesia

	Quantity (ton)						Value (1,000 US $)					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
Polyester resin intermediate products	—	—	—	—	—	—	—	—	—	—	—	1
Thermosetting resin intermediate products	6	—	—	1	8	1	5	—	1	1	8	1
Sub-Total	6	—	—	1	8	1	5	—	1	1	8	2
Polyvinyl chloride resin film, sheets and supported sheets	48	318	596	1,342	192	255	17	138	379	878	108	153
Polyvinyl chloride resin rigid pipes, fittings, plate and others	74	294	39	29	4	6	41	151	33	13	3	4
Polyethylene intermediate products	—	—	—	1	—	1	—	—	—	1	—	—
Polystyrene intermediate products	4	1	2	11	4	10	3	2	5	21	8	19
Acrylic resin intermediate products	1	1	—	—	2	1	4	2	—	—	2	2
Thermoplastic resin intermediate products	28	101	124	61	10	364	17	75	88	43	11	299
Sub-Total	155	716	761	1,443	211	636	82	369	505	955	131	476
TOTAL	160	716	761	1,444	219	637	87	369	507	956	139	479

Table AVI-11 Plastic Products Export from Major Countries to Indonesia

(1,000 US $)

	JAPAN							HONG KONG						WEST GERMANY						TOTAL					
	1966	1967	1968	1969	1970	1971	1972	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
Tableware, kitchenware	13	4	11	21	46	50	61	94	55	43	138	63	103	—	6	—	—	—	—	107	66	55	159	109	113
Table cloth	1	—	—	4	3	5	19	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	4	3	5
Raincoats of PVC	1	125	4	4	90	12	5	—	—	—	—	—	—	—	—	—	—	—	—	1	125	4	4	90	12
Gloves of PVC	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Apparel and clothing accessories	6	12	—	—	41	8	8	—	—	—	—	—	—	—	—	—	—	—	—	6	12	—	—	41	8
Sanitary and plumbing features, fittings	—	1	1	10	35	534	81	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	10	35	534
Office and stationery supplies	4	13	2	17	17	72	99	—	—	—	—	—	—	—	—	—	—	—	—	4	13	2	17	17	72
Transparent cellulose film converted	—	—	—	—	—	—	—	—	—	—	11	4	5	—	—	—	—	—	—	—	—	—	11	4	5
Polyethylene bags	—	—	—	—	—	—	—	9	19	26	30	9	10	—	—	—	—	—	—	9	19	26	30	9	10
Plastic decorative laminatos	—	—	—	—	—	—	—	1	23	51	17	6	2	—	—	—	—	—	—	1	23	51	17	6	2
Plastic tiles, flooring	—	—	—	—	—	—	—	—	1	—	3	45	22	—	—	—	—	—	—	—	1	—	3	45	22
Articles of artificial plastic materials n.e.s.	135	65	62	222	402	1,123	1,619	13	31	36	74	158	205	—	22	27	23	39	73	148	118	125	319	599	1,401
Dolls and toys	3	3	2	1	6	35	12	22	70	41	61	49	134	—	—	—	—	—	—	24	73	43	62	55	168
Imitation jewells	—	—	—	—	—	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9
Rattan articles	—	1	2	—	5	2	6	2	3	—	—	—	—	—	—	—	—	—	—	2	4	2	—	5	2
Buttons	57	70	12	37	29	46	16	56	56	45	41	38	41	—	—	—	—	—	—	113	126	57	78	67	88
Handbags	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Combs	—	—	—	—	—	5	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
Artificial flowers and fruits	—	—	3	—	2	—	4	5	2	7	12	27	9	—	—	—	—	—	—	5	2	9	12	29	9
TOTAL	220	293	99	316	675	1,900	1,937	201	261	248	387	400	530	—	28	27	23	39	73	421	582	375	726	1,115	2,504

ANNEX II List of Plastic Processing Firms

Notes: Scale of Firm
B = Big
S = Medium
K = Small

D.K.I. Jakarta Raya

		Scale of Firm			Unit	Production Capacity
1. Household ware						
1. GARDEN PLASTIK Jl. Bandengan Utara 43, Jakarta	P.T.	-	S	-	buah/th	70,000
2. PEONER PLASTIK Jl. Bandengan Utara 43, Jakarta	P.T.	B	-	-	buah/th	1,200,000
3. WELEX PLASTIK Jl. Bandengan Utara Dalam 91, Jkt.	P.T.	B	-	-	buah/th	760,000
4. The PUBLIC LTD Jl. Bandengan Utara Dalam 47, Jkt.	P.T.	B	-	-	buah/th	500,000
5. BINTANG TIMUR Jl. Sinar Budi 17, Jakarta	-	-	S	-	buah/th	115,000
6. TJAHAJA BARU Jl. Bandengan Utara Dalam 50A, Jkt.	-	-	S	-	buah/th	144,000
Jumlah		3	3	-	buah/th	2,789,000
2. Tooth brush						
1. LUCKY Jl. Jembatan Dua 139, D. Jakarta	P.T.	-	S	-	buah.	1,440,000
2. M E W A H Jl. Bandengan Utara 40 F Jakarta	P.T.	-	-	K		400,000
3. PEONER PLASTIK Jl. Bandengan Utara 43, Jakarta	P.T.	B	-	-		6,000,000
Jumlah		1	1	1	buah.	7,840,000
3. Plastic sandal						
1. GARUDA MAS Jl. Garuda 96, Jakarta	-	-	S	-	pasang	150,000
2. UNIVERSAL Jl. K.H. Mansyur 120, Jakarta	P.T.	B	-	-	"	8,000,000

			Scale of Firm			Unit	Production Capacity
3.	Industrial Plastik "BRITISH" Jl. Bandengan Utara 85/ 3A, Jakarta	C.V.	-	-	-	-	-
4.	" H I B A R " Jl. Prof. Dr. Latumenten Gg. Karung 17/21, Jakarta	-	B	-	-	pasang	4,300,000
5.	DAYA INDUSTRI Jatinegara Lio Pulogadung, Jakarta	P.T.	B	-	-	"	680,000
6.	SEDJATI Ltd. Jl. Pinangsia 14, Jakarta	P.T.	-	-	K	"	70,000
7.	TETAP BERKAWAN Jl. Jakarta 121, Jakarta	P.T.	-	-	K	"	52,000
8.	WARGA DJAJA Jl. Jelambar Ilir, Jakarta	-	-	-	S	"	200,000
9.	INDONESIA EVERGREEN Jl. Jembatan Item 7, Angke, Jakarta	C.V.	B	-	-	"	8,100,000
10.	SHANGHAI Jl. Jembatan Dua Dalam Sinar Budi 17, Jakarta	-	B	-	-	"	350,000
11.	M E X I C O Jl. Bandengan Utara 81, Jakarta	C.V.	-	-	K	"	23,000
12.	I N D A H Gg. Rawabebek 6, Jakarta	-	-	-	S	"	250,000
13.	STANDAR PLASTIC FACTORY Jl. Bintu Kecil 36, Jakarta	P.T.	B	-	-	"	300,000
14.	LUBUK RAYA PLASTIK INDUSTRY COY Jl. Gedong Panjang 33, Jakarta	P.T.	B	-	-	"	1,200,000
15.	PABRIK PLASTIK DRASTOSCO Jl. Pangeran Jayakarta 105, Jakarta	P.T.	B	-	-	"	540,000
16.	SINAR OTAFUKU COY LTD Jl. Kopi 11 - 13, Jakarta	P.T.	B	-	-	"	1,000,000
17.	SIPO CORPORATION Jl. Garuda 35, Jakarta	P.T.	B	-	-	"	378,000
18.	G O L C I N D O Jl. Jelambar, Jakarta	P.T.	B	-	-	"	4,000,000

			Scale of Firm			Unit	Production Capacity
19.	DJAKARTA PLASTIK Jl. Teluk Gong 14, Jakarta	-	-	S	-	pasang	150,000
20.	S P E K I Pusat Pertokoan Hayam Wuruk Blok A/10 Jakarta	P.T.	B	-	-	"	360,000
21.	KALIMANTAN INDUSTRI PLASTIK Jl. Bandengan Utara 81, Jakarta	-	B	-	-	"	11,796
	Jumlah		13	4	3		30,114,796

4. Plastic sheet, carpet and imitation leather

1.	GEMILANG Jl. Kebayoran Lama 15, Jakarta	C.V.	B	-	-	Yard	480,000
2.	SINAR PANAH INDUSTRI Jl. Prof. Dr. Latumenten Gg. Karung 89, Jkt.	P.T.	B	-	-	"	150,000
3.	THE VICTOR FACTORY Jl. Tiang Bendera 54, Jakarta	-	B	-	-	"	590,000
4.	PLASTIKA RAYA Jl. Penjaringan 39, Jakarta	P.T.	B	-	-	"	350,000
5.	INDUSTRI DINAR UNGGUL Jl. Palmerah Utara 69/71, Jakarta	P.T.	B	-	-	"	30,000
6.	MAN YANG RUBBER Jl. Angke Gg. Sontea 25, Jakarta	P.T.	B	-	-	"	200,000
7.	TJAHAJA LUAS Jl. K.H. Zainal Arifin 31, Jakarta	C.V.	B	-	-	"	180,000
8.	THJAN HOEN RUBBER FACTORY Jl. Kelapa 31, Jakarta	-	B	-	-	"	100.000
9.	ESTERN PLASTIC RAYA CORP. Jl. Pasar Pagi I/7, Jakarta	P.T.	B	-	-	"	500,000
10.	STAR DECOMA INDUSTRIES LTD. Jl. Pasar Pagi 2, Jakarta	P.T.	B	-	-	ton	1,079

		Scale of Firm			Unit	Production Capacity
11. S A R W I Jl. Pinangsia I/14F, Jakarta	P.T.	-	-	-	-	-
Jumlah		10	-	-	Yard ton	2,580,000 1,079
5. Corrugated sheet						
1. TAN SIONG KIE (PALIMAS MURNI) Jl. Let. Jen. Harjono Jakarta	P.T.	B	-	-	lembar	600,000
6. Plastic board, lamination						
1. First CHEMICAL INDUSTRY Jl. Palmerah Barat 85, Jakarta	P.T.	B	-	-	lembar	300,000
2. SUCATO Jl. Batu Ceper Tangerang	P.T.	B	-	-	"	240,000
3. SINTA MODERN PLASTIK Jl. Blora 22, Jakarta	P.T.	B	-	-	ton	1,000
Jumlah		3	-	½	lembar ton	540,000 1,000
7. Plastic pipe						
1. P.T. Tjahaja Mulja Jl. Pejagalan I-No.56-58 Jakarta	P.T.	B	-	-	ton/bl	26
2. PRAKARSA PLASTIK Jl. Jati Petamburan II/8 Jakarta	P.T.	B	-	-	" /th	1,600
8. Electric wire coating						
9. Urethan foam						
1. NEW CHEMICAL INDUSTRY COY Jl. K.H.A. Mansyur 236/ 238, Jkt.	P.T.	B	-	-	bal	4,500
2. TUPANG INDUSTRIAL COY LTD Pulo Gadung Jakarta	P.T.	-	-	-	-	-
3. INIPO (INDONESIA NIPPON POLYCHEN)	P.T.	B	-	-	lembar /bl.	330

		Scale of Firm			Unit	Production Capacity
4. INDUSTRI URETHON Jl. Karet Depan 130, Jakarta	P.T.	B	-	-	ton	300
Jumlah	4	3			bal lembar ton	4,500 330 300

10. Plastic film & bag

1. FEELING Jl. Jamblang III A/6 Jakarta	-	B	-	-	ton	120
2. BIMA SAKTI Jl. Cunung Sahard IX/3 Jkt.	-	-	-	K		3.6
3. INTA Jl. Ketapang Utara 61 Jkt.	-	-	-	K	-	9
4. ANEKA Jl. Kongsi 38 Jkt.	-	-	-	K	-	19
5. PILOT CHEMICAL INDUSTRY Jl. Kebajoran Lama 17 Jkt.	P.T.	-	S	-	-	48
6. WETAN SARI Jl. Bandengan Utara 85/65	C.V.	-	-	-	-	-
7. SUMBER PLASTIK Jl. Bandengan Utara I/28 Jkt.	-	-	S	-	-	90
8. PENGUKIRAN Jl. Pengukitan III/28 A Jkt.	-	-	S	-	-	60
9. BINTANG MAS BARU Jl. Mangga Dua 123 A Jkt.	-	-	-	-	-	-
10. BINTANG DJAJA Jl. Kebajoran Lma Kel. Crogol Selatan Jkt.	-	-	-	K	-	24
Jumlah		1	3	4		373.6

11. Woven bag

1. P.T. DJUARA ABADI MOTOR Jakarta	P.T.	B	-	-	Lembar	1,800,000
2. P.T. JAYA INPRASFAC Jakarta	P.T.	B	-	-	"	2,000,000

		Scale of Firm			Unit	Production Capacity
3. P.T. KARPLINDO ABADI Jakarta	P.T.	B	-	-	lembar	6,400,000
4. P.T. PELASNOL Jakarta	P.T.	B	-	-	"	3,300,000
5. P.T. SARICI RAYA Jakarta	P.T.	B	-	-	"	6,000,000
6. PERINDUSTRIAN KARUNG NASIONAL Jl. PLN. (DUren Tiga) Jakarta	P.T.	B	-	-	"	5,000,000
Jumlah		6	-	-	Lembar	24,500,000
12. Rope & net						
1. OLYMPIC DJAYA Jl. Ciledug 11B. Jakarta	P.T.	-	-	-	-	-
2. SINGA MAS Jl. Jakarta 78, Jakarta	P.T.	B	-	-	ton/th	170
3. BINTANG MAS (GOLDEN STAR PLASTIK) Jl. Jembatan Tiga 2C, Jakarta	P.T.	-	-	K	"	10
4. UNIVERSE LION & CO. Jl. Pluit 21, Jakarta	P.T.	B	-	-	"	120
5. TOYO NYLON FISHERY SUPPLY Jl. P. Tubagus Angke 10, Jakarta	P.T.	B	-	-	"	180
6. SUMBER HIDUP ENAM PULUH SEMBILAN Jl. Perniagaan Barat 81, Jakarta	P.T.	B	-	-	"	255
7. DJAWA NYLON MONOFILAMENT FISHING-LENE & NET INDUSTRI Jl. Orpa 13-15, Jakarta	-	B	-	-	"	864
8. SUNY RAPE Grogol Utara Kebayoran Lama Jkt.	P.T.	-	-	-	"	-
9. The Yata UNION FIRB INDUSTRI CO., Ltd. Jl. Pejagalan I/15, Jakarta	-	B	-	-	Yard/th	3,300,000

		Scale of Firm			Unit	Production Capacity
10. PETA MAS Jl. Pramuka 65, Jakarta	N.V.	-	-	-	-	-
Jumlah		6	-	1	ton/th Yard/th	1,599 3,300,000
13. Bottle cap seal						
1. AMRISCALS INDUSTRY CORP. Jl. Kopi 32 Jakarta	C.V.	-	S	-	ton	60
2. BALAPAN Jl. Besuki 27 Jakarta	C.V.	B	-	-	buah	12,000,000
Jumlah		1	1		ton buah	60 12,000,000
14. Plastic button						
1. Sido MAKMUR Jl. Jembatan Jamblang 61, Jkt.	P.T.	B	-	-	gross	30,000
2. ANTASARI PERKASA Jl. Kebon Jeruk XVIII/5, Jakarta	-	-	-	K	"	2,000
3. DJAJA SAKTI Jl. Jakarta 58A, Jakarta	C.V.	B	-	-	"	45,000
4. P.P. BERLIAN Gg. Kramat I/38, Jakarta	-	-	-	-	-	-
5. MULIA (Industri Kancing) Jl. Duri I/3, Jakarta	-	-	-	-	-	-
6. P.T. LUCKY Jl. Pengukiran II/21, Jakarta	P.T.	-	-	-	-	-
7. P.P. KEMENANGAN Jl. Teluk Gong 7A, Jakarta	-	-	-	-	-	-
8. P.T. HONGKONG Jl. Pisangan Lama I/9, Jakarta	-	-	-	-	-	-
9. P.T. KANTJING KIMIA INDONESIA Jl. Jembatan Tiga No. 2, Jakarta	P.T.	-	-	-	-	-
10. C.V. SEKAWAN Jl. Gg. Buntu 36, Semarang	C.V.	-	-	-	-	-
Jumlah		2	-	1	gross	77,000

15. Miscellaneous		Scale of Firm				Unit	Production Capacity
1. KALIMANTAN INDUSTRI PLASTIK Jl. Bandengan Utara 81 Jakarta	-	-	S	-		buah pasang	57,305 11,796
2. GEMILANG Jl. Jamblang I/60 D. Jakarta	-	B	-	-		buah	1,480,000
3. CAMAI DJAJA Jl. Petak Sembilan 58, Jakarta	-	-	-	K		buah	36,000
4. LARIS Jl. Kamp. Jawa II/19 Jakarta	-	-	S	-		buah	300,000
5. FADJAR BARC Jl. Jelambar Ilir, Jakarta	C.V.	-	S	-		buah	460,200
6. DJAKARTA Jl. Bandengan Utara Terusan 28 Jakarta	-	-	S	-		buah	115,200
7. DJEMBATAN TIGA Jl. Bandengan Utara 82 B. Jakarta	-	-	S	-		pasang buah	21,600 79,200
8. USAHA INDUSTRI NAGA SAKTI MULIA Jl. Bandengan Utara 52A 106, Jakarta	P.T.	-	S	-		buah	293,040
9. MULIA Jl. Bandengan Utara I Gg. Makmur 20, Jakarta	-	-	-	K		buah	65,904
10. SEDJAHTERA Jl. Jembatan Dua Dalam Sinar Budi 110, Jakarta	-	-	-	-		-	-
11. DJAJA MAKMUR Jl. Petak Baru 71 Jakarta	-	-	-	-		-	-
12. ALAM DJAJA Jl. Senatul 27 Jakarta	-	-	-	-		-	-
13. CYPRESS PLASTIK INDUSTRI CO., Ltd. Jl. Asemka 168 B, Jakarta	P.T.	B	-	-		Ton	1,200
14. KUDA TIGA Jl. Kamp. Krendang Tanah Sareal VI Jakarta	-	-	-	-		-	-

			Scale of Firm			Unit	Production Capacity
15.	SINAR BINTANG Jl. Jawa Park 11/9 Jakarta	-	-	-	-	-	-
16.	PERSHABATAN Jl. Peluit Blok C. 10-12 Jakarta	P.T.	-	-	-	-	-
17.	RAD-JAWALI SAKTI Jl. Kebon Jeruk III/33 Jakarta	-	-	-	-	-	-
18.	SUMBER AGUNG Jl. Kartini 53, Jakarta	-	-	-	-	-	-
19.	ANEKA PLASTIK	C.V.	-	-	-	-	-
20.	AISJAH Jl. Keamanan Belakang Pasar Rt. 8/Rk.4 Jakarta	-	-	-	-	-	-
21.	SHYMPHONY CHEMICAL INDUSTRI Jl. Jembatan Dua Gg. Petasan No. 2 B. Jakarta	P.T.	B	-	-	buah	10,000,000
22.	TACAOS Jl. Bendungan Asahan III/ 74 Jakarta	-	-	-	-	-	
23.	TEHNIK		-	S	-	buah	288,000
24.	ALBA Jl. Tanah Abang IV/13-15 Jakarta	P.T.	-	-	-	-	-
25.	LOKOMOTIF Jembatan Lima Gg. Jamblang Utara Jakarta	-	-	-	-	-	-
26.	DJAJA SURJA	C.V.	B	-	-	buah	3,450,000
	Jumlah Semua		4	7	2	buah buah pasang ton	13,174,849 18,450,000 572,796 1,200

16. PVC Compound and miscellaneous goods

1.	CHANDRA MARKONO Jl. Angke, Jakarta	P.T.	B	-	-	Ton	6,000[2)]
2.	UBAJA DHARMA NATIONAL ENGINEARING CORP (GAMANAC) Jl. Sungai Sambas II/1 Keb. Baru, Jakarta	P.T.	B	-	-	"	1,000

		Scale of Firm			Unit	Production Capacity
3. SINTA MODERN PLASTIK Jl. Blora 22, Jakarta	P.T.	B	-	-	Ton	3,750
4. WAFAC INDONESIA[1)] Jl. Tubagus Angke 49 Jakarta	P.T.	B	-	-	"	5,000
5. VINIL INDONESIA[1)] Jl. Pancoran 3, Jakarta	P.T.	B	-	-	"	3,600
6. UNITED DCRYLICAND POLYSTYRENE[1)] Jakarta	P.T.	B	-	-	" Lembar	8,250[4)] 360,000[3)]
Jumlah		6	-	-	Ton Lembar	26,000 360,000

Notes: 1) Foreign investment

2) PVC compound

3) Rosin coated corrugated board

4) Plastics material

East Jawa

			Scale of Firm			Unit	Production Capacity
1.	Household ware						
	1. N.V.P.P.S.I. Jl. Ngamarta No.2 Lawang Malang	N.V.	B	-	-	Ton/th	325
	2. P.T. MAS PION Desa Sawo Tratap Kec. Gedangan Sidoarjo	P.T.	B	-	-	"	250
	Jumlah		2	-	-	Ton/th	575
3.	Plastic sandal						
	1. METRO PLASTIK Jl. Koblen Kidul No. 3, Surabaya	-	B	-	-	Ton/th	468
	2. POLYMER * Jl. Koblen Kidul No. 3, Surabaya	-	-	S	-	"	75
	3. N AGA S A K T I Jl. Bubutan No. 70, Surabaya	-	-	S	-	"	90
	4. METROPOLE Jl. Kemayoran Baru No. 53, Surabaya	-	B	-	-	"	312
	5. D A I M A T U Jl. Dinoyo No. 31, Surabaya	-	B	-	-	"	450
	Jumlah	-	3	2	-	Ton/th.	1,395
8.	Electric wire coating						
	1. SINAR MERBABU	-	-	S	-	Ton/th	75.6
9.	Urethan foam						
	1. T R I C O P L A Jl. Dinoya No. 35, Surabaya	P.T.	-	S	-	Ton	360
10.	Plastic film & bag						
	1. TIGA SEKAWAN Jl. Gembong, Gg.Asih 11 Surabaya	-	-	-	K	Ton	15

		Scale of Firm			Unit	Production Capacity
2. SUMBER PLASTIK Jl. Dupak No. 36, Surabaya	-	-	-	K	Ton	9
3. S E N O Jl. Krembengan Makam 23, Surabaya	-	-	-	K	"	6
4. PLASTIK KEDURUS Jl. Kebraon No. 53, Surabaya	-	-	S	-	"	75
5. DARMAWAN Jl. Undaan Wetan 54, Surabaya	-	B	-	-	"	150
6. DIPONEGORO Jl. Diponegoro 150, Surabaya	-	-	S	-	"	60
7. S U R Y A Jl. Pajajaran 6, Surabaya	-	-	S	-	"	60
8. GUNAWAN Jl. Sidodadi 101, Surabaya	-	-	S	-	"	60
9. SINAR MERBABU Jl. Kenjeran 352, Surabaya	-	-	S	-	"	60
10. R O J O Jl. Undaan Wetan 22, Surabaya	-	B	-	-	"	150
11. A.D.A. Jl. Kupang, Krajan Tengah No. 16, Surabaya	-	B	-	-	"	120
12. KINGS Jl. Niaga Tambang No. 8 Surabaya	-	B	-	-	"	150
13. C.V. WANG TJHIANG Jl. Maspati IV/93, Surabaya	C.V.	-	-	K	"	18
14. SINAR TIMUR Jl. Sidoarjo No. 30, Surabaya	-	-	-	K	"	42
15. MULJA Jl. Mojopahit No. 58 Surabaya	-	-	-	K	"	4.8
16. SIDOBANGUN Jl. Argomuljo No. 9, Lawang Malang	-	B	-	-	"	100
17. APOLLO SADAR DJAJA Jl. Telogomas, Donsengkaling Malang	-	-	-	-	"	-

			Scale of Firm			Unit	Production Capacity
18.	MANALAGI Jl. Trunojoyo No. 19, Jember	-	-	-	K	Ton	3.5
19.	PLASTO. Jl. H.Samanhudi No. 118, Jember	-	-	-	K	"	2
20.	ANEKA DJAJA Jl. Raya Sultan Agung V/1, Jember	-	-	-	K	"	1.2
21.	SEKAR MAWAR Jl. Minakdjiaggo No. 7, Probolinggo	-	-	-	K	"	30
22.	BAHTERA Jl. P. Sudirman No. 118, Probolinggo	-	B	-	-	"	120
23.	HANDOKO WIDJOJO. Jl. Semeru No. 36, Pasuruan	-	-	-	K	"	3
24.	BIMASAKTI Jl. Trunodjojo No. 113, Madiun	-	-	-	K	"	28
25.	TERUNA Jl. Jen. Sudirman Sumenep	-	-	-	K	"	10
	Jumlah Semua		6	5	13		1,277.5
11.	Woven bag						
1.	I N T R A D A Sidoarjo	-	B	-	-	Lembar	1,107,000
2.	P.T. POLYNESIA INDUSTRI CORP. Surabaya	P.T.	B	-	-	"	800,000
3.	P.T. INDECO LTD. Surabaya	"	B	-	-	"	3,000,000
4.	P.T. ABADI Surabaya	"	B	-	-	Lembar Ton	1,400,000 1,752
5.	P.T. PANTJA DJAJA INDUSTRIAL Surabaya	"	B	-	-	Lembar	1,296,000
6.	P.T. SUMBER AGUNG Surabaya	"	B	-	-	"	1,200,000
7.	P.T. BEMBANGUNAN INDERALOKEN Surabaya	"	B	-	-	"	1,600,000
8.	P.T. WIHARA KARYA AGUNG	"	B	-	-	"	2,980,000
	Jumlah		8	-	-	Lembar Ton	13,443,000 1,752

		Scale of Firm			Unit	Production Capacity
12. Rope & net						
1. BUDI DJAJA Jl. Kenjeran No. 465A, Surabaya	-	B	-	-	Ton/th	180
2. S O H O R Jl. Pesapen Kali 15, Surabaya	-	-	-	K	"	36
3. T O E N I Jl. Kepatihan 1/5, Surabaya	-	-	-	K	"	12.5
4. H A S K A R A Jl. Kedung Turi Gg. 1/2 Surabaya	-	B	-	-	"	120
5. S U R A B A Y A Jl. Bubutan No. 24, Surabaya	-	-	S	-	"	60
6. SINAR BAKTI Jl. Gresik No. 160, Surabaya	-	-	-	K	"	18
7. DJAKARTA Jl. Semarang No. 128, Surabaya	-	B	-	-	"	280
8. H. A. S. Jl. Kapasar No. 98, Surabaya	-	-	-	K	"	24
9. S A M A N Jl. Semarang No. 128, Surabaya	-	-	-	K	"	30
10. LILY HARJANI Jl. Kenjeran No. 148, Surabaya	-	-	-	K	"	15
11. SUMBER DJAJA Jl. Semarang 128, Surabaya	-	B	-	-	"	270
12. P O L Y M E R Jl. Semarang No. 128, Surabaya	-	-	-	K	"	30
13. NAGA SAKTI Jl. Dupak No. 24, Surabaya	-	B	-	-	"	150
14. TJAHAJA PLASTIK Jl. Basuki Rakhamat 68, Surabaya	-	-	S	-	"	60
15. TUNAS DJAJA Jl. Kapasan Dalan III/I, Surabaya	-	B	-	-	"	112.5

			Scale of Firm			Unit	Production Capacity
16.	ONG BOEN Jl. Kedung Doro No. 96, Surabaya	-	-	-	K	Ton/th	6
17.	SINAR BINTANG Jl. Semarang No. 128, Surabaya	-	-	-	K	"	30
18.	TJHIANG LIE SIONG Jl. Kopi No. 7, Surabaya	-	-	-	-	-	-
	Jumlah		5	2	8	Ton	1,208

15. Miscellaneous

1.	SAMI DJAJA Jl. Penghele III/32, Surabaya	-	-	-	K	Ton/th	30
2.	A G U N G Jl. Pesapan Selatan 5, Surabaya	-	-	S	-	"	84
3.	W I D J A J A Jl, Pesapen Selatan 5A. Surabaya	-	-	-	K	"	42
4.	K E N T J A N A Jl. Ambengan 68, Surabaya	-	-	-	K	"	7.5
5.	KIE SIOE Jl, Gemblongan 52, Surabaya	-	-	-	K	"	11
6.	M U L J A Jl. Bubutan 143, Surabaya	-	-	-	-	"	-
7.	O E I Jl. Kartini 128, Surabaya	-	-	-	K	"	18
8.	PREGOLAN Jl. Pregolan Bunder 12, Surabaya	-	-	-	K	"	7.5
9.	PENGAMPON Jl. Pengampon II/3, Surabaya	-	-	-	K	"	10
10.	SUMBER DJAJA Jl. Krembangan 10, Surabaya	-	-	-	K	"	3.5
11.	C.V. ASIA BARU Jl. Kedurus 191, Surabaya	C.V.	-	-	K	"	7.5
12.	A T O O M Jl. Kedung Doros No. 80-82 Surabaya	-	-	-	K	"	12

		Scale of Firm			Unit	Production Capacity
13. TINTANG DJAYA Jl. Sidoyoso 8/2, Surabaya	-	-	-	K	Ton/th	13
14. HOK LIE HOO Jl. Banyu Rip 124, Surabaya	-	B	-	-	"	200
15. KENTJANA UNGU Jl. Ketabang Kali 9, Surabaya	-	-	-	K	"	18
16. I R A W A N Jl. Gembong II/63, Surabaya	-	B	-	-	"	150
17. MANOPPO Jl. Kenjeran. II/91 Sby	-	-	-	K	"	36
18. EKADJAJA. 15 Jl. Kapasan Kidul II/15 Sby	-	-	-	K	"	15
19. C.V. ANEKA PLASTIK Jl. Sino Lawang Baru I/1 Sby	C.V.	-	-	K	"	11.5
20. JAPARCO Jl. Bongkaran 57-59 Sby	-	-	-	K	"	25
21. PERPLASTIKAN Jl. EMBONG WUNGU 27-29 Sby	-	B	-	-	"	225
22. UNION PLASTIK Jl. Bongkaran 105 Sby	-	-	S	-	"	62
23. AMAN Jl. Pesapen Kali 1	-	-	-	K	"	20
24. SEDJATI Jl. Kenjeran 322 Surabaya	-	-	-	K	"	8
25. ANEKA DJAJA Jl. Tambak Bunder II/69 Surabaya	-	-	-	K	"	10
26. A. S Jl. Embong Tanjung 5 Surabaya	-	-	-	K	"	15
27. SUMBER INTAN Jl. Sulawesi 1 Surabaya	-	-	-	K	"	15
28. SUMBER MAS Jl. Pelampitan VIII/19-21 Surabaya	-	-	-	K	"	12
29. JONG SOE HIN & CO. Embong Malang 19 Surabaya	-	-	S	-	"	88
30. ASIA Jl. Pragoto 2 Surabaya	-	-	-	K	"	7

		Scale of Firm			Unit	Production Capacity
31. LAUW JAT KAUW Jl. Kembang Jepun VII/7 Surabaya	-	-	-	K	Ton/th	5.5
32. HAUW LAN SIOE Jl. Sidodadi Baru 30 Surabaya	-	-	-	K	"	0.7
33. KAMO Jl. Bunguran 51 Surabaya	-	-	-	K	"	25
34. TAM TIANG SENG Jl. Kalisosok 3 Surabaya	-	-	-	K	"	7
35. REN AY & CO. Jl. Pesapen Kali 4 Surabaya	-	-	-	K	"	5
36. LOEK WEN GOANG Jl. Gembong Tebasan 15 Surabaya	-	-	-	K	Ton	2.4
37. SIAUW KIOEN TJING Jl. Tembok Dukuh III/2 Surabaya	-	-	-	K	"	9
38. C.V. LIE KIEM TIE Jl. Djagir 68 Surabaya	C.V.	-	-	K	"	9
39. TOEMBOE Jl. Veteran 34 Gresik	-	-	-	K	"	21.6
40. GADJAH MADA Jl. Gadjah Mada 92 Sidoardjo	-	-	-	K	"	0.6
41. C.V. KIPWA Jl. Sepanjang 101 B. Medang Waru Sidoarjo	C.V.	-	S	-	"	70.6
42. CENTRAL Jl. Galuran 10. Pos Sepanjang Sidoarjo	-	-	-	K	"	16
43. P.T. KAWI Jl. Djenggolo 15 Sidoarjo	P.T.	-	-	-	"	-
44. KO DOE SANG Jl. Pelojen Kidul 44 Malang	-	-	-	K	"	15
45. C.V. COLUMBIA Jl. Klenteng 52 Malang	C.V.	-	-	K	"	12
46. SETIA DJAJA Jl. Kasin Kulon 21 Malang	-	-	-	K	"	5
47. TJHOEN JOENG THIEN	-	-	-	-	-	-
48. GOLDEN STAR Jl. KaYu Tangan 96 Malang	-	-	-	K	"	6
						120

			Scale of Firm			Unit	Production Capacity
49.	POLY GLAS Jl. Niaga 7 Malang	-	B	-	-	Ton	
50.	TINI WATI Jl. Blimbing Wetan 140 Malang	-	-	-	K	"	-
51.	SUBUR Jl. Maj. Jen. Harjono IV A/l 4B Malang	-	-	-	K	"	-
52.	SUMBER REDJEKI Jl. Raya 23 Lawang Malang	-	-	-	-	"	-
53.	BINTANG Jl. Diponegoro 55 Jember	-	-	-	K	"	4
54.	LIAW TIK JONG Jl. Leduri 25 Ds. Tamanan Tulungagung	-	-	-	K	"	12
55.	WOE YOEK SEN Jl. Kemuning 81 Tulungagung	-	-	-	K	"	0.65
56.	LIANG SENG HIEN Jl. K.H. Hasim Ashari 17 Jombang	-	-	-	K	"	10
57.	C.V. HIDUP TUNAS HARAPAN Jl. K.H. Hasim Ashari 17 Jombang	C.V.	-	-	K	"	10
58.	P.T. BERLINA Pandaan Pasuruan	P.T.	B	-	-	"	240
	Jumlah		5	4	45	Ton	1,770.55

West Jawa

		Scale of Firm			Unit	Production Capacity
1. Household ware						
1. MAJESTIC INDUSTRI COY LTD Gg. Balai Desa Kodya Bogor	-	B	-	-	Ton/th	500
Jumlah	-	1	-	-	Ton	500
3. Plastic sandal						
1. NAGA LADJU Jl. Sudirman 439 B, Kodya Bandung	-	B	-	-	Ton/th	120 (300,000 ps)
2. N.V. MARGA DAYA Jl. Simpangan Aruna No. 1 Bandung	N.V.	B	-	-	"	300 (900,000 ps)
3. N.V. SERBA WARAS Jl. Aruna, Bandung	N.V.	B	-	-	"	1,008 (3,024,000 ps)
4. P.T. HEVIA LATEX & RUBBER WORKS	P.T.	B	-	-	"	360 (2,160,000 ps)
Jumlah		4	-	-	Ton	780
10. Plastic film and bag						
1. TATANG PRIATNA Jl. Sudirman No. 527 Kodya Bandung	-	-	-	K	Ton/th	15
2. DEWI MULYA Jl. Sudirman No. 524 Kodya Bandung	-	B	-	-	"	132
3. C.V. EKA USAHA Jl. Arna No. 9 Kodya Bandung	C.V.	-	S	-	"	60
4. TJOE HAN WIE Jl. Bantjeui No. 24 Kodya Bandung	-	-	-	K	"	22.5
5. C.V. TRI DAYA Jl. A.B.C. No. 61 Kodya Bandung	C.V.	-	-	K	"	7.5
6. RODA MAS Jl. Gg. Souw Tjien Kie 130/ 84 Kod, Bdg.	-	-	-	K	"	15
7. KURNIA DJAYA Jl. M. Sapari No. 20, Kodya Bandung	-	-	-	K	"	22.5

		Scale of Firm				Unit	Production Capacity
8.	MASA BARU Jl. Cikawao No. 21/36 A Kodya Bandung	-	-	S	-	Ton/th	60
9.	SETIA WATY Jl. Aruna No. 19/BLKG Kodya Bandung	-	-	S	-	"	90
10.	P.T. PLASINDO Jl. Jatayu No. 10, Kodya Bandung	P.T.	-	S	-	"	60
11.	PRIANGAN DJAJA Jl. Wakap No. 81/82 Kodya Bandung	-	-	-	K	"	45
12.	SETIA DJAYA Jl. Surjani No. 32 Kodya Bandung	-	-	-	K	"	30
13.	NEFO Jl. Halten No. 95 A Kodya Bandung	-	-	-	K	"	37.5
14.	PLASTIN Jl. Halten 45/77, Kodya Bandung	-	-	-	K	"	27.5
15.	ARUNA PLASTIK Jl. Aruna No. 7 Kodya Bandung	-	-	S	-	"	75
16.	SITU AKSAN Jl. Situ No. 17 A. Kodya Bandung	-	-	-	K	"	40
17.	C.V. MEKAR DJAYA Jl. M. Toha Km. 7, Kodya Bandung	C.V.	-	S	-	"	90
18.	UDJU SUHADA Jl. Bumi Megara No. 1/320 Kod. Bandung	-	-	S	-	"	75
19.	JOESOEF (HOAN SOBY SONG) Jl. Slakoso 21/A Tasikmalaya	-	-	-	K	"	30
20.	WALET Jl. Gunung Putri 1 A Garut	-	-	-	K	"	34
21.	KHO KHE TJOEN Jl. Kanoman 20 Cirebon	-	B	-	-	"	132
22.	LOEKMAN SANTOSO Jl. 108, Cirebon	-	-	-	K	"	7.5
23.	NASCO PLASTIK INDUSTRI Jl. Sudirman 439 Bandung	-	-	S	-	"	90

		Scale of Firm			Unit	Production Capacity
24. TJOE HAN WHIE Jl. Bantjeu No. 42 Bandung	-	-	-	K	Ton/th	22.5
25. P.T. LONBISCO	-	-	-	K	"	22.6
Jumlah		2	8	15	Ton	1,185.6
11. Woven bag						
1. P.T. ASTER. Tanggerang	P.T.	B	-	-	Lembar	4,800,000
2. P.T. NEW GRAND PLASTIC INDUSTRY Bandung	P.T.	B	-	-	Lembar	4,800,000
3. P.T. PRAHUNU UTAMA Bekasi	P.T.	B	-	-	Lembar	900,000
4. P.T. KALI DJAJA UTAMA Bandung	P.T.	B	-	-	Lembar	4,000,000
5. P.T. DAYA SAKTI Bandung	P.T.	B	-	-	Lembar	1,000,000
6. P.T. LOKFAM PLASTIK INDUSTRY Bandung	P.T.	B	-	-	Lembar	1,800,000
7. P.T. DAYA SEJATI Cirebon	P.T.	B	-	-	Lembar	1,000,000
Jumlah		7	-	-	Lembar	18,000,000
15. Miscellaneous						
1. C.V. DAMAI Jl. EMONG NO. 29/16 D Kodya Bandung	C.V.	-	S	-	Ton/th	90
2. SERBA GUNA Jl. Aruna 19 Kod. Bdg.	-	-	-	K	-	30
3. PAL PLASTIK Jl. Sudirman No. 439 A Kod. Bdg.	-	-	-	K	-	15
4. LILIANA GUNAWAN Jl. Ketapang Kaler 1 Bdg.	-	-	-	K	-	12
5. OETOEY GUNAWAN Jl. Kopo/H. Ashari 37 A 91 Kod. Bdg.	-	-	-	K	-	15

				Scale of Firm		Unit	Production Capacity
6.	ONO ANWAR Jl. Oto Iskandar 126/120 A Kod. Bdg.	-	-	-	K	-	15
7.	SAMOAEL HARDIMAN Jl. Baratan No. 15 Kod. Bdg.	-	-	-	K	-	9
8.	PANDJI BUDIWATI Jl. Soka No. 1 Kod. Bdg.	-	-	-	K	-	18
9.	SEBAGUNA Jl. Aruna No. 19 Kod. Bdg.	-	-	-	K	-	30
10.	AHUN GUNAWAN Jl. CiCendo 126/58 Kod.Bdg.	-	-	-	K	-	9
11.	LING TJUI TJIOE Jl. Kebon Tangkil No. 76/8C Kod. Bdg.	-	-	-	K	-	7.5
12.	KEMAKMURAN Jl. Wongsoredjo Kod. Bdg.	-	-	-	K	-	6
13.	INDUSTRIAN PLASTIC CO. Jl. Imam Bonjol 20 Kod.Bdg.	-	-	-	-	-	-
14.	TERATE Jl. Dursasana No. 37 Kod.Bdg.	-	-	-	K	-	12
15.	PADASUKA Jl. Kebon Mangga 115/22 C Kod. Bdg.	-	-	-	K	-	38
16.	GARUDA MAS. Jl. Niti Prodjo 14 Bdg.	-	-	-	K	-	21
17.	ANEKA PLASTIK Jl. Suniaraja No. 2/13 D Kod. Bdg.	-	-	-	K	-	36
18.	SEGAR Jl. Tjulan No. 12-14 Kod. Bdg.	-	-	-	K	-	9
19.	NANANG Jl. Tjikawau No. 20 Kod. Bdg.	-	-	-	K	-	6
20.	ASTA AFRIKA Jl. Garuda No. 49 A. Kod. Bdg.	-	-	S	-	-	93
21.	SULANI Jl. ABD. Muis No. 53 Kod. Bdg.	-	-	-	K	-	9
22.	WARGI Jl. Sukasari No. 1 Kod.Bdg.	-	-	-	K	-	6

	Scale of Firm				Unit	Production Capacity
23. MUTIARA Jl. H. Sjamsudin 64 Kod.Bdg.	-	-	-	K	-	6
24. SITU AKSAN Jl. Surjani 19 Kod.Bdg.	-	-	-	K	-	12
25. INDAH Jl. Moh Jamhari 267/88 Kodya Bandung	-	-	-	K	-	9
26. ANEKA Jl. Abd. Muis 30/18C Kod. Bdg.	-	-	-	K	-	12
27. DEWI KARYA Jl. Halte Andir 335/78 Kod. Bdg.	-	-	-	K	-	24
28. ALI BIN TINGGAL Jl. Kebon Jati 152 Kod. Bdg.	-	-	-	K	-	3
29. SENTOSA Jl. Pasir Kodja 35 E/29 Kod. Bdg.	-	-	-	K	-	21
30. ARDJUNA Jl. Kebon Tangkil 61/8 C Kod. Bdg.	-	-	S	-	-	60
31. HERMAN RUSLI Jl. Nakola No. 121 Kod.Bdg.	-	-	-	K	-	6
32. SUMBER HARUM Jl. Narkiman 128/19 A Kod. Bdg.	-	-	-	K	-	9
33. HIN JIE HIAN Jl. Iskandar Dinata. 516 Kod. Bdg.	-	-	-	K	-	15
34. TJIN HIN NJAN Jl. Gg. Alwasin No.1 Kod. Bdg.	-	-	-	K	-	6
35. TJIN GIN TJOEI Jl. Kebun Jati 192 Kod. Bdg.	-	-	-	K	-	15
36. TJHAN KOK WAN Jl. Lim Siong 33/10 A Kod. Bdg.	-	-	-	K	-	9
37. SEGER TJAP ANTING Jl. Tjulan No. 2 Kod. Bandung	-	-	-	K	-	9
38. TJAN TJOEI WIE Jl. Keong No. 1 Kod.Bdg.	-	-	-	K	-	9

	Scale of Firm				Unit	Production Capacity
39. LIMA DJAJA Jl. Sania Raja 20 A Kod. Bdg.	-	-	-	K	-	15
40. SATELIT Jl. Cirojom No. 3/36 Kod. Bdg.	-	-	-	K	-	30
41. TJONG JOENG KWAN Jl. Batutulis No. 26 Kod. Bdg.	-	-	S	-	-	60
42. PLASTIE COMPANY Jl. Sukamadju, Tjimanggir Kab. Bogor	-	-	-	K	-	33
Jumlah		-	4	37	Ton	849.5

Central Jawa

		Cost of Firm			Unit	Production Capacity
2. Tooth brush						
1. MAULANA Jl. Kali Baru Barat No.35 Semarang	N.V.	B	-	-	Ton/th	245
10. Plastic film & bag						
1. N.V. ISTANA Jl. Cinderawasih No. 21 Semarang	N.V.	-	S	-	Ton/th	60
2. C.V. KUKILA KENCANA Jl. Gg. Pinggir No. 14 Semarang	C.V.	-	-	K	"	36
3. P.T. DWI KARYA Jl. Kakap No. 107 Semarang	P.T.	B	-	-	"	648
4. APOLLO Jl. Stasiun No. 50 Kudus	-	-	-	K	"	15
5. PLASTIK SINAR AGUNG Jl. Sorogenen 139 Sala	-	-	S	-	"	60
6. PLASTIK JARAPAH Debegan Kel. Mojosongo Jebres Sala	-	-	-	K	"	15
7. PLASTIK TAWON Jl. Mojosongo No. 9 Sala	-	-	-	K	"	15
8. PLASTIK YOEN TJOEN HEIN Jl. Siswa No. 33 Sala	-	-	-	K	"	12
9. PLASTIK SIDODADI Jl. Tambak Segaran No. 87 Sala	-	-	-	K	"	12
10. PLASTIK JANGKRIK Jl. Gajah Mada No. 42 Sala	-	-	-	K	"	30
11. PLASTIK MERPATI Jl. Mojosongo No. 39 Sala	-	-	-	K	"	45
12. BENGAWAN PLASTIK Jl. Peringgading No. 24 Sala	-	-	-	K	"	15
13. PLASTIK SAMUDRA Jl. Slamet Riyadi No. 167 Sala	-	-	S	-	"	60
14. PLASTIK RAJAWALI Jl. Kepunton No. 104 Sala	-	-	-	K	"	22.5
15. PLASTIK CINDRAWASIH Jl. Werdas No. 6 Sala	-	-	-	K	"	49.5

			Cost of Firm			Unit	Production Capacity
16.	PLASTIK SRITI Jl. Sala	-	-	-	K	Ton/th	30
17.	PLASTIK SUMBER JAYA Jl. Pemuda Selatan 40 Klaten	-	-	-	K	"	37.2
18.	PLASTIK MATAHARI Jl. Mesen No. 29 Karanganyar	-	B	-	-	"	210
19.	INDONESIA INPLASTIN Jl. Jen. A. Jani No. 217 Tegal	-	-	-	K	"	20
20.	PLASTIK SULTAN AGUNG Jl. A.R. Hakim No. 26 Tegal	-	-	-	K	"	18
21.	PLASTIK SARDANA Jl. Sugiono No. 7 Tegal	-	-	-	K	"	7.2
22.	PLASTIK P. SINGGIH Jl. W.R. Supratman No. 18 Pekalongan	-	-	-	K	"	14.7
23.	PLASTIK SUMBER HIDUP Jl. Pemuda No. 34 Magelang	-	-	-	K	"	36
24.	PLASTIK BERDIKARI Jl. Pemuda Magelang	-	-	S	-	"	72
25.	PLASTIK SUMBER CILIK Jl. Pemuda No. 32 Magelang	-	-	-	K	"	24
			2	4	19	Ton/th	1,564.1

15. Miscellaneous

1.	BADJA KARYA Jl. R. Patah 81 Semarang	C.V.	-	-	K	Ton/th	48
2.	SEKAWAN Jl. Gg. Buntu No.36, Semarang	C.V.	-	-	K	"	6
3.	CAHAYA Jl. Taman Seteran Barat 19 Semarang	C.V.	-	-	K	"	6
			-	-	3	Ton	60

North Sumatra

		Scale of Firm			Unit	Production Capacity
1. Household ware						
1. BANJUWANGI Jl. Sei Kera No. 12, Medan	-	-	S	-	Ton/th	50
2. C.V. Kober Kotabangun Labuhan Deli Serdang	C.V.	-	S	-	"	100
Jumlah		-	2	-	Ton	150
3. Plastic sandal						
1. BANYUWANGI (not operating) Jl. Kumango No. 13, Medan	-	-	S	-	Ton/th	100
2. C.V. HARAPAN KITA Jl. Duyung No. 64, Medan	C.V.	B	-	-	"	140
3. KARET DELI Jl. Mulia Km. 8.3 Deli Serdang	-	B	-	-	"	200
4. C.V. KOBER Kota Bangun Labuhan Deli Serdang	C.V.	-	S	-	"	100
5. C.V. ASIA SANDAL Gg. Mangga Sunggal Deli Serdang	C.V.	-	S	-	"	50
6. SIANTAR Jl. Merdeka No. 140 Pemantangsiantar	-	-	S	-	"	80
7. INDAH PLASTIK Jl. Martoba No. 12 Pemantangsiantar	-	-	S	-	"	60
8. C.V. CIPTA Tanjung Mulia No. 347 B, Deli Serdang	C.V.	-	-	K	"	24
Jumlah		2	5	1	Ton	754
10. Plastic film & bag						
1. DIAN Jl. Wahidin No. 22 A Medan	-	-	S	-	Ton	80
2. KALIMANTAN Jl. Percut No. 1 Medan	-	-	S	-	"	80
3. PERFEKTA Jl. Sabaruddin 13 B Medan	-	-	S	-	"	100

		Cost of Firm			Unit	Production Capacity
4. P.T. SUKARELA Jl. Mulla Km. 6.8 Deli Serdang	P.T.	B	-	-	Ton	200
5. C.V. KOBER 1. Kota Bangun Labuhan	C.V.	-	S	-	"	100
6. P.T. MARIAMAN Jl. Belawan Km. 10.5 Deli Serdang	P.T.	B	-	-	"	720
7. SIANTAR Jl. Merdeka No. 140 Pematang Siantar	-	-	S	-	"	100
8. SEMARANG Jl. Jenderan A, Yani 138-140 P. Siantar	-	-	S	-	"	60
9. SUMBER DJAJA Jl. Tawrin 36-BC. P.Siantar	-	-	S	-	"	60
Jumlah		2	7	-	Ton	1,500
11. Woven bag						
1. P.T. MARYAMA Medan	P.T.	B	-	-	Lembar	3,000,000
2. P.T. OTANI Medan	P.T.	B	-	-	"	1,300,000
Jumlah		2	-	-	Lembar	4,300,000
12. Rope & net						
1. DIAN Jl. Dr. Wahidin 22A, Medan	-	-	-	K	Ton/th	20
2. P.T. SUKARELA Jl. Mulia Km, 6.8 Deli Serdang	P.T.	B	-	-	"	260
3. UNITED Jl. Kom. L. Yos Sudarso Km 9.5 Deli Serdang	-	B	-	-	"	120
4. P.T. MARIAMA Jl. Belawan Km. 10.5 Beli Serdang	P.T.	B	-	-	"	480
Jumlah		3	-	K	Ton/th	880

15. Miscellaneous	Scale of Firm				Unit	Production Capacity
1. LIMA EMPAT. Jl. Maj. Jen. S. Parman Medan	-	-	-	K	Ton/th	21
2. AGAM HINDRAWAN Jl. Siantar Medan	-	-	-	K	-	-
3. ENDRA SUSANTO Jl. Kepribadian 31 Medan	-	-	-	K	-	1.5
4. SURYA SALIM Jl. Waringin 10 Medan	-	-	-	K	-	0.8
5. C.V. DELI DJAYA Jl. Wahidin 28 Medan	C.V.	-	S	-	-	65
6. INDRA SARI Jl. Puri 61 Medah	-	-	-	K	-	1.5
7. MODEL BARU Jl. Kepiting 1 A Medan	-	-	-	K	-	1
8. MDJU Jl. Brigjen Katamso Gg. Usdek 16 Medan	-	-	-	K	-	2
9. GO BUN WENG Jl. Komodore Laut Jos. Sudarso 14 Medan	-	-	-	K	-	-
10. MAWARDI Jl. Gg. Seri 412 F Medan	-	-	-	K	-	4
11. KALIMANTAN Jl. Kalimantan 9 Medan	-	-	-	K	-	0.8
12. PELANGI Jl. Sekip No. 25 Medan	-	-	-	K	-	6.5
13. GO TJENG LI Jl. Besi 492/493 Medan	-	-	-	K	-	2
14. SRIMURNI Jl. Sideli 39 C Medan	-	-	-	K	-	1.5
15. DUYUNG Jl. Duyung 31 A Medan	-	-	-	K	Ton/th	6
16. MINARNI Jl. Mahkamah 1 Medan	-	-	-	K	-	-
17. INTI OETOMO Jl. Klimantan 9 Medan	-	-	-	K	-	24
18. MUSTAFA DJAJA Jl. Bingkarung 20 B. Medan	-	-	-	K	-	5
19. SUWANDY Jl. Kapt. Johana Medan	-	-	-	K	-	-

		Scale of Firm			Unit	Production Capacity
20. SUKARTO SOFIA Jl. Gatot Subroto 22 Medan	-	-	-	K	-	1.4
21. ANTOMA Jl. Sisingamangaradja 16 A. Medan	-	-	-	K	-	3
22. MANAN HANITIS Jl. Jaya Paris 61 A Medan	-	-	-	K	-	30
23. M. YAHYA Jl. Pakantan 14 Medan	-	-	-	K	Ton/th	2
24. WAGIMIN TONADY Jl. Kalimantan 14 Medan	-	-	-	K	"	4
25. SAMIN LATIF Jl. Ubi 11C Medan	-	-	-	K	"	-
26. TUNAS BARU Jl. Pembangunan 1P. Brayan Medan	-	-	-	K	"	-
27. HASAN Jl. Penang 2 Medan	-	-	-	K	"	-
28. MUSTIKA JAYA Jl. D. Barat 20 Medan	-	-	-	K	"	1.2
29. SUNANG LUKITA Kamp. Dalam 40 Medan	-	-	-	K	"	-
30. LINTANG HALIM Jl. Rahmat Syah 124 Medan	-	-	-	K	"	5
31. TIMUR JAYA Jl. Stal Ban 181/11 Polonia Medan	-	-	-	K	"	2
32. TIGA SAUDARA Jl. Thamrin 34 Medan	-	-	-	K	"	2
33. MURSALIM Jl. Bakau 7 Medan	-	-	-	K	"	0.4
34. BUYUNG SUSANTO Jl. Riau Medan	-	-	-	K	"	5
35. USAHA SEDERHANA Jl. Kapt. Jumhana Gg.I/ 29 Medan	-	-	-	K	"	3
36. P.D. HARAHAP Jl. Pabrik Tenun Medan	-	-	-	K	"	-
37. STAR Jl. Maj. Jen. S. Parman 51 Medan	-	-	S	-	"	-
Jumlah		-	2	35	Ton/th	201.6

ANNEX III List of Plastic Processing Firms Visited

	Name of firm	Main products	Address of firm
1.	First Chemical Industry Ltd.	Panel sheet & household ware	35, Palmerah Barat, Jakarta
2.	Firma Aneka	PE bag	Jl. Bandengan Utara I/21
3.	P.T. Chandra Markono	PVC compound	Jl. Jelambar Ilir No. 20 Jakarta
4.	Hermawan Cahjana (C.V. Polytex Industie)	Woven bag	Jl. Jataju 1, Bandung
5.	P.T. Plasindo	Polyethylene bag	Jl. Djataju 10 A, Bandung
6.	P.T. Grand Textile Industry (P.T. Grandtex)	Woven bag and net	Jl. Jendral A. Yani Km 7, Bandung
7.	P.T. Nikkatsu Electric Works	Electric wires	Jl. Cimuncang 21 E, Bandung
8.	Naga Ladju	Sandal	Jl. Jen. Sudirman 439, Bandung
9.	P.T. Daimatsu Industry Indonesia	Sandal	Jl. Jembatan Merah 17, Surabaya
10.	P.T. Irawan	Plastic bottle, cap and PVC electric wire	Jl. Gembong Tebasan 36, Surabaya
11.	Saman	Reprocessing of plastic waste plastic tape	Jl. Semarang 128, Surabaya
12.	P.T. Abadi Nylon Rope & Fishing Net Mfg. Ltd.	Rope and woven bag	Jl. Ketegan 42-44, Taman Kab. Sidoarjo
13.	P.T. Maspion	Household wares & Jerry can	No. 29/1 Kembang Jepun, Surabaya
14.	P.T. Berlina	Bottle and cap	Jl. Slompretan 26, Surabaya
15.	P.T. Dwi Karya	PP bag	Jl. Kakap 107, Semarang
16.	C.V. Rojomulyo	Plastic bag and tape	Jl. Gajah 1, Semarang
17.	P.T. Union Rope Co.	Rope	Jl. Hitam 7, Medan
18.	Banyuwangi	Plastic bags, household-wares, jerry can	Jl. Sei Kera 12, Medan
19.	HKIK, Harapan Kita Industri Karet/Plastik	Sandal	Jl. Duyung 64, Medan
20.	C.V. Deli Djaja	Rope, hose, film & household wares	Jl. Kom. Laut Jos Sudarso Km. 6 1/2, Medan
21.	P.T. Sukarela	PP stretched tape & Handican	Jl. K.L. Yos Sudarno Km 6, 7, Medan
22.	P.T. Sumatra Plastic Works	Household wares	Jl. Belawan Km 7,3, Medan

ANNEX IV Guidance and Process Description of Plastics Processing

Contents

General Matters

1 Capital investment

(1) Fixed capital

(a) Process unit
Process unit includes auxiliary and ancillary facilities. Prices shall be 1.4 times of FOB Japan prices stood at mid-1973.

(b) Land
Shall be approximately 3 times of the building area, and the prices thereto shall be 5,000 Rp./m^2.

(c) Building & structures
Buildings shall be the head office and raw material warehouse to be made of ferroconcrete constructions @60,000 Rp./m^2 and all the other shall be in principle by ferroslates @30,000 Rp./m^2.

(d) Cost for installation work
Shall be 1.4 times of the Japanese price.

(e) Cost for operation preparation
Construction period shall be for 16(sixteen) months from the execution of the agreement and until the operation startup, with the provision of 1(one) month for the trial operation.
Fixed capital shall be raised by own capital by 75%, and remaining 25% to be raised by borrowings under the supposition that 1/5(one fifth) of the land, building and other facilities costs were made available by the borrowings.
The monetary interest shall be 24% p.a., operational ratio of the production facilities during the trial operation period shall be 50%, and product yield ratio shall be 20%.

(2) Operating fund

Operating fund shall be approximately 80% of the fixed capital. Said percentage shall be raised by own capital, and the remaining shall have a monetary interest rate of 24% p.a.

2. Cost

(1) Variable cost

(a) Raw materials

In respect of the raw materials, the following unit cost shall be assumed:

LDPE	450	Rp./kg
HDPE	450	
PP	450	
PVC(resin)	400	
PVC(compound)	700	
PS(GP)	450	

All the others were noted down previously whenever we referred to such items.

(b) Utilities

In respect of the utilities cost, the followings are assumed:

Electricity	10	Rp./KWH
Water	5	Rp./m^3

(2) Fixed cost

(a) Depreciation

For buildings and fixtures shall be on 20-year straight line method, and for facilities shall be on 8-year straight line depreciation.

(b) Repairs & maintenance costs

Reparis and maintenance costs for the initial year shall be 1.5% of the facilities amount.

(c) Fixed asset tax

Fixed asset tax for buildings and fixtures shall be 1.2% and for land 2.4%.

(d) Monetary interest

1) Long-term interest
   25% of the fixed capital shall be borrowed with the interest rate of 24%.
2) Monetary interest for operating fund
   50% of the operating fund shall be borrowed with the interest rate of 24%.

(e) Labour cost

1) Administrator and engineer:

Foreigner	150,000	Rp./mth
Locally recruited	30,000	

2) Operator

Foreman	20,000
Skilled	12,000
Unskilled	7,000

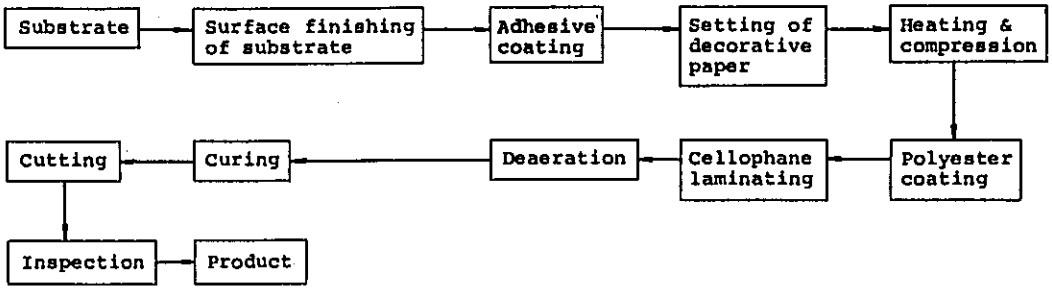
(f) Plant administrator

Shall be entitled to have 100% of the total salaries and wages.

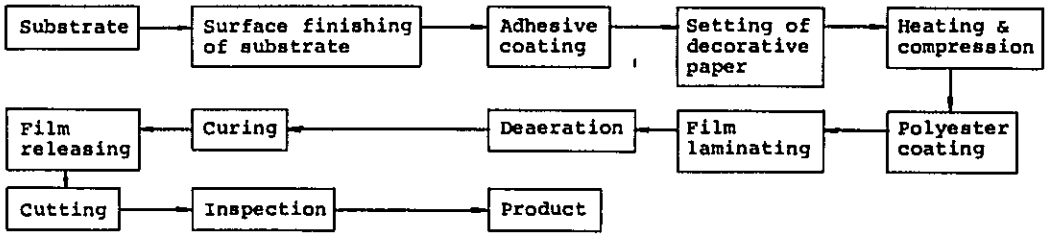
1. Decorative sheet made with unsaturated polyester resin

1-1 Flow chart

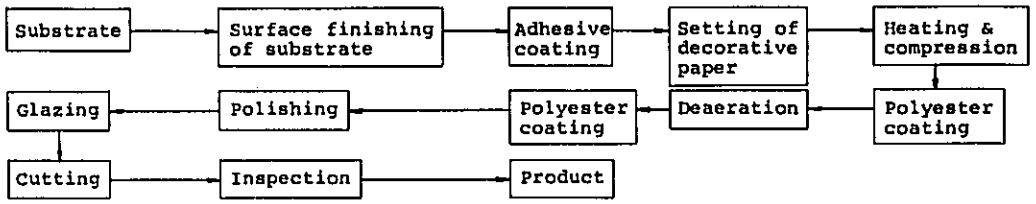
(a) Cellophane overlay method



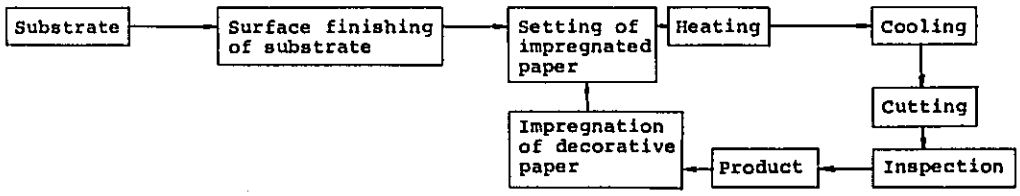
(b) Film overlay method



(2) Flow coating method



(3) Compression method.



1-2 Building and equipment list

(1) Building

	Area (m^2)	Unit price (1,000Rp/m^2)	Price (1,000Rp)	Notes
Head office	60	60	3,600	Reinforced concrete
Warehouse for material	30	30	900	Steel-frame slate
Manufacturing plant	457	30	13,710	"
Plant office	17	30	510	"
Warehouse for product	100	30	3,000	"
Boiler, generator room & machine shop	100	30	3,000	"
Total	764		24,720	

(2) Equipment

(a) Compression line

	Unit	Price (1,000Rp)
Mono crane	1	
Lift truck	1	
Coating roll	1	
Bench for decorative paper laminating (wood)	1	
Bench for setting decorative paper (steel)	1	
Laminating press (3 daylight, 4' x 8', 120tons)	1	
Stacking table (wood, with casters)	1	
Mixer for adhesive	1	
Total		20,750

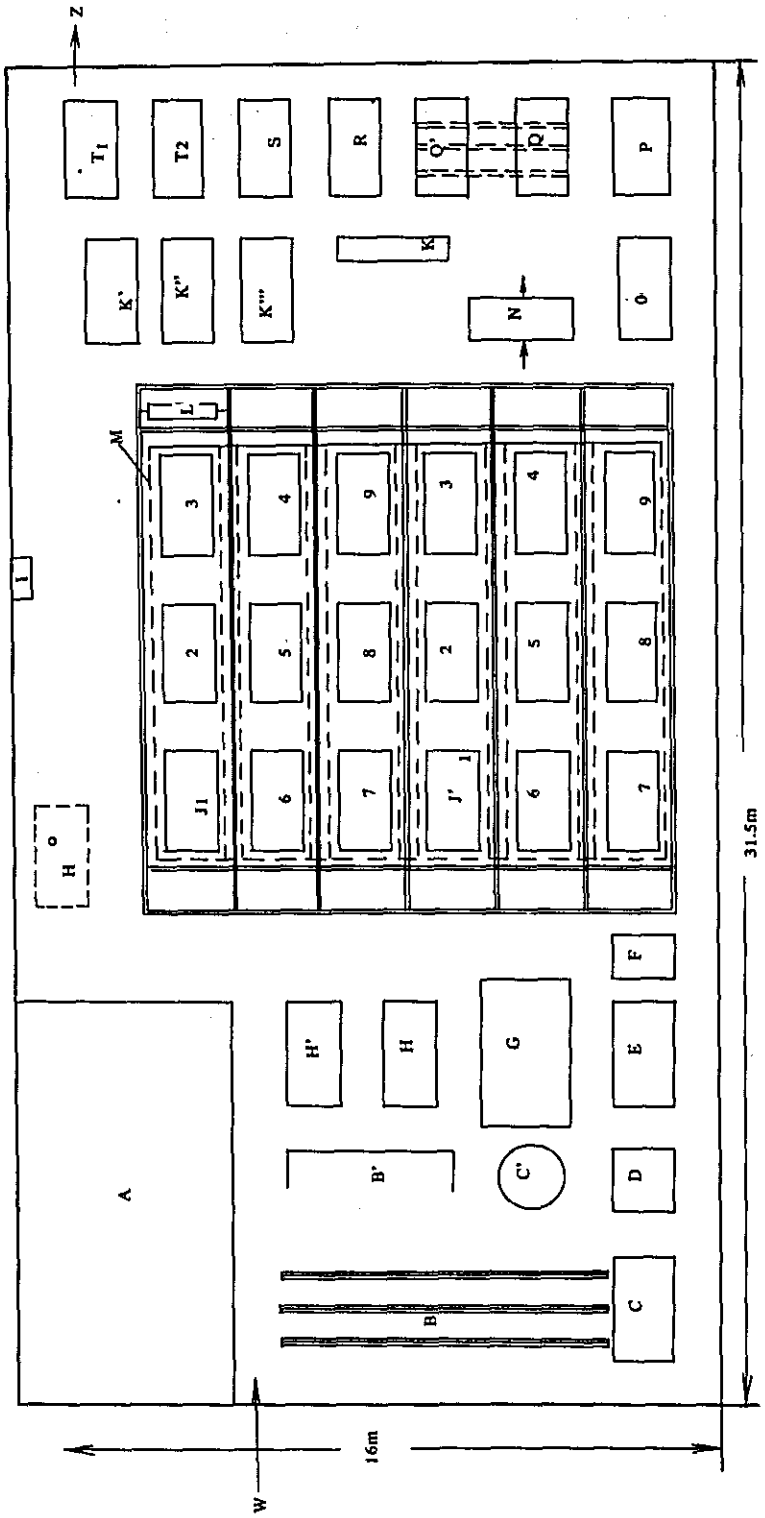
(b) Overlay line

	Unit	Price
Bench for overlay process	18	
Hand roll for deaeration	1	
Rail for substrate transport		
Bench for preparation of overlay resin		
Infrared heater with transformer 250 W	216	
Workbench		
Frames for polyester film		
Trimming cutter		
Truck and rail		
Bench for packaging (wood)		
Total		20,750

(3) Auxiliary equipment

	Unit	Price
Boiler (150Kg/h)		
Power plant		
Piping		
Others		
Total		41,500

1-3 Layout of plant



Explanation on the layout of production line

A	Material warehouse (other than veneer) directed to the combined use as the control room
B	Cart for the material board carriage (for 1,200 pcs) with rail
B'	Adhesive (resin) compounding
C	Board accumulation (by the use of a lifter)
C'	Agitation of B'
D	Roll coater
E	Paper pasting stand
F	Paper laying stand
G	Hot press
H, H'	Paper pasting stand, board receiving stand & reserve
H^{O}	Moves H - H'
I	Over-lay resin
J 1 - 9	Molding stand
J'1 - 9	- do - (another group)
K	Film storage for molding
K' - K'''	New film preparation
L	Moving defoaming roll (black frame is the moving rail)
M	(dotted line) Infrared ray heater
N	Film taken out from the J - J' group
O	Product, taken the film out
P	Cutting stand
Q	Storage of the product cut out (of the day)
Q'	Storage of the product cut out (of the previous day)
R	Inspection
S	Packaging
T	Product stock
W	Receiving of the material board
Z	Product shipment

1-4 Operating conditions

(1) Production capacity

Compression line	20,000 sheets/month
Overlay line	12,500 sheets/month

(2) Working hours 7 hr/day x 25 day/month

(3) Electricity

	KWH
Infrared heater	54.0
Lift	1.5
Lamination roll	2.5
Hot press	22.0
Mixer	1.0
Lighting	6.0
Total	87.0

(4) Labourer

	Foreman	Skilled labour	Unskilled labour	Total
Compression line	1	3	4	8
Overlay line	1	4	5	10
Total	2	7	9	18

1-5 Cost estimation

Cost estimation was omitted because price of plywood as a substrate and unit consumptions of raw materials were not available. However, unit prices of raw materials except plywood in Japan are as follows:

	Rp/kg
Unsaturated polyester resin	445
Catalyst	1,780
Emulsion adhesive	356
Decorative paper (1,270mm x 200mm)	296
Polyester film, transparent	445
delustered	593

1-6 Standard and specification

Decorative sheet is a kind of plywood. In Japan various legal standards and specifications for plywood are being enforced by the Japan Agricultural Standards (JAS) inclusive of qualitative indications.

According to JAS classification, decorative sheet is included in a category of "special plywood" which is regulated under Notification No. 1,373 of the Agricultural & Forestry Ministry of Japan dated September 10, 1969. Quality of decorative sheet for exportation is being regulated by the Ministerial Ordinance No. 1 of the Agricultural & Forestry Ministry and International Trade and Industry Ministry of Japan under the date of November 10, 1967.

Decorative sheet used for interior construction material, is subjected to "Construction Standard Law", by which admitted properties of the materials, permitted location of the use, etc. are stipulated.

The above regulation does pay an especial attention to the classification of the fire preventive performance of each material, and generally classified into: (1) Non-combustible materials, (2) Semi non-combustible materials, (3) Flame retardant materials.

Testing methods for classification of material are stipulated: "Designation for non-combustible materials", Notification No. 1,328, Construction Ministry, dated December 18, 1970, for non-combustible materials, and Notification No. 3,415, Construction Ministry, dated December 28, 1970 for semi non-combustible and flame retardant materials.

The same testing methods are also stipulated by JIS A 1,321, "Combustibility testing methods for construction interior materials and the working method".

Furthermore, the Construction Ministry has an enacted recognition mark system to immediately identify, at a glance,the performances of these materials as classified as described above. Said system is composed of the general recognition and the individual recognition. The former is collectively being carried out by the Construction

Research Center of Construction Ministry. The latter is being taken care of by following organization:

Construction Materials Testing Center (a juridical person),
Overall Construction Material Testing Institute of Japan (a juridical person),
Materials Inspection Institute of Tokyo Metropolitan Government,
Prevention Dept. of Tokyo Fire Prevention Board,
Forestry Testing Institute of Agricultural & Forestry Ministry.

All of them will issue a certificate of specific material and based on said certification, the performances are finally recognized by the "Fire Preventive Performance Evaluation Commission".

In either cases, the application for such a testing should be submitted to the Ministry of Construction Ministry.

1-7 Machine and Material Makers

Laminating Press

Taihei Machinery Works, Ltd.
3-3 Tatewaki-cho, Minami-ku, Nagoya

Seibu Industrial Co., Ltd.
2-497 Nosato-cho, Nishi-Yodogawa-ku, Osaka

Meiki Co., Ltd.
1-2 Shioiri-cho, Mizuho-ku, Nagoya

Spreader

Seibu Industrial Co., Ltd.
2-497 Nosato-cho, Nishi-Yodogawa-ku, Osaka

Hasegawa Iron Works Co., Ltd.
1-426 Takagi-cho, Fuchu-shi, Hiroshima

Mixer

Seibu Industrial Co., Ltd.
2-497 Nosato-cho, Nishi-Yodogawa-ku, Osaka

Tokuju Kosakusho Co., Ltd.
2-30-5 Ootsuka, Bunkyo-ku, Tokyo

Polyester Film

Toray Industries, Inc.
2-2 Nihonbashi Muromachi, Chuo-ku, Tokyo

Teijin Ltd.
1 Umeda, Kita-ku, Osaka

Polyester Resin

Showa High Polymer Co., Ltd.
20-3 Kanda Nishiki-cho, Chiyoda-ku, Tokyo

Dainippon Ink & Chemicals, Inc.
3-3 Nihonbashi, Chuo-ku, Tokyo

Takeda Chemical Industries, Ltd.
27-2 Doshomachi, Higashi-ku, Osaka

Mitsui Toatsu Chemical Co., Ltd.
5-2-3 Kasumigaseki, Chiyoda-ku, Tokyo

Catalyst

Kawaguchi Chemical Industry Co., Ltd.
8-3 Nihonbashi Honcho, Chuo-ku, Tokyo

Nippon Oil & Fats Co., Ltd.
5-1 Yuraku-cho, Chiyoda-ku, Tokyo

Yoshitomi Phamaceutical Industries, Ltd.
35-3 Hirano-cho, Higashi-ku, Osaka

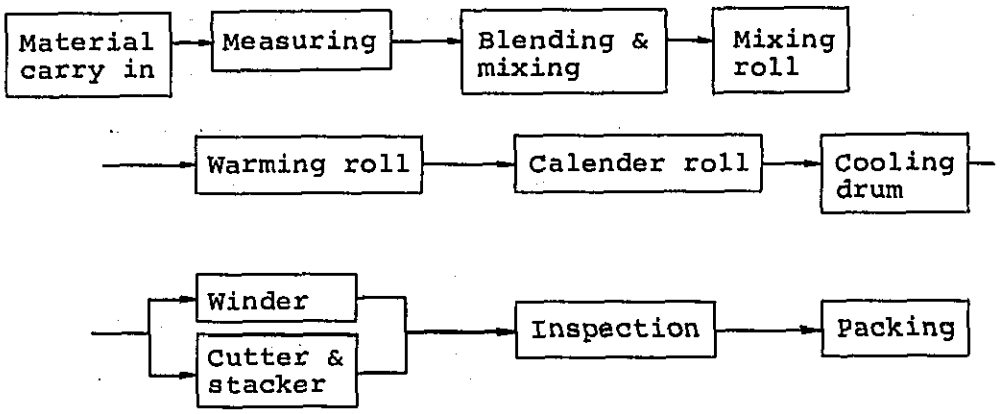
Decorative Paper

Dainippon Printing Co., Ltd.
12-1 Ichigaya Kaga-cho, Shinjuku-ku, Tokyo

Toppan Printing Co., Ltd.
1-5-1 Taito, Taito-ku, Tokyo

2. Rigid PVC sheet made by calendering process

2-1 Flow chart



2-2 Building and equipment list

(1) Building

	Area (m^2)	Unit price (1,000Rp/m^2)	Price (1,000Rp)	Notes
Head office	60	60	3,600	
Warehouse for material	162	30	4,860	
Blending & mixing room	243	60	14,580	
Calendering plant	600	30	18,000	
Plant office	67.5	30	2,025	
Warehouse for product	216	30	6,480	
Boilor, generator room & machine shop	190	30	5,700	
Total	1,538.5		55,275	

(2) Equipment

	Number	Unit price (1,000Rp)	Price (1,000Rp)	Notes
System for material carry in	1		38,640	
Hopper scale	1		8,694	
Super mixer	1		13,041	
Receiver tank	1		4,347	
Mixing roll	2	48,300	96,600	
Calender roll	1		104,320	
Cooling drum	1		34,776	
Winder	1		28,014	
Motor for calender roll	1		28,980	
Sub-total			357,420	
Package for export (8%)			28,594	
Total			386,014	

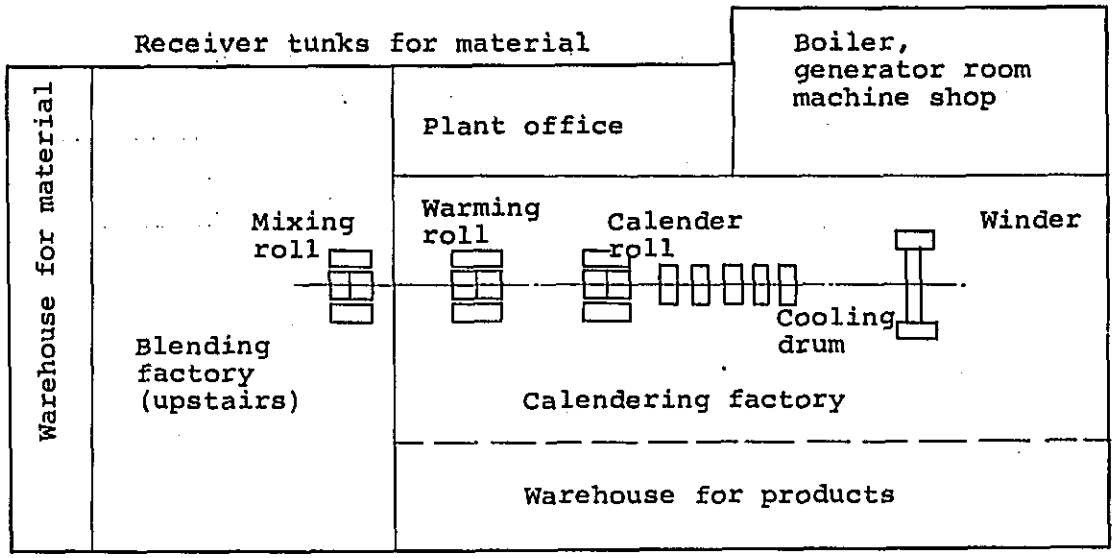
(3) Auxiliary equipments

	Number	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Scrap recycling system	1		4,347	
Scrap conveyer	1		5,796	
Intermediate product conveyer	1		17,388	
Equipment for inspection	1		26,082	
Lift truck	2	2,222	4,444	
Sub-total			58,057	
Package for export (8%)			4,644	
Total			62,702	

(4) Installation cost

	Number	Unit Price (1,000Rp)	Price (1,000Rp)	Notes
Electrical distribution system	1		28,980	
First stage wiring	1		16,229	
Water supply system	1		9,274	
Steam supply system	1		13,910	Boiler
Second stage wiring	1		19,320	
Piping	1		14,490	
Deck for super mixer	1		1,932	$3.0^{m} \times 5.0^{m}$
Lighting	1		8,694	
Fire extinguisher & telephone	1		4,830	
Foundation & installation	1		23,184	
Total			140,843	

2-3 Layout of plant



2-4 Operating conditions

(1) Production capacity

4,800 t/year

(2) Unit consumption of raw material 1.05

(3) Utilization 85%

(4) Yield of first class product 95%

(5) Utility

(a) Electricity

Neumatic conveyers	15 KWH
Super mixer	75
Mixing rolls	375
Calender roll	187
Cooling drum	7.5
Winder	3.7
Conveyer, boiler & air draft	10,8
Lighting	14
Water supply system	12
Total	700 KWH

(b) Water

Calender roll	10 m^3/h
Boiler	1.5
Total	11.5 m^3/h

(6) Labourer

(a) Management and administration 4 (2 foreigners)

(b) Operators (3 shifts) Total 42

	Foreman	Skilled labour	Unskilled labour	Total
Blending & mixing	3	4	5	12
Calendering	3	7	8	18
Inspection & packing	3	4	5	12
Total	9	15	18	42

2-5 Cost Estimation Data Sheet of Plastics Processing

Products Rigid PVC Sheet

Process Calendering

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	488,716	
		Land	23,078	4,615.5 m^2
		Building	55,275	1,538.5 m^2
		Installation	140,843	
		Pre-operation expense	73,811	
		Interest during construction	9,073	
		Total	790,796	
	Working capital		632,637	
	Total		1,423,433	

Production amount: 4,800 t/y

Manufacturing cost

		1,000Rp/Year	Rp/Kg	%
Variable Cost	Material (including packing material)	2,122,105	442.11	89.5
	Power	32,760	6.83	1.4
	Steam	-	-	-
	Water	414	0.09	0.02
	Total	2,155,279	449.02	90.98
Fixed Cost	Depreciation	63,853	13.30	2.7
	Maintenance	7,330	1.53	0.3
	Tax & Insurance	1,217	0.25	0.05
	Interest			
	On long team loan	47,448	9.89	2.0
	On working capital	75,916	15.82	3.2
	Labour	10,152	2.12	0.43
	Overhead	10,152	2.12	0.43
	Total	216,069	45.01	9.1
Grand Total		2,371,348	494.03	100.0

2-6 Standards and specifications

JIS K-6745

2-7 License holders and machine makers

(1) License holders

Tsutsunaka Plastic Industry Co., Ltd.
2-40 Doshomachi, Higashi-ku, Osaka

Mitsubishi Plastics Industries, Ltd.
2-5-2 Marunouchi, Chiyoda-ku, Tokyo

Mitsubishi Monsanto Chemical Co.
2-5-2 Marunouchi, Chiyoda-ku, Tokyo

(2) Machine makers

(a) Mixer

Mitsui Miike Machinery Co., Ltd.
2-1-1 Nihonbashi Muromachi, Chuo-ku, Tokyo

Kawata Mfg. Co., Ltd.
8-4 Tachibanadori, Nishinari-ku, Osaka

(b) Mixing roll, warming roll and calender roll

Nippon Roll Mfg. Co., Ltd.
2-3000, Kasai, Edogawa-ku, Tokyo

Osaka Roll Machine Mfg. Co., Ltd.
2-88 Tanigawa-cho, Daito-shi, Osaka

Hitachi Taura Works, Ltd.
1-284-5, Funakoshi-cho, Yokosuka-shi, Kanagawa

Kobe Steel Ltd.
1-1 Uajima, Kuise, Amagasaki-shi, Hyogo

Ohtani Heavy Industry Co., Ltd.
3-6-6 Kotobashi, Sumida-ku, Tokyo

(Especially for calender roll)

Ishikawajima-Harima Heavy Industries Co., Ltd.
2-2-1 Ohtemachi, Chiyoda-ku, Tokyo

(c) Winder

Ishikawajima-Harima Heavy Industries Co., Ltd.
2-2-1 Ohtemachi, Chiyoda-ku, Tokyo

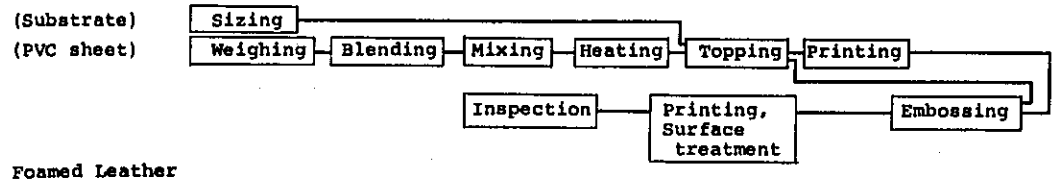
Nippon Roll Mfg. Co., Ltd.
2-3000 Kasai, Edogawa-ku, Tokyo

Fuji Iron Works Co., Ltd.
2-7 Furuichi Nakadori, Joto-ku, Osaka

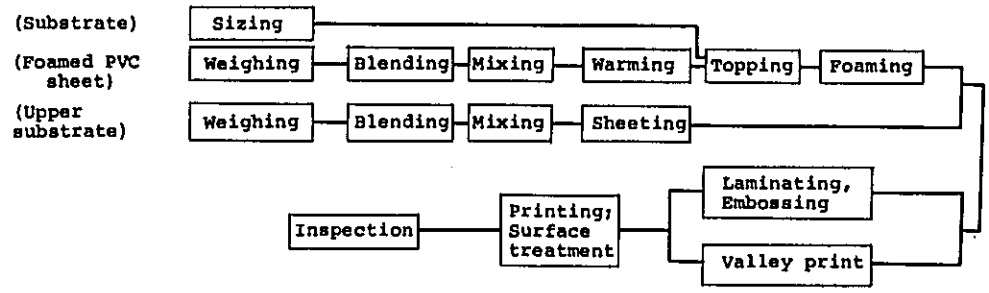
3. PVC leather

3-1 Flow chart

(1) Non-foamed Leather



(2) Foamed Leather



3-2 Building and equipment list

(1) Building

	Area (m^2)	Unit price (1,000Rp/m^2)	Price (1,000Rp)	Notes
Plant office	400	60	24,000	Two-storied, reinforced concrete
Warehouse for substrate	300	30	9,000	Steel-frame slate,
Sizing plant	700	30	21,000	"
Calender plant	1,000	30	30,000	"
Embossing plant	1,000	30	30,000	"
Foaming plant	1,000	30	30,000	"
Printing plant	500	30	15,000	"
Inspection room including warehouse for product	600	30	18,000	"
Boiler, generator room	700	60	42,000	Reinforced concrete
Others	130	60	7,800	"
Total	6,330		226,800	

(2) Equipment

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Tenter spreader for woven fabrics	1	33,200	33,200	
Tenter spreader for knitted fabrics	1	47,725	47,725	
Automatic weighing system	1	20,750	20,750	
Henschel mixer	1	20,750	20,750	
Banbury mixer	1	64,400	64,400	
Mixing roll	1	47,725	47,725	
Warming roll	1	47,725	47,725	
Calender roll	1	182,600	182,600	Inverted L type
Foam oven	1	103,750	103,750	
Embossing machine	4	24,900	99,600	
Valley print embossing machine	1	31,125	31,125	
Laminate embossing machine	2	37,350	74,700	
Printing machine	4	20,750	83,000	
Inspection machine	9	1,038	9,338	
Total			868,388	

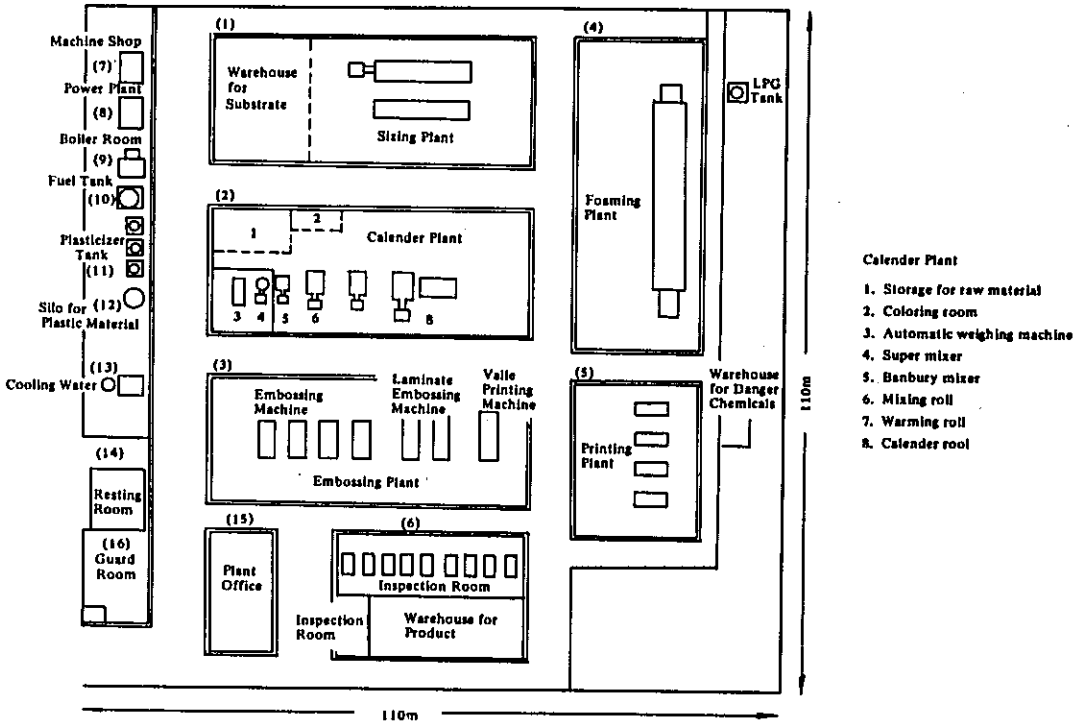
(3) Auxiliary equipment

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Silo for plastic material	2	24,900	49,800	
Plasticizer tank	3	4,150	12,450	
Fuel tank	1	4,150	4,150	
LPG tank for foam oven	1	14,525	14,525	
Power plant		41,500	41,500	Max. load 1,000KW
Boiler		31,125	31,125	3-5 tons/hr Max. 10kg/cm^2
Water supply system		20,750	20,750	300 tons/day
Machine shop		20,750	20,750	
Lift truck	4		5,188	Fork lift truck electric truck
Product inspection system	1		20,750	
Total			219,950	

(4) Installation cost

	Price (1,000 Rp)
Electrical distribution system	
Stream and water supply system	
Exhaust system	
Machine installations	
Fire extinguishers	
Telephone system	
Road pavement	
Total	352,750

3-3 Layout of plant



3-4 Operating conditions

(1) Production capacity

Non-foamed leather	5,400,000 m/year	
Laminated products	3,000,000	
Foamed leather	1,800,000	Thin 600,000 Thick 1,200,000
Total	10,200,000	

(2) Unit consumption of raw material (PVC compound)

	Specification Thickness[1] (mm)	Specification Width (mm)	Unit consumption of PVC compound
Non-foamed leather	0.25	980	319
Laminated products	0.30	1,200	486
Foamed leather (1)	0.40	1,200	645
Foamed leather (2)	0.55	1,200	879

Notes : 1) Thickness of PVC film
2) Thin
Annual raw material consumption is 5,150 tons.

(3) Working time

Sinzing, embossing, printing and inspection	8 hr/day
Calendering, foaming	24

1 month = 25 days

(4) Utility

(a) Electricity

	KW	
Sizing & tenter	100	
Henschel mixer	75	
Banbury mixer	225	
Mixing roll	110	
Warming roll	110	
Calender roll	250	
Others	130	
Total	1,000	Loading 60%

(b) Water 300 t/day = 90,000 t/year

(5) Labourers

(a) Management and administration 19 (2 foreigners)

(b) Operators

	Foreman	Skilled	Un-skilled	Total
Sizing & tenter	1	4	7	12
Calendering	3	10	32	45
Embossing, foaming & & printing	4	10	26	40
Inspection	1	4	3	8
Packing	1	7	22	30
Total	10	35	90	135

3-5 Cost Estimation Data Sheet of Plastics Processing

Products PVC leather

Process Calendering

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	1,088,388	
		Land	92,000	
		Building	226,800	
		Installation	352,750	
		Pre-operation expense	125,205	
		Interest during construction	22,515	
		Total	1,907,658	
	Working capital		1,526,126	
	Total		3,433,785	

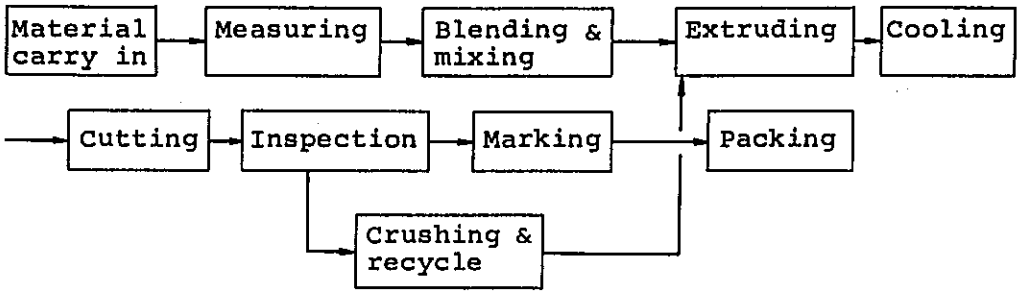
Manufacturing cost

		1,000Rp/Year	Rp/Kg	%
Variable Cost	Material (including packing material)	3,605,000		87.0
	Power	21,600		0.5
	Steam	-		-
	Water	450		-
	Total	3,627,050		87.5
Fixed Cost	Depreciation	147,388		3.6
	Maintenance	16,326		0.4
	Tax & Insurance	4,930		0.1
	Interest			
	On long team loan	114,459		2.7
	On working capital	183,135		4.4
	Labour	24,720		0.6
	Overhead	24,720		0.6
	Total	515,678		12.4
Grand Total		4,142,728		100.0

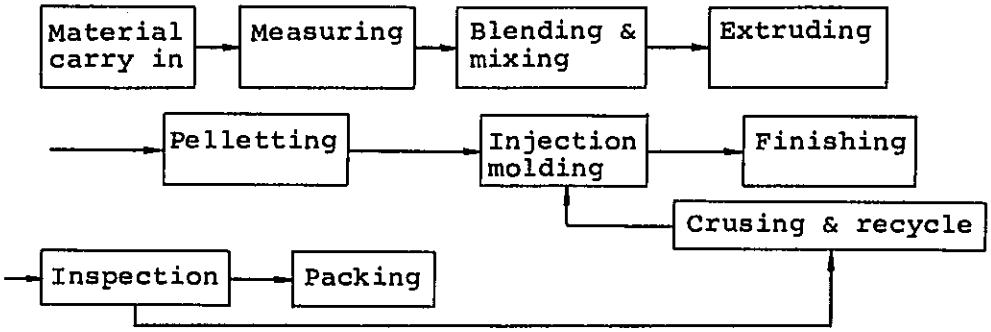
4. Rigid PVC pipe and fitting making process

4-1 Flow chart

(1) Pipe making process



(2) Fitting making prcocess



4-2 Building and equipment list

(1) Building

	Area (m^2)	Unit price (1,000Rp/m^2)	Price (1,000Rp)	Notes
Head office	60	60	3,600	
Stock storage room	162	60	9,720	2nd & 3rd stores
Blending and mixing room	324	60	19,440	
Extrusion plant	675	30	20,250	
Plant office	67.5	30	2,025	
Mold storing room & machine shop	81	30	2,430	
Waste reprocessing room	54	30	1,620	
Injection molding plant	67.5	30	2,025	
Inspection & packing room	270	30	8,100	
Power plant	200	30	6,000	
Warehouse	500	30	15,000	
Total	2,461		90,210	

(2) Equipment

		Number	Unit price (1,000Rp)	Price (1,000Rp)	
System for material carry in		1		48,300	Receiver tank x 2
Hopper scale		2	(8,694)	17,388	2,000kg & 200kg
Ribbon blender		2	11,592	23,184	3,000 l
Material receiver tank		2	580	11,592	6,000 l
Compound carrying apparatus		1		46,368	
Extruder	Small	4	28,980	115,920	Screw dia. 100 mm twin screw
	Large	2	54,096	108,192	Screw dia. 140 mm twin screw
Water tank		9	(3,220)	28,980	
Dies for extrusion		13	(6,093)	79,212	
Injection molder		1		34,776	Screw dia. 64 mm Clamping force 350 T
Molds for injection		12	(4,830)	57,960	
Diameter controller & printing machine		6	(8,050)	48,300	
Take off roller & cutter		9	(9,445)	85,008	
Sub-total				705,180	
Packaging for export			(8%)	56,414	
Total				761,594	

Notes: ( ) shows average price

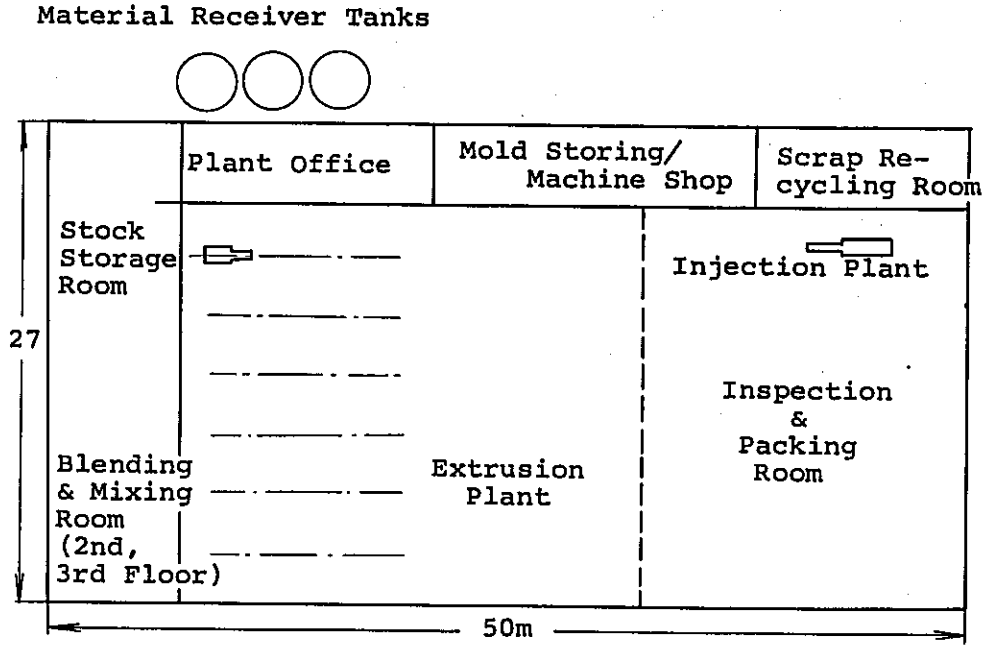
(3) Auxiliary equipment

	Number	Unit price (1,000Rp)	Price (1,000Rp)	Notes
System for product conveyer	1		9,660	
Scrap recycling system	1		13,138	
Mold maintenance equipment	1		8,114	
Inspection equipment	1		26,082	
Testing equipment	1		27,048	
Lift truck	1		2,512	2 tons
Sub-total			86,554	
Packaging for export		(8%)	6,924	
Total			93,478	

(4) Installation cost

	Number	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Electrial distribution system	1		28,980	1,000 KVA
First stage wiring	1		13,910	
Water supply system	1		13,910	50 t/h
Second stage wiring	1		20,286	700 KW
Piping	1		11,592	
Lighting	1		8,694	
Fire extiguisher & telephone	1		7,245	
Foundation & installation	1		23,184	
Total			127,802	

4-3 Layout of plant



(Unit: m)

4-4 Operating conditions

(1) Production capacity

(a) Extrusion

Small extruder	50 tons/month	(including utilization)
Large extruder	100 tons/month	(including utilization)
Total capacity	400 tons/month = 4,800 tons/year	

(b) Injection

30 cycles/min.

Weight of product per one shot	400 g
Weight of sprues and runners	120 g
Utilization	83.5 %

Total production capacity 6 tons/month = 72 tons/year

(2) Unit consumption of raw material 1.05

(3) Utility

(a) Electricity

Neumatic conveyers	10 KW
Motors for extruders	120
Heaters for extruders	120
Heaters for extrusion dies	80
Other motors for extruders	6
Vacuum pumps and compressors	15
Compound conveyers	7.5
Motors for tale-off rollers & cutters	9.0
Scrap recycle system	15
Sub-total	382.5
Motors for injection molders	63.5
Heaters for injection molders	18.5
Sub-total	82.0
Lighting	22.5
Water supply system	15.0
Sub-total	37.5
Total	502

(b) Water

Extruders (6 sets)	30 m^3/h
Injection molder	5
Others	2
Total	37

(4) Labourer

(a) Management and administration 6 (2 foreigners)

(b) Operators (3 shifts) Total 90

	Material handling	Extrusion	Inspection & packing	Injection	Finishing, inspection & packing	Maintenance	Total
Foreman	3	3	3	3	3	3	18
Skilled	4	10	7	4	7	1	33
Unskilled	5	11	8	5	8	2	39
Total	12	24	18	12	18	6	90

4-5 Cost Estimation Data Sheet of Plastics Processing

Products Rigid PVC pipe

Process Extrusion

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	855,072	
		Land	32,000	6,400 m^2
		Building	90,210	
		Installation	127,802	
		Pre-operation expense	70,957	
		Interest during construction	15,636	
		Total	1,191,678	
	Working capital		953,342	
	Total		2,145,020	

Production amount: 4,800 t/y

Manufacturing cost

		1,000Rp/Year	Rp/Kg	%
Variable Cost	Material (including packing material)	2,016,000	420.00	84.6
	Power	19,300	4.02	0.8
	Steam	-	-	-
	Water	1,330	0.28	0.1
	Total	2,036,630	424.30	85.5
Fixed Cost	Depreciation	11,394	23.21	4.7
	Maintenance	12,826	2.67	0.5
	Tax & Insurance	1,850	0.39	0.1
	Interest			
	On long team loan	71,500	14.90	3.0
	On working capital	114,401	23.83	4.8
	Labour	17,388	3.62	0.7
	Overhead	17,388	3.62	0.7
	Total	346,748	72.24	14.5
Grand Total		2,383,378	496.54	100.0

4-6 Standards and specifications

JIS K-6741
JIS K-6742
JIS K-6743

4-7 License holders and machine makers

(1) License holders

Sekisui Chemical Co., Ltd.
2 Kinugasacho, Kita-ku, Osaka

Kubota, Ltd.
2-22 Funadecho, Naniwa-ku, Osaka

Mitsubishi Plastics Industries, Ltd.
2-5-2 Marunouchi, Chiyoda-ku, Tokyo

(2) Machine makers

(a) Complete set for pipe making machine

Toshiba Machine Co., Ltd.
4-2-11 Ginza, Chuo-ku, Tokyo

Ikegai Iron Works, Ltd.
2-1-18 Uchisaiwai-cho, Chiyoda-ku, Tokyo

(b) Pipe take-off equipment

Hagino Iron Works, Ltd.
Nagoya

Igarashi Kikai Seizo Co., Ltd.
1-37-7 Oshiage, Sumida-ku, Tokyo

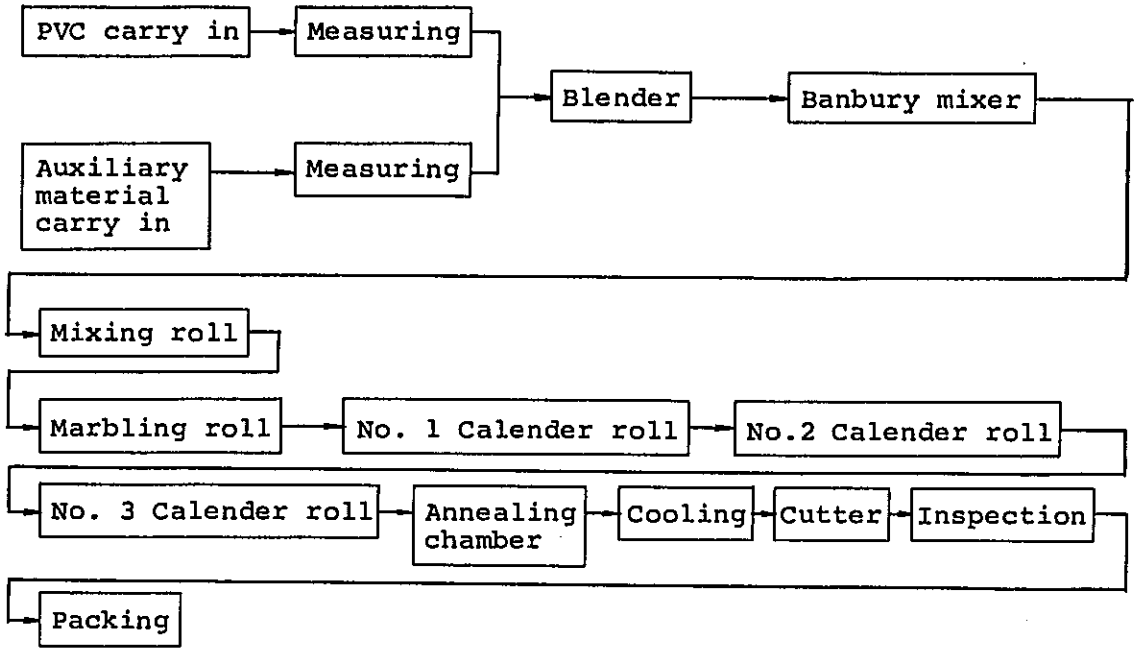
(c) Injection molder

Toshiba Machine Co., Ltd.
4-2-11 Ginza, Chuo-ku, Tokyo

Nissei Plastic Industrial Co., Ltd.
Nanjo, Sakaki-cho, Hanishina-gun, Nagano

5. PVC asbestos tile

5-1 Flow chart



5-2 Building and equipment list

(1) Building

	Area (m^3)	Unit price (1,000Rp/m^3)	Price (1,000Rp)	Notes
Head office	120	60	7,200	Reinforced concrete
Stock storage room	500	60	30,000	Reinforced concrete
Raw material preparation room	900	60	54,000	Reinforced concrete 3 stories
Calendering plant	1,800	30	54,000	Steel-frame, slate roofing
Power plant & boiler room	300	30	9,000	"
Total	3,620		154,200	

(2) Equipment

	Number	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Material carry in system	1		25,116	Elevator 3,000 l tank
Ribbon blender	2	9,660	19,320	2,000 l including 25HP motor
Hopper scale	2		12,550	75 kg & 150 kg
Banbury mixer	1		73,416	9 type, 168 l Including 300 HP motor
Mixing roll	2	32,844	65,688	24" x 6", including 150HP motor
Marbling machine	1		1,739	
Ribbon blender for marbling	1		3,864	500 l, including 10 HP motor
Mixing roll for marbling	2	17,388	34,776	18" x 54", including 75 HP motor
Calender roll	3	61,824	185,472	24" x 60", 1 type excluding 50 HP D.C motor
Annealing chamber	1		34,776	3 decks type, length 20m
Cooling chamber	1		11,592	Width 1.2 m Length 15 m
Cutter	1		26,082	
Crusher	1		13,041	
Scrap conveyor	1		9,660	Width 18 m Length 80 m
D.C motor for calender roll and control system	1		17,388	50 HP
Sub-total			534,488	
Packaging export		(10%)	53,449	
Total			587,937	

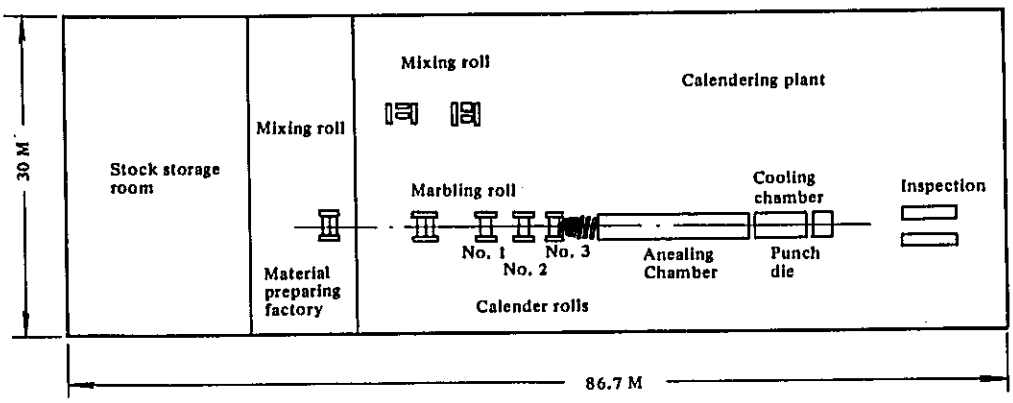
(3) Auxiliary equipment

	Number	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Intermediate product conveyor	1		17,388	Conveyers
Inspection and testing machines	1		34,776	
Lift truck	2		4,444	1 ton and 2 tons
Sub-total			56,608	
Packaging for export	(8%)		4,529	
Total			61,137	

(4) Installation cost

	Number	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Power plant	1		43,470	1,500 KVA
First stage wiring	1		28,014	
Water supply system	1		18,354	70 tons/h
Compressed air supply system	1		7,254	75HP, 6 kg/cm^2
Stream supply system	1		23,184	Boiler 2 tons/h
Second stage wiring	1		37,776	1,222 KW
Piping	1		28,980	
Deck for banbury mixer	1		7,245	3.0m x 12.0m
Lighting	1		26,082	
Fire extinguisher and telephone	1		5,796	
Foundation and installation	1		57,960	
Total			281,106	

5-3 Layout of plant



5-4 Operating conditions

(1) Production capacity

(a) Banbury mixer; Material input 200 Kg/cycle
Cycle 10/hr

(b) Calender roll; Sheet width 950 mm
Thickness 2 mm
Production speed 10 m/min.
Working hours 24 hrs x 25 days = 600 hrs/month
Utilization 75%
Yield of punching 72.5%
Yield of first class product 80%
Production capacity 600 tons/month
= 7,200 tons/year

(2) Raw material

(a) Compounding formulation

	PVC	Plasti-cizer	Calci-um carbo-nate	Asbestos	Titanium oxide	Stabi-lizer
PHR*	100	30-50	180-360	100-130	7-50	3-6
%	15-25	6-8	40-55	20-27	1-10	0.7-0.9

* Parts per hundred parts of resin

(b) Unit consumption of raw material 1.05

(c) Average price of raw material

Japan	130 yen/kg
Indonesia (assumption)	350 Rp/kg

(3) Utility

(a) Electricity

Elevator	7.5 KW
Ribbon blender	37.5
Banbury mixer	225.0
Mixing roll	225.0
Ribbon blender	7.5
Mixing roll	112.5
Calender roll	112.5
Heaters for annealing chamber	200.0
Crusher	37.5
Conveyers	55.0
Lighting	33.0
Compressor & boilor	147.0
Total	1,200.0

(b) Water

Cooling after annuealing	30 m^3/h
Boiler	2.5
Total	32.5

(c) Steam

Banbury mixer	0.5 m^3/h
Mixing roll	0.75
Calender roll	0.75
Total	2.0

(4) Labourer

(a) Management and administration 4 (2 foreigners)

(b) Operators (3 shifts) Total 72

	Material handling	Calender-ing	Inspecti on & packing	Utility & mainte-nance	Total
Foreman	3	3	2		8
Skilled	4	16	8	6	34
Unskilled	5	17	8		30
Total	12	36	18	6	72

5-5 Cost Estimation Data Sheet of Plastics Processing

Products PVC asbestos

Process Calendering

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	649,074	9,000 m^2
		Land	45,000	
		Building	154,200	
		Installation	281,106	
		Pre-operation expense	96,011	
		Interest during construction	13,572	
		Total	1,238,963	
	Working capital		991,171	
	Total		2,230,133	

Manufacturing cost

Production amount: 7,200 t/y

		1,000Rp/Year	Rp/Kg	%
Variable Cost	Material (including packing material)	2,646,000	367.50	86.1
	Power	59,760	8.30	1.9
	Steam	17,280	2.40	0.6
	Water	1,170	0.16	-
	Total	2,724,210	378.36	88.6
Fixed Cost	Depreciation	88,844	12.34	2.9
	Maintenance	9,736	1.35	0.3
	Tax & Insurance	2,930	0.41	0.1
	Interest			
	On long team loan	74,338	10.32	2.4
	On working capital	118,940	16.52	3.9
	Labour	27,312	3.79	0.9
	Overhead	27,312	3.79	0.9
	Total	349,413	48.53	11.4
Grand Total		3,073,623	426.89	100.0

5-6 Standards and specification

JIS A-5705 (revised in 1972)

5-7 License holders and machine makers

(1) License holders

Tajima Ohyokagaku Co., Ltd.

(2) Machine Makers

Ishikawajima-Harima Heavy Industries Co., Ltd.
2-2-1 Ohtemachi, Chiyoda-ku, Tokyo

Hitachi Taura Works, Ltd.
1-284-5 Funakoshicho, Yokosuka-shi, Kanagawa

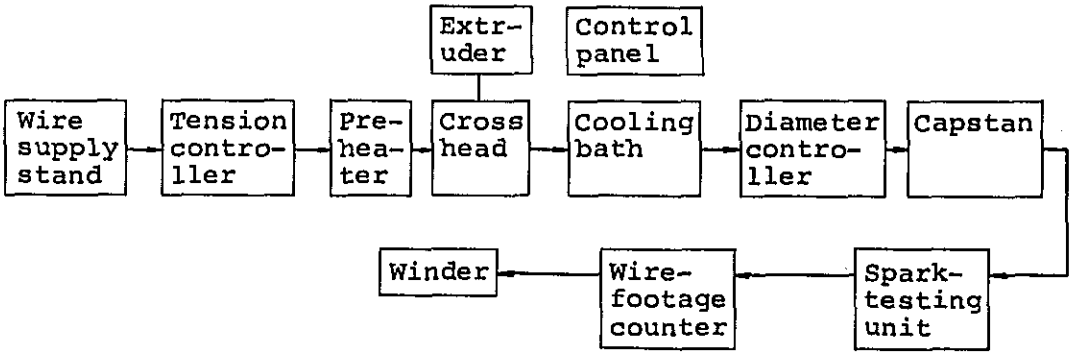
Kobe Steel Ltd.
1-1 Uajima, Kuise, Amagasaki-shi, Hyogo

Nippon Roll Mfg. Co., Ltd.
2-3000, Kasai, Edogawa-ku, Tokyo

6. Electric wire coating with PVC

6-1 Flow chart

(1) Single core cable extrusion coating process



(2) Twin core sheath cable extrusion coating process
(See 6-3 Layout of plant)

6-2 Building and equipment list

(1) Building

	Area (m^2)	Unit price (1,000 Rp)	Price (1,000 Rp)	Notes
Head office	120	60	7,200	
Store-house for core wire	88	60	5,280	
Storehouse for PVC powder	70	60	4,200	
Storehouse for product	132	30	3,960	
Maintenance room	60	30	1,800	
Utility room	60	30	1,800	
Plant office	60	30	1,800	
Wire coating plant	2,000	30	60,000	
Compounding plant	50	30	1,500	
Power plant	300	30	9,000	
Total	2,940		96,540	

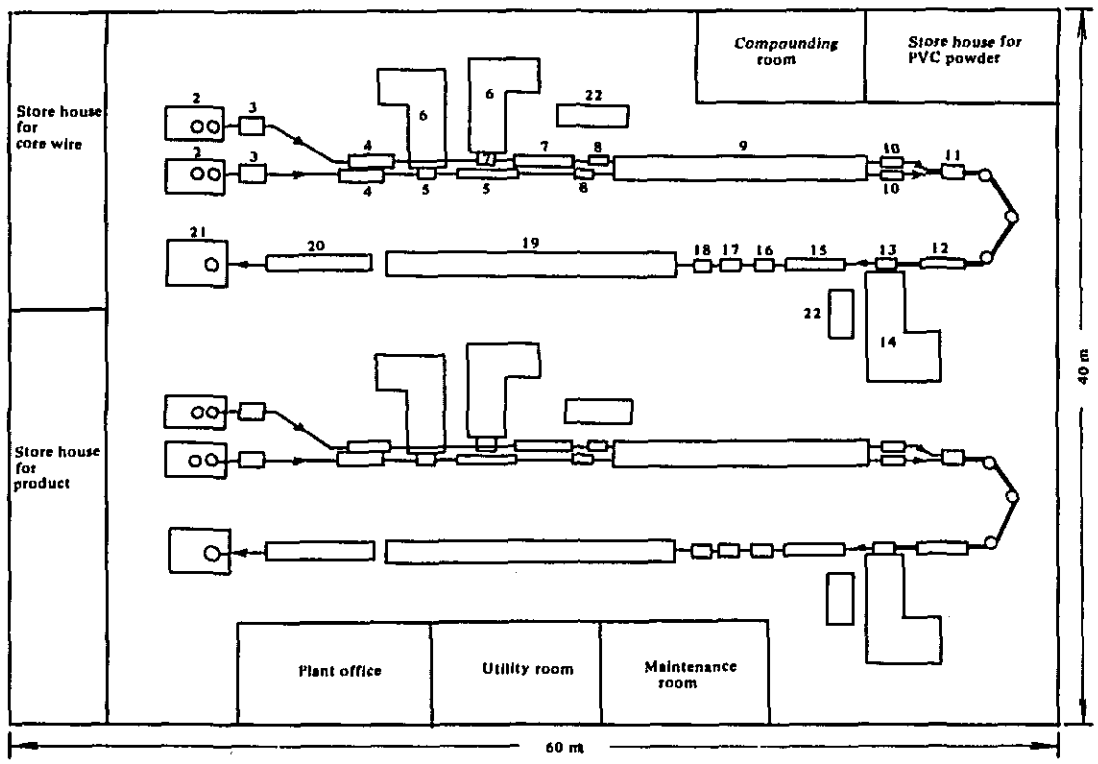
(2) Equipment

	Single core cable		Twin core sheath cable	
	Unit	Price (1,000Rp)	Unit	Price (1,000Rp)
Extruder	3	91,000	2	172,000
PVC compounding equipment	1	16,000	1	24,000
Wire supply stand	3	14,400	2	25,500
Take up unit	3	16,800	2	22,400
Winder and packer	3	12,000	2	64,000
Controller and tester	1	5,750	1	14,700
Electric panel	3	15,300	2	17,600
Conveyance	1	32,000	1	39,000
Others		53,000		44,700
Total		256,250		423,900

Notes: 1) 1972 price in Indonesia
2) Including installation cost

6-3 Layout of plant

Inline type twin core sheath cable production plant



(4) Labourer

(a) Management and administration 6 (2 foreigners)

(b) Operators (3 shifts)

1) Single core cable

	Material handling	Wire coating	Inspection & packing	Utility & maintenance	Total
Foreman	3	3	2		8
Skilled	9	51	12	9	81
Unskilled	15	80	16		111
Total	27	134	30	9	200

2) Twin core sheath cable

	Material handling	Wire coating	Inspection & packing	Utility & maintenance	Total
Foreman	3	3	2		8
Skilled	9	40	12	9	70
Unskilled	15	61	16		92
Total	27	104	30	9	170

6-4 Operating conditions

(1) Products and production capacity

(a) Single core cable

Product ; Diameter of core 1.2 mm
Outside diameter 2.4 mm
Take up speed 500 m/min. x 3 set
Extruding capacity 150 kg/h x 3 set
Production out put 4×10^8 m/year

(b) Twin core sheath cable

Product ; Diameter of single core cable 2.4 mm
Outside diameter 9.4 x 6.2 mm
Take up speed 200 m/min./set
Extruding capacity; Core cable 100 kg/h x 4 set
Sheathe 600 kg/h x 2 set
Production capacity 8.5×10^7 m/year

(2) Raw material

(a) Compounding formulation

	PVC	DOP	Tribasic lead sulphate	Dibasic lead phospha-te	Dibasic lead stearate	Clay	Antimony oxide	Calcium carbonate
Insulated	100	45-50	5-7	2	1	10	2	-
Shethe	100	50-60	5	2	1	-	3	10-30

(b) Consumption of raw material (tons/year)

	PVC	Cupper	Other material (1,000Rp/year)
Insulated	2,000	4,090	150,000
Shethe	5,000	3,050	400,000

Notes ; Price of copper is assumed as 1,650 Rp/kg

(3) Utility

	Electricity 10^6 KWH	Water 1,000 m^3	Others 1,000 Rp
Insulated	13.1	110	200
Shethe	22.4	220	400

6-5 Cost Estimation Data Sheet of Plastics Processing (1)

Products Single core cable

Process Extrusion

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	256,250	
		Land	45,000	9,000 m^2
		Building	96,540	
		Installation	-	Included in process unit
		Pre-operation expense	96,414	80% of cupper scrap is re-cycled
		Interest during construction	4,773	
		Total	498,977	
	Working capital		1,001,023	Raw material stock 1.5 month
	Total		1,500,000	

Production amount: 8.5 x 10^7 m/g

Manufacturing cost

		1,000Rp/Year	Rp/1,000m	%
Variable Cost	Material (including packing material)	7,698,500	19,246	96.7
	Power	13,087	33	0.2
	Steam	-	-	-
	Water	550	1	-
	Other utility	200	-	-
	Total	7,712,337	19,280	96.9
Fixed Cost	Depreciation	36,858	92	0.5
	Maintenance	3,844	10	-
	Tax & Insurance	2,238	6	-
	Interest			
	On long team loan	29,939	75	0.4
	On working capital	120,123	300	1.5
	Labour	27,948	70	0.4
	Overhead	27,948	70	0.4
	Total	248,898	623	3.1
Grand Total		7,961,235	19,903	100.0

6-5 Cost Estimation Data Sheet of Plastics Processing (2)

Products Twin core sheathe cable

Process Extrusion

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	423,900	
		Land	45,000	9,000 m^2
		Building	96,540	
		Installation	-	Included in process units
		Pre-operation expense	110,668	
		Interest during construction	6,785	
		Total	682,893	
	Working capital		1,017,107	
	Total		1,700,000	

Production amount: 4 x 10^8 m/y

Manufacturing cost

		1,000Rp/Year	Rp/10^3m	%
Variable Cost	Material (including packing material)	7,432,500	87,441	96.1
	Power	22,400	264	0.3
	Steam	-	-	-
	Water	1,100	13	-
	Other utility	400	5	-
	Total	7,456,400	87,723	96.4
Fixed Cost	Depreciation	57,851	681	0.7
	Maintenance	6,359	75	-
	Tax & Insurance	2,238	26	-
	Interest			
	On long team loan	40,974	482	0.5
	On working capital	122,053	1,436	1.6
	Labour	24,768	291	0.3
	Overhead	24,768	291	0.3
	Total	279,011	3,282	3.6
Grand Total		7,735,411	91,005	100.0

6-6 Standards and specifications

C-2380-72 Compound for electric insulation

6-7 Machine maker

Toshiba Machine Co., Ltd.
4-2-4, Ginza, Chuo-ku, Tokyo

7. Polyethylene laminated paper

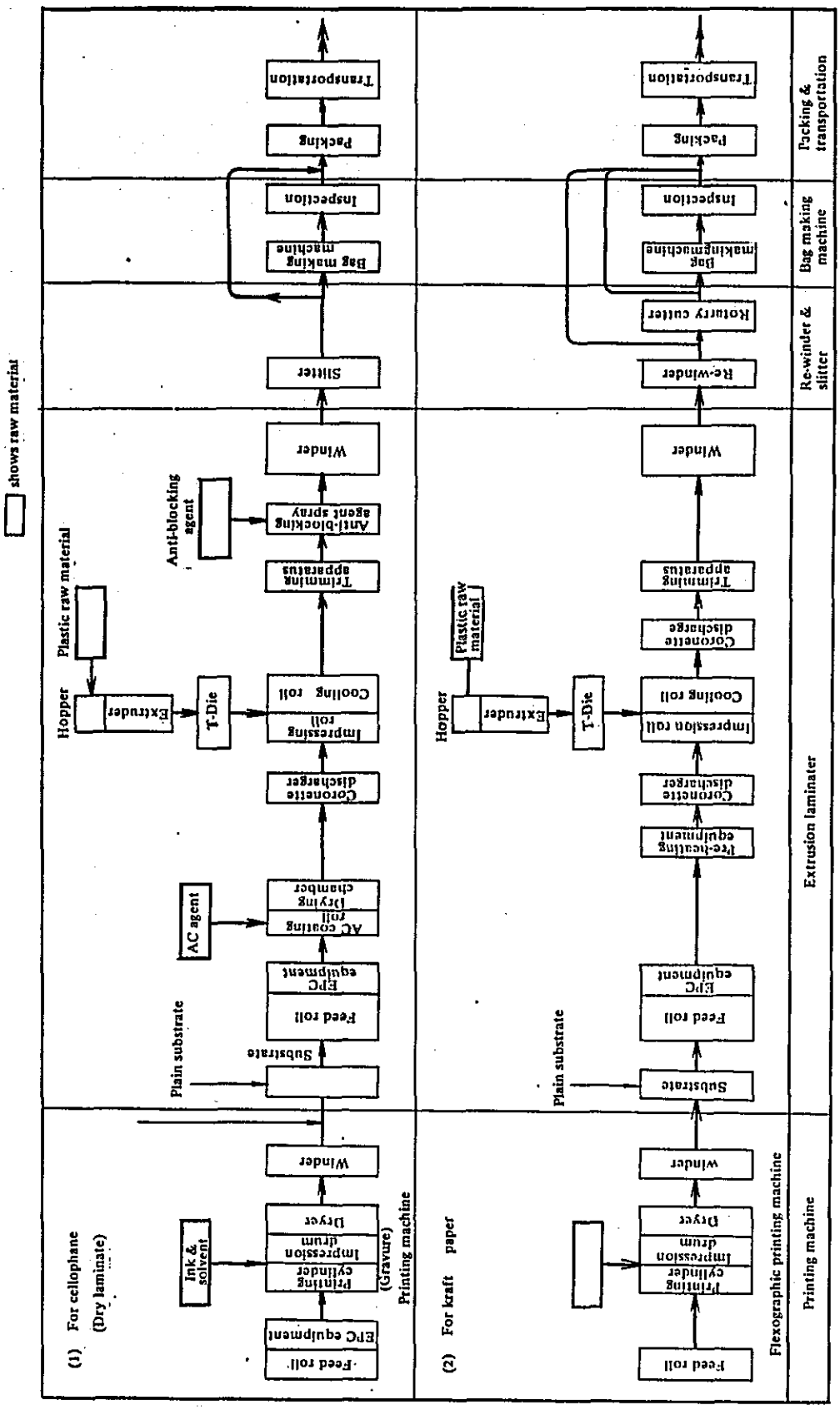
7-1 Flow chart

Flow charts of manufacturing polyethylene laminated paper are shown on next page.

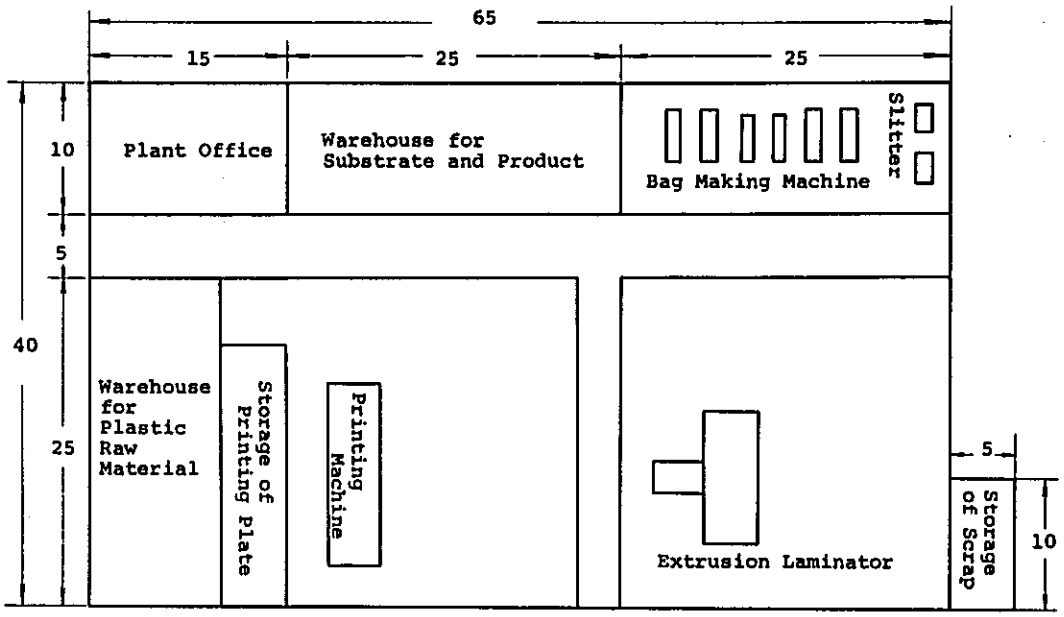
7-2 Building and equipment

(1) Building

	Area (m^2)	Unit price (1,000Rp/m^2)	Price (1,000Rp)	Notes
Plant office	300	60	18,000	Two-storied Reinforced concrete
Warehouse for substrate & product	250	30	7,500	Steel-frame slate
Warehouse for plastic raw material	250	30	7,500	"
Storage of printing plate	100	30	3,000	"
Printing plant	575	30	17,250	"
Laminating plant	625	30	18,750	"
Bag making plant	250	30	7,500	"
Storage scrap	50	30	1,500	"
Power plant	100	30	3,000	"
Warehouse for denger chemicals	24	60	1,440	Reinforced concrete
Others	400	30	12,000	Steel-frame slate
Total	2,924		97,440	


shows raw material
(1) For cellophane (Dry laminate)
(2) For kraft paper
Printing machine
Flexographic printing machine
Extrusion laminater
Re-winder & slitter
Bag making machine
Packing & transportation
Feed roll
EPC equipment
Printing cylinder
Impression drum
Dryer
Ink & solvent
Winder
Substrate
Plain substrate
Feed roll
EPC equipment
AC coating roll
Drying chamber
AC agent
Coronette discharger
Impressing roll
Cooling roll
T-Die
Extruder
Hopper
Plastic raw material
Trimming apparatus
Anti-blocking agent spray
Anti-blocking agent
Winder
Slitter
Re-winder
Rotarry cutter
Bag making machine
Inspection
Packing
Transportation

7-3 Layout of Plant



7-4-1 Extrusion lamination

	Cellophane	Kraft paper	Total
(1) Laminating capacity (tons/year)	800	400	1,200
(2) Coating specification			
Coating thickness (μ)	30	20	
Width (mm)	500	1,000	
(3) Laminating capacity (10^6 m/year)	58.0	21.7	79.7
(4) Raw materials			
LDPE (tons/year)	880	440	1,320
Substrates (10^6 m/year)	60.9	22.8	
AC agent (tons/year)	2.8	-	2.8
Solvent (tons/year)	92	-	92
(5) Utilities			
Electricity (10^3 KWH)	1,546	773	2,319
Water (m^3)	13,280	9,800	23,080
(6) Labourer (persons/year)			
Foreman	1		1
Skilled labourer	4		4
Unskilled labourer	10		10

7-4-2 Printing, slittering and bag making

Data are not available at present

7-5 Cost Estimation Data Sheet of Plastics Processing

Products Polyethylene laminated paper

Process Extrusion lamination

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	190,900	Extruder; Sorewdia. 120mm
		Land	44,000[1)]	
		Building	97,440[1)]	
		Installation	-	Included in the prices of process units
		Pre-operation expense	22,256[2)]	
		Interest during construction	5,317[2)]	
		Total	359,913	1) Including all plants Land 8,800 m^2 Building 2,924 m^2
	Working capital		290,087	2) Lamination only
	Total		650,000	

Production amount: Polyethylene laminated Cellophane 58.0 x 10^6m
Polyethylene laminated Kraft paper 21.7 x 10^6m

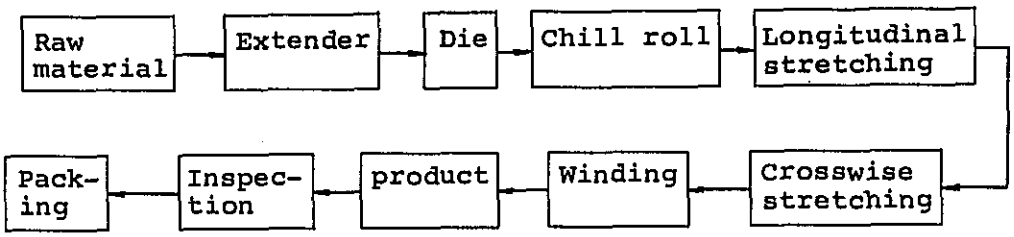
Manufacturing cost

		1,000Rp/Year	Rp/10^3m	%
Variable Cost	Material	618,000	7.75	84.1
	Power	23,190	0.29	3.2
	Steam	-	-	-
	Water	115	-	-
	Total	641,305	8.04	87.3
Fixed Cost	Depreciation	28,753	0.36	3.9
	Maintenance	2,864	0.04	0.4
	Tax & Insurance	2,225	0.03	0.3
	Interest			
	On long team loan	21,595	0.27	2.9
	On working capital	34,810	0.44	4.7
	Labour	1,656	0.02	0.2
	Overhead	1,656	0.02	0.2
	Total	93,559	1.18	12.7
Grand Total		734,864	9.22	100.0

Notes: 1) Not including the cost of substrates
2) Not including administration

8. Biaxial stretched polypropyrene film

8-1 Flow chart



8-2 Building and equipment list

(1) Building

	Area (m^2)	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Plant office	100	60	6,000	Reinforced concrete
Extrusion plant	1,500	30	45,000	Steel-frame slate
Slitting, rewinding inspection and packing room	1,000	30	30,000	"
Warehouse for product	600	30	18,000	"
Power plant	120	60	7,200	Reinforced concrete
Machine shop	100	30	3,000	Steel-frame slate
Total	3,420		109,200	

(2) Equipment

	Unit	Price (1,000Rp)	Notes
Extruder	1	179,280	Screw dia. 200 mm, L/D = 30, including T die width 460 mm
Chill roll	1	49,300	
Accumulator	1	13,450	
Longitudinal stretching machine	1	100,850	
Crosswise stretching machine	1	448,200	
Winder	1	89,640	
Line drive controller	1	112,050	
Total		992,770	

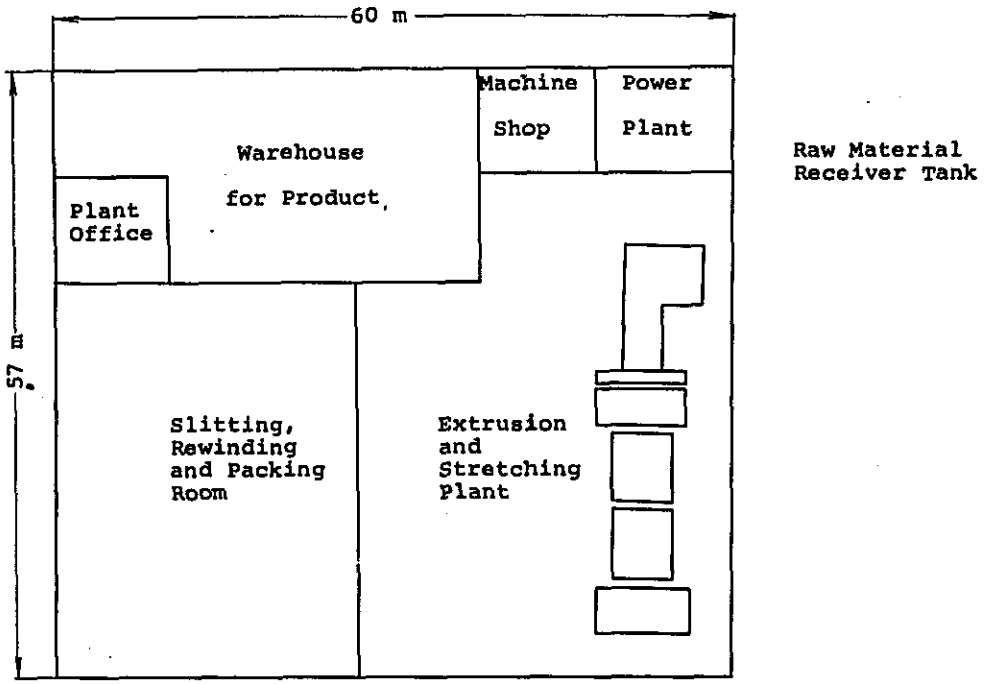
(3) Auxiliary equipment

	Unit	Price (1,000 Rp)	Notes
Site cutter	1	201,690	
Slitter and rewinder	1	134,460	
Product handling devices and inspection equipments	1	40,340	
Packing machine	1	16,810	
Total		393,300	

(4) Installation cost

	Unit	Price (1,000Rp)	Notes
Electrical distribution system	1	31,125	1,000 KVA
First stage wiring	1	20,750	
Water supply system	1	9,960	15 tons/h
Second stage wiring	1	20,750	
Piping	1	31,125	Including duct
Steem supply system	1	24,900	Boilor 2 tons/h
Sire extinguisher and telephone	1	51,875	
Lighting	1	8,300	
Foundation & installation	1	51,875	
Total		250,660	

8-3 Plant layout



8-4 Operating conditions

(1) Production capacity : 300 tons/month, 3,600 tons/year

(2) Unit consumption of raw material ; 1.15

(3) Yield of product ; 0.85

Consumption of raw material;

$$3{,}600 \text{ tons} \times \frac{1.15}{0.85} = 4.871 \text{ tons/year}$$

Scrap film 1,271 (4,871 - 3,600) tons is reused and total unit consumption of raw material is assumed as 1.05.

(4) Utilities

(a) Electricity

750 KW x 24 hrs/day x 25 days x 12 months x 0.80
= 4,320 x 10^3 KWH/year (40,320 thousand Rp)

(b) Steam

1.3 t/hr x 24 hrs/day x 25 days x 12 months x 0.80
= 7,488 tons/year

(5) Labourer

(a) Management and administration 4 (2 foreigners)

(b) Operators

	Foreman	Skilled	Un-skilled	Total
Material handling (2 shifts)		2	2	4
Extrusion (3 shifts)	3	3	6	12
Slitting, rewinding and packing (2 shifts)	2	20	28	50
Inspection (2 shifts)	2	2	2	6
Total	7	27	38	72
Wages (1,000 Rp)	1,680	3,888	3,192	8,760
Salaries (1,000 Rp)				4,320
Total				13,080

8-5 Cost Estimation Data Sheet of Plastics Processing

Products Biaxial stretched polypropyrene film
Process Extrusion

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	1,386,070	
		Land	50,000	
		Building	109,200	
		Installation	250,660	
		Pre-operation expense	60,560	
		Interest during construction	24,724	
		Total	1,881,214	
	Working capital		1,504,971	
	Total		3,386,185	

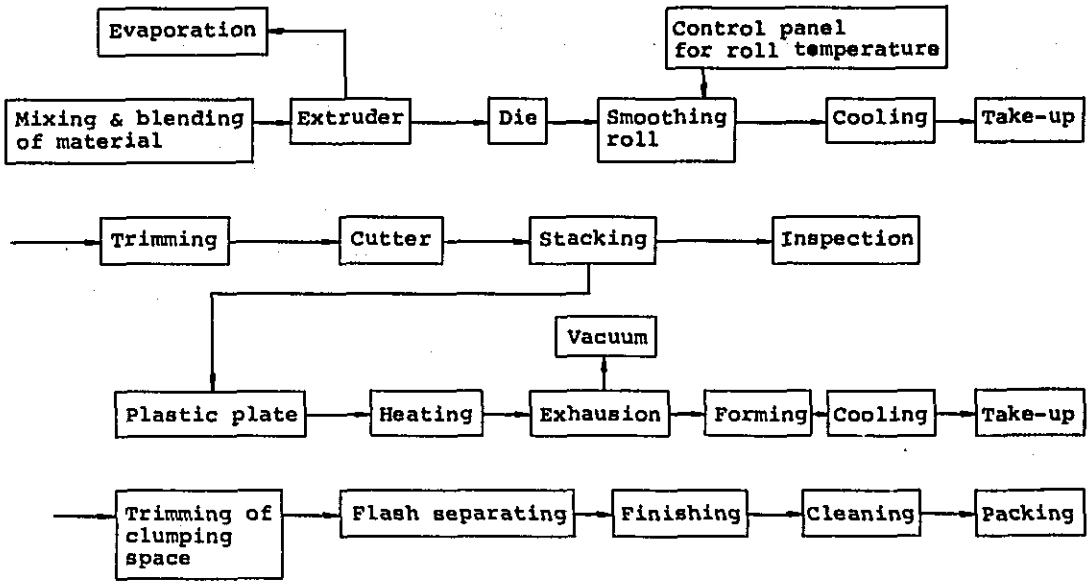
Production amount: 3,600 tons

Manufacturing cost

		1,000Rp/Year	Rp/Kg	%
Variable Cost	Material	1,701,000	472.50	75.2
	Power	40,320	11.20	1.8
	Steam	-	-	-
	Water	-	-	-
	Total	1,741,320	483.70	76.9
Fixed Cost	Depreciation	178,719	49.64	7.9
	Maintenance	20,791	5.78	0.9
	Tax & Insurance	2,510	0.70	0.1
	Interest			
	On long team loan	112,873	31.35	5.0
	On working capital	180,597	50.17	8.0
	Labour	13,080	3.63	0.6
	Overhead	13,080	3.63	0.6
	Total	521,649	144.90	23.1
Grand Total		2,262,970	628.60	100.0

9. Rigid sheet extrusion and its thermoforming

9-1 Flow chart



9-2 Building and equipment list

(1) Building

	Area (m^2)	Unit price (1,000 Rp/m^2)	Price (1,000Rp)	Notes
Plant office	60	60	3,600	Reinforced concrete
Warehouse for raw material	100	30	3,000	Steel-frame slate
Extrusion plant	384	30	11,520	"
Thermoforming plant	465	30	13,950	"
Finishing plant	78	30	2,340	"
Storage for angles wood patterns, resin molds and molds	45	30	1,350	"
Warehouse for rigid sheet	50	30	1,500	"
Warehouse for product	100	30	3,000	"
Boiler, generator room	100	60	6,000	Reinforced concrete
Others	72	30	2,160	Steel-frame slate
Total	1,454		48,420	

(2) Equipment

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Tumbler	1		5,603	
Extruder	1		33,615	Screw dia. 90 mm with controll panel
Vacuum pump	1		2,913	
Die	1		15,687	Lip width 1200 mm
Polishing roll	1		13,446	Roll dia. 260 mm Roll length 1300 mm
Heating & cooling devise	3	3,586	10,757	
Roller table	1		1,457	
Take-up machine	1		8,404	Roll dia. 250 mm Roll length 1300 mm
Side triming machine	2		6,051	
Cutter	1		13,446	
Sheet extractor	1		672	
Thermoforming machine	3	41,085	123,255	1000 mm x 2000 mm
Air compressor	3	2,967	8,902	
Vacuum pump	3	1,255	3,766	
Cloth heater	3	5,706	17,119	
Bandsaw	1		1,484	
Disc saw	1		1,141	
Drilling machine	3	342	1,027	
Buffer	1	228	228	
Total			268,973	

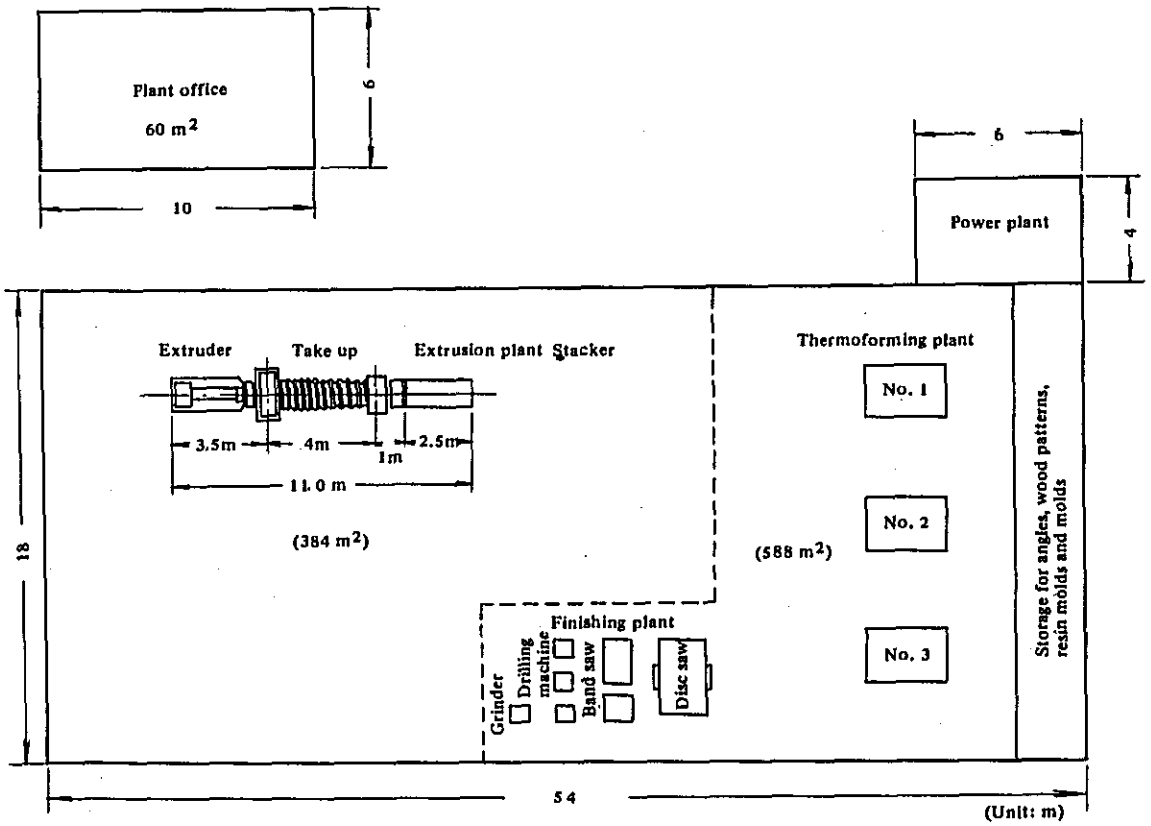
(3) Auxiliary equipment

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Lift truck	1		2,913	
Crasher	1		784	
Inspection & testing machine	1		3,362	
Total			7,059	

(4) Installation cost

	Unit	Price (1,000Rp)	Notes
Power plant	1	15,563	500 KVA (Loading capacity 294 KW)
First stage wiring	1	7,470	
Water supply system	1	9,960	15 tons/h
Second stage wiring	1	20,750	
Piping	1	6,225	
Lighting	1	6,225	
Fire extinguisher & telephone	1	5,188	
Foundation & installation	1	16,600	
Total		87,981	

9-3 Layout of plant



9-4 Operating conditions

(1) Production capacity

Production of sheets 720 tons/year (Unit consumption of raw material 1.05)

Sold in the form of sheet	374 tons/year
Own used sheet (Product	346 225)

(2) Working time

Extrusion 24 hours.day x 25 days/month x 12 months

Thermoforming 8 hours.day x 25 days/month x 12 months

(3) Utilitties

(a) Electricity

Tumbler	5.5 KW
Extruder	100.5
Thermoforming machine	330
Lighting	10
Water pump etc.	10
Total	456

Loading in daytime 436 x 0.65 + 10 = 294 KWH

Loading in night 106 x 0.65 + 20 = 89 KWH

$294 \times 8 \times 25 \times 12 + 89 \times 16 \times 25 \times 12 = 1{,}134 \times 10^3$ (KWH/year)

(b) Water

Daytime 6 m^3/h

Night 3

$6 \times 8 \times 25 \times 12 + 3 \times 16 \times 25 \times 12 = 24.8 \times 10^3$ (m^3/year)

(4) Labourer

(a) Management and administration 5 (2 foreigners)

(b) Operators

	Foreman	Skilled	Unskilled	Total
Extrusion	3	3	6	12
Inspection of sheet	1	2	3	6
Thermoforming	1	2	3	6
Finishing	1	2	3	6
Inspection & delivery	1	2	5	8
Total	7	11	20	38

9-5 Cost Estimation Data Sheet of Plastics Processing

Products Rigid sheet extrusion & its thermoforming
Process Extrusion, thermofoming

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	276,032	
		Land	22,000	4,400 m^2
		Building	48,420	
		Installation	87,981	
		Pre-operation expense	13,402	
		Interest during construction	5,543	
		Total	453,378	
	Working capital		366,622	
	Total		820,000	

Products: Sheet 374 t/y
Formed products 225 t/y

Manufacturing cost

		1,000Rp/Year	Rp/Kg	%
Variable Cost	Material (GP/HI 50:50) (@500 Rp/Kg)	378,000		77.8
	Power	11,340		2.3
	Steam	-		-
	Water	-		-
	Scrap (120 t/y) (@300Rp/Kg)	36,000		7.4
	Total	353,340		72.7
Fixed Cost	Depreciation	36,925		7.6
	Maintenance	4,140		0.9
	Tax & Insurance	1,109		0.2
	Interest			
	On long team loan	27,203		5.6
	On working capital	43,995		9.1
	Labour	9,624		2.0
	Overhead	9,624		2.0
	Total	132,620		27.3
Grand Total		485,960		100.0

9-6 Standerds and specifications

JIS K 6718 Methyl-m-acrilic plate (1958)
JIS K 6745 Rigid PVC plate (1963)

9-7 Machine makers

(1) Extrusion plant

Hitachi Shipbuilding & Engineering Co., Ltd.
1-47, Edobori, Nishi-ku, Osaka

Toshiba Machine Co., Ltd.
4-2-11, Ginza, Chuo-ku, Tokyo

The Japan Steel Works Co., Ltd.
1-12-1, Yurakucho, Chiyoda-ku, Tokyo

Ikegai Iron Works, Ltd.
2-1-18, Uchisaiwaicho, Chiyoda-ku, Tokyo

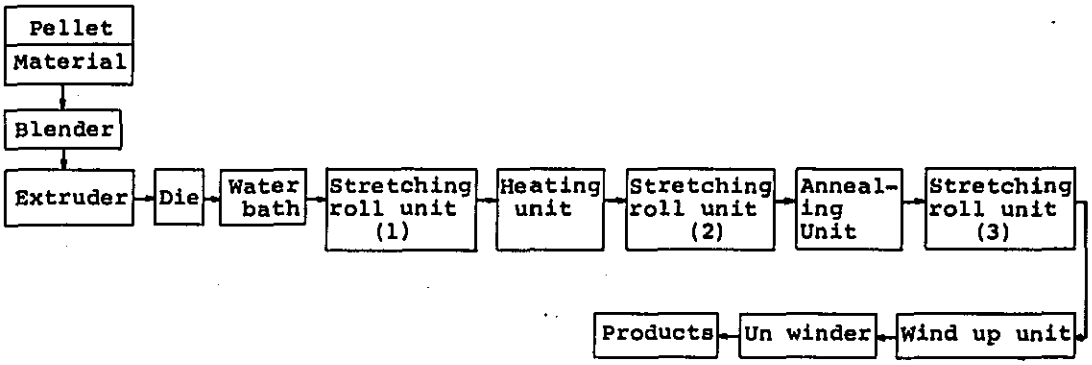
Tanabe Plastics Machinery Co., Ltd.
2-13-12, Haginaka, Ota-ku, Tokyo

(2) Thermoforming machine

Asano Laboratories Co., Ltd.
1-2-11, Nishiki, Naka-ku, Nagoya

10. Monofilament

10-1 Flow chart



10-2 Building and equipment list

(1) Building

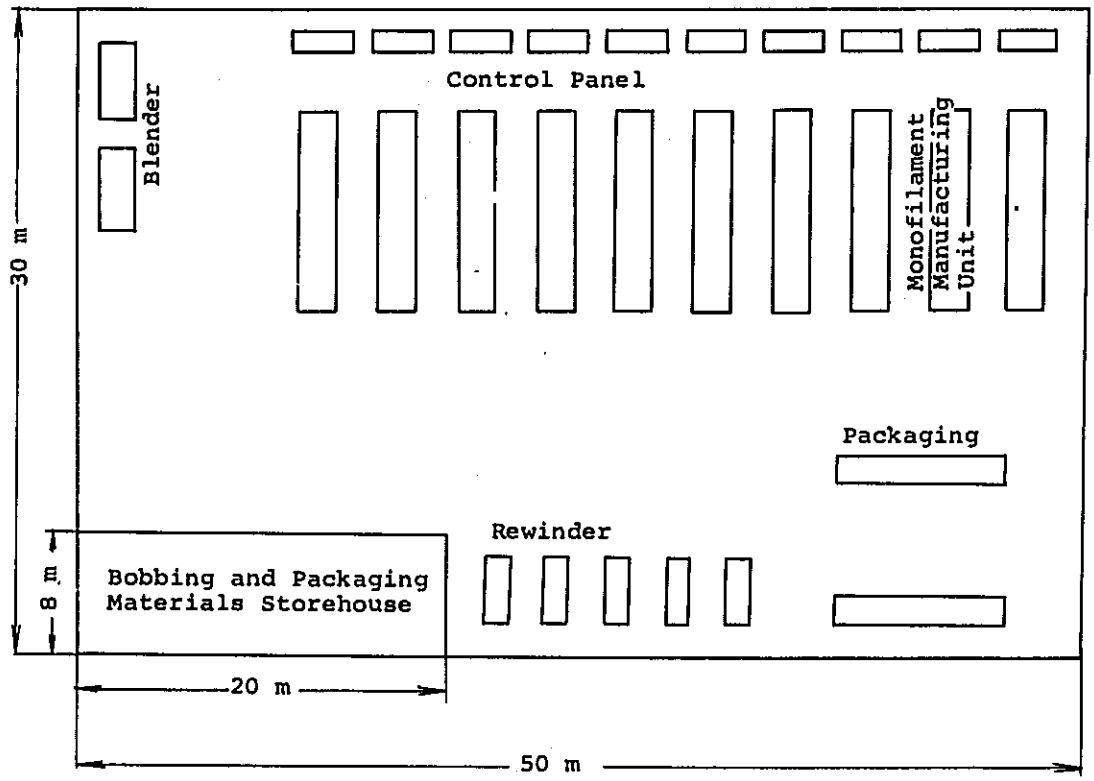
	Area (m^2)	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Head office	120	60	7,200	
Store house for raw material	200	30	6,000	
Store house for product	200	30	6,000	
Store house for bobbins & packaging material	160	30	4,800	
Maintenance room	60	30	1,800	
Utility room	60	30	1,800	
Plant office	60	30	1,800	
Extrusion plant	1,340	30	40,200	
Power plant	120	30	3,600	
Total	2,320		73,200	

(2) Equipment

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Extruder	10	9,660	96,600	Diameter of screw 50 mm
Stretching stand & water bath	10	15,456	154,560	
Winding machine	10	15,456	154,560	40 bobbins
Rewinding machine	5	3,091	15,455	
Ribbon blender	2	3,091	6,182	200 l
Other accessaries		11,592	11,592	
Total			438,949	

Notes : Including installation cost

10-3 Layout



10-4 Operating conditions

(1) Production capacity

Extrusion capacity (dia. 50 mm) 25 kg/h
Working hours 24 hrs x 25 days = 600 hrs/month
Utilization 0.90 x 0.80 (time loss 20%)
Yield 0.90
Production capacity
25 kg/h x 24 hrs/day x 25 day/month x 12 month x
0.90 x 0.80 x 0.90 = 116.6 tons/set
Total capacity 116.6 x 10 - 1,166 tons

(2) Unit consumption of raw material

High density polyethylene 1.05
Pigment 0.005
Price of pigment is assumed as 2,300 Rp/kg

(3) Utility

(a) Electricity

Driving motors of extruders	150 KW
Heaters of extruders	160
First stretching driving VS motors	15
Second stretching driving VS motors	15
Winding equipment driving VS motors	37
Sub total	377
Ribbon blender	7.5
Others	50
Total	434.5

(b) Water

Electricity for water pump is included in (a)

(4) Labourer

(a) Management and administration 4 (1 foreigner)

(b) Operators (3 shifts) Total 39

	Foreman	Skilled	Un-skilled	Total
Material handling		3	3	6
Extrusion	3	6	15	24
Inspection & packing	2	2	4	8
Utility & maintenance		3		3
Total	5	12	22	39

10-5 Cost Estimation Data Sheet of Plastics Processing

Products Monofilament

Process Extrusion

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	479,132	
		Land	35,000	7,000 m^2
		Building	73,200	
		Installation	-	Included in process units
		Pre-operation expense	20,934	
		Interest during construction	9,397	
		Total	617,664	
	Working capital		494,131	
	Total		1,111,795	

Production amount: 1,116 tons

Manufacturing cost

		1,000Rp/Year	Rp/Kg	%
Variable Cost	Material (including packing material)	564,344	484.00	73.4
	Power	20,335	17.44	2.6
	Steam	-	-	-
	Water	-	-	-
	Total	584,679	501.44	76.1
Fixed Cost	Depreciation	63,552	54.50	8.3
	Maintenance	7,187	6.16	0.9
	Tax & Insurance	1,718	1.47	0.2
	Interest			
	On long team loan	37,059	31.78	4.8
	On working capital	59,295	50.85	7.7
	Labour	7,656	6.57	1.0
	Overhead	7,656	6.57	1.0
	Total	184,124	157.91	23.9
Grand Total		768,803	659.35	100.0

10-6 Machine maker

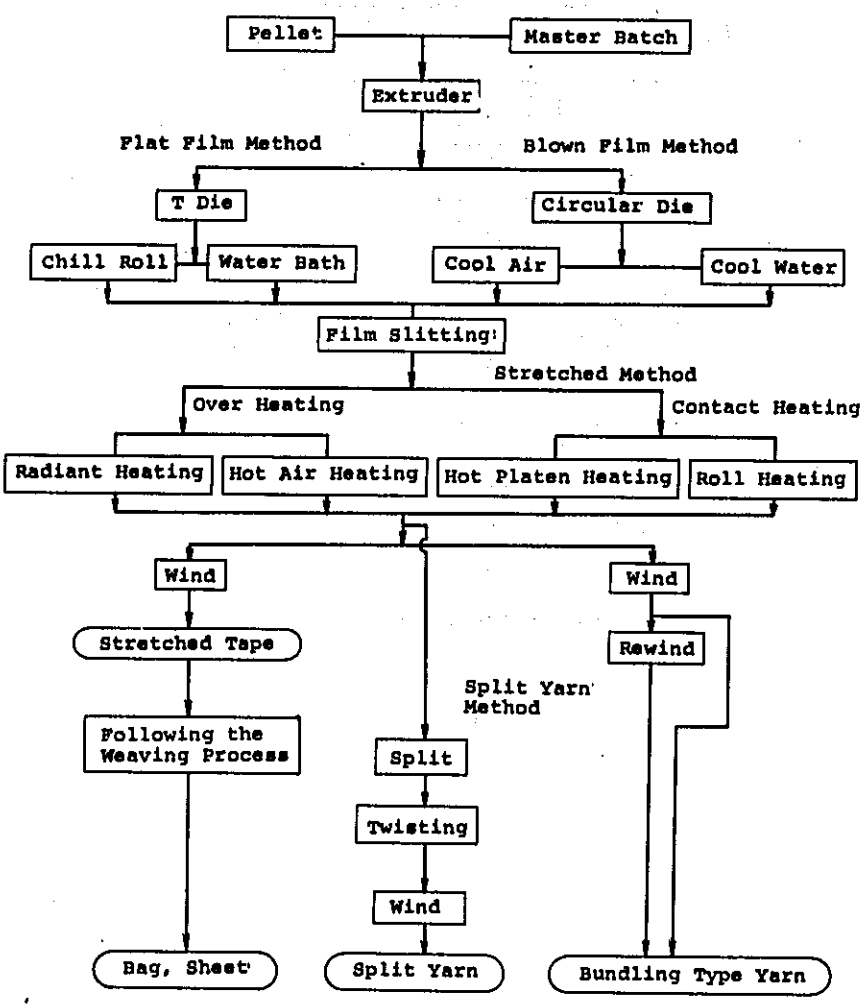
Toshiba Machine Co., Ltd.

4-2-11, Ginza, Chuo-ku, Tokyo

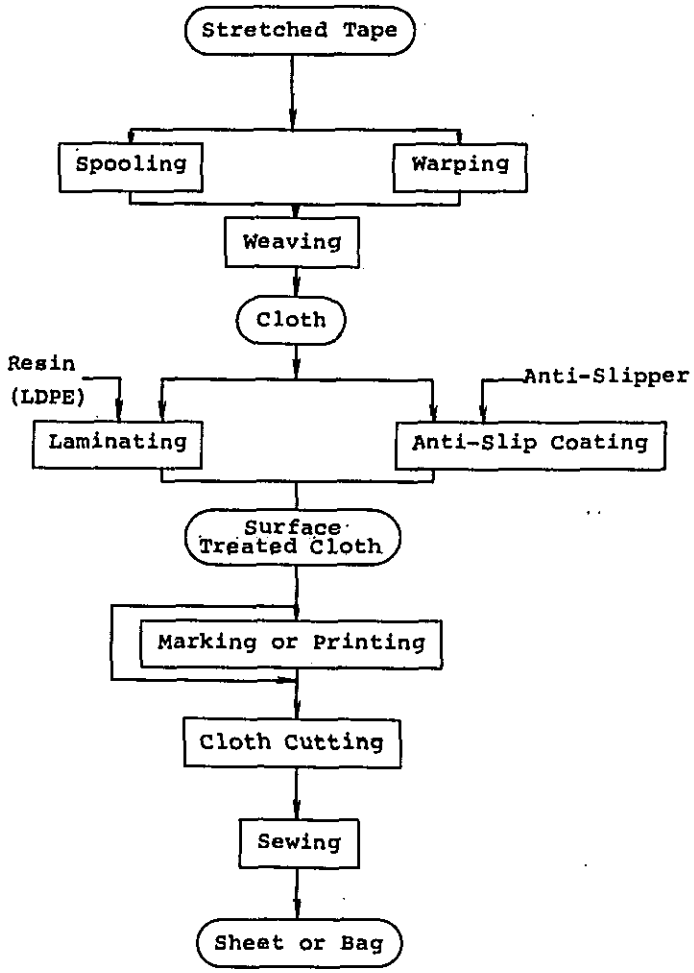
11. Fertilizer bag made with stretched yarn

11-1 Flow chart

(1) Stretched yarn making process



(2) Wwaving and bag making process



11-2 Building and equipment list

(1) Building

	Area (m^2)	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Head office	120	60	7,200	Reinforced concrete
Warehouse for material	362	30	10,860	Steel-frame, slate roofing
Warehouse for intermediate product	218	30	6,540	"
Warehouse for product	350	30	10,500	"
Blending and mixing room	80	30	2,400	"
Extrusion plant	448	30	13,440	"
Spooling and warping plant	280	30	8,400	"
Weaving plant	780	30	23,400	"
Laminating plant	255	30	7,650	"
Sewing plant	264	30	7,920	"
Plant office	188	30	5,640	"
Utility and machine shop	190	60	11,400	Reinforced concrete
Total	3,535		115,350	

(2) Equipment

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Stretched tape mfg. machine	3	77,280	231,840	
Weaving machine	30	7,728	231,840	Water jet room
Warping machine	1		57,960	Including creel stand
Printing machine	1		125,580	
Laminating machine	1		135,240	Extruder dia. 115 mm
Cloth cutting machine	2	6,762	13,524	
Sewing machine	5	1,932	9,660	
Total			805,644	

Notes: Installation cost is included in above price.

(3) Auxiliary equipment

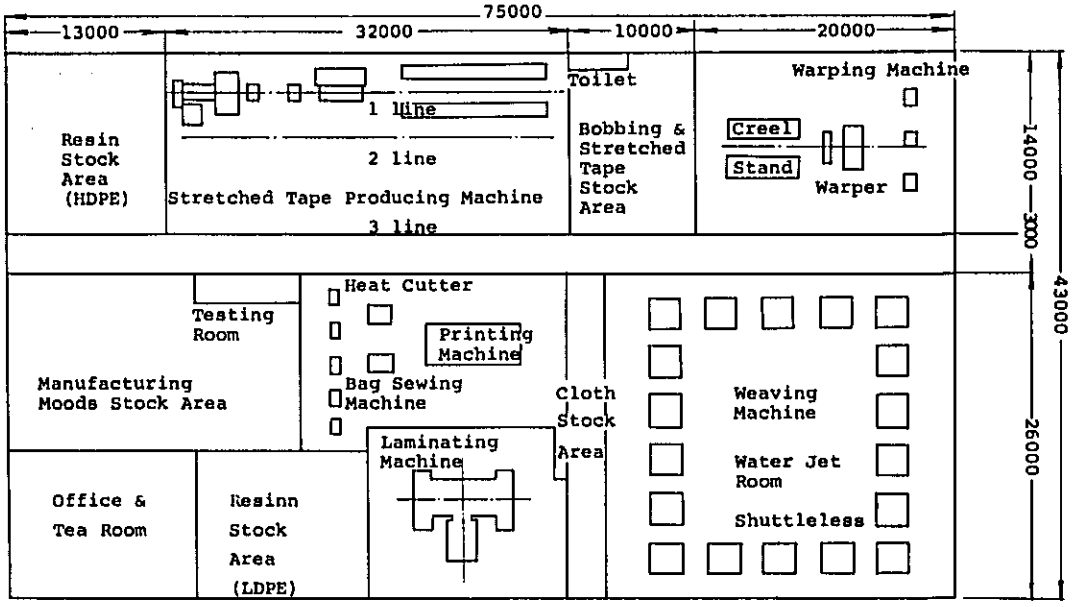
	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Ribbon blender	2	3,091	6,182	200 l
Crusher	1		13,041	
Carriar car	10	290	2,900	
Lift track	2	2,222	4,444	1 ton and 2 tons
Total			26,567	

Notes : Installation cost is included in above price.

(4) Cost of machine transport by sea and packing

6,900,000 Rp.

11-3 Layout



Unit: mm

11-4 Operating consitions

(1) Production capacity

(a) Extrusion

Film speed	15 m/min.
Tape speed	105 m/min.
Out put	50 kg/h

(b) Weaving

Picking speed	400 RPM
Weaving speed	50.8 m/h

(c) Warping

warping speed	40 m/min.

(d) Printing

Printing speed	40 m/min. (2 tone colors)

(e) Lamination

Laminating speed	40 m/min.
Extruder out put	172 kg/h

(f) Cutting

Cutting speed	10 m/min.

(g) Sewing

Sewing speed	10.5 m/min.

(h) Total production capacity

$7{,}130 \times 10^3$ bags/year

as fertilizer bag for urea (50 kg)

Total weight 1,540 tons/year

Notes : Specification of fertilizer bag for 50 kg urea

Length 103 cm, Width 60 cm

Bag weight 208 g

Thickness of LDPE lamination 0.06 mm

Weave density 12 x 12

Yarn density 1,000 denier

(2) Raw material

(a) Consumption of raw material (including loss)

HDPE	1,128 t/year
LDPE	527 t/year

(b) Unit consumption 1.07

(3) Working conditions

Working days	330 days/year
Working hours	24 hrs/day
Total working hours	7,920 hrs/year

(4) Utility

(a) Electricity

Stretched tape mfg. machines	450 KWH
Weaving machines	90
Warping machines	30
Printing machines	60
Laminating machines	150
Cloth cutters and sewing machines	70
Ribbon blender	7.5
Crusher	37.5
Others (lighting etc.)	50
Total	945

(b) Water

Stretched tape mfg. machine	150,000 m^3/year
Laminating machine	95,000
Total	245,000

(5) Labourer

(a) Management and administration 6 (1 foreigner)

(b) Operators (3 shifts) Total 144

	Foreman	Skilled	Un-skilled	Total
Material handling		3	3	6
Extruding	3	3	12	18
Warping		6	6	12
Weaving	3	20	22	45
Printing	3	3	3	9
Laminating	3	4	5	12
Cloth cutting[1)]		4	8	12
Sewing[1)]	2	4	9	15
Inspection & packing[1)]	2	2	8	12
Maintenance		3		3
Total	16	52	76	144

Notes : 1) 2 shifts

11-5 Cost Estimation Data Sheet of Plastics Processing

Products Fertilizer bag

Process Stretched yarn making process (extrusion)

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	839,111	
		Land	50,000	10,000 m^2
		Building	115,350	
		Installation	-	Included in process units & building
		Pre-operation expense	26,601	
		Interest during construction	16,071	
		Total	1,047,133	
	Working capital		852,867	
	Total		1,900,000	

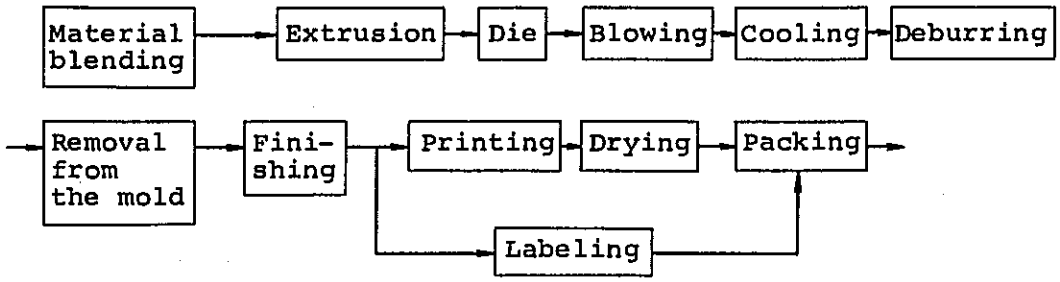
Production amount: 7,130 x 10^3 bags/y

Manufacturing cost

		1,000Rp/Year	Rp/Kg	%
Variable Cost	Material (including packing material)	744,750	104.45	64.5
	Power	74,844	10.50	6.5
	Steam	-	-	-
	Water	1.225	0.17	0.1
	Total	820,819	115.12	71.1
Fixed Cost	Depreciation	110,657	15.52	9.6
	Maintenance	12,587	1.77	1.1
	Tax & Insurance	2,584	0.36	0.2
	Interest			
	On long team loan	62,828	8.81	5.4
	On working capital	102,344	14.35	8.9
	Labour	21,312	2.99	1.8
	Overhead	21,312	2.99	1.8
	Total	333,624	46.79	28.9
Grand Total		1,154,443	161.91	100.0

12. PVC bottle

12-1 Flow chart



12-2 Building and equipment

(1) Building

	Area (m^2)	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Plant office	60	60	3,600	Reinforced concrete
Warehouse				
for raw material	100	30	3,000	Steel-frame slate
for product	100	30	3,000	"
for mold	50	30	1,500	"
Blow molding plant	324	30	9,720	"
Finishing & printing plant	216	30	6,480	"
Power plant	36	60	2,160	Reinforced concrete
Machine shop	36	30	1,080	Steel-frame slate
Total	922		30,540	

(2) Equipment

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Tumbler	1	4,034	4,034	300 l
Extruder & mold clamping device	1	33,167	33,167	Screw dia. 80 mm Clamping force 6.3 tons
Die	2	5,378	10,756	2 heads
Conveyor	1	4,482	4,482	
Air compressor	1	1,793	1,793	
Automatic finishing machine	1	2,237	2,237	
Push-in device for finishing machine	1	183	183	
Drill of finishing machine	1	137	137	
Printing machine	2	20,543	41,086	Dubuit model 150
Dryer	1	5,706	5,706	Infrared heater
Labeling machine	1	5,706	5,706	
Total			109,287	

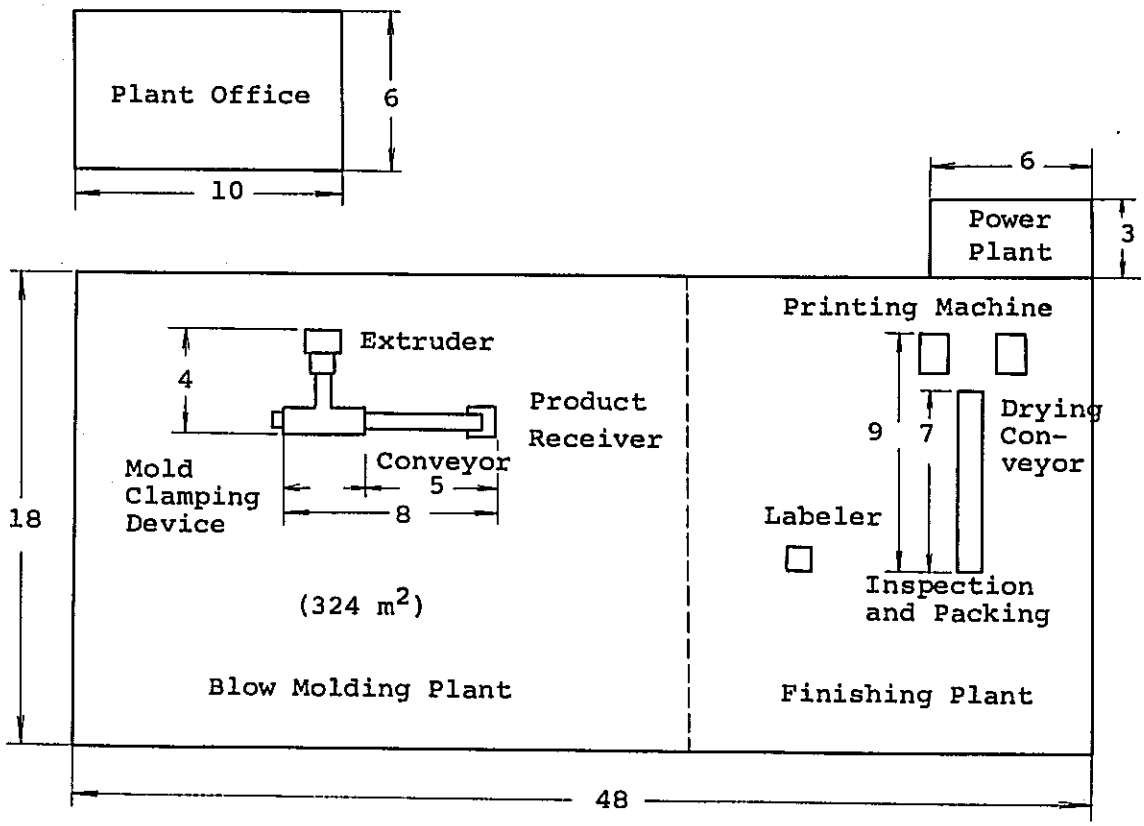
(3) Auxiliary equipment

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Lift truck	1	2,913	2,913	
Crusher	1	784	784	
Testing and inspection machine	1	3,362	3,362	Constant temperature bath Tensile tester.. etc.
Total			7,059	

(4) Installation cost

	Unit	Price (1,000Rp)	Notes
Electrical distribution system	1	6,225	200 KVA (Loading 145 KW)
First stage wiring	1	2,905	
Water supply system	1	5,395	5 tons/h
Second stage wiring	1	7,781	
Piping	1	4,150	
Lighting	1	5,603	
Fire extingisher & telephone		5,188	
Foundation & installation	1	10,375	
Total		47,622	

12-3 Layout of plant



(Unit: m)

12-4 Operating conditions

(1) Production capacity

(a) Extrusion capacity 65 kg/h for rigid PVC

(b) Blow molding capacity

Example: 180 ml shampoo bottle (30 g)
2 bottles for one head, using 2 heads
cycle; 10 second for one shot (6 shots/min.)

30 g x 4 bottles x 6 shots x 60 min. = 43.2 kg/hr

(c) Burr of blow molding; 30%

Consumption of raw material $43.2 \times \frac{1}{1 - 0.3} = 61.7$ (kg/hr)

(d) Unit consumption of raw material for blow molding

1.05

(2) Operating efficiency 0.85

(3) Working hours

Blow molding 24 hrs/day x 25 days/month = 600 hrs/month
Finishing 7 hrs/day x 25 days/month = 175 hrs/month
Printing 7 hrs/day x 25 days/month = 175 hrs/month

(4) Production amount of PVC bottle

4 bottles x 6 shots x 60 min. x 600 hrs x 0.85 =734,400/month
30 g x 734,400 = 22 tons/month

(5) Utilities

(a) Electricity

Tumbler	3.7 KW
Extruder motor	30.0
Extruder heater	36.0
Mold clamping	51.5
Conveyor	1.5
Compressor	11.0
Finishing machine	1.0
Printing & labeling machine	3.0
Dryer	50.0
Lighting	8.6
Water pump & others	7.4
Total	203.7

Loading in daytime	153.9 KW
Loading in night	108.5

Total

$153.9 \times 7 \times 25 \times 12 + 108.5 \times 17 \times 25 \times 12$

$= 877 \times 10^3$ (KWH/year)

(b) Water 5 $m^3/hr = 36 \times 10^3$ m^3/hr

(6) Labourer

(a) Management and administration 4 (1 foreigner)

(b) Operators

	Foreman	Skilled	Un-skilled	Total
Blow molding	3	3	6	12
Finishing	1	4	6	11
Printing	1	2	4	7
Labeling	1	2	6	9
Inspection & packing	1	2	8	11
Total	7	13	30	50

12-5 Cost Estimation Data Sheet of Plastics Processing

Products PVC bottle

Process Blow molding

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	116,346	
		Land	13,500	2,700 m^2
		Building	30,540	
		Installation	47,622	
		Pre-operation expense	5,499	
		Interest during construction	2,566	
		Total	216,072	
	Working capital		172,858	
	Total		388,931	

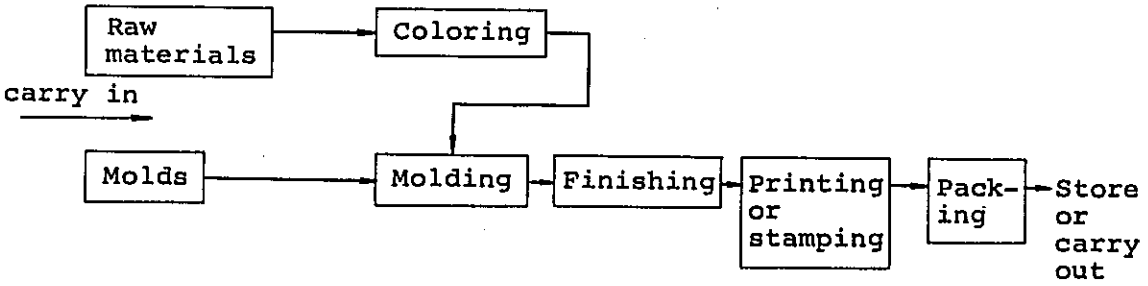
Products: 8,812,800 bottle/y
384 t/y

Manufacturing cost

		1,000Rp/Year	Rp/Kg	%
Variable Cost	Material (including packing material)	111,040	289.17	58.7
	Power	8,770	22.84	4.6
	Steam	-	-	-
	Water	-	-	-
	Total	119,810	312.01	63.3
Fixed Cost	Depreciation	16,070	41.85	8.5
	Maintenance	1,745	4.54	0.9
	Tax & Insurance	690	1.80	0.4
	Interest			
	On long team loan	12,964	33.75	6.9
	On working capital	20,743	54.02	11.0
	Labour	8,592	22.4	4.5
	Overhead	8,592	22.4	4.5
	Total	69,397	180.72	36.7
Grand Total		189,207	492.73	100.0

13. Plastic crate

13-1 Flow chart



13-2 Building and equipment

(1) Building

	Area (m^2)	Unit price (1,000Rp/m^2)	Price (1,000Rp)	Notes
Plant office	60	60	3,600	Reinforced concrete
Warehouse	47	30	1,410	Steel-frame slate
Molding plant	112	30	3,360	"
Power plant	40	60	2,400	Reinforced concrete
Machine shop	12	30	360	Steel-frame slate
Total	271		11,130	

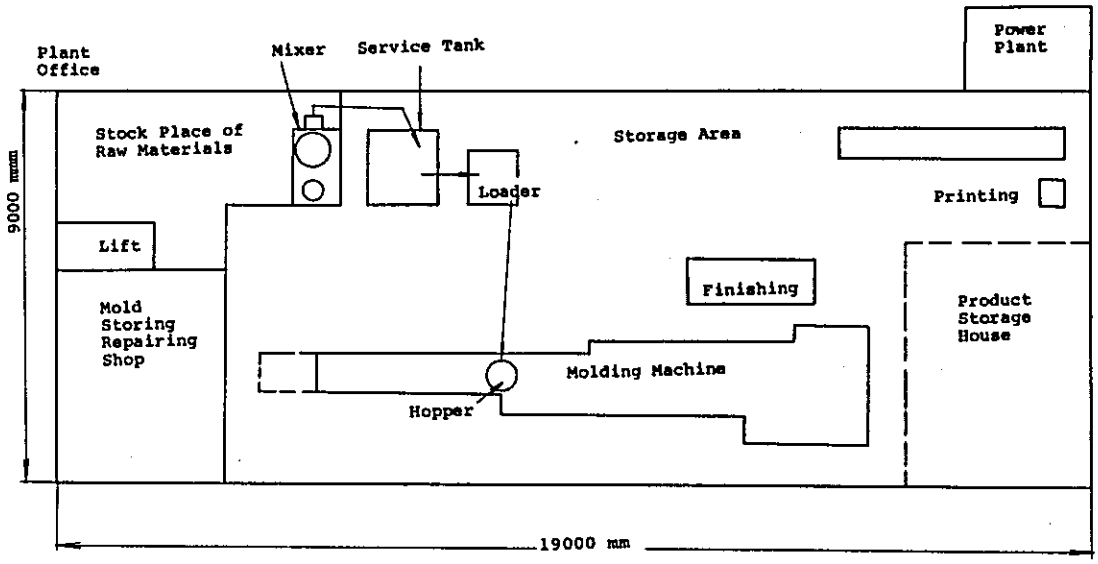
(2) Equipment

	Unit	Price (1,000Rp)	Notes
Ribbon blender	1	3,091	
Service tank raw material	1	580	6,000 l
Hopper loader	1	1,037	
Injection molding machine	1	91,300	Clamping force 630 tons
Printing machine	1	1,245	Screen printing device
Total		97,253	

(3) Auxiliary equipment

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Crane	1		2,830	10 tons
Crusher	1		13,041	
Lift truck	1		3,000	2 tons
Total			18,871	

13-3 Plant layout



13-4 Operating conditions

(1) Plant capacity

(a) Unit weight of crate 1,500 g

(b) Molding cycle 60 sec.

(c) Working hours

3 shifts, 24 hrs/day x 25 days/month x 12 month
= 7,200 hrs/year

(d) Utilization 90 %

(e) Total production 95 %

(f) Yield of product 95 %

(g) Production amount

432,000 x 0.95 = 410,400 pieces/year

(2) Raw material

(a) Unit consumption

HDPE	1.05
Pigment	0.005 (Average 2,300 Rp/kg)

(b) Consumption of raw materials

	Quantity (tons/year)	Amount (1,000Rp/year)
HDPE	646	290,700
Pigment	3	6,900
Total		297,600

(c) Printing ink Rp. 16/piece = 6,566 thousand Rp/year

(3) Utilities

(a) Electricity 960,000 KWH/year
(b) Water 32,000 m^3/year

(4) Labourer

(a) Management and administration 4

(b) Operators (3 shifts)

	Foreman	Skilled	Unskilled	Total
Material handling		2	3	5
Injection maolding	3	3	3	9
Printing	2	4	8	14
Product handling		1	2	3
Mold repairing & maintenance		1	2	3
Inspection		2	2	4
Total	5	13	20	38

13-5 Cost Estimation Data Sheet of Plastics Processing

Products Plastic crate

Process Injection molding

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	116,124	
		Land	4,000	800 m^2
		Building	11,130	
		Installation	-	
		Pre-operation expense	11,571	
		Interest during construction	2,100	
		Total	144,925	
	Working capital		115,940	
	Total		260,866	

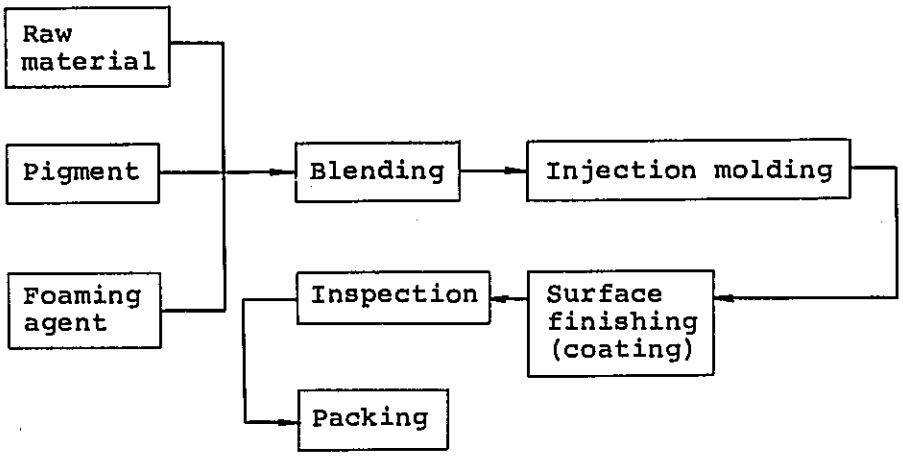
Production amount: 410,400 pieces/y (615.6 t/y)

Manufacturing cost

		1,000Rp/Year	Rp/Kg	%
Variable Cost	Material (including packing material)	304,166	494.10	83.1
	Power	9,600	15.59	2.6
	Steam	-	-	-
	Water	16	0.03	0.0
	Total	313,782	509.72	85.8
Fixed Cost	Depreciation	15,072	24.48	4.1
	Maintenance	1,742	2.83	0.5
	Tax & Insurance	230	0.37	0.1
	Interest			
	On long term loan	8,696	14.13	2.4
	On working capital	13,913	22.60	3.8
	Labour	6,192	10.06	1.7
	Overhead	6,192	10.06	1.7
	Total	52,035	84.53	14.2
Grand Total		365,818	594.25	100.0

14. Structural foam molding

14-1 Flow chart



14-2 Building and equipment

(1) Building

	Area (m^2)	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Plant office	50	60	3,000	Steel-frame slate
Storage				
for material	80	30	2,400	"
for product	150	30	4,500	"
for mold	40	30	1,200	"
Molding plant	120	30	3,600	"
Power plant	30	60	1,800	Reinforced concrete
Machine shop	20	30	600	"
Others	110	30	3,300	"
Total	600		20,400	

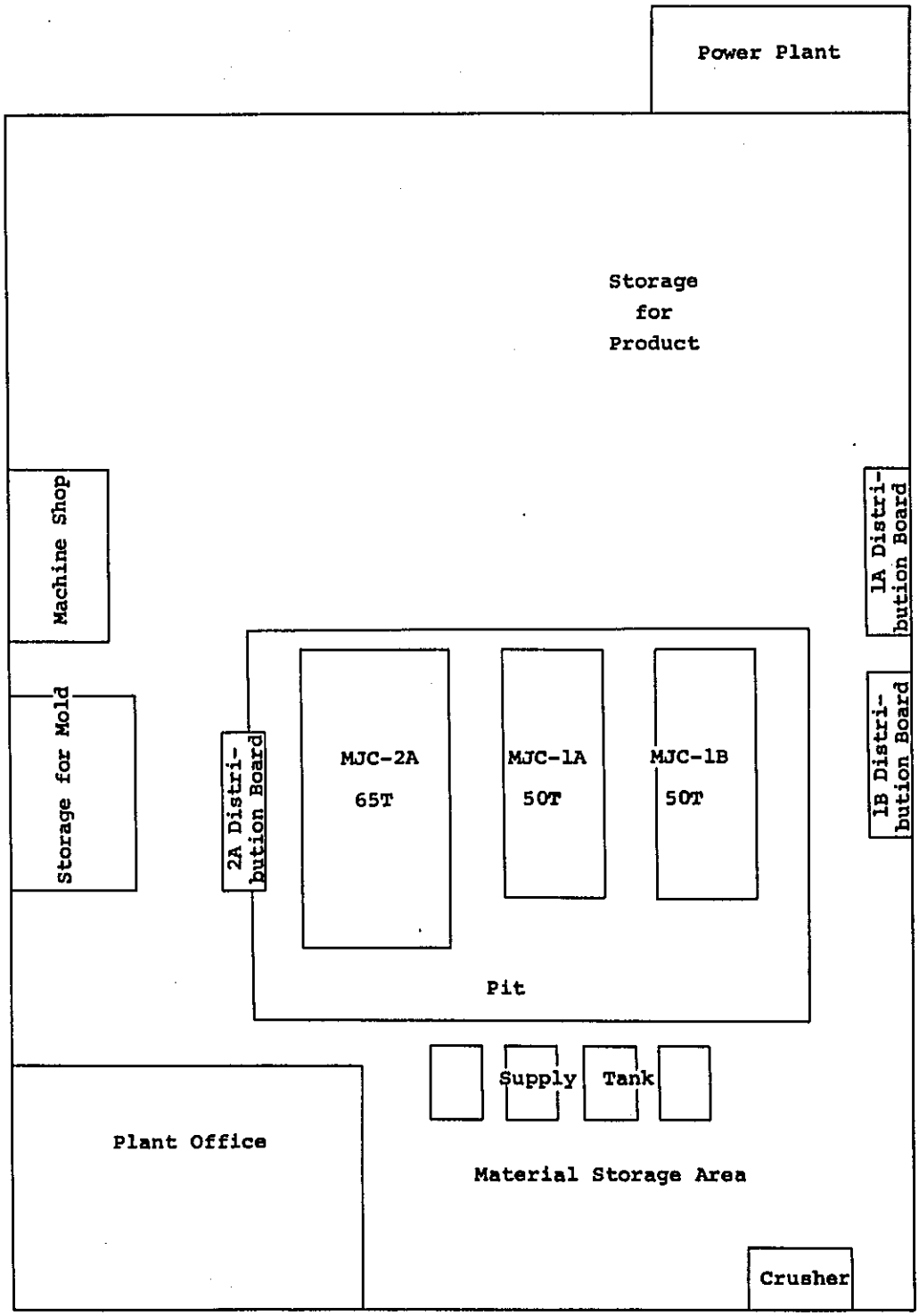
(2) Equipment

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Structural foaming molding machine	2	141,100	242,200	Injection capacity 5,000 cm^3
(twin head)	1		211,650	Injection capacity 10,000 cm^3 x 2
Mold cooling system	2	7,263	14,525	
Electric panel	1		10,790	
Total			479,165	

(3) Auxiliary equipment

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Crusher	1		13,041	
Crane	1		6,225	10 tons
	1		3,113	3 tons
Others			4,150	
Total			26,529	

14-3 Plant layout



14-4 Operating conditions

(1) Plant capacity

(a) Average unit weight of product

MJC	1	3,000 g/piece
MJC	2	6,000 g/piece

(b) Molding cycle

MJC	1	75 sec.
MJC	2	120 sec.

(c) Working hours

24 hrs/day x 25 days/month x 12 months = 7,200 hrs/day

(d) Utilization 90 %

(e) Total production capacity

MJC 1 $\frac{60 \times 60}{75}$ x 7,200 x 0.9 x 2 = 622,080 (pieces/year)

MJC 2 $\frac{60 \times 60}{120}$ x 7,200 x 0.9 x 2 = 388,800 (pieces/year)

(f) Yield of product 95 %

(g) Production amount

(622,080 + 388,800) x 0.95 = 960,336 (pieces/year)

(3 kg x 622,080 + 6 kg x 388,800) x 0.95 = 3,989 tons/year

(2) Raw material

(a) Unit consumption

HDPE 1.05

Pigment 0.005 (Average 2,300 Rp/kg)

Foaming agent 0.007 (3,000 Rp/kg)

(b) Consumption of raw materials

	Quantity (tons/year)	Amount (1,000Rp/year)
HDPE	4188	1,884,600
Pigment	20	46,000
Foaming agent	28	84,000
Total		2,014,600

(3) Utilities

(a) Electricity

	Motors (KW)	Heaters (KW)
Molding machines	329	295.6
Molds		40
Refrigirators	46.8	
Crusher	37.5	
Sub total	413.3	335.6
Loading (60%)	449.3	
Others	50	
Total	499.3	

499.3 KW x 7,200 hrs x 0.90 = 2,912 x 10^3 KWH/year

10 Rp/KWH x 2,912 x 10^3 KWH/year = 29,120 x 10^3 Rp/year

(4) Labourer

(a) Management and administration 6 (2 foreigners)

(b) Operators

	Foreman	Skilled	Unskilled	Total
Material handling		3	3	6
Injection molding	3	18	21	42
Product handling		4	8	12
Maintenance	2	2	2	6
Inspection	2	2	0	4
Total	7	29	34	70
Wages (1,000 Rp/year)	1,680	4,176	2,856	8,712

Total wages and salaries including managment and administration 13,752

14-5 Cost Estimation Data Sheet of Plastics Processing

Products Structural foam

Process Injection molding

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	505,694	
		Land	9,000	1,800 m^2
		Building	20,400	
		Installation	-	
		Pre-operation expense	70,666	
		Interest during construction	8,562	
		Total	614,322	
	Working capital		491,457	
	Total		1,105,780	

Production amount: 960,336 pieces/y
3,989 t/y

Manufacturing cost

		1,000Rp/Year	Rp/Kg	%
Variable Cost	Material (including packing material)	2,014,600	505.04	90.0
	Power	29,120	7.30	1.3
	Steam	-	-	-
	Water	194	0.05	0.0
	Total	2,043,914	512.39	91.3
Fixed Cost	Depreciation	64,232	16.10	2.9
	Maintenance	7,585	1.90	0.3
	Tax & Insurance	461	0.12	0.0
	Interest			
	On long team loan	36,859	9.24	1.6
	On working capital	58,974	14.78	2.6
	Labour	13,752	3.45	0.6
	Overhead	13,752	3.45	0.6
	Total	195,616	49.04	8.7
Grand Total		2,239,530	561.43	100.0

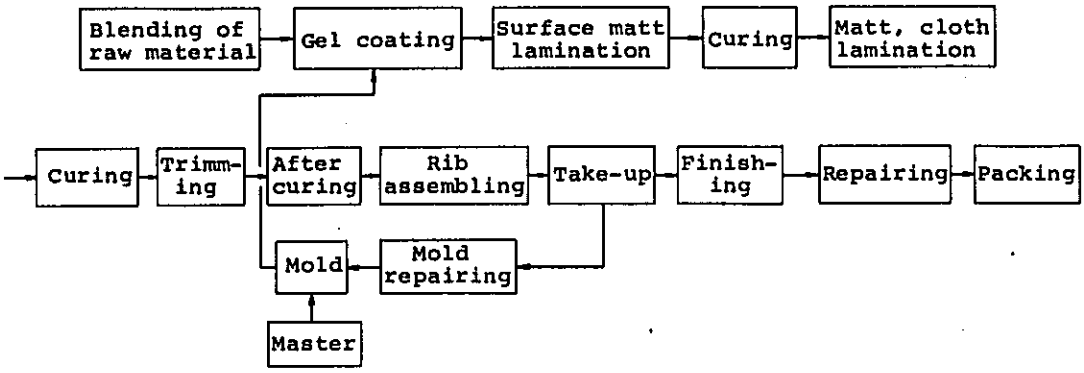
14-6 License holder

Mitsubishi Petrochemical Co., Ltd.

Chiyoda Building Annex
1-2, Marunouchi 2-chome, Chiyoda-ku, Tokyo

15. Fishing boat (hull and deck) made with fiber glass reinforced polyester

15-1 Flow chart



* In the case of boat with deck, finishing is made after assembling of hull and deck.

15-2 Building and equipment list

(1) Building

	Area (m^2)	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Plant office	60	30	1,800	
Molding factory	960	30	28,800	Including semi-finished products stage and finishing room
Power distribution room	18	30	540	
Warehouse	400	30	12,000	
Total	1,438		43,140	

(2) Euqipment

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Weigher	1		580	
Agitator for resin	1		966	30 l
Compounding vessel for resin	1		386	
Chopping machine for glass fibre	2	193	386	
Spray gun	2	38	76	for gel coating
Air compressor	2	386	772	for gel coating, painting etc.
Carrier car	10	97	970	
Tools	1		966	Hand drill etc.
Furnitures and fixtures	1		580	Working desk etc.
Sub total			5,680	
Packaging for export	(10 %)		568	
Total			6,248	

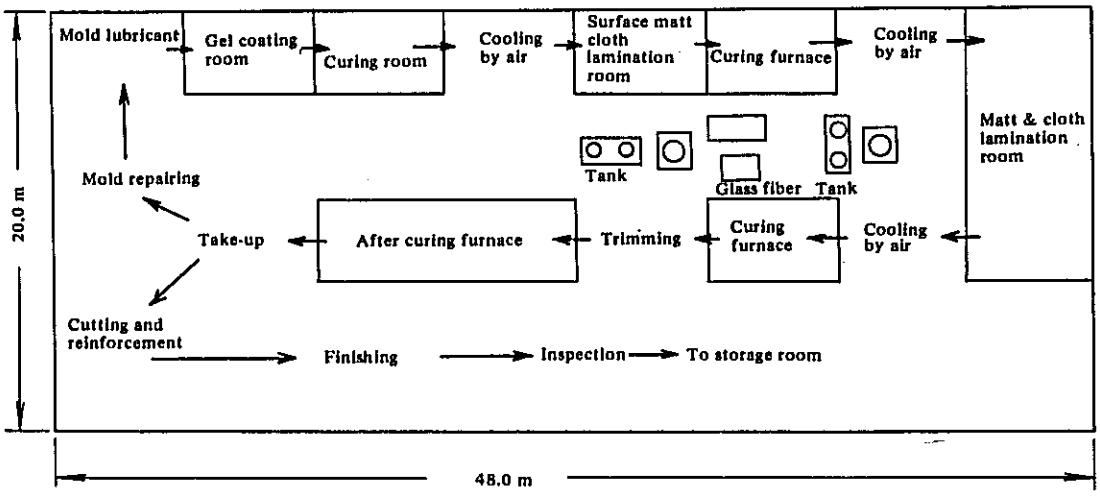
(3) Auxiliary equipment

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Lift truck	1		2,512	
Boiler	1		5,796	500 kg/hr
Crusher	1		676	3.7 KW
Testing & inspection apparatus	1		1,546	
Sub total			10,529	
Packing for export	(8 %)		842	
Total			11,371	

(4) Installation

	Unit	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Power distribution room	1		773	20 KVA (load 14.6 KW)
First stage wiring	1		580	
Water supply system	1		2,512	2 tons/hr
Second stage wiring	1		966	16.9 KW
Heat insulation	246 m^2		5,796	
Lighting	1		4,830	
Fire extinguisher & telephone	1		3,864	
Foundation & installation	1		966	
Total			20,286	

15-3 Layout of plant



15-4 Operating conditions

(1) Production capacity

14 ft. Finishing boat (hull and deck) 6,000 units/year

(2) Raw material

(a) Consumption and formulation of raw material

	Quantity for one unit kg	Unit price Rp/kg	Price Rp
Isophthalic acid resin	55.5	780	43,290
Gelcoat resin	8.0	1,540	12,320
Glass cloth WR 570	15.4	1,100	16,940
Glass mat MC 450	13.4	840	11,256
Surface mat SN 30	0.4	880	352
Glass tape (4")	1.2	1,100	1,320
Calcium carbonate	5.0	26	130
Catalyst and promotor	3.0	1,100	3,300
Total	101.9		88,908

(b) Total consumption of raw material

Resin	381 ton/year
Glass fibre	182
Other chemicals	48
Total	611

(3) Utility

(a) Electricity

Compressor	4.4 KW	Load	2.9 KW
Tools	1.0		0.65
Agitator	1.0		0.65
	6.4		4.2
Lighting	10.5		10.5

(b) Water 1 m^3/h

(4) Working hours

8 hrs/day x 25 days/month x 12 months = 2,400 hrs/year

(5) Labours

(a) Management and administration 4 (2 foreigners)

(b) Operators (1 shift) Total 116

	Foreman	Skilled	Un-skilled	Total
Mold handling		1	3	4
Gel coating		2	4	6
Cloth lamination		5	7	12
Matt & cloth lamination	1	15	24	40
Trimming		1	3	4
Beam assembling	1	2	5	8
Take-off from mold		1	3	4
Finishing		2	6	8
Keel assembling	1	10	19	30
Total	3	39	74	116

15-5 Cost Estimation Data Sheet of Plastics Processing

Products Fishing boat

Process Hand lay-up process of FRP

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	17,619	Depreciation 5 years
		Land	21,500	4,300 m^2
		Building	43,140	
		Installation	20,286	
		Pre-operation expense	20,740	Construction 6 months
		Interest during construction	1,316	
		Total	124,602	
	Working capital		99,681	
	Total		224,283	

Production amount: 6,000 units/y

Manufacturing cost

		1,000Rp/Year	Rp/Unit	%
Variable Cost	Material (including packing material)	533,448	88,908	89.5
	Power	3,525	588	0.6
	Steam	-	-	-
	Water	12	2	
	Total	536,985	89,498	90.1
Fixed Cost	Depreciation	4,359	727	0.7
	Maintenance	264	44	-
	Tax & Insurance	1,034	172	0.2
	Interest			
	On long team loan	7,476	1,246	1.3
	On working capital	11,962	1,994	2.0
	Labour	16,872	2,812	2.8
	Overhead	16,872	2,812	2.8
	Total	58,839	9,807	9.9
Grand Total		595,824	99,304	100.0

15-6 Standards and specifications

MIL-P-17549C Mechanical strength of FRP products

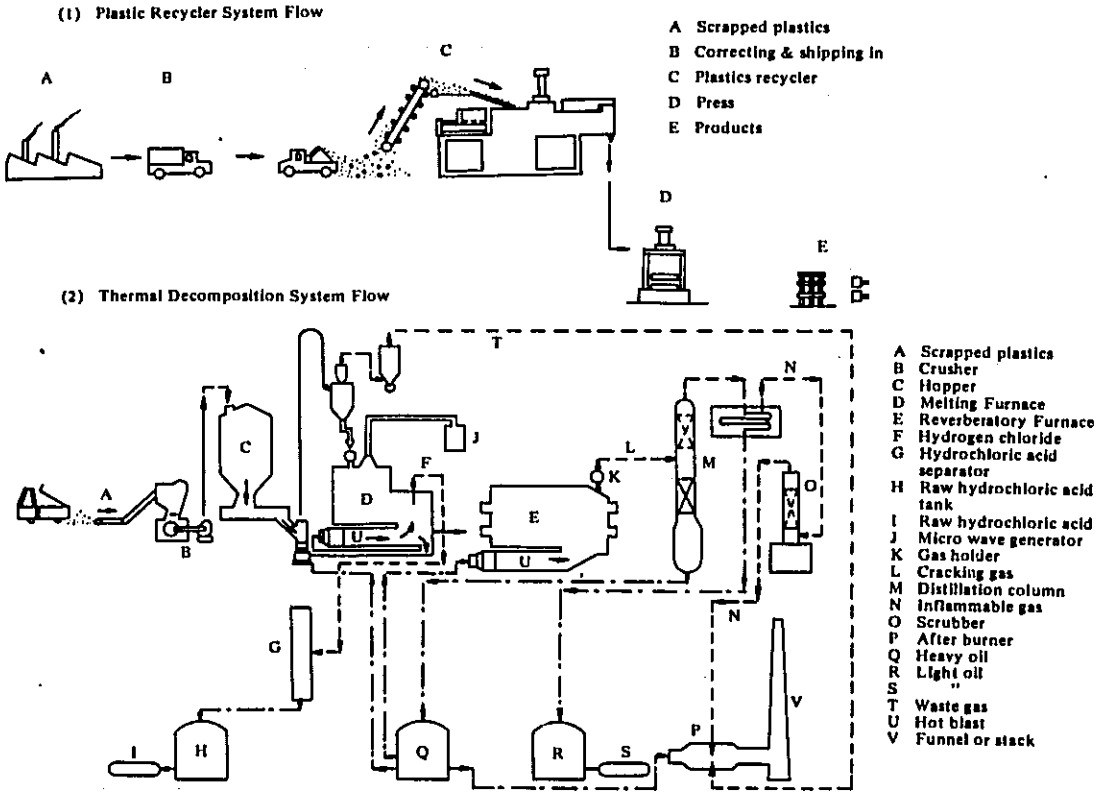
JIS-A-5704 FRP bath tub

16. Printing machine makers (Japan)

Name of Maker	Gravure printing			Flexographic printing		
	Machine Model	Color Stage	Printing object	Machine Model	Color Stage	Printing object
Toshiba Machine Co., Ltd. 4-2-11, Ginza, Chuo-ku, Tokyo	GC	6	Cellophane, PP, PE, Light packaging paper	AWV	4	Plastic film, Aluminum alloy
	GF	6	Cellophane, Synthetic film (PP, PE)	AWK AWJ	4 2	Same as the above Same as the above
	GCV	many	PE heavy duty bag	ASK	many	Heavy duty bag, Packaging paper
Hayashi Kikai Kogyo Co., Ltd. 1-27-9, Umejima, Adachi-ku, Tokyo	MD	1-8	Cellophane, PE, PP, PVC, Aluminum	HFS HF	1-4 1-6	PP, PE PE, PP, Cellophane,
	MR	1-6	Cellophane, PP, PE			Packaging paper
	HP	1-6	PE, PP, PVC	HF-H	1-6	PE, PP, Cellophane,
	V	1-6	PVC			Packaging paper, Kraft paper
Nakajima Seiki Co., Ltd. 2-17-18, Okuto, Katsushika-ku, Tokyo	GF	1-8	Cellophane, PP, PE Packaging paper			
	ET	1-8	Cellophane, Various plastic film, Aluminum alloy Thin paper			
Sato Tekko Co,, Ltd. 4-5-9, Minami, Hatogaya-shi, Saitama	SK-CR	1-6	PP, Cellophane Plastic film			
	SK-B SK.A	1-8 1-7	Cellophane, PVC, PP, Plastic film			
Iwase Kikai Kogyo Co., Ltd. 1-26-15, Toyo, Koto-ku, Tokyo	ST	1-8	PP, Cellophane, Paper			
	DT	1-8	PP, Cellophane, PE heavy duty bag			
	PIT	1-8	PE, PP			
Kyoei Printing Machine Co., Ltd. 2-2, Kuromoncho, Higashi-ku, Osaka	AK	1	PE, PP, Cellophane, Packaging paper			
	BK	2	Same as the above			
	CK	3	Same as the above			
	DK	4	Same as the above			
Toho Machinery Industry Co., Ltd. 1-24, Yoshihara-cho, Nishi-ku, Nagoya	TS	1, 2, 3, 4, 5	PP, PE			
	TK	1-5	Cellophane, PP, PE PVC			

17. Process for plastic waste disposal

17-1 Flow chart



17-2 Building and equipment list

(1) Plastic recycle system
(a) Building

	Area (m^2)	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Plant office	60	60	3,600	Reinforced concrete
Recycler plant	60	30	1,800	Steel-frame slate
Press plant	30	30	900	"
Storage for material and product	110	30	3,300	"
Power plant	60	60	3,600	Reinforced concrete
Total	320		13,200	

(b) Equipment

	Unit	Price (1,000Rp)
Plastic recycler	1	31,920
Press	1	6,384
Others		1,596
Total		39,900

(c) Installation cost

Total (1,000Rp)	638.4

(2) Thermal decomposition system

(a) Building

	Area (m^2)	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Plant office	60	60	3,600	Reinforced concrete
Plant including product storage	400	30	12,000	Steel-frame slate
Total	460		15,600	

(b) Equipment

Plastic thermal decomposition plant (including installation cost) (1,000Rp)	1,005,480

17-3 Operating conditions

(1) Plastic recycler system

(a) Production capacity	2,400 tons/year
(b) Operating efficiency	100 %
(c) Utility	
i) Electricity	384,000 KWH/year
ii) Water	2,400 tons/year

(d) Labourer

i) Management and adminstration 3

ii) Operators (3 shifts)

	Foreman	Skilled	Un-skilled	Total
Recycler	3	3	3	9
Press		3	3	6
Material & product handling			3	3
Total	3	6	9	18

(2) Thermal decomposition system

(a) Production capacity 6,600 tons/year

(b) Operation efficiency 100 %

(c) Utility

i) Electricity 1,452,000 KWH/year

ii) Water 363,000 tons/year

(d) Labourer

i) Management and administration 3

ii) Operators (3 shifts)

	Foreman	Skilled	Un-skilled	Total
Thermal decomposition plant	3	3	6	12
Material & product handling		3	3	6
Maintenance		1	1	2
Total	3	7	10	20

17-4 Cost Estimation Data Sheet of Plastics Processing (1)

Products Process for plastic waste disposal
Process Melt recycling system

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	39,900	
		Land	5,000	1,000 m^2
		Building	13,200	
		Installation	638	
		Pre-operation expense	730	
		Interest during construction	930	
		Total	60,398	
	Working capital		48,318	
	Total		108,717	

Production amount: 2,400 t/y

Manufacturing cost

		1,000 Rp/Year	Rp/Kg	%
Variable Cost	Material (including packing material)	-	-	-
	Power	3,840	1.60	14.4
	Steam	-	-	-
	Water	12	0.01	0.0
	Total	3,852	1.61	14.4
Fixed Cost	Depreciation	5,648	2.35	21.2
	Maintenance	599	0.25	2.2
	Tax & Insurance	278	0.12	1.0
	Interest			
	On long team loan	3,624	1.51	13.6
	On working capital	5,798	2.42	21.8
	Labour	3,420	1.43	12.8
	Overhead	3,420	1.43	12.8
	Total	22,786	9.49	85.5
Grand Total		26,638	11.10	100.0

17-4 Cost Estimation Data Sheet of Plastics Processing (2)

Products Process for plastic waste disposal

Process Thermal decomposition method

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	1,005,480	
		Land	7,500	1,500 m^2
		Building	15,600	
		Installation	-	
		Pre-operation expense	1,289	
		Interest during construction	16,457	
		Total	1,046,325	
	Working capital		837,060	
	Total		1,883,386	

Process amount: 6,600 t/y

Manufacturing cost

		1,000Rp/Year	Rp/Kg	%
Variable Cost	Material (including packing material)	-	-	-
	Power	14,520	2.20	4.4
	Steam	-	-	-
	Water	1,815	0.28	0.6
	Total	16,335	2.48	5.0
Fixed Cost	Depreciation	126,465	19.16	38.5
	Maintenance	15,082	2.29	4.6
	Tax & Insurance	367	0.06	0.1
	Interest			
	On long team loan	62,779	9.51	19.1
	On working capital	100,447	15.22	30.6
	Labour	3,648	0.55	1.1
	Overhead	3,648	0.55	1.1
	Total	312,437	47.34	95.0
Grand Total		328,772	49.81	100.0

17-5 License holders and machine makers

(1) Melt recycling system

System	Reprocessed waste	Maker (name of equipment)	Reprocessing method	Price*, ¥1,000 (capacity, kg/hr)	Remarks
Melt reprocessing	City waste	The Japan Steel Works	Water washing-melting	90,000 (500)	A test plant (200 kg/hr) in operation at Funabashi Laboratory. Adaptable for industrial wastes.
		Mitsubishi Heavy Industries	Water washing-gravity sorting-melting	120,000 (500)	A 75 kg/hr pilot plant was put into operation at Funabashi Laboratory as the second equipment. Adaptable for industrial wastes.
		Kikosha (RECLAMAX)	No water washing-mixing and melting with aggregate (sand)	150,000 (500)	Tests for fish nests applications being conducted by Plastic Waste Management Institute. Adaptable for industrial wastes.
	Industrial waste	Mitsubishi Petrochemical (REVERZER)	Melting-extrusion	40,000 (500)	Operated by nine reprocessors including Shin Nihon Sangyo. Export contract to the U.S. concluded.
		Nippon Polygiken (DISPOSER)	The same as above	40,000 (500)	Operated by 15 companies including Hiroki Sangyo.
		Toyo Kikai** (PLAPOSER)	The same as above	10,000 (200)	Operated by Kochi Pref. Plastics Processing Center and other two.
		Nippon Zeon (SPU Process)	(disposable system)		
		Todai Seiki (SUTENAIZO)	Melting-extrusion	13,000 (300)	Installation expected by Plastic Waste Reprocessing Cooperative Society.
		Niigata Engineering	Melting-extrusion (Sludge also used)	90,000 (500)	A 10t/day (including sludge) plant installed at its own plant site.
		Kobe Steel	Melting-extrusion	30,000 (400)	Compactor-meltor is unique. Operated at Takaoka Kogyo.
		Okuma Chuzo (PAO Process)	Mixed with heated sand to make aggregate	23,000 (1,200)	Products are being test as man-make aggregate on road.
		Kanegafuchi Chemical Ind.	Melting-press	Abt. 300,000 (10t/day)	
		Sekisui Puplas	Melting-extrusion	20,000 (300)	Operated by Murayama Shoten and one more reprocessor.
Melt reprocessing	Agricultural PVC and PE films	Hitachi Zosen	Water washing-melting-pelletizing	140,000 (500)	Mfg. of reprocessed pellets. Installed by Kochi Pref.
		The Japan Steel Works	Water washing-melting-pellets or molded products	70,000 for pellets (500)	Pellet manufacturing. Operated by Sun Kasei and one more reprocessor.
		Mitsubishi Petrochemical	(see above)		
		Niigata Engineering	(see above)		
Melt reprocessing	PS and industrial wastes	Nichireki Kagaku	Emulsifying		Emulsion for road pavement (operated)
		Nippon Fukugen Kagaku	Partially melt-decomposed into oil		Simultaneous reprocessing with sludge.
Granulation and other	Foamed PS and containers	Sekisui Plastics	Cement+granulated PS+block making Granulating--soil conditioner		Operated at the new plant constructed in Tenri, Nara.
		San Zetto	Granulating		Used for colored blocks.

* Main unit only ** Production is curtailed.

(2) Thermal decomposition system

System	Characteristics		Merits	Demerits	Developing company
	Melting	Decomposition			
Melt bath system	External heating (not necessary depending on case)	External heating	Technically easy.	Due to low thermal conductivity of wastes, heating unit and decomposing oven become larger. Coking of heat conducting surface. Due to large quantity of melted plastics, starting and emergency stop require complicated steps.	Mitsui Petrochemical/ Mitsui Zosen Nichio Kawasaki Heavy Industries Mitsubishi Heavy Industries
Two-stage system	Combination of external heating and internal heating by microwaves	Pretreatment prior to external heating (removal of HCl)	Melting is easy. Corrosion after decomposition is reduced by pretreatment. Consistent thermal conduction effected by screw agitation; fast decomposing speed. Mixing of foreign matters permitted.	Number of screws increases as the processing capacity increases. Due to a large quantity of melted plastics, starting and emergency stop require complicated steps.	Sanyo Electric
Screw system	(not necessary)	External heating	Melting not necessary. Consistent heating and fast decomposing speed effected by screw agitation.	Inconvenient for capacity expansion.	The Japan Steel Works
Pipe-still system	Dissolving or dispersion in heavy oil	External heating	Even heating and high yield rate of oil. Easy adjustment of decomposing conditions.	Prevention of coking inside decomposition cylinder.	Japan Gasoline
Fluidized-bed system	(not necessary)	Internal heating (partial burning)	Melting not necessary. Fast decomposing speed. Due to nearly no melting of plastics, starting and or stopping are easy. High thermal efficiency Readily available for capacity expansion.	Necessary to recover suitable fractions as decomposed materials contain organic oxides and other.	Sumitomo Shipbuilding & Machinery Japan Gasoline The Japan Steel Works Hitachi Zosen (gasification)
Contact system	External heating	External heating (catalysts are used)	Less coking due to low decomposing temperature. Lower rate of gas emission.	Large oven and heating unit as in case of melt bath system. Due to a large quantity of melted plastics, starting and emergency stop require complicated steps. Not available or difficult for reprocessing of PVC and thermosets. Mixing of foreign matters limited.	Nichimen Toyo Engineering

(2) Equipment

	Unit	Price (1,000Rp)	Machined parts
Shaper	1		Mold base
Precision lathe	1		Guide pins, locating rings, pins
Knee type vertical milling machine	1		Mold base, cores, mold platers, ejector plates
Knee type horizontal milling machine	1		Mold base, cores
Automatic die sinking & machine	1		Mold base, cores
Radial drilling & boring machine	1		Mold base, cores, platens, ejector pins
Universal grinding machine	1		Guide pins, bushing return pins
Precision surface grinding machine	1		Liners, mold base, cores
Universal cutter & tool grinder	1		Cutting tools
Upright drilling machine	1		Small parts
Engraving machine	1		Mold base, cores
Hack sawing machine	1		(Raw material)
Total		(212,520)	

(3) Auxiliary equipment

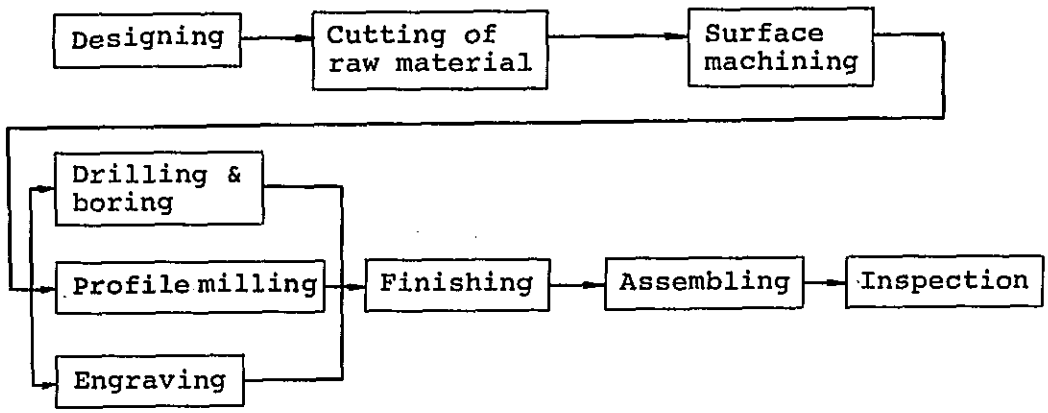
	Unit	Unit price (1,000Rp)	Price (1,000Rp)
Mono crane	1		
Jib crane	1		
Floor grinder	1		
Air compressor	1		
Electric AC welding machine	1		
Gas welding kit	1		
Total			

(4) Tools 52,164,000 Rp

(5) Installation cost 77,280,000 Rp

18. Mold making

18-1 Flow chart

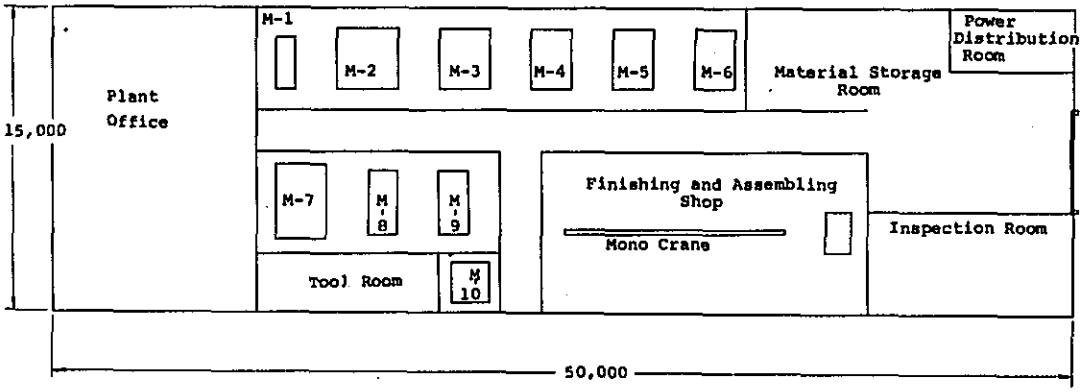


18-2 Building and equipment list

(1) Building

	Area (m^2)	Unit price (1,000Rp)	Price (1,000Rp)	Notes
Head office and design room	150	60	9,000	Reinforced concrete
Plant office	60	30	1,800	Steel-frame slate
Material storage room	75	30	2,250	"
Machine shop	432.5	30	12,975	"
Finishing & assembling room	112.5	30	3,375	"
Tool room	20	30	600	"
Inspection room	50	30	1,500	"
Power plant	100	30	3,000	"
Total	982		34,500	

18-3 Layout



18-4 Operating conditions

(1) Production capacity

(a) Maximum mold

Weight approxilately 600 Kg

Dimension 400 x 400 x 400 mm

(b) Production scheme

Weight of molded product gr/shot	Annual production of molds pieces
70	20
140	30
240	30
400	7
	87

(2) Raw material

(a) Selection of mold material

Table 1 shows the selection of mold material according to the kind of plastics molded and the number of products manufactured by own mold.

(b) Material of mold

Table 2 shows material of mold used for injection molding in the United States.

(c) Material consumption 60 tons/year

Average price of material is assumed as 400 Rp/Kg

(3) Utility (Electricity)

Machine shop	100 KW x 0.65 = 65 KW
Lighting	10 KW

Table 1 Selection of Mold Material

Number of Products / Kinds of Plastics	Small Mold		Medium Mold		Large Mold
	10,000 -100,000	1,000,000 -10,000,000	10,000 -100,000	1,000,000 -10,000,000	10,000 -
General purpose Acrylic resin Cellulose acetate PP PE PS Cellulose propionate	P20 PPT Pre-hardend steel HB> 300	01 HRC 53-57 F6 P20 Carburized HRC 54-58	P20 PPT Pre-harden HB > 300	P6 Carburized HRC 54-58 P20 PPT Pre-harden HB > 300	P20 PPT Pre-harden HB > 300
Nylon	P6 or P20 Carburized HRC 54-58	01 HRC 53-57	P6 Carburized HRC 54-58	P5 Carburized HRC 54-58	
PVC	P6 or PPT Pre-harden HB > 300 Cr-plating 0.005-0.025mm	01 HRC 53-57 Cr-plating 0.005-0.025mm 420 Stainless HRC 45-50	P20 or PPT Pre-harden HB > 300 Cr-plating 0.005-0.025mm	P6 Carburized HRC 54-58 Cr-plating 0.005-0.025mm 420 Stainless HRC 45-50	P20 or PPT Pre-harden HB > 300 Cr-plating 0.005-0.025mm

Table 2 Material of Mold

(Unit: %)

AISI	C	Cr	Mo	W	V	Mn	Ni	Al
P5	0.10	2.30				0.30		
P6	0.10	1.50				0.40	3.50	
P20	0.35	1.25	0.40					
PPT	0.20				0.20		4.00	1.20
LZ	0.50	1.00			0.20			
01	0.90	0.50		0.50		1.00		
A2	1.00	5.00	1.00					
A6	0.70	1.00	1.00			2.00		
H13	0.35	5.00	1.50					

(4) Labourer

(a) Managing and administration 4

(b) Design engineers 3 (1 foreigner)

(c) Operators (1 shift) Total 34

	Machine shop	Finishing & assembling	Total
Foreman	1	1	2
Skilled	8	4	12
Unskilled	8	12	20
Total	17	17	34

(5) Working hours

8 hrs/day x 23 days x 12 months = 2,208 hrs/year

18-5 Cost Estimation Data Sheet of Plastics Processing

Products Mold

Process

Investment cost

			1,000 Rp.	Notes
Total Investment Cost	Total Fixed Capital Cost	Process units	212,520	
		Land	15,000	3,000 m^2
		Building	34,500	
		Installation	77,280	
		Pre-operation expense	-	
		Interest during construction	2,349	
		Tools	52,164	Depreciation 2 years
		Total	393,813	
	Working capital		306,187	
	Total		700,000	

Production amount: 78 molds/y

Manufacturing cost

		1,000Rp/Year	Rp/Kg	%
Variable Cost	Material (including packing material)	24,000	276	14.2
	Power	1,656	19	1.0
	Steam	-	-	-
	Water	-	-	-
	Total	25,656	295	15.2
Fixed Cost	Depreciation	54,372	625	32.3
	Maintenance	3,188	37	1.9
	Tax & Insurance	774	9	0.5
	Interest			
	On long team loan	23,629	272	14.0
	On working capital	36,742	422	21.8
	Labour	7,848	90	4.7
	Overhead	7,848	90	4.7
	Other expenses1)	8,424	97	5.0
	Total	142,825	1,642	84.8
Grand Total		168,481	1,937	100.0

18-6 License holders and machine makers

(1) License holders

Daido Steel Co., Ltd.
1-7-13, Nishishinbashi, Minato-ku, Tokyo

Gifu Dei & Mold Engineering Co., Ltd.
1230, 6-jo, Gifu-shi, Gifu

Ikegami Mold & Die Mfg. Co., Ltd.
462, Kukihon, Kuki-shi, Saitama

Showa Precision Machinery Co., Ltd.
157, Katayama, Minamishimizu, Amagasaki-shi, Hyogo

Sumitomo Bakelite Co., Ltd.
1-2-2, Uchisaiwaicho, Chiyoda-ku, Tokyo

Toshiba Machine Co., Ltd.
4-2-11, Ginza, Chuo-ku, Tokyo