mentioned above, advances in the area of biotechnology are expected to see the introduction of technologies holding great potential.

4)Surfactants

In the area of anionic surfactants, particular interest is being paid to α-sulfonated fatty acid metyl esters, and a host of research projects are under way. These began to appear in the market in detergents from 1991. They have been found to offer detergents high biodegradability, excellent anti hard water properties, solubilization and a high level of detergency. However, there are many matters to be sloved when α–sulfonated fatty acid methyl esters will develop a surfactant market.

Also in the field of anionic surfactants, R&D is being conducted into mono alkyl phosphate ester salts and Kao has already begun production in the Philippines. Because these are milder against the skin than lauric acid based soaps and sodium polyoxylaurylether sulfates they have begun to be used as bases for facial soaps and body shampoos. Research of mono alkyl phosphate ester salts, including their physical properties, is continuing.

In the field of nonionic surfactants, there is a considerable amount of research being conducted into alkyl polyglucosides manufactured from the fatty alcohols and glucose. Because they are only a minor irritant of the skin and eyes, have excellent foaming capabilities and a high level of detergency against oil, it is thought to be a promising surfactant for the future.

Also in the field of nonionic surfactants, the use of polyglycerol fatty acid esters, polymerized from glycerol using catalyst, is expected to become widespread in the future. These esters are both low irritant and non-toxic. In the area of biosurfactants, sophorolipids, a kind of glycolipid, have been found to be excellent as solubilizing and wetting agents. They have begun to be put into practical use. Phosolipids are not merely emulsifiers but have also been found to effective in assisting the action of antioxidants. New applications for these are also the subject of research.

Research into surfactants also includes the development of manufacturing methods and the improvement of detergency through changing of blends. At present research is moving in the direction of substantially decreasing blends of surfactants in detergents. It has become difficult to develop these new surfactants as a considerable investment of time and funds would be needed to establish their safety.

(2) Trends in Oleochemical Research in Fiscal 1990 at the Palm Oil Research Institute of Malaysia

1) Large scale R&D projects by pilot plants

a)Substitution of diesel fuel with methyl esters

With the aim of achieving a diesel fuel substitute, methyl esters were produced from crude palm oil and palm stearin, and then tested in the engines of thirty one diesel vehicles. A mixture of methyl esters and diesel fuel (50:50) was also put in diesel vehicles. The results of the running tests were positive and it was found that palm oil fatty acid methyl esters could be used as a substitute for diesel fuel. Moreover, glycerol produced in the methyl esterification process was able to be removed easily. This kind of research began thirty years ago in Japan, and recently come to be focused again.

b)Concentration of Vitamin E from PFAD

In order to refine crude palm oil, physical refining is carried out through steam distillation. A pilot plant was constructed and research carried out on the concentrating of vitamin E from palm fatty acid distillates (PFAD) separated in this physical refining process. Vitamin E concentrate with a purity of over 95% was achieved. Vitamin E is used in drugs and foods as an antioxidant, cosmetics and others. The vitamin E in palm oil in particular acts to inhibit cancer. The pilot plant used in this research was supplied by Japan. Commercial production plan are currently being carried out by two Malaysian firms.

c)Technology for the proptotype automated palm oil mill

A prototype automated palm oil mill was established in 1990. Test operations are currently taking place. In the case of oil palm, it is essential for the refineries to be located close to the the palm estates. It is hoped that this technology will be able to be utilized in refining at villages from which it is difficult to transport fresh palm fruit bunches.

2) Major research

a)Research on methods for the synthesis of unsaturated fatty alcohols

The synthesis of unsaturated fatty alcohols is difficult and as yet no satisfactory method has been developed. Research to find a catalyst to assist in the synthesis of unsaturated fatty alcohols from oleic acid, a major component of palm oil, is taking place. Studies of catalysts and reaction conditions are also taking place. This research is being conducted jointly with Japan.

b)Research on the use of calcium soap in feed for ruminants

Calcium soap is known to improve energy absorption in dairy cattle, increase the milk fat in milk and assist in the digestion of fibre. PFAD calcium soap separated in the palm oil refining process was supplied to the Malaysia Agricultural Research and Development Institute (MARDI) and was used in trial breeding of cattle.

c)Alkanolamides from palm oil

Research is being conducted on the synthesis of alkanolamides, which improves the anti hard water properties of soap and enhances sustained foaming in detergent, from fatty acids derived from palm oil and palm kernel oil. The research particularly focuses on reaction conditions with lauric acid methyl ester and diethanolamine and necessary catalysts.

d)Use of palm oil derived substances in printing ink

Studies are being conducted into the possibilities of using substances from palm oil as substitutes for raw materials in printing ink. Sixty three substances derived from palm oil were sent to Coate's Brother (M) Sdn. Bhd. (a private company) and the suitability of each as a substitute for ink raw material is being assessed.

e) The synthesis of lubricating oil from palm oil by metathesis reactions

With the object of effectively using the oleic acid, a major (39%) component of palm oil, 9-octadecene and diethyl 9-octadecenedioate were synthesized by a metathesis reaction. The synthesis of civetone from 9-octadecenedioate was also studied. There are plans to synthesize lubricating oils from 9-octadecene.

f)The synthesis of glycerol esters from palm oil

Research is being conducted on the synthesis of monoglyceride and diglyceride from palm oil and palm stearin using enzymes and chemical methods. Results of tests on the composition of the synthesized mono and diglycerides showed that the majority were 1- and 3- monoglycerides and that there were only a small quantity of 2-monoglycerides. In the case of diglycerides, it was found that position 2 was mainly occupied by unsaturated fatty acids as compared to position 1 or 3.

g)Fractionation of palm oil fatty acids

Two methods are employed in the fractionation of unsaturated fatty acids (mainly oleic acid) from palm oil fatty acids: 1) hydrophilisation, and 2) the urea crystallization. For hydrophilisation, results for both yield and titre were positive. Although when the urea crystallization was employed the good quality of the unsaturated fatty acid was collected, however, yield was no good. Fractionation using zeolite will be studied next.

h)Treatment of effluent from fatty alcohol plants

Effluent from fatty alcohol plants contains a considerable amounts of methanols and fatty alcohols. Research into the treatment of effluent with the aim of lowering the level of biological oxygen demand (BOD) to less than 50mg/l, in accordance with regulations, is underway. It was found that the BOD removal efficiency could be 98.1% if treated in a tank containing charcoal chips. However, when the degree of BOD is high, it cannot be eliminated sufficiently, further research will be conducted.

1-6 Outlook for Demand in Oleochemical Products

An outlook for demand for oleochemical products, which are expected to grow in the future and related with coconut oil derivatives, will be mentioned. Furthermore, a procduction prospect of oleochemicals in the Philippines will be examined. (refer to Table V-1-2)

(1) Soap

Soaps can be divided into bath soaps, body washing soaps and clothing washing soaps. Others are liquid soaps for hand washing and industial use. The following may be offered as factors which will have a major influence on demand for soap in the future possibility of local production.

1) Though in developing countries per capita consumption is low, demand can be expected to increase in the future as incomes increase. However, until incomes reach a certain level, consumers tend to buy for reasons of price not quality. For this reason, soap produced by cottage industries will make up the bulk of the market, and exports cannot be expected to increase to match demand in the developing countries.

2) In industrialized countries annual per capita soap consumption is high, at 1.47kg in Western Europe, 1.51kg in the U.S., and 1.52kg in Japan. There is already no room for further expansion. However various types of soaps for personal use including high quality facial soaps, makeup removal agents, and body shampoos are being developed. The segmentation of the market is progressing and the quantity of upmarket soaps increasing. It follows, then, that in order to increase soap exports to these industrialized nations the upgrading of products and the carrying out of advertising and promotional activities directed at increasing the appeal of products are essential. Entering the market

would be extremely difficult without a tie-up with a firm which has experience in sales in industrialized countries.

3) In the past, soap was produced primarily in the areas of consumption. However, a recent trend has been to produce soap base in the raw material producing areas (Malaysia) and transport soap chips/noodles in bulk to the consumption areas (Japan). This shifting of production from the consumption areas to the raw material production areas means that expansion in imports can be expected.

4) At one stage there were calls for the use of powedered laundry soap to replace synthetic detergents due to concern over environmental conservation. However, such calls are heard less often now that synthetic detergent manufacturers have made environmental conservation a concern of their own.

Growth in consumption of soap in the future will come from consumption growth in developing countries. Assuming that the rate of population increase in developing countries will average 2.5 percent, and growth in GDP 2.0 percent, and that soap consumption in industrialized countries will fall by 1.8 percent then global soap consumption can be expected to grow 1.5 percent till 1995 and 2.2 percent till 2000. However as has been stated above, possibilities for production of soap for export in the Pilippines will be determined not so much by trends in demand as in changes in the type of production conducted in industrialized countries (production of soap noodles/chips in produing areas).

(2) Synthetic Detergents / Personal Care Products

Synthetic detergents include those for 1) laundry, 2) kitchen and household furniture use and 3) personal care products include hair shampoo/rinse, body shampoo and facial soap.

Consumption levels for each of these are quite high in industrialized countries. segmentation of the market according to use (clothing, tableware, household furniture, hair and face, body, etc.) and taste is progressing and the quantities of upmarket and high performance products in the market increasing. As a whole the demand is showing steady increase.

Per capita consumption in developing countries is still low. However in order to increase laundry and washing use, the largest demand area in synthetic detergents, the widespread use of electric washing machines is an important requirement.

In addition to these general factors, the following will play a part in the expansion of demand in the field of synthetic detergents in the future.

1) In 1987 detergents of superconcentrates were introduced into the market in Japan. In the third year these came to occupy 84% of the market (on a value basis). In the U.S. they already occupy 25% of laundry detergent market. The figure for Western Europe is estimated to be slightly less. The amount required for a single wash weighs 1/1.6 and its volume is 1/4 of the amount required with detergents used previously. In superconcentrates, the ratio of blends in surfactants is 40% as opposed to 15-20% in phosphate detergents and 20-25% in phosphate-free detergents. Thus the amount of the effective component in superconcentrates is almost no different to that of other detergents.

2) Though the petroleum based LAS (linear alkylbenzene sulfonates) is generally used as the effective component in synthetic laundry detergents, there is a tendency for shift to the use of natural substances such as AS (alkyl sulfate ester salts) and AE (polyoxyethylen alkyl ethers).

3) Furthermore, α-sulfonated fatty acid methyl esters, manufactured from coconut oil, palm oil and palm kernel oil methyl esters have begun to be used as detergents. As this does not require the high pressure catalytic process equipment needed in the manufacture of fatty alcohols, it can be manufactured at relatively low cost, so is suited to the markets of developing countries.

At present, emphasis is placed on C_{14}-C_{18} fatty acid methyl esters and interest is being shown in palm oils. However, derivatives of coconut fatty acid methyl esters (fractionated C_{14}-C_{18}) can be expected in the field of synthetic detergents.

4) The consumption of kitchen use detergents in industrialized countries is already high and growth in demand has declined (0.5% up on previous year). However, the trend in favor of detergents using natural materials is strong, particularly as they have to do with food. Sucrose fatty acid esters, sorbitan fatty acid esters and their POE ethers, and fatty acid alkanolamides have come into wide use. Raw materials for these, not simply the fatty acids are either produced or have the potential to be produced in the Philippines. From the point of view of procurement of the raw materials, these would be products for which production in the Philippines would be relatively easy.

However, because these products are used in connection with food and may produce chapped hands, standards regarding blends and applications in industrialized countries are strict. It would thus necessary for strict quality control to be implemented. Moreover, as this market is twice the size of the market for shampoo, (in Japan 260,000 MT/year) there is enormous competition between manufacturers. Thus production in the Philippines would require tieups with overseas firms with strong research, production, supply and retail bases.

5) Demand for shampoos, rinses and conditioners in the area of personal care products is also large scale. Each of these are well established as commercial products in industrialized countries. Fatty alcohol based surfactants are widely used in shampoos. Those most widely used include alkyl sulfate salts (sodium salts, alkanolamine salts), POE lauryl sulfates, and POE sorbitan esters. An increase in the consumption of shampoos and hair rinses in developing countries is expected to follow widespread introduction of showers. Demand for tertiary and quaternary amines and other anionic surfactants and amphoteric surfactants, which are main components in these products, is expected to increase. The use of coconut oil derivatives in the production of shampoos and rinses is increasing. However, as the blend ratios of the effective components in these products is no greater than 20-30% and the majority comprised of water, they are fundamentally suited to production at the place of consumption. However the export of surfactants, the major component of shampoos and rinses as intermediate blend materials is highly possible.

6) There is a good possibility that ester sulfate salts from coconut oil fatty acids, and lauric acid monoglycerides will come to be widely used in shampoos, toothpaste and bar soap. This will offer many possibilities to countries which produce those raw materials.

(3) Industrial Surfactants

Surfactants as raw materials for synthetic detergents has been discussed. Below industrial surfactants will be examined. In industry, most demand for surfactants comes from the textile industry (25.1% in Japan). Other industries (in order of size of demand) are 1)the rubber and plastic industries, 2) civil engineering, construction and ceramics industries, 3)the lifestyle industries, 4) foodstuff industries, 5) fragrance and drug industries, and 6)the paper and pulp industry. As demand areas for surfactants are expanding, continued and stable growth in demand can be expected. It may be expected, too, that a host of new products performing new functions will be developed thus ensuring stable growth.

Sales of industrial surfactants involves a system which is akin to joint development between manufacturers and customers. Sales cannot be made separate from technical services. It is generally the case in industrialized countries that manufacturers have facilities almost equivalent to pilot plants on the side of customers, at which research and testing is carried out. Manufacturers receive support for their R&D and technical service systems from firms to whom they sell their products. With the exception of the textile industry, most user industries are located in industrialized countries. For this reason, the manufacture of industrial surfactants is almost entirely carried out in industrialized countries.

However, the manufacture of surfactants in developing countries has become more possible in recent years due to: 1) the remarkable shift of textile industry manufacturing bases to developing countries, and 2) the fact that, as is the case for surfactants for the textile industry, stability has been achieved in manufacture of almost finished products as well as in the required technology, as a result of many years of research.

However, few surfactants are made from coconut oil. In Japan, coconut oil accounts for no more than 18% of all raw materials used in surfactants (or 0.6-0.7% of the total volume of surfactant produced). Alkyl sulfate ester salts would be an appropriate substance for manufacture in the Philippines, as this is used in the textile industry, its technology established and demand adequate.

Among surfactants, POE alkyl ethers polymerized by fatty alcohols and ethylene oxides accounts for about 15% of total production, and are used in the production of emulsifiers and other industries use. If ethylene oxides will be procured, their is a possibility of local production.

(4) Plastic Additives

In the area of plastic additives, oleochemical derivatives play a relatively important role in 1)plasticizers, 2) vinyl chloride stabilizers and 3) lubricants.

Plasticizers are most important in the plasticizing of polyvinyl chloride (PVC) and large quantities are used for it. As demand for PVC products is increasing, growth in demand for plasticizers is also growing steadily. The majority of plasticizers are DOP (in Japan this accounts for 550,000 MT, 54% of all plasticizers). There is a high demand for DOP (dioctyl phtalates) in developing countries, and imports of this in the Philippines are relatively large.

Another raw material, natural octanol is produced from coconut oil, and if this were to be produced in the Philippines, it would be necessary to procure, phtalic anhydride. In Taiwan and Korea there are plans to build new facilities for the production of plasticizers from octanol and phtalic acid.

Vinyl chloride stabilizer is an additive which is necessary for the stabilization of vinyl chloride resin. Along with plasticizer it is an indispensable auxiliary material in the processing of vinyl chloride resin. Lubricants are used to reduce friction between polymers, and also between polymers and the surface of equipment during processing. It is also used to improve its performance as a product. As a oleochemical derivative, metallic soaps are used as a as a major ingredient in both vinyl chloride stabilizers and lubricants. Fatty alcohols and fatty acids over C_{16}, fatty acid amides and fatty acid esters are also used in lubricants. However the extent of demand for these is not known. As a whole, demand for vinyl chloride stabilizers and lubricants is expanding steadily with growth in demand for vinyl chlorides. Although metallic soaps would be a product relatively well suited to manufacture in the Philippines, there is a high degree of local production of this in all countries. Moreover, exports from Japan to these countries is drastically decreasing. Thus production must be supported by domestic demand.

(5) Food Ingredients and Industrial Agents

In the other fields, diversification of product development and development of applications is progressing. Importance has been placed on the following as derivatives which are becoming widely used in product technology as well as in the manufacturing technology.

1) C_8, C_{10} glycerol fatty acid esters, derivatives of fatty acids and glycerol are used widely in food ingredients. Among them are fatty acid monoglycerides and triglycerides which are used in the emulsification of raw food materials, dispersion, and as ice cream bases. They are also used as lubricants for plastic and in cosmetic emulsifiers. Among these, distilled and purified molecular distilled monoglycerides is growing.

2) Similarly, C_8, C_{10} medium chain triglycerides (MCT) have excellent absorption and metabolism and greater use of these in foods, drugs and cosmetics is expected.

3) Esters of trimethylol propane and pentaerythritol derived form C_8, C_{10} fatty acids are excellent as lubricants and are use as synthetic lubricants in areas requiring high performance such as jet engines. It is also possible that in the future their demand in more general areas will increase.

(6) Other Uses of Coconuts and Coconut Oil

Although not an oleochemical product, it is recognized that C_8 helps in reducing fat in the bodies of animals. By mixing this in with the feed of cattles and fish for breeding, development in the area of low fat meats and fish can be expected.

(7) Development of Oleochemicals in the Philippines

1) Outlook for the fine chemical products

The oleochemical industry's developing fields include 1) basic oleochemicals, 2) derivetives from basic oleochemicals, and 3) fine chemical products. In the case of fine chemicals, even when the technological level of products as well as production technology has achieved stability, small quantities of a wide range of products must be produced and standards for quality are extremely strict. Furthermore even when shipments volumes are not large, they are often made on the basis of drum can units, and strict delivery dates is required. Technical service requirements are even greater here than in the fields mentioned above. Thus, in the case of fine chemicals, as well as there being strict requirements for production, high levels of quality are expected at a negotiating level as well. Moreover, from the perspective of marketing products, finding users is difficult except, perhaps, in the case of new users. Thus it is believed that it would be difficult for Filipino firms to enter this field unless they did tieups with firms in industrialized countries.

On the other hand, it is thought that emphasis should be placed on basic oleochemicals and intermediate derivatives which make the most of coconut oil properties. It is important, too, that efforts be made to capitalize on coconuts and coconut oils in fields other than oleochemicals. This could include, for example, improving the quality of coconut oil for export and taking measures to avoid deterioration during transportation.

2) Effective use of fatty acid composition

Up till now, development of coconut oil based oleochemicals has basically taken the form of exploiting the properties of C_{12} and C_{14}. However in the future it will be necessary to consider ways of using all of the fatty acids which make up coconut oil.

Though a considerable amount of fatty alcohols produced are synthetic, most fatty acids are produced from natural sources due to considerations of price. However, in future an increase in the proportion of natural alcohols, too, is expected as a response to the changing preferences of environmentally conscious consumers. Lauric acids are particularly necessary for the production of fatty alchols.

With the development of ever more commercial products such as body shampoos and the like, demand for C_{14} fatty acids is expected to expand still more. Indeed there is a possibility that there will be a global shortage of supply. Though shampoo use in tropical regions is expected to increase, from the standpoint of foaming, fatty acids less than C_{12} would be more appropriate.

Though the development of demand areas for C_8 has been behind in relative terms, demand for this as a component for animal feed, as mentioned above, can be expected. Interest is also being shown in C_8-C_{10} fatty acid esters for use in lubricants.

Because of the advances being made in simple fatty acid fractionation technology, in the future it will be relatively easy to exploit the characteristics of fatty acid compositions in many varieties of oils and fats. It follows that development which relies on a single type of fatty acid (say fatty acid from coconut oil) in the face of diversifying demand would be sacrificing economic efficiency. It is necessary that this point, too, be given consideration.

3) Development toward the production of basic oleochemicals and derivatives

Total global demand for oleochemicals is expected to expand in the future. Expansion in demand for the basic oleochemicals, fatty acids, fatty alcohols, methyl esters, fatty amines and amides is also expected. Because of the nature of the manufacturing process of basic oleochemicals, an economical scale is generally sought and the trend toward production in raw material producing countries is accelerating. However, as has been stated above, greater stability of supply can be expected of palm kernel oil than coconut oil. Thus this trend is more visible in palm oil and palm kernel oil producing countries than in coconut oil producing countries. Because expected added value for basic oleochemicals production is not definitely smaller than that for derivatives production, it is believed that most emphasis should be placed on the expansion of production of basic oleochemicals in the Philippines.

Demand for detergents, the major final products of fatty alcohols, is expected to grow. There is also expected to be a shift away from synthetic alcohols due to considerations of cost. In view also of the possible applications for natural fatty alcohols, preferences will swing in favor of coconut oil and palm kernel oil fatty acid compositions.

Alkyl sulfate ester salts, polyoxyethylen alkyl ethers and polyoxyethylen alkyl sulfate ester salts are fatty alcohol derivatives for which demand is expected to grow in developing countries. If inexpensive raw materials are used, surfactants made from α-

sulfonated fatty acid methyl esters can be produced at lower cost than those based on petroleum. Study to reduce production cost is underway.

Although growth in demand for fatty acids and glycerols will not be as high as that for fatty alcohols, fatty methyl esters and, and fatty amines, demand for derivatives of these such as medium chain triglycerides (MCT) and monoglycerides is expected to grow in the future.

As MCTs have excellent absorption and metabolism, their use in foods, drugs, and cosmetics is expected to rise in the future. Among monoglycerides, demand for the purified molecular distilled monoglycerides has been increasing in recent years. Although their major use is in emulsifiers for foods, they are also used in margarine, shortening, ice-cream, bread, cakes, noodles, and tofu and others. Monoglycerides are also used as lubricants for plastics and emulsifiers in cosmetics.

As production of basic oleochemicals and intermediate derivatives expands there will be a need for mutual cooperation in manufacturing and marketing between various firms in each of the derivative fields. There must be a complex production base where an overall balance in fatty acids is achieved. There is also a need for adequate consideration to be given to rationalization in the area of distribution.

Manufacturers who deal in coconut oil and coconut oil derivatives, have in general tended to accumulate technology, including production technology in this field, and seek to concentrate their production here, even when slight losses were made due to the coconut oil supply situation. Although this could be said to be beneficial to a country like the Philippines which has a pre-existing coconut oil production base, as history illustrates, it is necessary to be mindful of the possibility that instability of, price, supply volumes and quality of coconut oil may prompt the development of a substitute source in the long term.

Table V-1-1: Demand and Supply of Oleochemical Finished Products in Industrialized Countries

(Unit: tons,%)

	Production		Export		Import		Consumption		Per Capita Consumption (kg)	
	Volume in 1990	AAI in 1985–1990	Volume in 1990	AAI in 1985–1990	Volume in 1990	AAI in 1985–1990	Volume in 1990	AAI in 1985–1990	in 1990	in 1985
Soaps	1,241,000	−1.1	229,000	+6.6	136,200	+6.6	1,089,000	−1.8	1.5	1.6
Detergents	13,698,000	+2.1	1,160,500	+9.6	1,147,300	+19.5	13,678,000	+2.6	15.2	14.0
Shampoos	622,100	+5.9	78,850	+4.8	67,700	+4.8	607,000	+5.8	0.8	0.7
Surfactants	7,972,000	+6.5	306,600	+2.0	48,600	+9.7	7,407,000	+4.2	–	–

Notes: Industrialized countries include U.S., Japan, and Western European countries.
AAI = Average Annual Increase Rate (%)

Source: Japan Soap & Detergent Association
Japan Cosmetics Association
MITI, Chemical Statistics
U.S. Department of Commerce

Table V-1-2: Production of Basic Oleochemicals in the World

(Unit: 1,000 tons)

	1985	1990	Annual Average Increase
Fatty Acids	2,000	2,130	1.30
Glycerol	530	563	1.25
Fatty Alcohols	760	855	2.50
Methyl Esters	400	450	2.50
Fatty Amines	350	425	4.29
Total	4,040	4,423	1.90

Source: Henkel, Montreux 1986 (1985 & 1990)
Japan Soap & Detergent Association

Table V–1–3: Demand and Supply of Basic Oleochemicals in the World

(Unit: 1,000 tons)

		1985			1990		
		Production (A1)	Consumption (B1)	A1–B1	Production (A2)	Consumption (B2)	A2–B2
Fatty Acids	Western Europe	920	866	54	900	953	–53
	U.S.	580	716	–136	580	800	–220
	Japan	280	229	51	307	284	23
	Southeast Asia	140	–	140	223	–	223
	Others	80	–	80	120	–	120
	Total	2,000	1,811	189	2,130 (+6.5)	2,037 (+12.5)	93
Glycerol	Western Europe	200	148	52	218	160	58
	U.S.	140	139	1	144	152	–8
	Japan	45	40	5	52	48	4
	Others	145	–	145	149	–	149
	Total	530	327	203	563 (+6.2)	360 (+10.1)	203
Fatty Alcohols	Western Europe	240	240	0	265	280	–15
	U.S.	390	398	–8	440	455	–15
	Japan	95	100	–5	106	110	–4
	Southeast Asia	35	4	31	44	5	39
	Others	–	–	–	–	–	–
	Total	760	742	18	855 (+12.5)	850 (+14.6)	50

Source: Henkel, Montreux 1986 (1985 & 1990)
Japan Soap & Detergent Association

Table V-1-4: Demand Areas of Fatty Acids and Glycerol in the World

<Fatty Acid>

U.S./1987	%	Western Europe/1986	%	Japan/1987	%
Fatty Acid used as such		Fatty Acid used as such	48	Soaps and Cleaning Compounds	23
or as Alkali Metal Salts	41	or as Alkali Metal Salts		Metal Soaps	
Fatty Amine Derivatives		Fatty Nitrogen Derivatives	21	(e.g. PVC Stabilizers)	21
(via Nitrile Route)	17	Esters	8	Rubber Processing	18
Esters	11	Heavy Metal Salts	7	Surfactants (Synthetic)	11
Monomer/Dimer/Trimer Acids	8	Monomer/Dimer/Trimer Acids	6	Lubricating Oils and Greases	5
Heavy Metal Salts	6	Detergent Alcohols	4	Other	
Fatty Acid Amides	4	Other Derivatives	6	(e.g. Amines and Amides)	22
Fatty Alcohols	1				
Other Derivatives	12				
Total	100	Total	100	Total	100

<Glycerol>

	U.S./1988, %	Western Europe /1988, %	Japan/1988, %	Total, %
Drugs/Personal Care Products	39	23	34	31
Tobacco/Triacetin	16	17	5	15
Food	14	6	–	9
Polyether Polyols	11	13	12	12
Alkyd Resins	9	13	19	12
Cellophane	2	4	4	3
Explosives	1	3	2	2
Others	8	21	24	16
Total	100	100	100	100

Source: SRI, Chemical Economics Statistics

Table V-1-5: Production Capacity of Basic Oleochemicals in the World

(1) Fatty Acids

(Unit: 1,000 tons)

	1985	% Increase	1990	% Increase	1995
Americas	700	(0)	700	(0)	700
Western Europe	1,000	(+8.5)	1,085	(0)	1,085
Asia/Pacific	538	(+19.9)	645	(+49.3)	963
Total	2,238	(+8.6)	2,430	(+13.1)	2,748

Souce: Asahi Denka Kogyo K.K.

(2) Natural Glycerol

(Unit: 1,000 tons)

	1985	% Increase	1990	% Increase	1995
Americas	120	(+16.7)	140	(+14.3)	160
Western Europe	190	(+2.6)	195	(+1.0)	197
Eastern Europe	40	(+7.5)	43	(+4.7)	45
Asia/Pacific	79	(+16.5)	92	(+13.0)	104
Total	429	(+9.6)	470	(+7.7)	506

Souce: Asahi Denka Kogyo K.K.

(3) Fatty Alcohols

(Unit: 1,000 tons)

	1985	% Increase	1990	% Increase	1995
Americas	119	(+38.7)	165	(+24.2)	205
Western Europe	232	(+13.4)	263	(0)	263
Asia/Pacific	88	(+108.0)	183	(+82.0)	333
Total	439	(+39.2)	611	(+31.1)	801

Souce: Asahi Denka Kogyo K.K.

Table V-1-6: Demand Prospects of Basic Oleochemicals

(Unit: 1,000 tons)

	1990		1995		2000		2005		2010
Fatty Acids	2,037	(+3.6)	2,400	(+1.7)	2,600	(+1.9)	2,850	(+2.0)	3,130
Glycerol	360	(+1.7)	390	(+1.5)	420	(+1.4)	450	(+1.1)	475
Fatty Alcohols	850	(+7.5)	1,170	(+7.7)	1,620	(+6.2)	2,120	(+5.2)	2,670
Methyl Esters	510	(+2.4)	570	(+2.1)	630	(+2.2)	700	(+2.0)	770
Fatty Esters	230	(+4.3)	280	(+3.9)	335	(+3.9)	400	(+3.5)	470
Fatty Amines	435	(+2.1)	480	(+2.1)	530	(+2.1)	585	(+1.0)	615

Notes: 1. The above figures are calculated as follows.
1) multiply population up to the year 2010 in the world by per capita consumption of finished oleochemicals to estimate their demand volume.
2) estimate demand volume of the basic oleochemicals in relation with finished oleochemicals.
2. Figures in the parentheses show average growth rates per annum.

Table V-1-7: Demand and Supply of Oleochemical Finished Products in Japan

(Units: tons, %)

	Production		Export		Import		Consumption		Per Capita Consumption (kg)	
	Volume in 1990	AAI from 1985	Volume in 1990	AAI from 1985	Volume in 1990	AAI from 1985	Volume in 1990	AAI from 1985	in 1990	in 1985
Soaps	183,343	−0.1	2,923	+12.5	7,133	+48.3	187,553	+0.3	1.52	1.53
Detergents	993,754	+0.5	34,368	+34.8	28,881	+19.0	988,303	+0.4	8.00	8.01
Shampoos	107,988	+3.6	511	−7.5	1,879	−4.0	104,253	+3.5	0.84	0.73
Surfactants	1,127,251	+5.2	128,487	+7.1	19,730	+13.8	1,272,538	+5.0	–	–

Note: AAI = Average Annual Increase Rate (%)

Sources: MITI, Yearbook of Chemical Industries Statistics
Ministry of Finance, Custom Duties Bureau
Japan Cosmetic Association, Monthly Report

Table V-1-8: Production of Basic Oleochemicals in Japan

(Units: tons, %)

	1985	1990	Annual Average Increase
Fatty Acids	242,274	307,003	+ 5.3 %
Glycerol	45,244	52,279	+ 3.1 %
Fatty Alcohols	37,548	45,688	+ 4.3 %
Total	325,066	404,970	+ 4.9 %

Source: MITI, Yearbook of Chemical Industries Statistics

Table V-1-9: Value of Shipments , Exports and Imports of Soap, Detergents and Surfactants in the U.S.

(Unit: Million US$)

	1989	1990	1991
Soap and Detergents			
Shipments	12,137	12,847	-
Exports	271	295	350
Imports	148	165	188
Surfactants			
Shipments	3,647	3,858	-
Exports	251	294	345
Imports	120	140	162

Note: Estimate(1990), Forecast(1991)

Source: US Industrial Outlook 1991

Table V-1-10: U.S. Imports of Raw Materials

(Unit: Metric Tons)

	1988	1989	1990
Coconut Oil (Crude)	434,740	385,954	414,429
Coconut Oil (Refined)	10,448	5,949	37,794
Palm Kernel Oil (Crude)	99,479	31,971	60,712
Palm Kernel Oil (Refined)	10,923	119,310	93,615
Palm Oil (Crude)	5,696	19,049	13,109
Palm Oil (Refined)	146,440	93,152	118,052

Source: IM 146, US Imports for Consumption

Table V-1-11: U.S. Imports of Oleochemicals

(Unit: Metric Tons)

	1989	1990	Major Importing Countries (1990)
Stearic Acids	1,542	1,389	Malaysia, U.K.
Oleic Acids	191	301	Canada, Argentine
Industrial Fatty Alcohol	18,289	15,162	Germany, Philippines
Glycerol (Crude)	20,061	19,500	Malaysia, Brazil
Glycerol (Others)	12,160	16,630	Germany, Netherland

Source: IM 146, U.S. Imports for Consumption

Table V-1-12: Demand Prospects for Oleochemical Products

Products	Demand Prospects
Soaps	Supply of soap chips/noodles to consumption areas
Synthetic Detergents	
Laundry Use	Increasing use of superconcentrated detergents Shift from LAS to AS and POE AE Use of alpha-sulfonated fatty acid methyl esters
Kitchen Use	Preference for natural materials
Personal Care Products Use	Growing demand for shampoos and rinses in developing countries (Growing demand for amines and surfactants as raw materials)
Industrial Surfactants	Expansion of demand fields in developed countries Growing demand in the textile industries in developing countries
Plastic Additives	
Plasticizers	Growing demand for n-DOP
PVC Stabilizers	Their increasing use will arouse demand for metallic soaps.
Lubricants	
Food	Growing demand for monoglycerides and MCTs
Others	Jet engine oil (Fatty acids incl. C8 and C10) Mixing of C8 into feedstuff

Figure V-1-1: Flow Chart of Oleochemical Derivatives

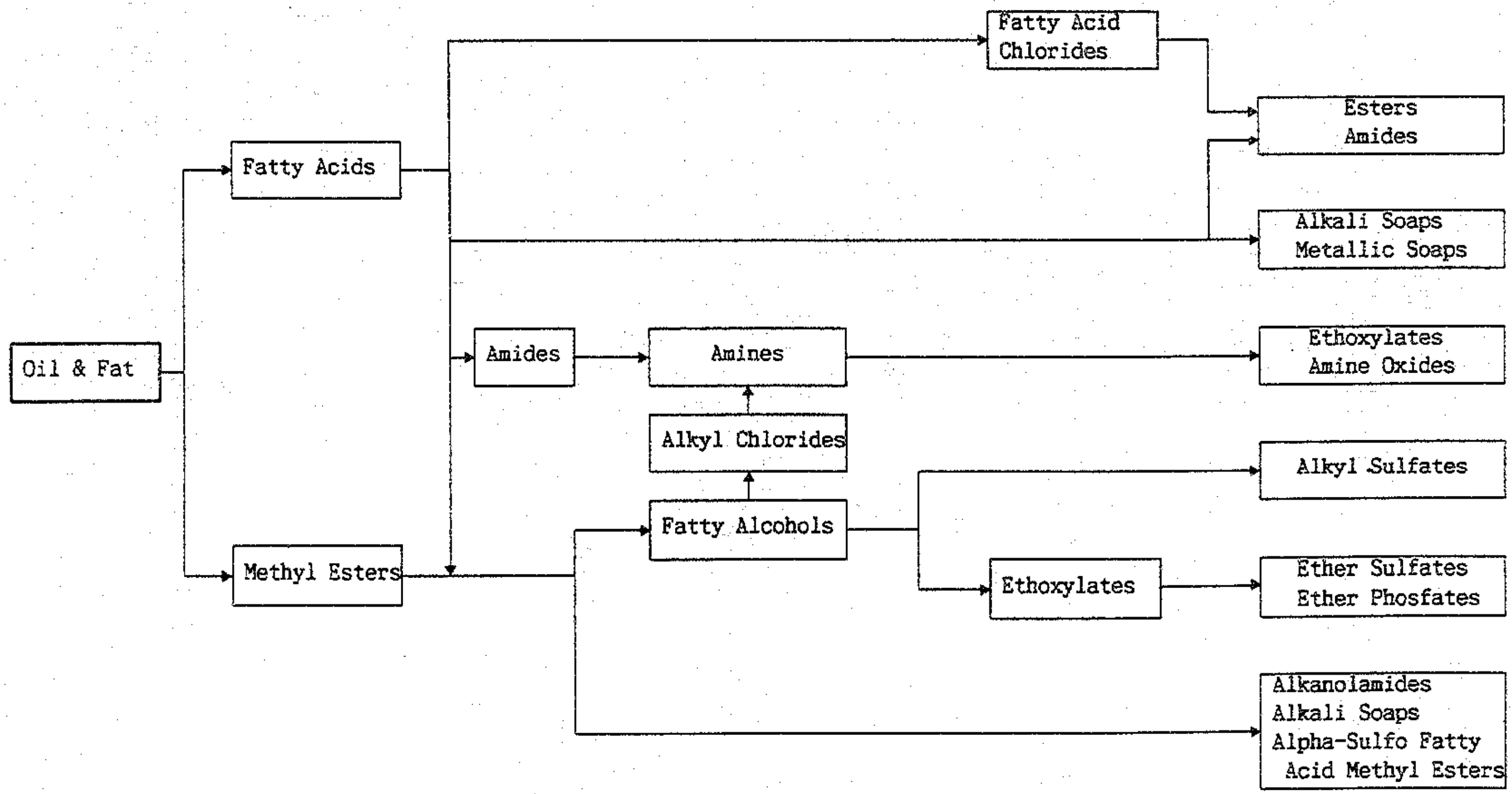
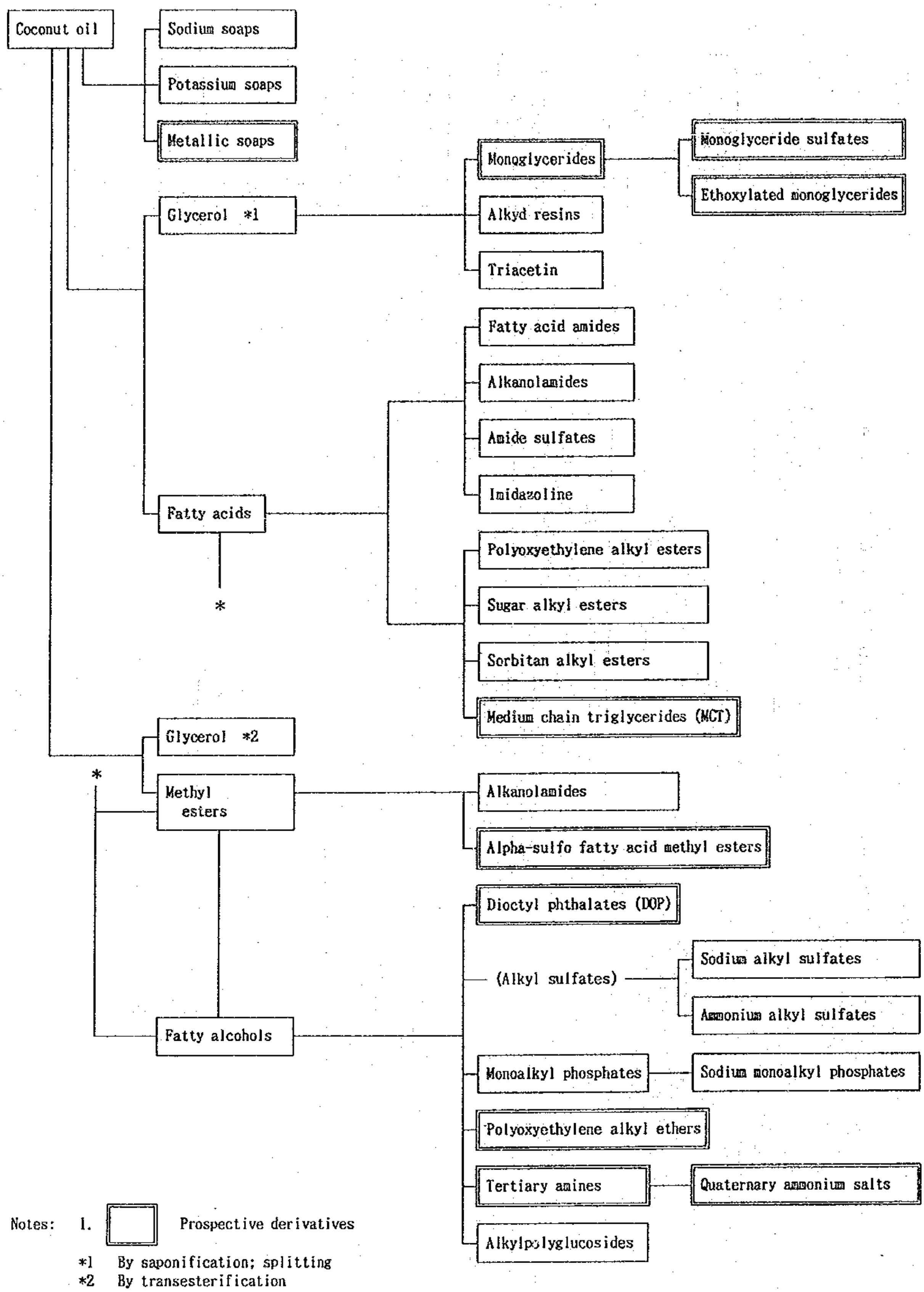


Figure V-1-2: Flow Chart of CNO Derivatives



2. Oleochemical Industries in Neighboring Countries

2-1 Outline

In recent years Malaysia and Indonesia have become well known as production bases for oleochemicals. The oleochemical industries in both countries were established in the mid 1970s, and when production of palm oils and palm kernel oils, the raw materials for oleochemicals, increased, both foreign and local firms began expanding their production there.

Seven firms currently have operations in Malaysia and this will grow to thirteen in 1993. Although palm oil and palm kernel oil based fatty acids and glycerol have been the major products up till now, expansion of fatty alcohol production is planned for the future.

The Malaysian government provided pioneer status to investment in the field of oleochemicals, and incentive measures such as reduction of corporate tax and investment tax allowances to investors. In Malaysia there is a system of regulation for the industry including registration for palm oil and palm kernel oil related firms with the Palm Oil Registration and Licensing Authority (PORLA), cess and export tax. The cess is used to fund the activities of the Palm Oil Research Institute of Malaysia (PORIM) and PORLA. These activities are aimed at supporting the industry and include R&D and the development of markets.

In Malaysia, though steady progress is being made in oil palm production, reduction of production cost by increasing yield has become an important issue.

Coconut oil as well as palm oil and palm kernel oil are produced in Indonesia. Up till now government policy was such that domestic demand, which includes demand from manufacturers of frying oil, soap and margarine, should be met. However following an easing of regulations in June 1991, domestic sale and export of palm oil, palm oil products and copra were liberalized.

In Indonesia 80-90% of oleochemicals produced are based on palm oil, though some manufacturers also use coconut oil. There are plans to expand present production capacity as well as to begin production of surfactants and metallic soaps. These moves are expected to bring about a quantum leap in the development of the oleochemical industry.

2-2 Malaysia

(1) Oleochemical Firms

Malaysia's first oleochemical firm was Acidchem, established in 1976 (operations beginning 1980). The 1980s saw a number of new firms established and in August 1991 there were seven firms conducting operations in the industry. Total production capacity for fatty acids is 220,000 MT, 80,000 MT for methyl esters, 30,000 for fatty alcohols and 6,000 MT for fatty esters.

Oleochemical firms have been constructing new facilities in accordance with the steady growth in production of palm oils and palm kernel oils. In 1993 there will be thirteen firms and total production capacity is expected to grow to 994,000 MT. Estimates show that at the beginning of the 21st century production capacity will reach 865,000 MT for fatty acids, 200,000 MT for methyl esters, 400,000 MT for fatty alcohols, and 35,000 MT for fatty esters.

The world's major oleochemical firms such as, Henkel (Germany), P&G (U.S.), Kao Corp., and New Japan Chemical Co. Ltd. (Japan) have operations in Malaysia. Indian firms also set to begin operations there.

(2) Production and Export of Oleochemicals

The total production by five manufacturers rose from a marginal 130,000 MT in 1988 to 150,873 MT in 1989. In 1990, the number of manufacturers increased to seven, with total production at 209,455 MT.

A look at raw material consumption shows that consumption of palm oil (crude and processed) and palm kernel oil rose from 85,427 MT and 57,014 MT respectively in 1988 to 106,221 MT and 59,739 MT in 1989 and to 120,152 MT and 110,249 MT in 1990. In particular, remarkable gains have been made in the consumption of palm karnel oil.

Increase rate of demand for palm kernel oil is expected to exceed that of palm oil in the future. According to Acidchem, demand for palm kernel oil is predicted to amount to 1,174,250 MT in the year 2000. Production of palm kernel oil, however, is forecast to be only 1,090,000 MT in 2000, which points to a possible supply and demand gap in the future. Some predict that the gap will be filled by palm kernel oil supplied from Indonesia and coconut oil imported from the Philippines. It may not be too much to say that palm kernel oil production in Malaysia is the most important key for the development of the oleochemical industry in the future.

The production of basic oleochemicals, so far, has been concentrated in fatty acids and glycerol. Manufacturers such as Fatty Chemical, FPG and Henkel Rika, however, plan to strengthen production of fatty alcohols. Export trends for fatty acids, glycerol and fatty alcohols between 1988 and 1990 show a sharp increase in fatty alcohols against a background of the revisions to the production structure mentioned earlier. Export of fatty alcohols totaled 8,046 MT in 1990, of which, 7,326 MT were exported to Japan, representing 91 percent of the total export volume. Main importers of Malaysia's oleochemical products in 1990 are as follows: Japan, Singapore and Taiwan for stearic acid; Pakistan, Germany and India for palm fatty acid distillates; Pakistan for palm acid oil; and Japan, China and India for glycerol. (refer to Table V-2-1)

(3) Demand and Supply for Raw Materials

1)Plantations

a) Oil palm

Oil palms were first introduced into Malaysia in 1870 and estate cultivation of them began in 1917. For many years natural rubber production was Malaysia's main industry. However in the 1960s the government adopted a policy of reducing the economy's dependence on natural rubber in favor of oil palm and construction of palm oil refineries in the 1970s contributed to the increased production of oil palm.

In 1960 a only 54,634 ha of land was oil palm estates. In 1990 this had risen 1,984,167 ha. Broken down by region, 525,000 ha is located in the state of Johor, 434,000 ha in Pahang, 220,000 in Perak and 147,000 ha in Selangor. Production is concentrated in the inland regions of Peninsular Malaysia.

Broken down by ownership, the majority, 890,000 ha is owned by private estates, 740,000 ha belong to government authorities, the Federal Land Development Authority (FELDA), the Federal Land Consolidation and Rehabilitation Authority

(FELCRA), and the Rubber Industry Smallholders Development Authority (RISDA), 170,000 ha to state schemes and, 170,000 ha to small holders.

In 1989 the average age of oil palms was said to be 16 years. Thus replanting has become an important issue. According to current plans, 2.2 billion Malaysian dollars (M$) will be invested and around 590,000 ha replanted by the 21st century. In future emphasis will be placed on increasing yield, and expansion of plantation scale is expected to slow down. In the 21st century an estimated 2.5 million ha will be under cultivation. Concern is being expressed over the question of maintaining price competitiveness in the light of forecasts of a labor shortage.

b) Coconuts

At the end of 1989 coconut plantations totaled 306,440 ha. Most of these are located in Peninsular Malaysia. There are 109 estates nationwide. These estates are small scale and account for 25,710 ha. The remaining 280,000 ha belongs to small holders.

Because coconuts are not deemed to be important crops, there is no official data, and it is believed that planting/replanting by small holders will proceed at a rate of 7-10% per year in the future.

2) Production and export of palm oil and other products

Production of crude palm oil has been steadily increasing from 5,027,496 MT in 1988 to 6,056,504 MT in 1989 and to 6,094,622 MT in 1990. Good weather, an increase in yield and reduction in oil losses at the mills are considered main reasons for the growth. The production of palm kernel oil also shows steady growth; 620,837 MT in 1988, 750,048 MT in 1989 and 827,233 MT in 1990, keeping pace with the increase in production of crude palm oil . The export volume of processed palm oil amounted to 5,633,502 MT in 1990. Main importers of processed palm oil include China, Pakistan, India and Egypt. Exports to China showed a sharp rise from 490,000 MT in 1989 to 740,000 MT in 1990.

Exports of crude palm oil jumped from 4,525 MT in 1989 to 93,949 MT in 1990. Exports of palm kernel oil also showed a steady increase to 689,727 MT in 1990. Main importers include the Netherlands, the U.S., Singapore, the U.K. and Japan.

Bulking installations are available for export of palm oil. Construction of bulking installations started in 1972. There are 27 bulking installations at main seaports in Malaysia, as of 1988, which have a combined storage capacity of about 620,000 MT.

Both palm oil and palm kernel oil are subject to export tax. In case of export of palm oil, export tax is free for products with a per-unit price of 650 M$ and less per MT. If prices are higher than 650M$, 10 percent to 25 percent will be levied for every 50 M$ up to a maximum of 30 percent (ad valorem tax). In the case of palm kernel oil, 10 percent is levied for crude oil, 15 percent for refined oil (oleic acids and stearic acids) and there are no duties for fractionated products.

(4) Development Policy for the Oleochemical Industry

1) Investment incentives

Under the Promotion of Investment Act, 1986 palm oil and palm kernel oil derivatives were provided pioneer status and either of the following incentives (revised in November).

-Corporate tax relief

Companies which apply for and are granted pioneer status on or after November 1, 1991 will no longer be exempted from tax on all their income. 30 percent of their statutory income will be taxed. The companies will effectively be subject to tax at a rate of about 11 percent. Strategic projects with heavy capital investment and high technology which have a significant impact on the Malaysian economy may be granted more favorable tax relief on a case-by-case basis, including a 100 percent tax exemption.

No extension of tax relief period will be allowed for companies which apply for pioneer status on or after November 1, 1991.

-Investment tax allowance

Exemptions of up to 60 percent are given on qualifying capital expenditure. The allowance will be subject to a maximum of 70 percent of the statutory income.

All new and existing oleochemical plants are given pioneer status. (refer to Table V-2-2)

(5) R&D Activities

The center of research into palm oil in Malaysia is the Palm Oil Research Institute of Malaysia (PORIM). The institute was established in May, 1979 under The Palm Oil Research and Development Act, 1979, and is under the control of the Ministry of Primary Industries. Activities at the institute are carried out under the direction of the Palm Oil Research and Development Board.

1) Organization and activities of PORIM

PORIM is divided into five different divisions, administration and finance, biology, chemistry and technology, techno-economic and technical advisory services, and central services. There are 557 employees (end of 1988) in all and most, 147, are employed in biology, with chemistry and technology the second largest employing 134 people. There is a branch office in Brickendonbury, U.K., and representative offices in Washington, U.S., and Karachi, Pakistan. (refer to Fig. V-2-1)

PORIM also has a program advisory committee, which includes foreign experts, to advise on research themes.

PORIM's main activities are as follows.

- Improvement of palm oil extraction and refining technology, maintenance of quality
- Research on the use of palm oil in food and other areas
- Technological advice for palm oil users
- Technological and economic research, particularly on palm oil marketing, including trends in the supply and demand of oils and fats
- Biological research, including the development of new hybrids, with the aim of increasing yield and reducing cost

Oleochemicals are dealt with in the chemistry and technology division. According to the 1988 annual report, palm-based metallic soaps as processing aids in rubber, mono and dibasic acids as potential starting materials for lubricant manufacture, and fatty alcohols were themes of research.

In the techno-economic and technical advisory services division, research projects such as those entitled "World Supply and Demand for Palm Oil up to Year 2000", "A Study of International Market Development", "Import Tariff Problems in Palm Oil and Palm Oil Products", and "Production Cost Investigations" are underway. The results of these will be used in publications issued by PORIM.

There is also a library containing a total of 35,000 items, including books, journals, annual reports, microfiche, and slides. A data base called "PALMSEARCH" was developed in 1982 and the possibility of offering data bases to external users also is being studied.

2) Financial matters

PORIM's revenue was about M$ 29.32 million in 1988, of which M$ 23.45 million come from the Palm Oil Research and Development Board's subsidy, accounting for 80 percent, M$2.96 million from research grants (10 percent), M$2.41 million from sales of palm products (8.2 percent) and the remaining from other miscellaneous income.

The source of the subsidy from PORDB is a production surcharge called the cess, which started in January, 1980 and under which M$ 5 per MT is levied on producers of palm oil and palm kernel oil. The major part of the income from the cess is funded PORIM's activities including research and development, personnel costs and travel expenses.

2-3 Indonesia

(1) Oleochemical Firms

Indonesia's first oleochemical plant was Cisadane Raya Chemicals (West Java, established 1974, operations begun 1975). Many new facilities followed in the 1980s.

Indonesia's leading manufacturers are Cisadane Raya Chemicals, P.T. Sumi Asih, the Sinar Mas Group, P.T. Aribhawana Utama, and P.T. Polekao Indonesia Chemicals. There are also two soap manufacturers which produce glycerol as by-products, P.T. Unilever Indonesia, PT Jaya Makmur Raya.

In Indonesia 80-90% of the raw materials used is palm oil. The only firms which use coconut oil are Cisadane Raya (10-20% of basic oleochemical production) and Polekao (240-360 MT annually).

(2) Production, Exports and Imports of Oleochemicals

According to the Ministry of Industry, total production for the five firms operating in 1988 was 17,350 MT of glycerol (crude and refined), 30,600 MT of fatty acids, 5,000 MT of stearic acids, 15,000 MT of fatty alcohols, and 22,500 MT of stabilizer. As the number of facilities has increased since 1988, today's figures would be greater.

The aforementioned companies, Polekao (surfactants, emulsifiers, etc.), and P.T. Henkel (glue, textile auxiliaries, industrial cleaners, etc.) are also derivatives manufacturers. In addition the following firms have plans to begin production of derivatives: P.T. Manyar Kimindo (alkyl benzene sulfonate, alcohol ether sulfates, alcohol sulfates), P.T. Jaya Baru Pratama and P.T. Sungai Pinang (metallic soaps, refined glycerol, fatty acids).

Exports of intermediate products expanded in the three years between 1988 and 1990. In 1988 exports of oleic acids amounted to 13,771 MT. In 1990 this had grown to

43,906 MT. Exports of stearic acids increased from 140,639 MT to 256,437 MT, almost double in that time. Glycerol exports, on the other hand, fell from 6,020 MT to 4,435 MT, reflecting an oversupply in the global market. In 1990 exports amounted to US$88.34 million.

Imports into Indonesia fell during that period, as a result of development of the oleochemical industry in Indonesia. Exports of palmitic acids fell drastically, decreased from 15,417 MT in 1988 to 2,833 MT in 1990. Fatty alcohols fell from 2,492 MT to 1,826 MT. Imports amounted to US$10.15 million in 1990.

(3) Demand and Supply for Raw Materials

1) Plantations

a) Oil palm

There are oil palm plantations in 15 states of Indonesia. Most are located in North Sumatra. Area under cultivation totals 1.15 million ha. Large estates of the state account for 414,328 ha of this, large estates of private companies for 321,345 ha, and small holder's plantations for 410,594 ha. In 1967 only 105,808 ha was under cultivation. Since then, both Indonesian and foreign firms have established projects, and 16 trillion rupiahs has been invested.

In 1979 the Nucleus Estate System was introduced. Under this system, large plantations, both state and privately owned companies, seeking to expand their plantations are required to give 80% of their newly opened land to farmers. It was for this reason that plantations owned by small holders jumped from 3,125 ha in 1978 to around 410,000 ha in 1990.

Further plantation expansion is set out as a goal in REPELITA V (The 5th Five-Year Development Plan (1990-1994)). Plantation is expected to increase to 1.4 million ha in 1994.

b)Coconuts

Apart from Jakarta, there are coconut plantations in all regions of Indonesia. The area under cultivation, however, is not expanding. This is against a background of poor prices for coconut oil, and a shift in emphasis to oil palm. In 1990, total area of coconut plantations was 3.33 million ha. Small holder's plantations accounted for 3.25 million, the overwhelming bulk, large estates of the state for 17,000 ha, and large estates of private companies for 71,000 ha.

2) Demand and supply for raw materials

Production, exports and total demand for palm oil (crude) and palm kernel oil grew steadily, in accordance with the aforementioned expansion of plantations. However, because coconut exports decreased while production leveled, the surplus was directed to domestic demand.

a) Trends in exports

Though over the last three years (1988-1990) export volumes have increased, they have fallen rapidly on a value basis due to falling world prices. Crude palm oil accounted for 84% of all exports. However export volumes of palm stearin are also on the increase.

Western Europe is the major destination of Indonesian palm oil (crude). Importing countries include the Netherlands, the U.K., Germany, and Italy in that order. In 1990 palm oil was also exported to the U.S., Canada, Columbia, and Ecuador. It seems that efforts will be concentrated particularly toward promoting exports to Canada and the U.S..

The major importers of Indonesian palm stearin are China, India, the Netherlands and Turkey. China is seen as an important destination for palm stearin in the future.

Like palm oil, though export volumes of palm kernel oil are increasing, they are decreasing on a value basis. The main importers of Indonesian palm kernel oil are Germany and the U.K.

For coconuts, exports are falling on both a volume and value basis. The major destinations of Indonesian coconut oil (crude) are the U.S., the Netherlands, Italy, and Malaysia. However it is hoped that Australia, Canada and the U.S.S.R. will become major destinations.

b) Domestic demand

The largest users of palm oils and coconut oils are frying oil manufacturers. In 1990 there were thirty eight factories nationally. In 1983 consumption of copra exceeded that of palm oil (crude). However, a shift is occurring in favor of palm oil as a result of escalating prices for copra as well as the instability of its supply. In fiscal 1989, a total of 1.25 million MT of frying oil was produced. Of this, 752,900 MT was manufactured from palm oil and 499,800 MT from copra.

In 1989 there were 60 soap (bath and washing) manufacturers. Total production volume in fiscal 1989 were 185,509 MT for bath soap, and 166,902 MT for washing soap. Production for washing soap peaked in fiscal 1983 when 199,000 MT were produced, and fell after that with the popularization of detergents. Soap manufacturers use a combination of palm oil and coconut oil, the ratio of palm oil to coconut oil being 75:25 on average. In 1989, consumption of palm oil and coconut oil by soap manufacturers was 62,724MT and 23,059 MT respectively.

Margarine and shortening manufacturers are also large users of palm oil. In 1990 twenty three factories were in operation, and total palm oil processing capacity was 284,707 MT. It is estimated that in fiscal 1989 153,398 MT of margarine and shortening was produced using 138,058 MT of palm oil.

Other users are the oleochemical and cosmetics (including toothpaste) industries. Consumption of palm oil in the cosmetics industry was thought to be around 9,600 MT in 1990. (refer to Table V-2-4 and V-2-5)

(4) Development Policy for the Oleochemicals Industry

The oleochemical industry in Indonesia began in the 1970s. The industry was deemed a priority industry by the Indonesian government in REPELITA V in light of the abundance of the oil palm production.

Plantation development, expansion of production of palm oil and coconut oil, and the improvement of copra processing technology have been progressing with aid from international organizations (the Food and Agriculture Organization (FAO), the International Fund for Agricultural Development (IFAD), and the Asian Development Bank (ADB)), and the Japanese government.

As a response to shortages in supply of palm oil and coconut oil, regulation was introduced to stabilize prices. In June, 1991 the easing of restrictions were announced. Though the regulations did not apply directly to oleochemicals, they were indirectly affected in the following ways.

1) Domestic sales and exports of palm oil and palm oil products, and copra and frying oils were liberalized. In the event of supply shortages imports of frying oils as well as palm oil and copra were permitted. In that case a 10% tariff applied to frying oil and 5% to palm oil and copra.

2) Investment into frying oil (palm oil) manufacture will only be permitted in cases where facilities are constructed near plantations, and where over 65% of production is exported.

(5) R&D Activities

Although Indonesia has no research facilities specifically for oleochemicals, palm oil R&D is conducted at the Research Center for Estate Crops in Marihat, North Sumatra.

The institute is comprised of agronomy, plant protection, soil and fertilizer, service and consultancy, laboratorium analysis, biotechnology, statistical services, and plant breeding departments, and soil surveys, as well as research into varieties improvement, and plant protection is conducted.

(6) Oleochemical Industry Organization

The Asosiasi Produsen Oleochemicals Indonesia (APOLIN) was formed in response to the establishment of the ASEAN Oleochemical Manufacturing Group (AOMG). The organization is comprised of the three firms, P.T. Aribhawana Utama, P.T. Sumi Asih, and P.T. Cisadane Raya Chemicals. Details of its activities are not known.

Table V-2-1: Malaysia's Exports of Oleochemicals

(Unit: Metric Tons,
Thousand Malaysian Dollars)

	1988		1989		1990	
	Volume	Value	Volume	Value	Volume	Value
Stearic Acids	86,099	106,306	110,543	15,128	109,044	141,062
Oleic Acids	86	165	16	32	36	76
Palm Fatty Acid Distillates	18,905	146,199	248,559	163,079	269,613	132,999
Other Industrial Monocarboxylic Fatty Acids	7,285	10,634	9,122	13,469	12,701	14,043
Palm Acid Oil	16,278	12,147	16,398	10,201	24,366	11,604
Fatty Alcohol	2.5	24	125	96	8,046	23,698
Glycerol	12,080	31,314	10,344	41,409	9,723	37,918

Source: Trade Statistics of Malaysia

Table V-2-2: List of Pioneer Status (Oleochemicals and Others)

* Fatty acids and their derivatives, fatty esters and their derivatives inclusive of metallic esters, fatty alcohols and their derivative fatty amines and their derivatives and glycerine (crude and refined).

* Cocoa butter replacers (such as cocoa butter substitutes, cocoa butter alternatives, cocoa butter modifiers, cocoa butter equivalents); palm oil mid fraction, special olein II and special olein III.

* Margarine, vanaspati, shortening and other manufactured fat products.

* Crude palm kernel olein and stearin, neutralised or refined and bleached palm kernel olein and stearin neutralised or refinded, bleached and deodorised palm kernel olein and stearin.

* Hydrogenated and/or interesterified oils and oil blends, all types.

* Neutralised palm kernel oil.

* Refined, bleached and deodorised palm kernel oil.

Table V-2-3: Demand and Supply of Raw Materials in Indonesia

(Unit: Metric Tons)

	1988	1989	1990
Palm Oil (Crude)			
Production	1,713,335	2,112,521	2,431,247
Imports	302,190	412,392	26,183
Exports	731,118	781,842	815,380
Total Demand	1,284,407	1,743,071	1,642,050
Palm Kernel Oil			
Production	342,667	422,504	486,250
Imports	490	61	530
Exports	121,723	135,448	158,303
Total Demand	221,434	287,117	328,477
Coconuts (Copra Terms)			
Production	2,143,987	2,267,029	2,293,033
Imports	-	88	1
Exports	379,658	352,816	355,605
Total Demand	1,764,329	1,914,301	1,937,429

Source: Study on the oleochemical industry in Indonesia(JICA Study Team)

Table V-2-4: Consumption of Palm Oil (Crude) and Palm Kernel Oil for Industries in Indonesia

(Unit: Metric Tons)

	1988	1989	1990
Domestic Consumption of Palm Oil (Crude)	1,284,407	1,743,071	1,642,050
Domestic Consumption of Palm Kernel Oil	221,434	287,117	328,477
Sub-total	1,505,841	2,030,188	1,970,527
Frying Oil	1,055,303	1,164,754	1,171,262
Soap	171,311	178,526	184,049
Margarine	105,815	124,555	146,614
Other Industries including Oleochemicals	173,412	562,353	468,602

Source: Study on the oleochemical industry in Indonesia (JICA Study Team)

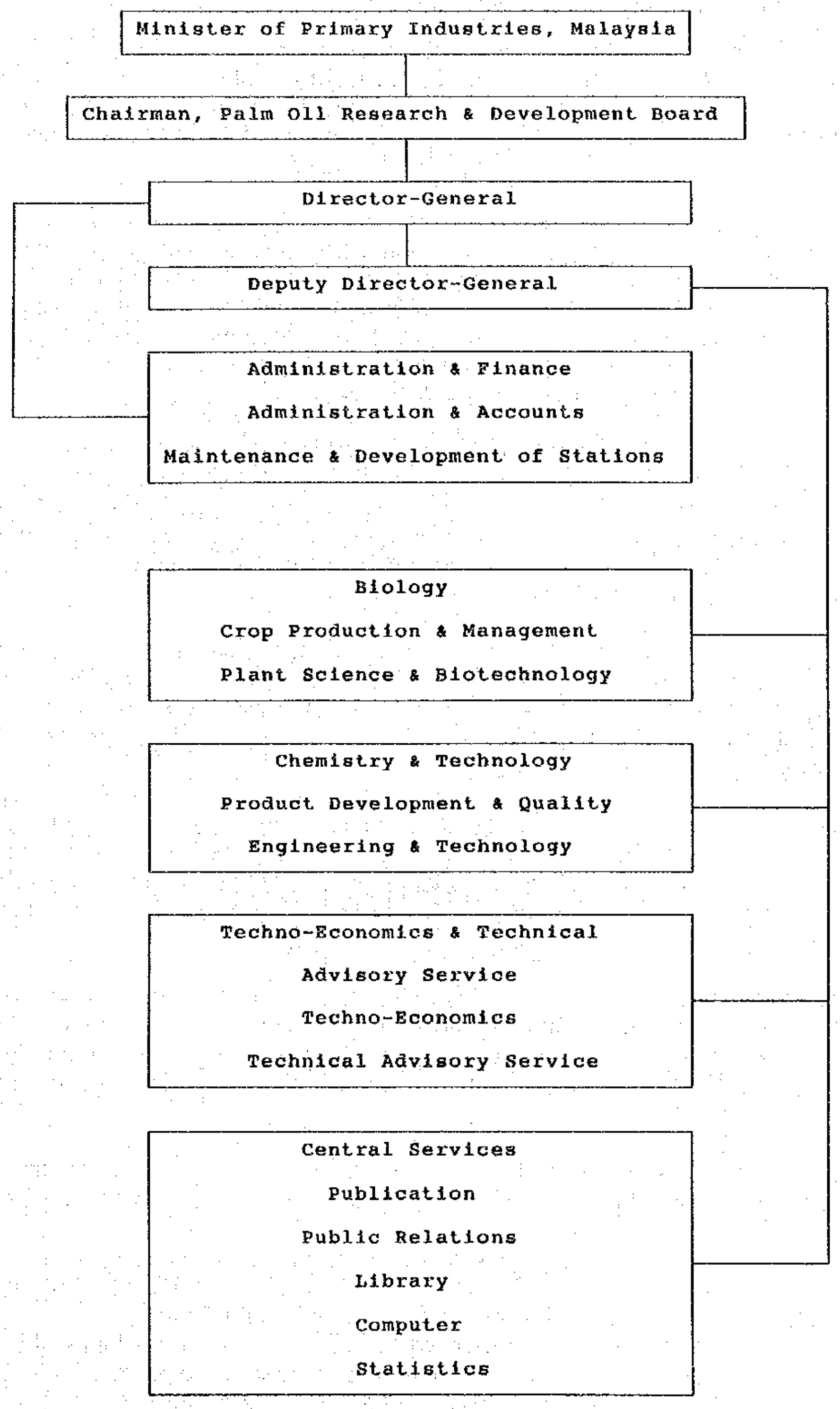
Table V-2-5: Consumption of Coconuts for Industries in Indonesia

(Unit: Metric Tons)

	1988	1989	1990
Domestic Consumption of Coconuts	1,764,329	1,914,301	1,937,429
Frying Oil	824,755	878,537	918,171
Soap	103,825	108,197	112,410
Other Industries and Households	835,749	927,567	906,848

Source: Study on the oleochemical industry in Indonesia (JICA Study Team)

Figure V-2-1: Organization Chart of the PORIM



3. Current Situation and Issues in the Philippine Oleochemical Industry

3-1 Outline

The Philippine oleochemical industry was established in the latter half of the 1960s using coconut oil as a raw material. Different from the oleochemical products being produced in Malaysia and Indonesia, as mentioned in Chapter 2, Philippine-made oleochemicals can be called coco-chemicals because coconut oil is the sole raw material used.

The Philippines is one of the leading coconut producing countries in the world and this gives the country's oleochemical industry an advantage in terms of the supply of raw materials required for oleochemical production. However, several negative factors influencing the supply of coconuts, including natural disasters such as typhoons and droughts, insufficient fertilizer and aging of coconut trees, have become serious in recent years. These factors are resulting in a slowdown in coconut production on a long-term basis, price increases and an unstable supply of coconut oil.

The Philippine government has promoted a shift in exports from copra to coconut oil and has adopted a policy to promote the production of higher value-added products in the oleochemical industry. However, rather than encouraging competition in the industry, the government has been oriented toward restrictions on competition through intervention in the industry. Restrictive measures taken in the past include the introduction of export tax and levies and a ban on exports of copra.

This is in strong contrast to Malaysia and Indonesia, which have been succeeding in steadily increasing production of palm oil and palm kernel oil, which are competitors for coconut oil, through plantation production. In Malaysia in particular, a number of oleochemical firms have been established and are benefiting from the abundant supply of raw materials.

The Indonesian government has not been as enthusiastic regarding the export of palm oil and coconut oil because of the need to support domestic demand for edible oils. However, the government introduced a policy to relax the export ban on these oils in June 1991. If production continues to increase steadily, it may be not long before Indonesia becomes a competitor for the Philippines.

The Philippine oleochemical industry has had to export basic oleochemicals (fatty acids, glycerol, fatty esters and fatty alcohols) and derivatives because of the small size of the domestic market for soaps, detergents, surfactants and a variety of agents. In the case of fatty alcohols, however, domestic demand has been increasing since the implementation of EO259 (mentioned later).

The industry must depend on imported chemical products required for the production of derivatives because the Philippine chemical industry is still underdeveloped.

The oleochemical industry does not create many jobs because of the nature of the industry as a capital-intensive industry. Many foreign affiliated oleochemical manufacturers located in the Philippines depend on their parent companies for technology and R&D. It is necessary to continuously foster and develop the oleochemical industry in light of the characteristics of the industry such as the availability of domestically-produced materials, the high level of net foreign exchange earnings and the high quality of Philippine operators.

3-2 The Philippine Economy and the Oleochemical Industry

Fig. V-3-1 shows the flow from coconut to coconut oil, oleochemicals and finished products. In the Philippines, an estimated 18 million people, or as much as thirty percent of the country's population, are engaged in production and distribution of coconuts. Therefore, the coconut industry plays a significant role in the Philippine economy.

The following is an analysis of the current situation of each stage of the industry.

(1) Coconut Farmers

There are about 3.11 million ha (1990) of coconuts under plantation and 1.5 million coconut farmers with 1.8 million landless workers in the Philippines. Coconut farmers with farms of seven ha or less account for 89 percent of all coconut farmers. As a result, the average farm size is small compared to the large-scale plantations which prevail in Malaysia and Indonesia.

(2) Distribution of Coconuts

Coconut distribution is complicated. Buying stations along the roads collect coconuts which are then transported by buyers to oil mills. The buying prices are often indicated by the downstream sector (oil refiners). Advance payments are sometimes given to coconut producers by dealer buyers and exporters.

(3) Oil Mills

Data compiled by the United Coconut Association of the Philippines Inc. (UCAP) say that as of June 1991 there were 92 oil mills with a combined annual crushing capacity of 5.06 million MT. The actual crushing volume is only 2.15 million MT with the estimated capacity utilized remaining at 42.5 percent. During the Marcos regime, a policy was implemented to integrate a number of oil mills into United Coconut Oil Mills, Inc. (UNICOM). Since the abolition of UNICOM, there have been numerous new entries, resulting in increased crushing capacity.

The main coconut producing areas are located in the southern part of Luzon and Mindanao. In Luzon, the shortage of copra has been serious due to typhoons and droughts and this has forced a considerable number of oil mills to close.

(4) Oil Refineries

As of June 1991, 45 oil refineries existed with a crushing capacity of about 1.47 million MT. San Pablo Mfg., Corp., the largest oil refinery, has an annual capacity for about 160,000 MT. A refinery owned by Coco Chemical Phils. Inc. (CCPI) (described later) still exists in Atimonan.

(5) Employment in the Oleochemical Industry

According to the Philippine Oleochemical Sector Ten-Year Development Program, the oleochemical industry employs 780 people.

(6) Exports of Coconut Products

Table V-3-1 shows the trend in the value of exports of main coconut products since 1970. The figure clearly shows the shift in exports from copra to coconut oil. The Coconut Statistics 1989 report says that oleochemical exports began in 1979.

The total value of exports of coconut products in 1990 was about US$550 million, accounting for 6.7 percent of all exports of US$8,186 million. Oleochemicals in table V-3-1 include fatty alcohols, fatty acids and methyl esters. Therefore, this figure is lower than the value of exports by BOI registered companies as shown later.

3-3 Industrial Structure

(1) Outline

1) History of the oleochemical industry

The production of oleochemicals in the Philippines began in the 1960s, before the Malaysian and Indonesian oleochemical industries were established. In 1969, Coco Chemical Phils., Inc. (CCPI) started operation in Lucena producing butyl coco phtalate (BCP) using coconut oil as a raw material. CCPI was established by the National Investment and Development Corp., affliate of the Philippine National Bank with technologies from Kao Corp. of Japan.

Proton Chemical Industries, Inc., was established in 1972 as a joint venture between New Japan Chemical Co., Ltd., a local firm and Pilipinas Kao, Inc. (PKI), was established as a joint venture between Kao Corp. and Abotiz Group in 1977. CCPI, which produced methyl esters and fatty alcohols, faced a financial crisis because BCP could no longer compete with petroleum-based plasticizer in terms of price. As a result, Kao Corp. began purchasing all of the fatty alcohols produced by CCPI.

CCPI was purchased by Phil. Pigment and Resins in 1984 and then acquired by Colgate-Palmolive Phil. the following year. The Coconut Industry Investment Fund (CIIF) based on coconut levies was established as part of a coconut oil industry rationalization program. Based on CIIF, United Coconut Chemicals, Inc. (Cocochem) was established in 1982, the same year that D&L Industries, Inc., was established as 100 percent Philippine-owned company.

In 1990, Sakamoto Orient Chemicals Corp. became the third Japanese company operating in the Philippine oleochemical industry when it started production of refined glycerol. Chemphil Specialty Chemicals Corp. was established the same year to cope with Executive Order (EO) 259 issued in 1989.

2) Oleochemical Firms

As of March 1992, 15 BOI registered oleochemical companies existed in the Philippines. They can be classified as follows, based on the status of their operations. (refer to Table V-3-2 and Annex V-4)

Operating:	Cocochem, PKI, Colgate, P&G, Proton, Sakamoto, D&L, Philippine Refining Company (PRC), Chemphil Specialty, Vegoil Phil., Countryside Millers	(11 firms)
Stopped:	Atson Coco, Universal Robina	(2 firms)
Pre-operating:	Royal Industrial Development, Primofina Oleochemicals	(2 firms)

Atson Coco:	The firm started operation in 1976 as an oil mill and began production of desiccated coconuts in 1979. In 1990, Atson Coco exported methyl esters and diethanol amides to China. The firm stopped the exports due to lowering of price competitiveness resulting from a sharp rise in the price of coconut oil. It uses batch system facilities. It is now producing only refined coconut oil and desiccated coconuts.
Countryside Millers:	The firm is producing cochin oil and steam distilled oil as well as fatty acids (by-product). The products are being exported, mainly to the U.S. and Europe but to Japan as well in small volume.
Universal Robina:	Universal Robina is a food manufacturer producing snacks, noodles, corn starch and corn oil. The detergent bar has been produced for three to four years under an assigned production contract with P&G.
Vegoil:	The firm is producing shortenings and edible oils using palm oil. Vegoil has no intention of diversifying into production of oleochemicals because of the small volume of palm oil production in the Philippines. According to the company, three palm plantations with a total of 12,000 ha are being operated by three companies in Mindanao.
Royal Industrial Development:	Detergent bars are being produced by the company using fatty alcohols and alcohol sulfates purchased from Cocochem. Production of surfactants is scheduled to start in 1992.

(2) Production and Markets

Table V-3-2 shows the production capacity of Philippine oleochemical manufacturers, excluding Vegoil, based on the results of the field survey. The manufacturers can be grouped into two categories according to the table.

Firms producing only basic oleochemicals and derivatives: Cocochem, Proton, Sakamoto, D&L, Chemphil Specialty

Firms producing soaps and detergents as well: Pilipinas Kao, Colgate, P&G, PRC

Of the companies listed above, Proton is producing glycerol and alkanolamides and exports of all of its products to its parent company and related companies in Japan. Sakamoto is refining crude glycerol supplied from other Philippine companies for export to its Japanese parent company and third countries. At D&L, exports account for as much as 60 to 70 percent of production. D&L's export markets include Southeast Asia, China, Taiwan, the Middle East, Australia and Europe. The company regards China as a promising export market.

Chemphil Specialty supplies alcohol sulfates to Philippine detergent manufacturers. Although the firm does not export, it is interested in China as a promising export market.

Cocochem and Pilipinas Kao are the main manufacturers of fatty alcohol, which are ingredients for the production of detergents and shampoos. Colgate is also producing fatty alcohols. It supplies C_8~C_{10} to Philippine manufacturers as a raw material for plasticizer while all of the C_{12} it produces is captive use.

PRC produces finished products after in-house sulfation of fatty alcohols purchased from Cocochem. Soaps and detergents are produced mainly for the domestic market with a small portion being exported.

Pilipinas Kao supplies C_8~C_{10} fatty alcohols to plasticizer manufacturers while C_{12} fatty alcohols are supplied to detergent manufacturers. The firm is exporting mono alkyl phosphates (MAP) to its related firms in Malaysia, Hong Kong and Singapore.

Fig. V-3-2 shows the business relationship between the above-mentioned Philippine firms.

Cocochem plans to expand capacity by 30,000 MT a year by 1995 to address the increasing domestic demand for fatty alcohols which has resulted from the implementation of EO259. The firm is now running a pilot plant for sulfation for the trial production of detergent bars.

(3) Production of Oleochemical Derivatives

It appears difficult for major foreign affiliated oleochemical manufacturers to develop and produce derivatives by themselves because their operations are in line with their parent companies' production systems and R&D policies.

Based on the results of the field survey, if the Philippine economy grows in the future, the demand for products such as detergents and personal care products including shampoos, body shampoos and conditioners is expected to increase in view of the present small size of the market. In this sense, fatty alcohols and alcohol sulfates may be promising.

3-4 Issues Facing the Oleochemical Industry in the Philippines

Exports by the oleochemical industry in the Philippines amounted to US$79 million in 1990. If the industry continues to expand in the future, it can be expected to have far-reaching effects on coconut farmers, oil mills and refineries. The results of the field survey show, however, that there remain a number of issues which must be dealt with if the industry is to be promoted. These are described below.

(1) Stable Price and Supply of Coconut Oil

Coconut production depends on weather conditions and the results of harvests bring about fluctuations in the price of copra and coconut oil. A look at the trend in the domestic market price for coconut oil between 1979 and 1990 shows that the price peaked at 18.44 pesos per kg in June 1984. In more recent years, a price of 13.5 pesos was recorded in May 1989. In 1991, the coconut oil price has been showing a gradual rise due to a shortage of copra caused by typhoons and drought. (refer to Table V-3-3)

Palm kernel oil, a competing oil, contains less lauric acids than coconut oil and is produced in lower volumes. As a result, the international price of palm kernel oil is lower than that of coconut oil. However, consumption of palm kernel oil has been growing steadily on a volume basis due to steady growth in production of palm oil.

Production volume of palm kernel oil is estimated to account for between 13 and 14 percent to that of palm oil. Oil World magazine forecasts production of coconut oil and palm kernel oil to reach 3.37 million MT and 2.17 million MT respectively in 2000. For this reason it is expected that the shift toward palm kernel oil will further progress unless the stabilization of price and supply of coconut oil is realized through replanting, fertilization and increased yields. This is of great concern for oleochemical manufacturers in the Philippines. Consequently, attentions are now focused on PCA's measures, especially on the Small Coconut Farms Development Project.

(2) Small Market Size

According to an estimate by POMA based on the fatty alcohol requirement, the size of the Philippine market for oleochemical products in 1991 is estimated at 230,000 MT for detergents (powder and bars); 22,000 MT for soaps; 18,000 MT for shampoos.

A look at Japan's production of oleochemicals in 1990 shows that production of synthetic detergents (powder and liquid) and soaps (washing soaps and others) were 655,804 MT and 42,664 MT, respectively. Production of shampoos and hair rinse/treatment products amounted to 107,988 MT and 78,216 MT respectively.

Since the domestic market is small, as mentioned above, oleochemical manufacturers of both basic oleochemicals and derivatives depend on exports. Main user industries for surfactants and industrial agents include textiles, rubber, plastics and chemicals. However, they are still underdeveloped in the Philippines. The small scale of the domestic market has made it difficult for oleochemical manufacturers to expand production of surfactants, especially, because of the wide variety of products.

The Philippines' imports of surfactants (including defoaming agents) and plasticizers (DOP) amounted to 6,846 MT and 3,118 MT respectively. If import substitution by domestic production can be realized, large effects can be expected in terms of savings of foreign exchange and the expansion of domestic production.

(3) Difficulties in Procurement of Related Chemicals

Many kinds of chemicals are required to produce derivatives from basic oleochemicals. Among chemicals which Philippines oleochemical manufacturers can domestically procure are sodium hydroxide (which is being produced 67,500 MT per year) and sulfuric acid (1,028,500 MT).

The supply of all soda ash, sodium silicates, sodium sulfate and sodium phosphates are reliant on imports because of the lack of domestic production. The import duties levied on these chemicals result in higher production costs and influence the price competitiveness of derivatives.

(4) Lack of Consistency of Measures Related to Oleochemical Industry

Interviews with major Japanese oil and fat manufacturers and industry associations indicate that they do not have a positive image of Phillipine coconut oil because of fluctuations of price and production volume. Their image of the Phillipines' coconut industry development programs, so far implemented by the government is not good either.

As to the development programs, many issues remain such as coconut levies, export tax, delayed distribution of hybrids and insufficient fertilization. Since palm kernel oil production volume is currently smaller than that of coconut oil, demand for coconut oil is unlikely to entirely disappear. It is difficult, however, to modify production facilities for the coconut oil-based production system, once capital investment is made for production of derivatives based on palm oil and palm kernel oil. For this reason, Japanese oil and fat manufacturers prefer Malaysia and Indonesia.

Table V-3-1: Exports of Coconut Products

(Unit: Thousand US Dollar)

	1970	1980	1986	1987	1988	1989	1990
Copra	76,532	47,974	18,959	30,397	27,535	24,097	19,351
Coconut Oil	94,350	564,586	334,871	390,776	407,861	375,143	367,684
Copra Meal	14,848	78,798	73,495	74,548	67,142	53,285	53,532
Desiccated Coconut	18,069	116,775	44,748	65,707	78,377	75,058	60,313
Cocochemicals	-	62,269	48,096	61,676	72,527	66,751	49,239
Total	203,799	870,403	520,169	623,105	653,443	594,334	550,118

Note: Cocochemicals incude fatty alcohol, fatty acids and methyl esters.
Source: PCA

Table V-3-2: Production Capacity of Major Oleochemical Manufacturers

(Unit: Metric Tons)

	ME	CFA	CFAS	G	Others
Cocochem	X	O (36,000)	Pilot Plant	O (8,000)	C. Fatty Acid (30,000)
Pilipinas Kao	O (36,000)	O (24,500)	X	Refined (4,200)	Tertiary Amines (4,300) MAP (400)
Colgate	O (*4,200)	O (*3,600)	O (*21,600)	O	DOP SLES
P & G	X	X	O (*32,400)	X	X
Proton	Refined (9,600)	X	X	Crude (1,300)	Alkanolamides (1,000)
Sakamoto	X	X	X	Refined (6,500)	X
D & L	Refined (3,000)	X	X	Refined(98%) (1,800)	Monoethanolamides Diethanolamides (1,200)
Chemphil Speciality	X	X	O (10,400)	X	SLES/SLS Planning
Phil. Refining Company	X	X	O (*21,600)	X	X

Note: ME=Methyl Esters; CFAS=Coco Fatty Alcohol Sulfates; SLES=Sodium Lauryl Ether Sulfate
G=Glycerol; CFA=Coco Fatty Alcohols; SLS=Sodium Lauryl Sulfate
O=Operating; X=Not Operating
* converted into per annum based on as follows:
(hourly production) X (24 hours) X (300 days)

Source: JICA Study Team (Field Survey)

Table V-3-3: Domestic Prices of Copra and Coconut Oil

(Unit: Peso/kg)

Year	Copra	Coconut Oil
1979	4.0560	6.4071
1980	2.1594	4.1263
1981	1.7481	3.8925
1982	1.7606	3.5283
1983	3.5079	6.3433
1984	9.1806	15.4058
1985	4.5517	8.5841
1986	2.8812	5.2992
1987	5.3923	9.0275
1988	7.3014	12.3920
1989	6.9286	11.7442
1990	4.6556	8.0400

Note: Price of copra is traded in Manila.
Source: Coconut Statistics 1989 and others

Figure V-3-1: Flow Chart of Coconut Production to Oleochemicals

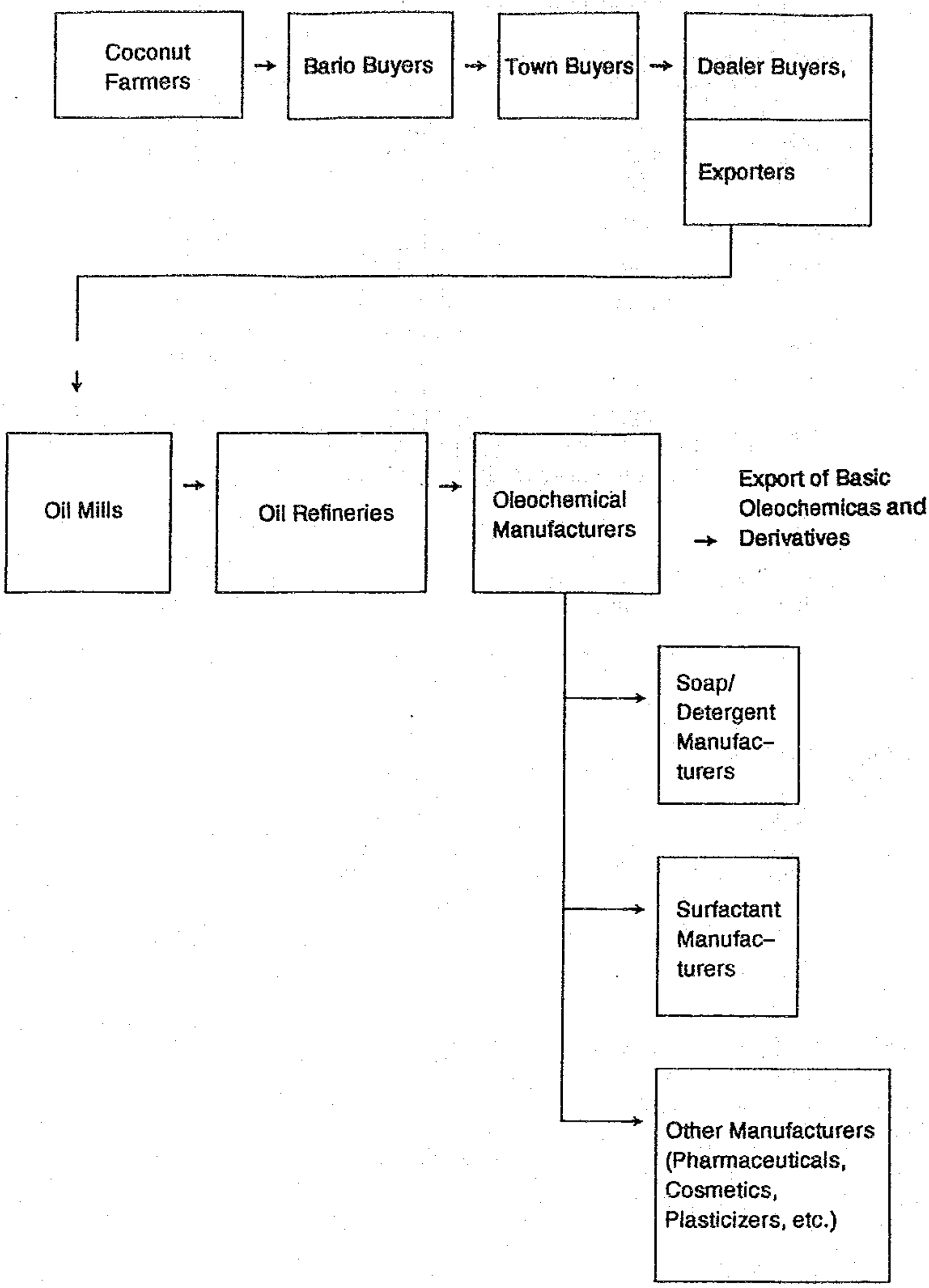
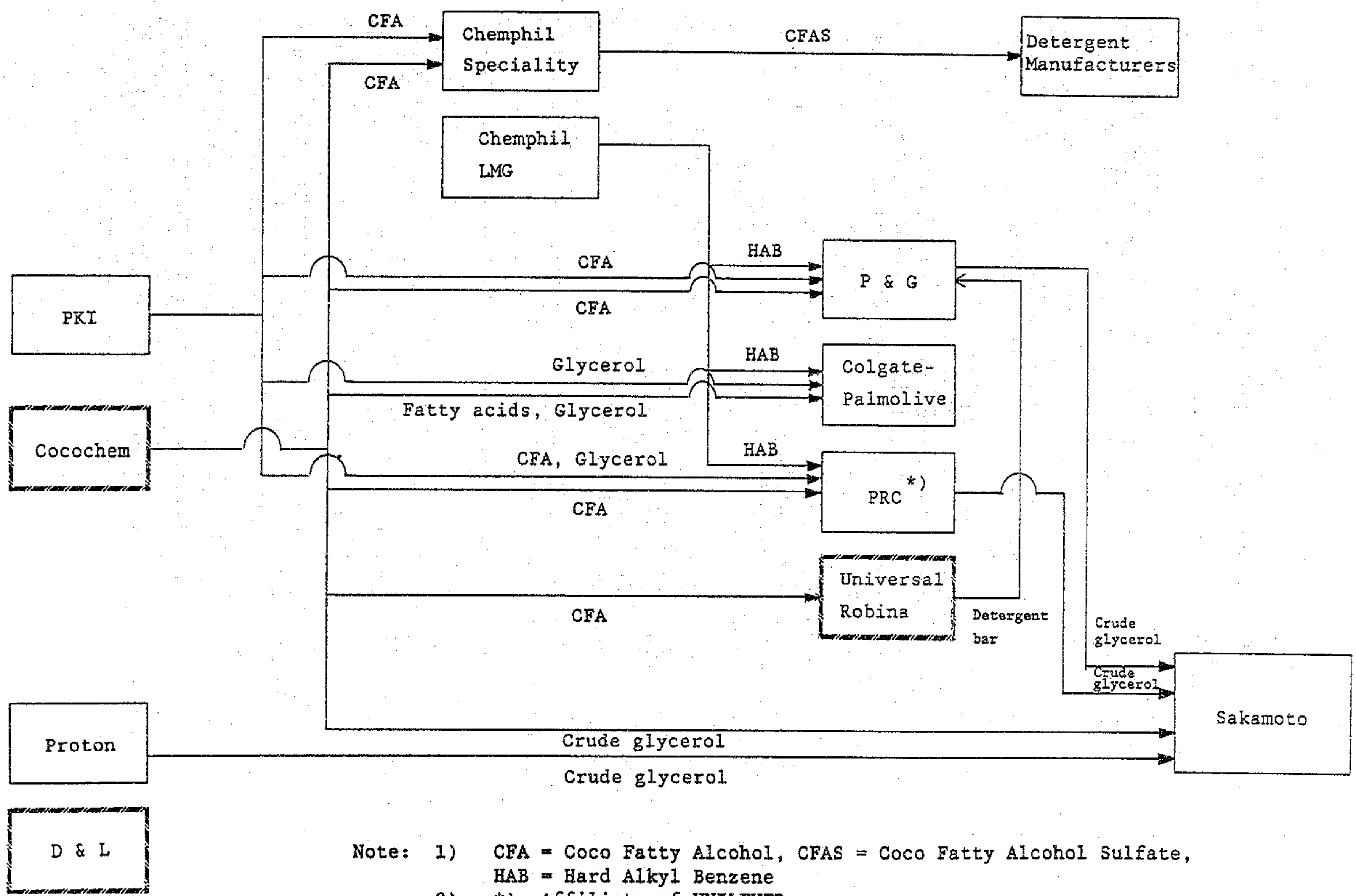


Figure V-3-2: Business Relations among the Philippine Oleochemical Firms



Note: 1) CFA = Coco Fatty Alcohol, CFAS = Coco Fatty Alcohol Sulfate, HAB = Hard Alkyl Benzene
2) *) Affiliate of UNILEVER
3) Shaded blocks mean local capital firms.

4. Development Policies and Programs for Oleochemical Industry

4-1 Development Policies for Oleochemical Industry

(1) Philippine Oleochemical Sector Ten-Year Development Program

The Philippine Oleochemical Sector Ten-Year Development Program was announced in 1988. The program includes analysis of the present state of the industry, strategies, and proposals. The recommendations in the program are as follows.

1. The increase of coconut production in order to stabilize the supply of coconuts and improve farmers' incomes.
2. Elimination of middlemen by improving the distribution system and thereby increasing farmers' incomes.
3. Imposition of export tax for copra and coconut oil.
4. Establishment of a coconut and coconut products R&D center.
5. Establishment of the necessary infrastructure and telecommunications.
6. Development of an education system which emphasizes vocational skills.
7. Adoption of successful working plans using the Malaysian example as a model, including the following:

   - Imposition of heavy tariffs on indigenous crude raw materials.
   - Granting pioneer status to new companies.
   - Establishment of a coconut research institute similar to PORIM.
   - Granting investment incentives such as investment tax allowances.

8. Abolition of PCA and the establishment of a non-political, profesional and industry-oriented agency. The agency should be properly funded and controlled equally by the government and private sector.
9. Efforts to introduce the latest technology.
10. Foreign investment policy to encourage investment based on 50-50 foreign-local equity.
11. Elimination of delays in the release of accrued funds from government agencies to the industry, such as tax refunds and duty drawbacks.

The following are the findings of the field survey regarding development with relation to the recommendations.

1. Increasing coconut production: PCA is in the process of implementing SCFDP (mentioned later). Its results should be observed.
2. Export tax: Based on past experiences, export tax and levies still have an unfavorable image. Some believe that the introduction of these would bring an increase in the cost of raw materials.
3. R&D: Although a coconut R&D network has been established, there are problems such as a shortage of funds and staff at the full-time secretariat.
4. Import tariffs: Under EO470 imports of palm oil, palm kernel oil and coconut oil are taxed at 50%, the highest rate.
5. Replacement for PCA: Although the Speaker Mitra has submitted a bill for the establishment of a Philippine Coconut Industry Development Authority (PHILCIDA), there has been strong opposition to the plan because the body's regulatory and supervisory functions would be even greater than those held by the PCA.

(2) Coconut R&D Network

The Coconut R&D Network was established in order to develop the coconut industry by promoting R&D, particularly the development of manpower for R&D. Preparatory meetings have been held since 1989 and in 1990 the Network was established based on an agreement reached by the 15 organizations listed below.

(Government organizations) 6

Science and Technology Coordinating Council (STCC)
Technical Planning and Review Committee (TPRC)
Industrial Technology Development Institute (ITDI)
Philippine Coconut Authority (PCA)
Board of Investments (BOI)
Food and Nutrition Research Institute (FNRI)

(Private companies and industry organizations) 5

United Coconut Association of the Philippines (UCAP)
Philippine Oleochemical Manufacturers Association (POMA)
Philippine Institute fo Pure and Applied Chemistry (PIPAC)
Twin Rivers Research Center (TRRC)
Pilipinas Kao, Inc. (PKI)

(Universities) 4
University of the Philippines-Diliman (UP-Diliman)
University of the Philippines-Los Banos (UPLB)
Visayas State College of Agriculture (VSCA)
Mindanao State University-Iligan Institute of Technology (MSU)

Fig. V-4-1 shows the organization of the Network. Its activities can be broadly divided into coconut cultivation technology, coconut processing technology improvement and product development, and techno-economic research such as analysis of demand and supply trends and costs.

The issues revealed by the field survey may be listed as follows.

1) Inadequate funds

Although concrete programs for long and short-term activities in each field have been submitted, implementation is difficult because the Network does not have its own funds. Although government organizations are involved in the Network, because it is regarded as a private voluntary organization, no funds are granted directly by the government.

Some measures such as subsidies from UCAP and UCPB or a change in legal status to a government-authorized non-profit organization can be considered, no final solution has been proposed.

2) Lack of full-time secretariat

People from the private sector are voluntarily working as a Network manager while the function of the secretariat is undertaken by ITDI on a voluntary basis. The fill-time secretariat will have to play a more important role as the activities of the R&D Network come on track. For this reason, it is necessary to urgently take measures for securing funds.

3) Coordination of research theme

Among the Network members' R&D activities, ITDI's activities give priority to manufacturing technologies while PCA has its own research themes which focus on agricultural fields. As a result, the two organizations show sometimes different opinions.

Efforts to coordinate their activities are necessary so that the member organizations can be engaged in research activities in their specialized fields and the widespread use of their research results is possible.

(3) Encouragement for Use of Domestically Produced Raw Materials

Under the Marcos regime, a shift toward coconut-based raw materials for the production of detergents was promoted based on Presidential Decree (PD) 1863 and 1872 implemented in 1983. The Aquino regime followed this policy and implemented EO 259 in July 1989.

The order calls for a gradual reduction of the hazardous hard alkylbenzene (HAB) for the purposes of shifting toward coconut oil-based raw materials and saving of the foreign exchange required for imports of HAB. The percentage of coconut oil-based raw materials (fatty alcohols) used increased from 20 percent in the initial stage to 40 percent in the second stage and to 60 percent in April 1990.

According to detergent manufacturers, the shift toward coconut-oil based raw materials was relatively smooth while the ratio was raised to 20 percent. When shifting from 20 percent to 40 percent, however, they faced problems with many defective products. In the process of further increasing from 40 percent to 60 percent, productivity fell significantly. Among detergent manufacturers belonging to the Soap and Detergent Association of the Philippines (SDAP), small and medium-sized firms are lagging behind due to the huge capital investment required to cope with EO 259.

There are two fatty alcohol manufacturers in the Philippines, Cocochem and Pilipinas Kao. Cocochem plans to expand production capacity in a move to meet increasing domestic demand for fatty alcohols. The total exports of BOI-registered manufacturers show that fatty alcohol exports significantly dropped from about 54,000 MT in 1988 to about 39,000 MT in 1990, indicating that a large volume of fatty alcohols which should be destined for export have been going to the domestic market. (refer to Table V-4-1)

One detergent manufacturer blames EO 259 caused an increase in the price of detergents and resulted in a decline in foreign exchange earnings. The firm also says that only fatty alcohol manufacturers are benefiting from EO 259. In this sense, EO 259 seems to have both merits and faults. However, it is reported that a congressman from Mindanao, a main coconut producing area, is preparing legislation calling for 100 percent use of coconut-oil based raw materials. Such bill should be closely watched.

(4) Investment Promotion Policy

According to the 1991 Investment Priorities Plan (IPP), basic oleochemicals including glycerol, methyl esters, fatty alcohols, fatty acids and alkanolamides are classified as non-pioneer which can benefit from exemption from income tax for a four-year period following the start of operations. The field survey indicates that large oleochemical manufacturers are not opposed to new entries. The survey also says that local manufacturers are seeking joint venture partners for the production of derivatives.

In June 1991, a new foreign investment law was formulated under which 100 percent foreign ownership is allowed as long as the foreign investment is not listed on the negative list (transitory list at present). The oleochemical industry is not included on the negative list.

4-2 Past Development Programs and Programs under Implementation

(1) Coconut Industry Levies

During the 1970s, under the Marcos regime, policies for the promotion of the coconut industry and stabilization of coconut product prices were implemented. In addition, coconut levies were introduced to secure funds to implement the policies.

1) Coconut Consumers Stabilization Fund (CCSF)

In August 1973, the Coconut Consumers Stabilization Fund (CCSF) was established based on PD 276. At that time, the main objective of the levies was to stabilize the retail prices of edible oils and soaps because the prices of copra and coconut oil were soaring. In the initial stage, the levy was 150 pesos per MT of copra. Since then, the levy has been raised in line with fluctuations in copra prices and reached 1,000 pesos per MT of copra in the May-November period of 1974.

In April 1974, the CCSF began to be used for a wide range of promotion measures for the coconut industry under PD 414. The CCSF, however, was abolished in May 1980 in the face of problems in collecting the levy due to the decline in farmers' incomes.

2) Coconut Industry Stabilization Fund (CISF)

In December 1981, the Coconut Industry Stabilization Fund (CISF) was set up under PD 1841 to implement development programs for the benefit of coconut farmers. The levies were charged from exporters and oil mills at a rate of 500 pesos per MT of copra and 117.5 pesos per MT of husked nuts.

Later, the levies were lowered to 320 pesos per MT of copra and 75.2 pesos per MT of husked nuts based on PD 1842 implemented in January 1982 because of a decline in international prices. A further decline in prices forced the government to abolish the levies in August 1982.

3) Use of levies

Levies collected during the nine years from August 1973 to August 1982 totaled as much as 9.64514 billion pesos. Table V-4-2 shows the usage of the revenue from the levies, which was mainly administered by the United Coconut Planters Bank (UCPB), the Philippine Coconut Authority (PCA), the Philippine Coconut Producers Federation (COCOFED) and others.

The CCSF and CISF were used for a wide range of programs including integration of oil mills (UNICOM), establishment of UCPB (bank), Cocolife (life insurance) and Cocochem (oleochemicals) and coconut plantation projects. Some of the funds, however, also benefited some politicians.

(2) Plantations

1) Planting/replanting projects implemented in the past

As shown in Table V-4-3, the volume of coconuts produced in the Philippines is on a long-term downturn trend due to typhoons, droughts and the five-year production cycle, despite the expansion of cultivation areas. The production forecast for 1991 by UCAP is still unavailable but an oil mill has forecast a 20 percent decline in coconut production.

PCA implemented a planting survey in 1978 and a crop suitability study in 1981. A nation-wide planting/replanting plan introduced in 1980 saw 24,000 ha of plantation planted or replanted compared to the targeted 30,000 ha. The plan was suspended in 1982 when levies were abolished.

In 1984, typhoons did serious damage to coconut plantations in Mindanao and Visaya. In view of the serious damage, President Marcos implemented the National Coconut Productivity Program which required 118 million pesos in June 1985. The program was suspended in line with the revolution which took place in February 1986. Under the program, 3,700 ha of plantations were planted compared to the target of 10,000 ha.

In August 1987, one year after the establishment of Aquino regime, coconut plantations were again hit by typhoons. As a result, the remaining 62 million pesos carried over from the preceding program was spent for the National Coconut Planting Program. The program began to include not only planting but also fertilization.

Thus, the planting and replanting projects have been characterized by a lack of continuity and failure to produce expected results. Adding to this is the delay in development and dissemination of hybrids by PCA which has triggered criticism of the organization. (refer to Table V-4-3)

2) Small Coconut Farms Development Project (SCFDP)

The World Bank financed the Small Coconut Farms Development Project (SCFDP) for the implementation of programs for planting, replanting, fertilization and intercropping of coconuts. The SCFDP was signed in June 1990 and authorized by the the World Bank under conditions which provide for the formation of a new PCA organizational structure satisfactory to the World Bank, the establishment of a Central Project Operation Unit, and the establishment of a coconut seed garden.

The project calls for replanting of 25,000 ha (9,600 ha for Tall variety and 15,400 ha for hybrids) and fertilization of 348,000 ha in the initial five years. The project will be financed by World Bank loans worth US$121.8 million. A total of 1,641 people of PCA will be mobilized under the project.

As of the end of June 1991, 3,181 ha were replanted with 18,210 ha fertilized. PCA aims to realize harvests of 1.8 MT of coconuts per ha through this project.

4-3 Governmental and Industry Organizations

(1) ASEAN Oleochemical Manufacturers Group (AOMG)

The ASEAN Oleochemical Manufacturers Group (AOMG) was formed by 12 oleochemical manufacturers in the Philippines, Indonesia, Malaysia and Thailand in August 1986. The participated companies in the establishment of AOMG are listed below.

The Philippines:	United Coconut Chemicals Inc., Colgate Palmolive Philippines, Proton Chemical Industries Inc., Pilipinas Kao Inc., D&L Industries Inc.	(5 companies)
Malaysia:	Acidchem (Malaysia) Sdn. Bhd., Henkel Oleochemicals (Malaysia) Sdn. Bhd., Malaysian Oleo Chemicals Sdn. Bhd., Southern Acids (Malaysia) International	(4 companies)
Indonesia:	PT Sumi Asih, PT Cisadane Raya Chemicals	(2 companies)
Thailand:	Imperial Industrial Chemicals Co., Ltd.	(1 company)

The objectives of AOMG include:

- Promotion of cooperation and coordination among oleochemical manufacturers in the ASEAN region
- Coordination and promotion of plans and projects for the development of the oleochemical industry in the ASEAN region
- Strengthening of relationships and cooperation with other regional and international organizations
- Recommendations on policies which will affect the oleochemical industry such as investment incentives, tariff and non-tariff measures
- Information exchanges and consultations regarding issues common to member firms

(2) Philippine Oleochemical Manufacturers Association (POMA)

The Philippine Oleochemical Manufacturers Association (POMA) was formed based on the AOMG initiative. The member firms are the same Philippine firms belonging to AOMG.

POMA's objectives include promoting a shift toward high value-added products, various kinds of information exchanges, human resource development, quality and safety control and exchanges with the American Oil Chemists' Society. As an industry organization, the POMA filed a complaint against the 9 percent import levy. (The import levy was lowered to 5 percent in August 1991). POMA has submitted a request to BOI for the introduction of investment incentives equal to those available in Malaysia.

At the enterprise level, POMA helps farmers in the regions where member firms' factories are located to improve productivity. For example, Pilipinas Kao has made an effort to disseminate results of its R&D activities. Seminars for farmers are being held by Cocochem.

Although POMA has no secretariat, it holds board meetings every quarter.

(3) Industrial Technology Development Institute (ITDI)

The Industrial Technology Development Institute (ITDI) is a public research organization under the Department of Science and Technology (DOST). The functions of ITDI include basic research in each field, testing and inspection, assigned research for the government, universities and companies, practical training of students and the announcement of research results at home and abroad.

The Chemicals & Minerals Dept. is in charge of the research on oleochemicals. The themes of present research are as follows.

1) Commercialization

a) Low-cost laundry soap program

ITDI has given guidance to farmers for the production of detergent bars (9 pesos a bar) from coconut oils using production kits worth 600 pesos. Using this method, 15,000 farmers have started production of detergent bars.

b) Integrated village-level coconut processing

2) On-going

a) Coco methyl ester as diesel fuel substitute
b) Utilization of coconut flour
c) MCT and structured fat
d) Production of sulfated monoglyceride detergent
e) Production of glycerol monoesters
f) Sulfosuccinate ester
g) Quarternary ammonium compounds
h) Production of textile auxiliaries
i) Simulated dairy milk beverages

3) Proposed

a) Laminated coconut husk composite board
b) Synthesis of extreme pressure lubricant additives and viscosity improvers

Although most of the oleochemical research conducted by ITDI is basic research, as mentioned above, ITDI is facing the problem of an insufficient budget for research. ITDI expects continued support (mini projects) from JICA, after programs for the dispatch of experts ended in 1991 following the supply of a building and facilities such as a coconut oil and rice bran oil extraction unit, a molecular distillation unit and a large-scale reactor in 1990 under JICA's grant aid program.

(4) Board of Investments (BOI)

At the Board of Investmens (BOI), the Chemical Dept. is in charge of activities for the oleochemical industry such as the registration of new firms, offering of incentives, monitoring of production and export activities of registered companies. BOI is responsible for the formulation and implementation of rules and the gradual implementation, monitoring and supervision of EO 259.

(5) Philippine Coconut Authority (PCA)

In 1973, PILOCOA, PHILCORIN and CCC were integrated to form the Philippine Coconut Authority (PCA) as a public corporation under the Department of Agriculture (DA). Afterward, PCA became an organization under the president for the promotion of coconut industry development programs. After the Aquino government took office, PCA was again placed under the control of DA.

The Secretary for DA concurrently holds the post of chairman of the PCA. Approval from DA is necessary for the implementation of PCA's programs. PCA is a huge governmental organization with 1,500 employees and an annual budget of as much as 200 million pesos. The financial sources of PCA include registration fees, export processing fees and analysis, inspection and supervisory fees. PCA's budget is separate from that of DA.

The basic functions of PCA range from the varietal improvement of coconuts (including research on hybrids), research on production/cultural management and fertilization of coconuts, plant quarantine (cadang-cadang, in particular), the processing of cocowood and its utilization, technological assistance and various kinds of consultation. PCA has research centers in Albay, Davao and Zamboanga, each of which is engaged in different aspects of the above-mentioned research.

In 1990, PCA announced the Coconut Agricultural R&D Program (10 years) which refers to oleochemicals. Under the program, PCA has chosen oleochemical products such as surfactants/detergents, lubricating oils/greases, biocides, medicines and medium chain triglycerides (MCT) as future research themes for the Philippines.

Table V-4-1: Exports of Oleochemicals

(Unit: Metric Tons, Million US$)

	1988		1989		1990		1991 (1-6)	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Methyl Esters	16,748	11	18,199	11	16,634	7	6,954	2.8
Fatty Alcohols	54,443	55	41,926	48	39,040	40	16,669	18.4
Crude Glycerine	9,977	9	8,901	9	6,192	6	2,057	1.8
Refined Glycerine	3,149	3	2,272	3	5,446	6	4,096	4.6
Fatty Acids	21,710	13	19,128	12	20,396	11	8,081	5.1
Alkanolamides	2,038	2	1,263	2	1,278	1	548	0.6
Others	19,796	8	3,261	3	4,365	7	2,197	8.1
Total	127,861	101	94,950	87	93,351	79	40,602	41.4

Note: 1) Aggregate of exports of BOI registered firms

2) Others; Sulfonic Acid, Acid Oil, Tertiary Amines, etc.

Source: BOI

Table V-4-2: Summary of Levy Collections and Allocations

	Amount (Pesos)	Share (%)
I Total Collections	9,695,139,749.67	100.00
II UCPB Administered Levy Collection	4,753,231,845.13	49.03
1. Coconut Industry Investment Fund (CIIF)	2,572,143,884.69	26.53
2. Insurance Fund	994,941,396.29	10.26
3. Debt Service Fund	38,970,509.40	0.40
4. Coconut Industry Development Fund (CIDF)***	1,147,176,054.75	11.83
III PCA Administered Levy Collection	2,818,167,904.31	29.07
1. Subsidy	2,147,207,603.38	22.15
2. PCA Reseach & Development	242,892,132.30	2.51
3. Premium Duty	173,142,231.78	1.79
4. Additional Equity ON UCPB*	80,864,000.00	0.83
5. Fertilizer Distribution Program	52,521,977.03	0.54
6. Donation to Children's Hospital	50,000,000.00	0.52
7. Ang Tahanang Maharlika	40,000,000.00	0.41
8. Acquistion Price of Controlling Equity Interest	28,880,000.00	0.30
9. Hagemaier Aqueous Coconut Processing Project	2,659,959.82	0.03
IV Cocofed Administered Levy Collection	905,528,789.29	9.34
1. Dist'n of Stock Cert. of UCPB to Coco Farmers	694,833.81	0.01
2. Copra Price Stabilization Fund (CPSF)	144,922,064.14	1.49
3. Development and Socio-Economic Projects for Coconut Farmers	759,911,891.34	7.84
V Others	1,218,511,210.94	12.57
1. Census Committee**	23,000,000.00	0.24
2. Coconut Industry Rationalization Fund		
a) UNICOM - Administered	1,189,735,210.94	12.27
3. Subscription Deposit		
b) Per PCA and COA Report	5,776,000.00	0.06

Notes: *) PCA through PNB as Escrow Agent
**) Committee Composed of Representatives of UCPB, Cocofed and PCA
***) From 1974 to 1978: NIDC: from 1978 up to 1982, when levy was suspended, UCPB

Source: COA Audit Report dated July 2, 1986

Table V-4-3: Philippine Coconut Situation

Year	Area (1,000 has.)	Production (1,000 Metric Tons)
1975	2,280	2,199
1976	2,521	2,742
1977	2,714	2,452
1978	2,890	2,455
1979	3,207	2,015
1980	3,236	2,180
1981	3,224	2,346
1982	3,204	2,172
1983	3,201	2,028
1984	3,223	1,441
1985	3,270	2,051
1986	3,284	2,690
1987	3,252	2,508
1988	3,222	1,894
1989	3,110	1,876
1990	3,112	2,472

Note: Production is total of export, domestic consumption and inventory (copra terms)

Source: Coconut Statistics, Coconut Industry Kit

Figure V-4-1: Organization Chart of the Coconut R&D Network

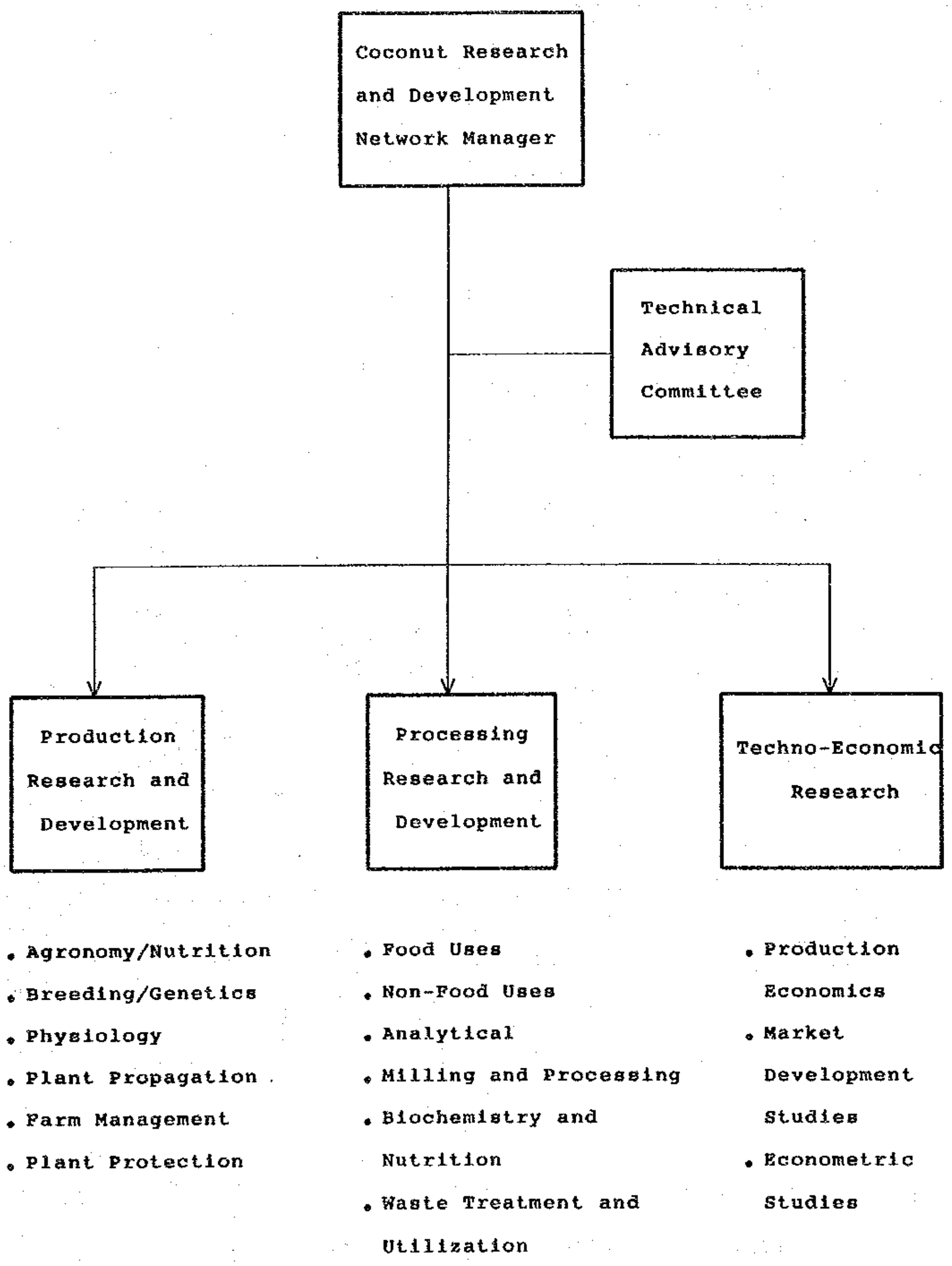


Figure V-4-2: History of the PCA

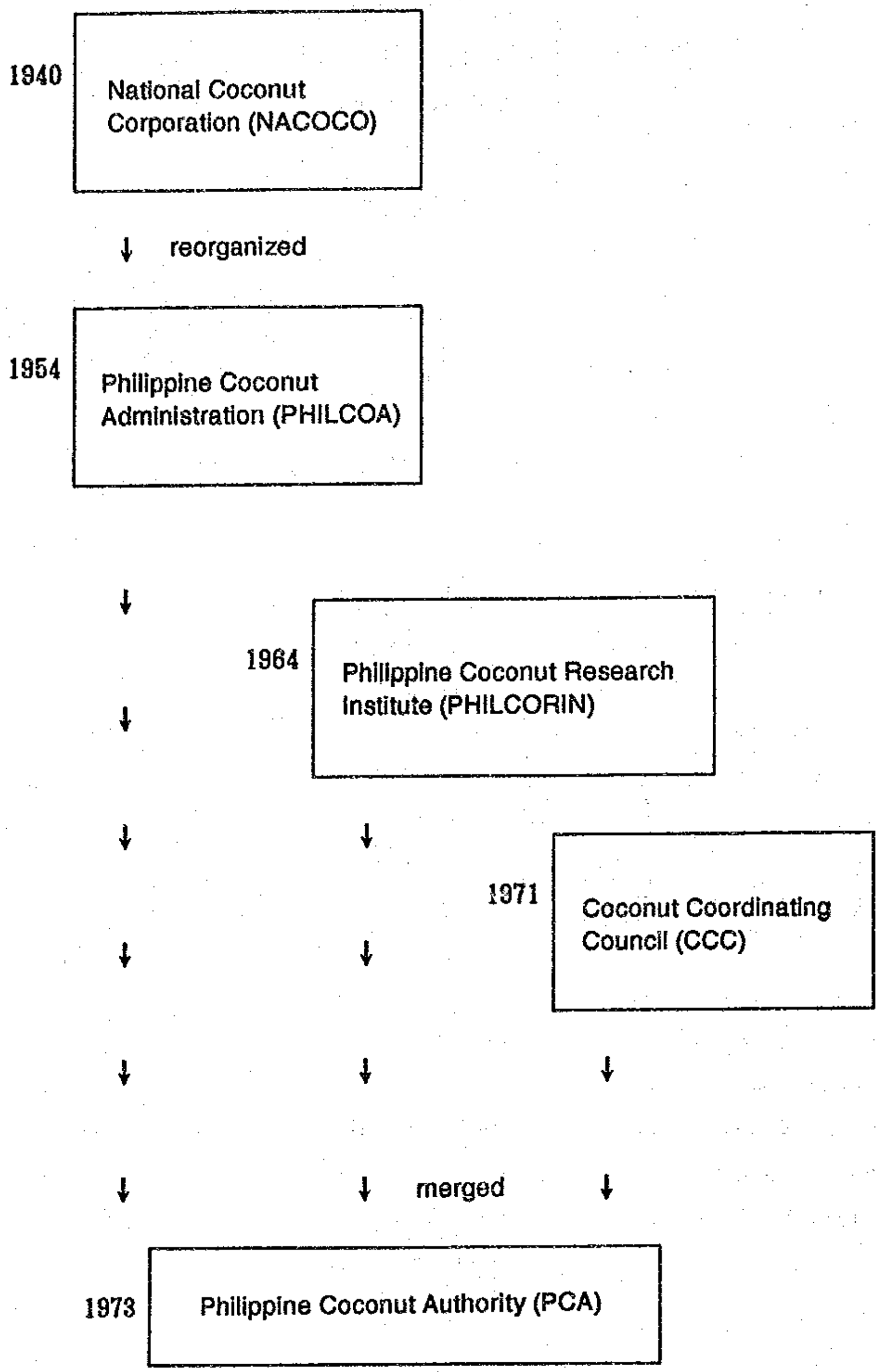
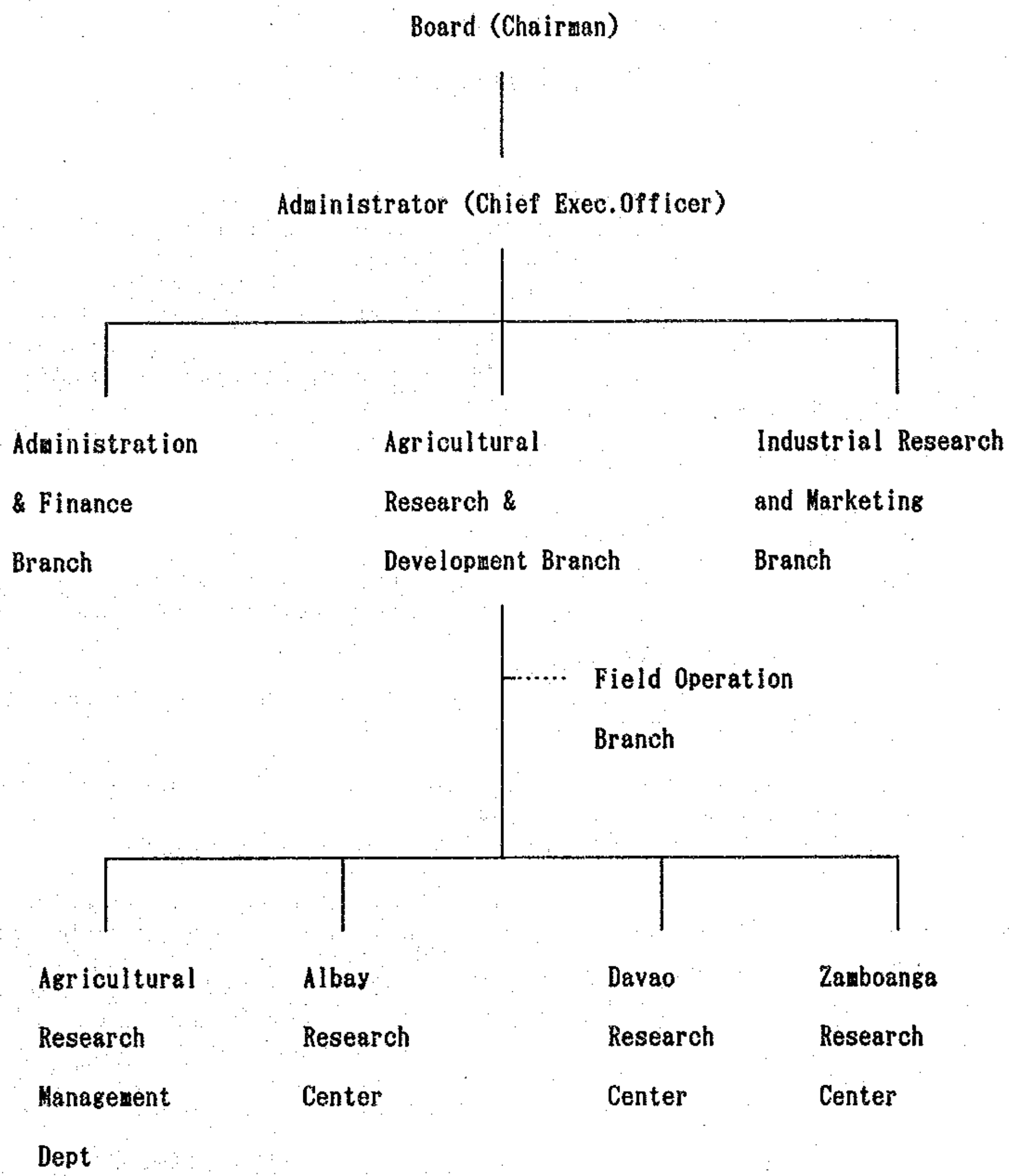


Figure V-4-3: Organization Chart of the PCA (1991)



5. Framework of Development Programs for Oleochemical Industry and Recommendation on Implementation

5-1 Framework of Development Programs

(1) Establishment of Targets of Development Programs

1) Introduction

In the establishment of targets of development programs it is necessary to 1) have a grasp of global trends in demand for oleochemical products and forecast for same, 2) to analyze the international development of the oleochemical industry and trends in trade and 3) research the advantages and disadvantages of the Philippine oleochemical industry. Targets should be based on considerations of how to make the best use possible of the advantages of the Philippine oleochemical industry. Below is a summary of the items examined in the previous chapters as well as an examination of the ways the advantages of the Philippine oleochemical industry may be best utilized.

2) Trends in global demand for oleochemicals

a) Total demand for related products

Demand for oleochemical products is expanding. (refer to chapter one, 1-2 (1)) End-use oleochemical products can be divided into two categories according to use.

1. Household soaps, detergents and toiletries
2. Industrial fine chemicals such as surfactants with surface activity and other functions, additives and stabilizers.

There are differences between industrialized and developing countries in trends in demand for household soaps and detergents and toiletries. In advanced countries demand has almost peaked, demand in developing countries is still expanding steadily.

In industrialized countries, as well as demand peaking, a shift among products can also be seen. Per capita consumption of household soap has already peaked and in some countries is even showing tendencies, of decline. This is because household soap is being replaced with detergents and toilet soaps with other similar products. In regard to the latter, demand for toiletries is growing. Moreover, the transition from laundry soaps to household detergents has run its course. Recently there has also been a reduction in consumption volumes, as a result of the development of detergent concentrates in Japan. However, total demand for these products is gradually increasing as a whole.

In developing countries, demand for household soaps and detergents is increasing as income levels increase.

Demand for industrial fine chemicals is showing rapid increase as industrial structures are upgraded. A wide variety of applications for oleochemicals have already been developed. It would seem that there is also potential for further expansion in demand in this area, in light of the diversity of the functions of oleochemicals. However, consumption volumes of these products are not large, and a large variety of products are produced very small in quantity.

b) Competition with petrochemical products

Competition with petrochemical derivatives exists in the fields of fatty alcohols and glycerol. In 1988 the ratio of global use of natural to synthetic alcohols was 40:60. In 1990 this was 43:57. Natural alcohols are less expensive and it is estimated that ratio of supply of natural to synthetic alcohols will rise to 49:51 in 1995 and 50:50 by 2000.

Natural glycerol, too, has a competitive edge over their petrochemical counterparts. As well as being less expensive, though natural glycerol is a by-product of fatty acids and methyl esters, it is thus easy for them to maintain their competitiveness with synthetic products.

c) Competition with other raw materials

Coconut oil derivatives compete with palm kernel oil derivatives. Palm kernel oils have the competitive edge in two respects. Firstly, whereas coconuts are largely produced by small farmers, oil palms are operated by large scale estates. It follows that rationalization of management is more possible for the latter, and technological improvements of farming may be more effectively implemented. The second is that palm kernel oils are by-products of palm oil production. Thus, even were the market to weaken, in the case of palm kernel oil, it would be relatively easy to take responsive action.

Currently, competition between palm kernel oils and coconut oils is particularly fierce in the field of basic oleochemicals. Development of palm kernel oil based oleochemicals is proceeding as part of palm oil based oleochemicals development. Moreover, more interest is being shown in palm kernel oil than coconut oil, as production of the former is stable and has the advantage of being a by-product.

However, production of palm kernel oil has the limitation of a by-product. Palm kernel oil production is determined by the supply and demand situation for palm oil. Thus, quite unlike coconut oil, it is not possible for it to become a major product. In other words, if production of coconut oil was stable, the share of coconut oil derivatives in the main demand areas would exceed that of palm kernel oil derivatives.

However, this does not mean that coconut oil derivatives will play a role of price leadership in the market. Trends in palm kernel oil will still have the greatest effect on the market. The influence on the market of coconut oil derivatives would only be secondary. Moreover, if the supply of coconut oil was not able to meet increased demand, this would not necessarily bring a greater dependence on coconut oil, but may even simply stimulate efforts to develop alternative sources. It can thus be seen that efforts to improve coconut oil production will be a major determining factor in the future possibilities for coconut oil based oleochemicals.

d)Outlook for coconut oil-based oleochemicals

As has been stated above, though demand for oleochemicals as a whole is tending to increase, coconut oil based oleochemicals face competition from palm kernel oil based oleochemicals and a large number of issues must be solved in order to ensure the future expansion of this industry.

That is to say, because of issues such as low productivity of coconuts, unstable harvests and unclear distribution costs, many plans for expansion of oleochemical production choose palm kernel oil based rather than coconut oil based. Moreover many plants currently using coconut oil are faced with uncertainty about the stability of supply of the necessary quantities of coconut oil, and it is necessary to consider the possibility that there will be a changeover to other oil seeds including lauric acids among these factories.

3) International development in the oleochemical industry

Expansion of production facilities for basic oleochemicals and derivatives has been continuing in accordance with increasing demand for oleochemical products. Basic oleochemical production facilities are concentrated in Malaysia and Indonesia which are producers of palm oil and paln kernel oil. (refer chapter one, 1-2 (5))The only firm planning expansion of production of coconut oil based oleochemicals is the Philippine firm, Cocochem. These projects are promoting under the international division of labor among leading and medium scale oleochemical firms.

In relation with this international division of labor, a shift toward production of derivatives in the raw material producing countries is beginning to appear. Development of fine chemical products is promoting in the major areas of consumption, the U.S., Western Europe and Japan and a concentration of efforts in the area of high value added products can be seen.

4)Issues for the Philippine oleochemical industry

1. Unstable supply of coconut oil and decline of its price competitiveness.
2. Small market size
3. Underdeveloped chemical industry
4. Lack of consistency of measures related to the oleochemical industry

5) Establishment of targets of development programs

a) Examination of prospective products in the Philippines

The competing situation between coconut oil and palm kernel oil has already been examined. It was mentioned that if the current supply situation continues in this way, there is a danger that a relative reduction in the scale of the coconut oil-based oleochemical industry will become inevitable. The conditions surrounding the following coconut oil derivatives are such that equal competing terms with the corresponding palm kernel oil derivatives would be maintainable or that a more stable coconut oil supply would ease such competition.

If conditions correspond to the following, production in the Philippines would be almost impossible.

1. Where bulky products (including products which contain only a small amount of coco chemicals) are to be transported over long distances: In this case transportation costs expand and comparative advantage over production in consumption areas can not be expected.

2. Where production requires a number of raw materials and only a limited number of these are produced in the Philippines: As Philippine oleochemicals depend on the relative advantages of coconut oil. As the development of a balanced chemical industry in the Philippines lags behind other countries, having to procure such materials would weaken the cost competitiveness of the industry.

On the basis of the conditions outlined above, it is considered that the following fields would be helpful in the development of the Philippine oleochemical industry.

b)Expansion of basic oleochemicals production.

It is believed that the following basic oleochemicals should be given priority for production expansion because 1) demand as a whole for those products is expanding, 2) the demand scale in terms of volume is largest, meaning that merit in scale can be expected and raw material producer countries are in a position of comparative advantage, and 3) the value added for the Philippines would be in no way small compared to other products.

Global demand for basic oleochemicals is forecast as follows.

(Units: 1,000 MT)

	Fatty acids	Fatty alcohols	Methyl esters	Glycerol
1995	2,400	1,170	570	390
2000	2,600	1,620	630	420
2005	2,850	2,120	700	450
2010	3,130	2,670	770	475

c) Diversification into mass production derivatives

Fatty acid esters and fatty amines are regarded as mass production derivatives. As these mass production derivatives are followed by a wide variety of derivatives. They can be produced at lower cost in countries producing the raw materials. Prospects of demand is as follows;

(Units: 1,000 MT)

	Fatty esters	Fatty amines
1995	280	480
2000	335	530
2005	400	585
2010	470	615

Note: The following methods were used to make the above forecasts.

1. The scale of demand for final products by 2010 was estimated by multiplying population forecasts by per capita consumption.
2. The scale of demand for basic and intermediate oloeochemicals was estimated by examining the relationship between final products and basic and intermediate oleochemicals in production processes.

d) Promotion of fine chemicals production

In the past fine chemicals themselves were not sold so much as the technology for them. Manufacturers who developed products or applications worked closely with their customers and offered technical services in addition to selling products. Thus when these customers moved their production bases overseas, many fine chemicals manufacturers began supplying to these production bases overseas. However in recent years as well as those customers moving their production bases overseas, production by local firms has also been increasing. Therefore, though in the past where business deals depended on ties with firms from industrialized countries, new types of business relationship has arisen. It follows that diversification of fine chemicals trade in NIEs and ASEAN countries can be expected.

Products on which the highest expectations can be placed are those related to the industries undergoing rapid expansion in these countries.

1. Textile industry
2. Electric and electronics industry

3. Automobile and other transportation industries, automobile repair industry
4. Plastic processing industry

e) Assistance to local firms for small scale production of oleochemicals suitable for the local market and export market

Oleochemical products can be categorized in the following way according to marketing requirements.

1. This group is comprised of products such as toilet soaps, detergents, and toiletries where there are no direct links between the final consumers and manufacturers and it is thus very important to draw consumers to a product at the point of final sale. For the marketing of these products it is thus regarded as necessary to allocate considerable funds for advertising. Where this financial power is lacking, it is very difficult to succeed in this product area. As a result, the leading firms and other fairly large businesses occupy over half this market. Even for large firms looking to enter this market, large investment into introductory advertising is necessary. Returns from such investments are relatively low in comparison to the outlay required. It would be almost impossible for small and medium firms to enter the market.

2. This product group comprises products for which there is very little differentiation according to the manufacturer (eg. metallic soaps, lubricant agents, animal feed) and laundry soaps of commercial use. For these products appropriate price setting and maintaining good relations with customers is the key to maintaining and expanding consumption. Sustaining good relations with customers involves maintaining quality and providing a system of delivery responsive to customer needs.

3. This group is comprised of fine chemicals, and those intermediate products which require compliance with detailed standards. Product development and closely linked joint operations with customers is considered necessary for the marketing of these products. It is thus necessary for manufacturers to establish R&D as well as technical services systems enabling them to respond to such requirements. However, after a certain amount of time some of these products come into more general use, and for some products it is becoming the case that a more general approach can be taken to the marketing of these products.

4. This group comprises basic oleochemicals and mass consumption type intermediate products. Standards for these products are relatively general. However, a large proportion of these intermediate products are consumed by the manufacturers itself. It is therefore considered necessary to conclude contracts before new production begins.

The oleochemical industry in the Philippines is comprised mainly of the operations of leading firms such as Kao, P&G and Colgate, medium sized firms such as New Japan Chemical Co. Ltd, and local firms such as Cocochem. With the exception of Cocochem, most of these firms' products are either for captive use, or sold to parent companies or via sales contract concluded at the time of the establishment of facilities.

Demand for oleochemicals (except for fatty alcohols) in the Philippines is still low, and production for the domestic market is presently beset by difficulties. Despite this it is believed that the industry will be able to supply both the Philippines and the neighboring countries in the future. However, because of the abovementioned marketing features, production looks set to become limited to the following products.

1. Low priced toilet soaps, household soaps and toiletries directed at consumers not particular about brand name
2. Intermediate products for which there is little differentiation

3. Those fine chemicals which have come into general specifications
4. Products based on long term contracts

f) Prospective derivatives for production in the Philippines

There are already a wide range of demand areas for the coconut oil derivatives shown in Fig. V-1-2. As a result of studies on oleochemical development in the Philippines (chapter 1, 1-6 (7)), the following may be said.

1. It is difficult for Philippine firms to begin production of fine chemicals without tieups with foreign firms with advanced technological capabilities due to the many restrictions to which Philippine firms are subject. These include a limited capacity to produce diverse ranges of products in small quantities, to comply with strict standards and delivery dates, as well as a lack of adequate technological systems.

2. It would be more desirable for the Philippines to develop through the expansion of its production of basic oleochemicals, the effective use of fatty acid composition of coconut oil, and the production of derivatives within the capabilities of the industry.

Finding prospective derivatives for production in the Philippines was extremely difficult amid such limitations. Derivatives deemed appropriate by the survey team are outlined in Table V-5-1. The derivatives chosen were those for which 1) fatty acid composition of coconut oil could be used effectively, 2) demand in the domestic and export markets is expected to expand, 3) the use of large volumes of petroleum-based materials is not required, thereby restraining costs, 4) foreign exchanges will be conserved through import substitution, and 5) capital investment requirements are relatively small.

However a number of issues such as manufacturing technology, the procurement of auxiliary materials, and market development methods need to be overcome. There is most certainly a need to research these issues in order to develop the Philippine oleochemical industry based on coconut oil, and respond to global demand.

(2) Basic Perspective on Development Strategies

As is the case with numerous other countries, most Philippine oleochemical manufacturers are joint ventures with overseas firms. Cocochem and D&L are the only major firms of Philippine capital. Both firms basically have the capacity to expand their operations based on their particular management strategies. It follows that as a development strategy it is necessary to provide support for the creation of an industrial environment which allows each of these firms, including those which will enter the industry in the future, to fully demonstrate their capacities. In other words, what is necessary is an industrial environment in which Philippine oleochemical firms may compete on equal conditions with firms in competing countries.

From this standpoint, the following are believed necessary.

1. The provision to existing firms of incentives in line with those offered to firms in competing countries, particularly Malaysia
2. Security of stable supplies of coconut oil
3. Elimination of barriers to new investment from overseas

In areas where it is believed that firms will as a matter of course, or should, make efforts according to their own management plans, development should be left to those firms. However, areas where this cannot be expected, for reasons of the limitations on the Philippine oleochemical industry, should be given separate consideration. On this point, it is often the case that though the Philippines may have a particular need for development in certain areas, little attention will be paid to this as it does not concern the international development of the oleochemical industry. This is due to the fact that most of the oleochemical firms in the Philippines are are either multinational corporations or joint ventures with overseas firms, and activities are carried out fundamentally in accordance with the concerns of these firms. Therefore there is always the possibility that these firms will move their production bases to more advantageous regions rather than expend more of its resources than necessary in the Philippines. Thus it is strongly emphasized that R&D activities based on Philippine needs should be promoted.

(3) Recommendation on Development Programs

As has been mentioned above, the implementation of programs in the following areas is necessary for the comprehensive development of the oleochemical industry in the Philippines (However, the programs are based on the assumption that stability in the supply of raw coconut oil will be achieved.).

1. Improvement of the industrial environment

-The granting of incentives equal to those offered in competing countries.
-Elimination of barriers to new investment.

2. Strengthening of R&D activities.

The strengthening of activities for the stabilization of coconut oil supply is urgently required as a matter which is fundamental to the development of the industry.

5-2 Recommendation on Implementation of Development Programs

(1) Development Stages of Oleochemical Industry and Necessity for Implementation of Programs in Accordance with Stages

The development program assumes the following two stages in the development of the oleochemical industry. It is necessary that each of the development programs be implemented in accordance with the particular development stages.

The first stage is that of drawing the attention of global oloeochemical manufacturers, being accepted as part of their global strategies and developing further as a production base.

However, in addition to this development which depends on manufacturers' global strategies, the Philippine oleochemical industry must also research possibilities for independent industrial development. This would involve the development of fields other than those in which international oleochemicals firms are interested, and to focus still more on coconut oil as a raw material. This is the second stage of development. It is not possible to say how these developments would proceed at present. Oleochemical firms operating on a global scale choose from all types of possible oils and fats those which are most suitable to them. When a material ceases to be the most appropriate, firms opt to use other materials. As coconuts will continue to be a resource for the Philippines despite this, efforts must be made to ensure that this continues to be the most suitable resource for firms. Even if international oleochemicals firms cease to find coconut oil the most appropriate material for their operations, efforts must be made so that it will become this for other firms (for example local firms). This would require conducting R&D activities in the Philippines. (refer to Fig. V-5-1)

(2) Recommendation on Implementation Schedule and Priorities

1) Introduction

Below, short-term programs are programs for which it is desired to start work or start preparations immediately, and projects for which it is desired to start preparations immediately are those which presume further consideration as to necessity, feasibility, profitability, etc. in the process of preparation. Medium and long-term programs are programs for which immediate commencement of work or commencement of preparations are not deemed necessary at the present time, but which are recommended to be started along with the development of oleochemical industry.

2) Short-term programs

a) Projects for which immediate implementation is recommended

1. Granting of incentives equal to those offered in Malaysia.
2. Measures to facilitate imports of raw materials.

b) Projects for which the immediate preparation is recommended.

-Establishment of R&D system (augmentation of each separate theme in the Coconut R&D networks).

3)Medium and long-term programs

-Establishment of R&D system (comprehensive R&D system).

4) Priority project

-Establishment of R&D system: In order to stop the current trend among oleochemical firms of favoring palm and palm kernel oils and see a return to coconut oils, securing a stable supply of coconut oil is of primary importance. This cannot be achieved overnight. The first step in this direction, however, would be to demonstrate to the oleochemical manufacturers the joint efforts being made in the Philippines by government and private enterprise for a revival of industries which rely on coconut oil for raw materials. The establishment of an R&D system is essential not only to the development of the industry as was mentioned above, but also as evidence of the Philippines' positive efforts in this field.

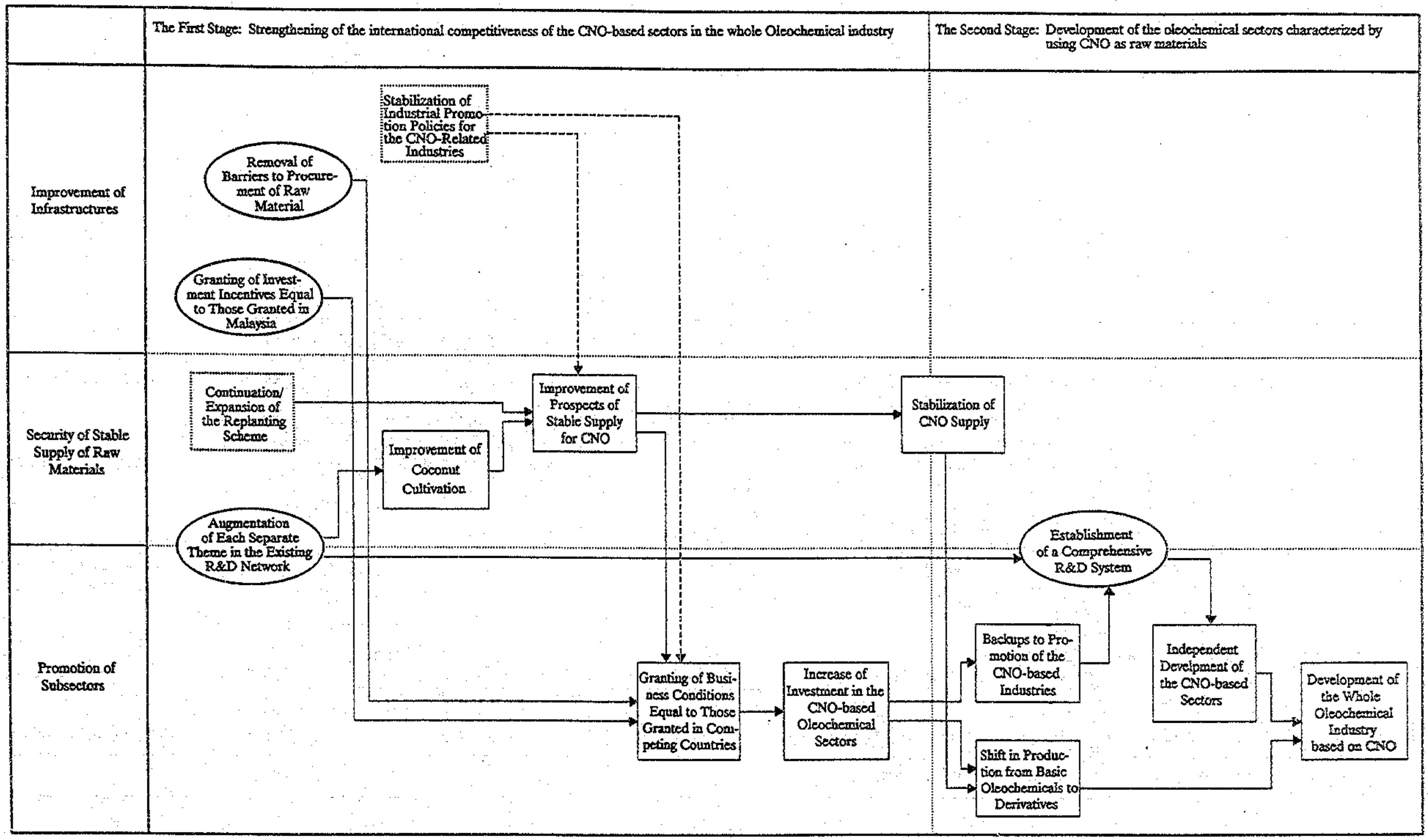
Table V-5-1: Examination of Prospective Oleochemical Intermediates in the Philippines (1)

	Reasons to be Prospective	Problems in the Philippines
Metallic Soaps	- Use of C_8, C_{10}, and C_{12} - Growing demand for plastics (incl. PVCs) in developed countries - Large domestic demand - Comparatively small investment for production facilities	- Close cooperation with agricultural sectors (calcium soaps) - Procurement of calcium hydroxides, plumbum oxides, dibuty l tin oxides, etc. - Introduction of production technologies through foreign firms
Monoglycerides and their Derivatives	- Use of C_8, C_{10}, and C_{12} - Growing demand for food, cosmetics, and toiletries - Increasing use as materials for liquid synthetic detergents - Monoglycerides using lauric acids and myristic acids are 10 degrees lower in the melting point and more easily processed than those from hydrogenated lard oil or soybean oil - Large domestic demand (ex. anti-molding agents) - Comparatively small investment for production facilities - Application of production technologies to other fields incl. synthetic lubricants	- Introduction of molecular distillation technology through foreign firms
MCTs	- Use of C_8 and C_{10} - Growing demand for nutritive/dietetic products in developed countries - Development of production technologies of synthetic MCTs applying lipase in developed countries - Prospective domestic demand - Prospective export demand - Comparatively small investment for production facilities	- Introduction of production technologies through foreign firms (synthesizing methods with no catalysts, quality control, etc.)
α-Sulfo Fatty Acid Methyl Esters	- Production cost can be reduced because of no need for high-pressure catalytic facilities	- More basic researches (use of CNO, sulfonation technologies, stabilization of soda salts, etc.)
n-DOPs	- Use of C_8, C_{10}, and C_{12} (incl. caprylic acids) - Growing demand for gel-use plasticizers in developed countries - Large domestic demand - More competitive in production cost then petroleum-based products - Application of production technologies to other fields (Phenolic/phosphoric/sulfuric anti-oxidizing agents, ultraviolet ray absorbing agents, etc.)	- Lowering of import duties on phthalic anhydrides - Reduction of production cost through technological improvement

Table V-5-1: Examination of Prospective Oleochemical Intermediates in the Philippines (2)

	Reasons to be Prospective	Problems in the Philippines
AEs and their Derivatives	- Growing demand for various products incl. cosmetics, pharmaceuticals, and surfactants - Increasing use as materials for liquid synthetic detergents - Comparatively small investment for production facilities - Application of production technologies to other fields - Large domestic demand	- Lowering of import duties on EOs and AEs
Primary Amines, Tertiary Amines and Quarternary Ammonium Salts	- Use of C_8, C_{10}, and C_{12} - Growing demand in developed countries - Large domestic demand	- Introduction of production technologies through foreign firms - Procurement of phosphoric trioxides, di-methyl amines, quaternizing agents.
Soap Chips/Noodles	- Growing demand in developed countries (for mixing into synthetic detergents) - Establishment of production technologies in the Philippines	- More basic researches - Use of other raw materials than CNO
Alkyl Polyglucosides	- Local procurement of fatty alcohols and starch - Growing demand in developed countries - Comparatively small investment for production facilities	- Introduction of production technologies through foreign firms

Figure V-5-1: Development Stages of Oleochemical Industry and Expected Effects of Development Projects



6. Development Programs for Oleochemical Industry

6-1 Improvement of the Industrial Environment

(1) Incentives Equal to those in Competing Countries

A comparison of investment incentives for the oleochemical industry was made between the Philippines and competing countries such as Malaysia, which produces palm kernel oil, a competitor of coconut oil, and Indonesia, which produces both coconut oil and palm kernel oil. As incentives in Indonesia have been offered exemptions of import duties on facilities and raw materials after a tax reform package introduced in 1984, Philippine incentives are more favorable than those in Indonesia.

As a result, it is more important to compare Philippine incentives with those offered by Malaysia. In Malaysia, the government has granted foreign investors in the oleochemical industry pioneer status under which they have been exempted from corporate tax for a maximum of 10 years. In addition, they have been eligible for an investment tax allowance of up to 100 percent for qualified capital expenditures made within the first five years of operation. However, facing a fiscal deficit, the Malaysian government scaled back incentives under the new investment policy announced in November 1991.

Table V-6-3 shows a comparison of the incentives in the Philippines with Malaysia's incentive scheme which was revised in 1991. In the Philippines, the extension of tax exemption on imported capital goods imported by BOI registered firms, the introduction of net operating loss carry-over and accelerated depreciation and the extension of land leasing periods, etc., are under discussion in the congress.

There have been no new entries by foreign investors into the Philippine oleochemical industry since the establishment of Sakamoto Orient Chemicals in 1990 and if the coconut and oleochemical industries are to be vitalized through the attraction of foreign investment, it is necessary to establish incentives at least equal to those offered by Malaysia and to ensure a stable supply of coconut oil. As Malaysia's incentives have been scaled back, as mentioned above, it is desirable that the Philippine government take this opportunity to improve its incentives including above mentioned extension of import duty exemption and others to a level equal to Malaysia.

(2) Elimination of Obstacles to New Investment

The oleochemical firms all over the world are showing stronger interest in Malaysia and Indonesia. Table V-6-4 shows the main points of their evaluation of the Philippine oleochemical industry.

The greatest concerns for Japanese oil and fat manufacturers are stable supply and prices of coconut oil. The Philippine coconut industry has suffered a decline in production in recent years, hit by typhoons and drought, and it is therefore necessary to take measures to overcome these problems. These measures may include coconut production on more suitable lands, fertilization, replanting and planting of hybrids, etc., all of which are included in PCA's Small Coconut Farms Development Project. Although the project only started as recently as 1991, to alleviate the supply-related uneasiness of oil and fat manufacturers which use coconut oil, it is necessary for PCA to frequently announce the progress of the project at home and abroad.

The recovery in Philippine coconut oil production amidst the rising production of palm kernel oil would result in a temporary decline in the international price of coconut oil. In the long-term, however, the recovery in production would help Philippine coconut oil gain a reputation for reliability as a raw material and would provide an impetus for new entries by foreign investors. This would contribute to the development of the Philippine oleochemical industry.

Table V-6-5 shows a comparison of import duties on raw materials required for oleochemical production. In the Philippines, import duties based are on EO 470. In 1995, import duties on sodium tripolyphosphates and sodium carbonate will be reduced to 20 percent and three percent respectively while import duties on other raw materials will remain unchanged until the end of 1995. The Philippines are reliant on imports for the supply of petroleum-based raw materials because of the absence of petrochemical plants in the Philippines. For example, Philippine oleochemical manufacturers import ethylene oxide, which is required for the production of surfactants, mainly from the United States. If assignment of ethoxylation to neighboring countries and areas such as Singapore and Taiwan for reimportation is more favorable in terms of cost than ethoxylation in the Philippines, it would seem necessary to consider the introduction of preferential import duties for reimportation. Although import duties under EO 470 will be lowered, it is desirable for POMA and other organizations to urge the Philippine government to further reduce import duties in cases where costs resulting import duties levied on raw materials became unfavorable compared to those in competing countries.

6-2 Strengthening of R&D Activities

(1) Establishment of the Coconut R&D Center (Tentative Name)

1) Outline of the project

a) Objectives

In the Philippine coconut industry, production volume and productivity have been declining on a long-term basis. Moreover, the oleochemical industry consumes only seven to eight percent of the total volume of coconut oil produced.

In the coconut industry, PCA is implementing varietal improvements, plant quarantine and development of cultivation technologies, in addition to planting, replanting and fertilization, using loans from the World Bank. Pilipinas Kao is independently developing hybrids.

R&D activities for oleochemicals are being conducted by private firms which are making heavy investments for basic research, new product development and the establishment of production technologies. However, many of the results of their R&D activities are patented. In many cases, disclosures are made only after the patent expires. There are few foreign oleochemical manufacturers which are independently engaged in R&D activities because their R&D activities are closely tied with their parent companies' management and technology strategies.

ITDI has been involved in R&D activities utilizing facilities supplied under JICA's grant aid program and has been receiving guidance from Japanese experts dispatched by JICA. Its R&D activities are confined to research on basic technologies, which will hardly lead to the development of new products.

The project is aimed at fostering R&D activities as same level as PORIM through the promotion of integrated research in coconut-related sectors such as agriculture and industry. Its main objectives focus on contributing to a recovery in coconut production and the development of oleochemicals.

b) Outline

Research should focus on projects which are difficult for an individual company alone to conduct or which can be carried out only in the Philippines. In the selection of research themes, the Philippines should not merely follow the lead of international corporations on a smaller scale. At the current stage, the following can be suggested.

1. Development of new applications for the coconut to reduce coconut oil production costs, including use of husks and nuts as well as use of copra meal for feeds
2. Research on the substitution of coconut oil derivatives for imports in areas where imported products or products using imported raw materials are being utilized. (example: import substitution through reduction of DOP production cost)
3. Research on substitution of domestically available materials, except coconut oil derivatives which are used in the Philippine oleochemical industry.
4. Research on applications for surfactants in Philippine indigenous industries or industrial fields which have been neglected in the industrialized countries (surfactants for the textile industry, anti mold agents, etc.)
5. Development of new applications for alkyls which are not being effectively used. (particularly, C_8 and C_{10} fatty acid)
6. Research on manufacturing technologies for small-scale production of oleochemical products
7. Use of spent catalysts, fatty acids and alcohol residues

It is recommended that these research projects be conducted in line with research and tests on coconut cultivation (in particular, development and evaluation of hybrids) and that they be conducted from the perspectives of the economic effect and usage of coconuts including intercropping.

c) Requirements of project

To realize the objectives of the project, the following requirements must be fulfilled.

1. Consensus among a number of related organizations (government organizations, industries and universities) is required regarding funding, personnel and administrative organizations to implement the project. Under the current circumstances, the Coconut R&D Network may be chosen as the organization to coordinate the promotion activities for the project. The Coconut R&D Network is not eligible for foreign assistance. In this regard, some measures should be taken.

2. Coordination of responsibilities with other existing R&D organizations in the coconut sector will be indispensable. In order to promote the project, the following two options may be considered. The first option is to set up a completely new R&D center and the second is the gradual establishment of an R&D center based on the integration of existing organizations. Taking funds and manpower into consideration, the second option may be more desirable. For the integrated implementation of the project, it is necessary to make use of the results of projects which are already under way with aid from foreign countries such as PCA's SCFDP or ITDI's CMD (Chemical & Minerals Division) and the Soil Research Center's research on soils.

3. In terms of financing, securing operating funds may remain, even if buildings and facilities are financed by foreign assistance. Malaysia's PORIM is financed through sources such as cess, grants from government and sales of palm products. In the case of the Philippines, it would appear difficult to request a large amount from the government in view of the government's fiscal deficit. Some form of funding from the private sector will be necessary. Ways of securing financing through new legislation should be studied, if possible.

d) Reference matters in implementation of project

1. PCA's Coconut Industrial Research and Development Center may be a similar concept. A feasibility study conducted by PCA shows that 136.8 million pesos are required for buildings, facilities and equipment, in addition to a total of 141.8 million pesos for operating costs for five years. As mentioned above, the project is aimed at establishing an R&D system which integrates the R&D activities of the agricultural and industrial sectors. In this regard, coordination with PCA appears to be necessary.

2. Fig. V-6-1 and Table V-6-6 offer a hypothetical case of an R&D center and facility requirements for oleochemicals.

3. The R&D center should function as an international R&D organization like the International Rice Research Institute (IRRI) by adding functions for 1) development of researchers and 2) research exchanges with oleochemical researchers in other coconut producing countries or industrialized countries.

2) Expected economic effects

1. An increase in farmer's income can be expected through research on the improvement of the productivity of coconuts.
2. Through the dissemination of research results, local oleochemical manufacturers can reduce R&D costs.
3. If the project produces research results, positive effects can be expected in exports of coconut products, including oleochemicals, and on foreign investment in the oleochemical sector due to higher international confidence in the Philippine coconut and oleochemical industries.
4. Decline in imports of oleochemicals

3) Recommendations on implementation

a) Implementing

1. Promotion of project: Details should be discussed, mainly by the Coconut R&D Network, to formulate concrete details of the project. DOST will be centered for the promotion of project.

2. Implementation of project: DOST. A promotion council based on the Coconut R&D Network will be established to implement the project. Another detailed feasibility study is necessary regarding the acquisition of land, design of buildings and required facilities. (refer to Table V-6-6 and Fig. V-6-1)

Table V-6-1: Objectives and Development Programs for the Oleochemical Industry

Promotion Objectives	Effective Measures	Development Projects: Granting of Investment Incentives Equal to Those Granted in Malaysia	Development Projects: Removal of Barriers to Procurement of Raw Materials	Development Projects: Establishment of R&D System
	Schedule	A	A	B / C **[1)]
(1) Stable Supply of CNO in Both Volume and Price	1. Continuation/Expansion of the Replanting Schemes Industrial Policies to Promote the CNO-Related Industries			
	2. Improvement of Coconut Cultivation a. R&D for Improving Seeds			×
	b. From Small Farming to Corporate Management			
	3. Rationalization of Distribution of CNO			
	4. Improvement of Quality of CNO			×
	5. Measures to Deterioration of CNO in Distribution			×
(2) Development of the Oleochemical Product Markets/Security of Scale Economy in Production	Improvement of Investment Environment to Make the Most of the Private Sector	×	×	
(3) Removal of Barriers to Procurement of Related Chemicals and Intermediates			×	
(4) Development of Independent R&D	1. Activation of the R&D Network			×
	2. Backups from Private Firms	×		×
	3. Addition of Functions as an International Center for Coconut-Related Studies			×

Notes: . "Schedule" symbols:
A = Should be implemented immediately
B = Preparation should be made immediately
C = Medium to long-term project
** = Key projects

1) "B" means augmentation of each separate theme in the existing R&D network, while "C" means establishment of a comprehensive R&D system.