REGIONAL PLAN HARMONIZATION AND
INTEGRATION STUDIES
No. 1

THE COCONUT INDUSTRY OF ASIA

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FOREWORD

I have great pleasure in writing this foreword to the Study on the Coconut Industry of Asia. The Asian Coconut Community is now an established fact. In its formation the Asian countries have for the first time expressed their firm determination to solve their own problems themselves.

The birth of the Asian Coconut Community would not have been possible had it not been preceded by the painstaking and voluminous research as represented in this study. The success achieved by this study clearly demonstrates the usefulness of well-directed and purposeful research in discovering feasible solutions to the complex problems of economic development. These problems are too complex to be resolved by intuitive action or preconceived notions. It is only through a careful and dispassionate analysis of facts that the clue to this solution can be found.

The credit for the success of this study largely goes to the coconut producing countries of Asia whose active co-operation was obtained through out the period of investigation. My grateful thanks are also due to the United Nations Development Programme for their very liberal assistance and to the United Nations Food and Agricultural Organization for its co-operation and advice.

The study does not claim to be the final word on coconut. It has left many important areas untouched. I believe its main contribution has been in isolating the major problems of the industry and in discovering the most potential line of solutions. I have no doubt that the readers will find the study useful and interesting.

U Nyun
Executive Secretary

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Chapter I
INTRODUCTION

On 8 October 1968 the coconut producing countries of Asia met together at Sala Santitham, the Headquarters of the Economic Commission for Asia and the Far East (ECAFE), to discuss their common problems in order to evolve a concerted programme of action. The present study was prepared with a view to providing this meeting with materials that would enable it to formulate a useful, feasible and acceptable programme of action regarding coconut and to devise a suitable organization to implement it.

The study has drawn heavily on the pioneering work done by the Food and Agricultural Organization (FAO) in this field. In addition to using FAO documentation, the Secretariat has also benefited from personal contacts with FAO experts. The country reports on Ceylon, India, Indonesia, Malaysia, the Philippines, and Thailand, prepared by government officials in these countries have also provided valuable data and information. Awkward gaps still remain; these have prevented the study from being comprehensive and many problems could not be examined in depth for lack of data. For example, the capital structure of the coconut processing industries, their relative efficiency, unit costs and location advantages have not been examined in the report except in broad qualitative terms. Similarly the structure of the final demand and the trend in consumption and industrial uses have also been discussed by and large in qualitative terms. Despite these deficiencies, it is believed that the broad features of the problems relating to coconut have been identified with sufficient clarity so as to permit the focussing of the general issues with adequate precision.

One of the major problems of the industry has been the stagnation of production in the primary stage. The output of coconuts has remained more or less stagnant during the post-war years. It is true there have been some cyclical variations with corresponding changes in prices, but, by and large, these changes have been caused more by weather factors than by any basic change in productivity. Over the long period, the supply has remained short of the potential demand, causing the price for coconut oil to be relatively higher than that for any other vegetable oil. The high demand for coconut oil has been maintained largely because of certain special properties, not possessed by other vegetable oils, which make it indispensable for many industrial uses and for food industries.

The high price, resulting from the shortage in supply relative to demand has, no doubt, enabled the industry to earn a high income and profit. It has, however, brought the danger of substitution much closer.

The danger of substitution of products or of the sources of supply has very much darkened the future of the coconut economy of Asia. The threat has come from two sources: substitutable vegetable oils and synthetics. If the price of coconut oil remains high, the process of substitution will, no doubt, be considerably hastened. On the other hand, if the productivity of coconut plantations and the processing industries can be increased, it will lead to a fall in price, through a fall in cost accompanied by a rise in income of the producers. Increase in productivity would, therefore, be a better solution for the future of the industry than adjustment of high demand to stagnant supply through high prices.

If increase in productivity is the key solution to the problem, the tariff and quota restrictions and high freight charges remain important factors which add to the cost and thus partially share the responsibility for the high price in the importing countries. Copra generally enters the markets of the developed countries free of duty, while coconut oil pays a duty which varies from 8-20 per cent depending on the level of processing. Since the value added by the oil crushing industry is around 10 per cent, the effective tariff imposed on the coconut processing industries in the developing countries is around 100 per cent or more. No wonder, the processing industries are not being developed in the coconut producing countries to the extent of their potentiality despite many natural and economic advantages they enjoy.

No concerted effort has been made by the coconut producing countries to obtain a lowering of the exhorbitant tariffs and the removal of the quota restrictions in the developed countries. If any results are ever achieved it will be only through united and concerted action and not by an individual approach. The scope for getting some preferential concessions for one's country from one or other of the developed countries by offering it some political concession has long been exhausted and it is unlikely that purely political motivations can be exploited further to obtain preferential treatment in the developed countries. It is likely therefore to be more prudent to present a united demand to the developed countries, presenting the case for reduction of tariffs from the point of view of the importing countries as well. For, the lowering of the tariff will not only produce immediate benefits to the

consumers in these countries but it will also be in conformity with their long-run benefit, so that their investment resources will be gradually transferred from less efficient to more efficient industries.

Joint action among the regional countries will be more conducive to better results in the field of trade as well. Not only in external trade but also in domestic trade, a concerted programme of action is likely to produce quicker results. In internal trade, the immediate requirement is a better system of transport, more efficient collection, building of warehouses at points of collection, uniform grading and standardization and credit. In adopting all these measures, a concerted programme will certainly be more fruitful. For example, the supply of credit, the fixing of the grades, the financing of warehouse operations, etc. can be done better if a joint organization undertakes them on behalf of the government or if, at least, the national government can obtain the advice of a specialized organization created by all coconut producing countries of the region.

In foreign trade, the role of a joint organization is obvious. The position of the countries will be considerably strengthened in any bargaining situation, if they can act jointly. Standardization of the export products would be very much facilitated if the countries were to act through a representative organization. Similarly, in financing foreign trade, negotiating with the shippers, or organizing alternative shipping services, introducing a buffer-stock policy or any other policy for price or income stabilization, and in introducing any market specialization (a representative organization) would be immensely valuable.

This report demonstrates the need for co-ordinated and concerted research in coconut. In fact, the survival of the coconut economy depends to a large extent on research. Research is needed to increase agricultural and industrial productivity, to develop new processes and to discover new uses and new markets so that the threat of substitutes can be met and new avenues of development can be found. The major regional effort here would be in intensification of research and in providing finance. Researches in control of diseases and pests, in discovering improved strains, better fertilizers and cultural practices, etc., are the first priority objectives in any development scheme in coconut. Yet the developing countries of Asia cannot mobilize the human and financial resources that are needed for concentrated effort in research. Obviously regional mobilization of resources and national specialization are the best means for maximizing the use of the meagre resources that these countries can spare. Similarly, the investments that are needed for implementing the research findings, such as, replanting by improved seedlings and establishing nurseries for their production, application of improved fertilizers, etc., can be raised more easily by a regional organization than by a single government.

In the sphere of processing, the regional organization of the producing countries can play a very important role in modernizing the plants and establishing further processing industries in the producing countries of the region. In fact it is doubtful if the modernization of the plants and establishment of further processing industries can ever be achieved in the producing countries of the region unless larger markets can be created, at least in the initial stages, by making special arrangements among themselves. By creating larger markets alone they can hope to utilize the modern plants fully and reduce the unit cost to a competitive level by achieving the economies of scale enjoyed by large-scale production.

The critical situation in the coconut industry as brought out in this report and the urgency of concerted action have induced the coconut producing countries of Asia to join together to form the Asian Coconut Community with the motto of 'better research, better marketing and better processing' as the key for the the survival of the coconut economy and for its fullest development.

Chapter II
PRODUCTION

Coconut Products and Their Utilization: Background

The coconut (**Cocos nucifera Linn.**) is one of the widespread tropical crops which provide man with a variety of products which are of economic value in their food and industrial uses. Some of these uses take a position of strategic importance in the world economy as commodities of commercial significance in international trade, while others are only of local interest in the coconut producing countries themselves.

Coconut products derived from practically all parts of the coconut palm may be grouped into: (1) those which come from the meat of the nut and are valued largely for their oil content and used mainly for food or animal feed; (2) the fibrous products which are derived from the husk of the coconut; and (3) miscellaneous products originating from the coconut shell, the leaves, the flowers and other parts of the plant. The first group consists essentially of the meat of the nut in a fresh or dried state and it uses as food and for culinary purposes, and as an important source of oleaginous commodities and their derivatives and by-products (copra, oil, copra meal and cake, dessicated coconut). The second group comprises the coconut coir fibre which is useful mainly in the manufacture of mattings carpets, brushes, brooms, sacks, rubber-coated fibres and hardboards, and in stuffing and padding seats, cushions and mattresses. The miscellaneous products under the third group include the coconut shell charcoal which, after activation, is an excellent absorbent for gases and vapours and can be used as a replacement for coke in smelting metallic ores; the shell itself, which can be used as fuel in native copra-drying kilns, and when finely ground, can be blended with rubber to make a covering for floors and stair-treads; coconut water which is popular as a refreshing drink in many coconut-growing countries and is used experimentally in laboratories for the development of plant tissues on account of its growth-substance content; products from the sap of the unopened inflorescence of the palm (sweet toddy, coconut syrup, crude sugar, alcoholic beverages and vinegar; product from the leaves (baskets, trays, brooms, and roofing materials); and products from the trunk (rafters, posts, troughs, furniture).

Copra is the dried meat of the mature nut from which the moisture content has been largely removed by sun-drying or by artificial heating with the use of smoke or hot air. It is not edible but is useful mainly as the source of coconut oil and its by-products, copra meal and copra cake. As a general principle, copra with a moisture content in the vicinity of 6 per cent produces the optimum amount of oil. The oil content of copra varies in response to several factors like variety, ripeness of the nuts when gathered, interval between gathering and opening the nuts, drying technique used, etc. In the case of copra with moisture content of 5-7 per cent, the oil content is generally between 65 and 70 per cent of the total material. Depending on the size of the nuts and thickness of the meat, the average number of nuts required to produce one metric ton of copra ranges from 3,500 to 6,000 nuts for the medium- and large-sized nuts and from 1,000 to 11,000 nuts in the case of the extremely small nuts.[1]

Coconut oil may be produced from fresh, undried meat (via coconut milk), or from copra, either from pressing (single or multiple) or by solvent-extraction methods. The principal uses of coconut oil are for edible purposes (the manufacture of margarine, cooking oil and shortening) and for industrial usages (the manufacture of soap, fatty alcohols, plasticizer, detergents and explosives). Its value in these uses is chiefly due to its pecular chemical properties which are quite distinct from those of other fats and oils: it has less tendency to become rancid than other oils; it has a high melting point (76°F) which makes it definitively an oil (i.e. a liquid glyceride) in tropical climates; it contains more than 40 per cent solids at 50°F. and, having a consistency similar to butter, is made into margarine and is useful in the manufacture of confectionery and bakery products.[2] The density of coconut oil is 0.925 at 15°C. Its unusually high saponification value (250 to 260) and very low iodine number (8 to 10) result from its fatty-acid composition, the principal acids present being the saturated one of lower molecular weight (lauric acid and myristic acid)[3]. This composition of coconut oil notably its lauric acid content which confers good lathering properties in soap, shampoo and shaving cream, makes it exceedingly useful in the soap industry. The ability of coconut oil to combine with alkalies or caustic soda even in ordinary weather make it most widely used oil for the manufacture of cold-process soap on a cottage-industry

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[1] Yan Fremond, Robert Ziller and M. de Nuce de Lamothe, *"The Coconut Palm"*, International Potash Institute, Berne/Switzerland (1966), pp. 16-21.

[2] George L. Hicks, The Philippine Coconut Industry: *Growth and Charge, 1900-1965*, Field Work Report No. 17, Centre for Development Planning, National Planning Association (June 1967), pp. 1-6.

[3] Yah Fremond, Robert Ziller and M. de Nuce de Lamothe, *ibid.*, pp. 175-177.

basis.[4] Coconut oil also contains glycerine, a substance used in the manufacture of explosives.

Copra meal and cake are the by-products of coconut oil extraction. There are in general two kinds of these by-products presently marketed: those obtained by pressure alone and those obtained by solvent extraction. Copra meal of the first kind has an oil content of about 5 per cent. With solvent extraction the oil content of the meal generally does not exceed one per cent (usually 0.4 - 0.8%), since much of the oil is already removed by a preliminary pressing. Commercial copra meals in general have a moisture content of the order of 9-10 per cent. The crude protein content of copra meal, hardly exceeding 20 per cent, is distinctly lower than that of other oilseed cakes and meals like peanut, soybean and linseed. Copra meal and cake, especially those obtained from expeller extraction, are used mainly as animal and poultry feed and as an ingredient in the manufacture of fertilizers. They give good results as component of the supplementary rations given to cows at grass, and quite generally, to fattening animals which require to have a firm body-fat and do not want too much protein in their diet[5].

Dessicated coconut is the shredded dried meat of coconut. It is very acceptable all over the world, in making cakes, cookies, pastries, candies and other confectionery products, because of its pleasant taste and aroma which go along with a nutrient content similar to that of copra.

Ecological Requirements

Coconut is grown in different parts of the world but the greater concentration of its cultivation as an economic crop may be found over a large proportion of the coasts and islands of the tropics, where ecological conditions are favourable to the growth and yield performance of the coconut palm. According to agricultural authorities,[6] the essential environmental factors that affect coconut growing are climate (rainfall, temperature, sunshine, humidity and wind) and soil, and that the influence of these factors on the cultivated plant is very closely linked with each other. These authorities suggest that the following are imperative conditions for coconut to be an economically worthwhile crop.

An even distribution of rainfall is more desirable for coconut production than a climate marked by pronounced wet and dry seasons. With about 60 inches (1,500 mm.) of rainfall spread very uniformly throughout the whole year, the coconut does not suffer from drought. Unless the ground itself can maintain the supply of moisture, it is generally considered that the most that can be tolerated is not less than 5.1 inches (130 mm.) of rain per month, with a dry season (less than 2 inches of rainfall per month) not longer than three consecutive months. Otherwise, the lack of moisture will be reflected in a reduction in yields. On the other hand, too much rain would also be harmful. Long rainy periods would make the coconut palms suffer from a lack of sunshine, interfere with pollination, and saturate the soil, or may cause leaching of mineral elements of the soil or even erosion.

The coconut palm requires a temperature that is not only high but also as constant as possible. A mean temperature of 27°C (80°–81°F) is regarded as optimum, and a mean of 20°C (68°F) for any month is considered as the lower limit which should be crossed as infrequently as possible, since excessive cold even for a very short duration upsets the fruiting of the coconut plant. It is temperature that limits the boundaries of coconut production in respect to altitude. Coconut thrives best below an elevation of 1,500 feet, but some are grown at an altitude of 2,000 feet. Yield tends to decline as altitude increases.

A long period of insolation (hours of sunshine), especially in the last months of ripening of the nuts, is conducive to the formation of larger amounts of meat in the nuts. There is no upper limit for hours of sunshine but it is suggested that 2,000 hours per year and 120 hours in a month, (as recorded by the Campbell solarigraph) should be the levels below which light becomes a limiting factor in coconut production.

The coconut palms prefers warm and humid climates. If a constantly very high humidity is not desirable, excessive dryness of the air, which causes premature dropping of the nuts, among another effects is equally unfavourable. The recommended relative humidity of the atmosphere is between 80 and 90 per cent, with the monthly means not falling below 60 per cent.

Because the coconut is generally an allogamous plant, (i.e. it reproduces by plant-to-plant cross-fertilization), wind plays an important part in the dispersal of pollen and the fertilization of the flowers. However, winds of great violence, such as those characteristic of typhoons or hurricanes, do much damage to coconut plantations.

Nearness to the sea is not absolutely necessary, but due to its influence in regulating the climate, it becomes also a favourable factor for coconut growing.

[4] Alejandro R. Apacible: The coconut industry and the need for a coconut research institute, *Sugar News*, Vol. 43, No. 9 (September 1967), pp. 545-546.

[5] Yan Fremond, *et. al., op. cit.*, pp. 177-178.

[6] Leopoldo B. Uichanco, *Philippine Agriculture*, Vol. 1, University of the Philippines, College of Agriculture (1959), pp. 208-222; and Yan Fremond, *et. al., op. cit.*, pp. 56-58.

A fertile deep open soil that is aerated and adequately drained, with a minimum depth of 30 to 40 inches is particularly suited to the coconut. Although coconut palms thrive on sandy beaches and alluvial and sandy loam soils because of the capacity of these soils to hold circulating water and the constant but not stagnant water supply, they grow best on soils of volcanic origin. But the coconut has considerable power of adaptation to heavier soil textures, especially if such heavy soils become neither anaerobic for long periods, nor dry out too much. The presence of a hard pan or any slab-like feature in the soil is highly prejudicial, since it serves as a barrier both to the advance of the roots and to the movement of water.

If natural factors have a direct influence on the growth and productivity of the coconut palm, the part that management, in terms of improved cultural methods, better manuring and used selection, can play cannot also be overemphasized. A coconut plant generally begins to bear fruit after six to eight years, and full production is reached in a 15-20 year period.[7] Through selection and proper maintenance, however, the palm can be made to come to bearing earlier. To maximize nut production, scientific cultivation, including fertilization, cover cropping, and proper distance of planting, should be followed.[8] Fertilizers help increase productive capacity and make the plants resistant to diseases. Cover crops are useful in reducing soil erosion, in providing nitrogen to the soil, in making the soil more porous, and in keeping the soil cool. The planting of catch crops can improve the condition of the soil, but some catch crops deplete the soil and compete with the coconut palms either for the soil's reserves of moisture and plant nutrients, or for sunlight. Experience gained in many countries has shown that cultivating the soil has a beneficial effect on coconut yields, provided one digs neither too deeply nor too frequently.[9] Shallow cultivation has a useful pruning action, cutting a certain number of roots and acting as a stimulus to the root system, and giving an opportunity for the burial of organic matter. There is an optimum number of coconut palms per hectare for any given set of soil and climatic conditions. The closer the distance of planting (or the more trees planted per hectare), the lower the yield per unit area (or the fewer nuts produced per bearing tree), assuming that climatic and soil conditions are the same.

Economic Importance

The coconut industry occupies a position of paramount importance in the agricultural economies of a number of developing countries of the world, particularly in Asia and Oceania. The coconut is one of the world's major sources of vegetable oil and oilcake. Out of the total world production of coconuts, estimated at about 27 billion nuts, some 3.3 million metric tons of copra and 1.2 million metric tons of oil were produced.[10] Among the different types of oils and fats produced in the world, coconut oil takes seventh place, on the basis of 1961-67 average output, accounting for about 6 per cent of the total production of all kinds of fats and oils (Table II.1). Exports of coconut oil and copra in terms of oil represented about 60 per cent of the total output of coconut oil.[11] Coconut oil exports alone averaging 472,000 metric tons and valued at about U.S.$126 million, comprised 13 per cent each of the total quantity and value of exports of vegetable

Table II.1. Relative importance of Coconut Oil in the World Production of Fats and Oils, 1961-67 Average

Oil or fat	Production 1,000 metric tons	Per cent of world total
1. Butter and ghee (fat content)	4,592	13.25
2. Lard	3,900	11.26
3. Tallow and greases	3,841	11.08
4. Soybean oil	3,519	10.16
5. Groundnut oil	2,376	6.86
6. Cottonseed oil	2,163	6.24
7. Coconut oil	2,116	6.11
8. Sunflowerseed oil	2,007	5.79
9. Olive oil	1,373	3.96
10. Palm oil	1,246	3.60
11. Rapeseed oil	1,042	3.01
12. Linseed oil	1,024	2.96
13. Fish and seal oil[a]	719	2.08
14. Sesameseed oil	410	1.18
15. Palm kernel oil	397	1.14
16. Castorseed oil	276	0.80
17. Whale oil[b]	235	0.68
18. Corn oil	208	0.60
19. Babasser oil	62	0.18
20. Tung oil	32	0.09
21. Oiticica oil	15	0.04
22. Miscellaneous fats and oils	293	0.85
Total, excluding China (Mainland)	31,846	91.92
China, Mainland	2,800	8.08
World total	34,646	100.00

[a] Excludes fish liver oil.

[b] Excludes sperm oil.

Source of basic data: FAO, *Coconut situation*, Nos. 14-19.

[7] Robert E. Huke, *Shadows on the Land*, Manila, Bookmark, Inc. 1963, p. 273, *as cited* in George L. Hicks', *The Philippine Coconut Industry: Growth and Change, 1900-1965*, Field Work Report No. 17, Centre for Development Planning Association (June 1967), pp. 1-6.

[8] Yan Fremond, *et al., op. cit.*, pp. 126-130.

[9] Yan Fremond, *et al., op. cit.*, pp. 126-130.

[10] Average for 1962 to 1966, computed from FAO data in *Production Yearbook*, 1967, No. 21.

[11] Average for 1964 to 1967, computed from FAO data in *Coconut Situation*, No. 19.

oils in 1962-66 (Table II.2). Exports of copra on the average of 1.5 million metric tons valued at approximately U.S.$252 a year in 1962-1966 were 12.6 per cent and 16.6 per cent, respectively, of the total volume and value of exports of important oilseeds entering the international market. For the same period, exports of copra cake and meal, amounting to about 447,000 metric tons with an average value of U.S.$27 million a year, represented 5.9 per cent and 4.6 per cent, respectively, of the total quantity and value of world exports of oilseed cake and meal and other vegetable residues (see Table II.2 also).

In countries where coconut is an important crop, the coconut industry provides the means of livelihood to millions of people representing not only the primary producers of the crop but also those engaged in industries developed around the production, processing and marketing of coconut products. It also contributes a substantial share to the gross domestic product and export earnings of the countries concerned.

In the *Philippines,* the economy and well-being of about one-third of the total population, or roughly 10 million people, is dependent upon the development of the coconut industry.[12] The contribution of the coconut industry as a whole to the national income in 1966 was estimated at 1.92 billion pesos, or about 10.3 per cent.[13] For several years now, the industry has consistently maintained its position as the No. 1 earner of

[12] Alejandro R. Apacible, *op. cit.,* pp. 541-547.

[13] Mariano P. Ramiro, "Philippines: Study on Regional Plan Harmonization of the Coconut Industry" (Country Study), pp. 3-4.

Table II.2. Share of Coconut Products in the World Export Trade of Oilseeds of Vegetable Oils, and Oilseed Cake and Meal, 1962-66 Average

	Quantity 1,000 metric tons	*Per cent of total*	*Value in million US$*	*Per cent of total*
Export of oilseeds:				
Soybeans	6,182	51.8	649	42.9
Copra	1,503	12.6	252	16.6
Groundnuts (shelled basis)	1,456	12.2	268	17.7
Palm nuts and kernels	669	5.6	94	6.2
Linseed	612	5.1	75	4.9
Other oilseeds	1,519	12.7	176	11.7
Total	11,941	100.0	1,514	100.0
Export of vegetable oils:				
Soybean oil	648	18.6	171	17.7
Palm oil	620	17.8	128	13.3
Coconut oil	472	13.5	126	13.0
Groundnut oil	403	11.6	130	13.5
Sunflower-seed oil	356	10.2	99	10.2
Linseed oil	270	7.7	55	5.7
Cottonseed oil	237	6.8	66	6.8
Other vegetable oils	483	13.8	191	19.8
Total	3,489	100.0	966	100.0
Exports of oilseed cake and meal and other vegetable oil residues:				
Soybean, cake and meal	2,386	31.4	213	36.4
Groundnuts, cake and meal	1,571	20.7	121	20.7
Cottonseed, cake and meal	894	11.8	61	10.4
Linseed, cake and meal	675	8.9	53	9.0
Copra, cake and meal	447	5.9	27	4.6
Sunflowerseed, cake and meal	296	3.9	19	3.2
Other oilseed cake and meal and other vegetable oil residues	1,331	17.4	91	15.7
Total	1,600	100.0	585	100.0

Source of basic data: FAO, *Trade Yearbook,* 1967, Vol. 21.

the country's foreign exchange. In 1966, exports of coconut products valued at 1.15 billion pesos, represented about 35 per cent of the total value of exports of the Philippines. In terms of hectarage, coconut is third in importance, next to rice and corn, with about 1.6 million hectares or approximately 20 per cent of the country's total area under cultivation.

It is estimated that the coconut industry in *Indonesia* provided employment to at least 500,000 people.[14] The value of copra represented about 2 per cent of the net national product and about 29 per cent of all commercial crops in 1960-65. Exports of copra and copra cake averaged about 3.65 per cent of the total exports of Indonesia in 1960-66 or about 5.48 per cent of the value of all exports excluding oil. Coconut is second to rubber as a principal cash crop in terms of total area; about 1.72 million hectares or 37 per cent of the total area planted to principal cash crops were devoted to coconuts. More than 75 per cent of the Indonesian vegetable oil supply is produced from coconuts and copra.

In *India,* it is reported that about one-third of the population of Kerala State, the country's principal coconut growing State, is dependent upon the coconut crop in one way or another for their livelihood and sustenance.[15] Coir making alone, which is an important cottage industry in that State, is estimated to provide employment to as many as 600,000 people. Income from the coconut crop represents roughly about 2 per cent of the agricultural income of the country, while its contribution to the national income is approximately one per cent. While coconuts and important coconut products such as copra and coconut oil do not figure in the export trade of India, as the indigenous production is not sufficient even to meet the internal demand, foreign exchange amounting to about 150 million rupees annually is earned from the export of coir and coir manufactures and coconut oil cake. The total area under coconut in India is estimated at about 908,000 hectares, or less than one per cent of the total arable land area.

The total work force supported by coconut in *Ceylon* including workers engaged in cottage industries based on coconut fibre would be approximately 110,000.[16] The contribution made by the coconut industry to the country's gross national product amounting to 617.5 million in 1965 was 8.3 per cent. Coconut accounted for nearly 16 per cent of the total output of the agricultural sector in the economy of Ceylon and 18 per cent of that of the manufacturing sector. Exports of coconut products in the amount of 331.5 million rupees comprised 17.3 per cent of the total export earnings of the country in 1965 and ranked second, after tea, as a major foreign-exchange earner for the country in that particular year, although in most years rubber is the second highest export earner. Revenue earned by the Government from the coconut industry in the form of export duties, excise, profits from the sale of coconut arrack and tavern rents and licence fees for sale of liquor, amounted to about 104 million rupees in 1965/66, representing nearly 6 per cent of total Government revenue. Next to paddy, coconut occupies the second largest area of the cultivated land under principal crops in Ceylon. The total acreage under coconut is estimated at 1.15 million acres or about 27 per cent of the cultivated land area planted to principal crops, compared to 1.27 million acres for paddy.

In *Malaysia,* the contribution of the coconut industry to the national economy is relatively small, and in recent years has been declining in importance as a result of reduced level of production and exports.[17] Total employment on coconut estates fell from 6,700 in 1963 to 5,300 in 1965. Coconut oil mills accounted for only about one per cent of the total employment in the manufacturing sector in 1965 and 1966. Total sales value of these mills represented about 4-5 per cent of the gross sales in the manufacturing sector. The contribution of coconut estates and small holdings and coconut oil mills to the country's gross domestic product at factory cost averaged 0.9 per cent during 1964-66. Similarly, the contribution of coconut products to gross export earnings has also been less than one per cent during the same period. In terms of area, coconut is the third largest crop in Malaysia following rubber and rice, occupying about 691,000 acres in 1966 compared with 645,000 acres in 1961.

The contribution of coconut to the agricultural product and gross domestic product of *Thailand* is also small, being 3 per cent and less than one per cent, respectively in 1963-65.[18] Coconuts and coconut products are only a very minor item in the international trade of the country; the export value of coconut products in 1965 was less than 15 million baht, whereas the total value of all exports was 12,339 million baht. However, coconut occupies a prominent place in the diet of the Thai people, considering the fact that one out of four or five dishes in the commonfolks' meals of the day is usually prepared with coconut milk, and coconut is an important ingredient in 70-80 per cent of Thai desserts and bakery products.

[14] Arsjad Anwar and Moh. Sisman, "Country Study on Coconut and Other Oil Seeds", p. 6.

[15] Government of India, Ministry of Food, Agriculture, Community Development and Co-operation, "Country Study on the Regional Plan Harmonization and Economic Co-operation in Coconuts", New Delhi, 1968.

[16] Ceylon: "Country Study on Coconut", p. 5 (Mimeo.), 1968.

[17] Malaysia: "The Coconut Industry in the Economy of Malaysia" (Country Study), Mimeo., 1968.

[18] Sura Sanittanont, *"Thailand's Coconut"*. (Country Study of Thailand), Mimeo., 1968.

Table II.3. Estimated Area Planted to Coconut, Selected Countries, 1963

Country	Average (million acres)	Per cent of total
Asia		
Ceylon	1.10	8.0
India	2.08	14.8
Indonesia	3.84	27.4
Malaysia	0.65	4.6
Philippines	3.44	24.6
Thailand	0.56	4.0
Viet-Nam, Rep. of	0.11	0.8
Others[a]	...	...
Sub-total	11.78	84.2
Oceania		
Fiji Islands	0.16	1.1
French Polynesia and Solomon Islands	0.20	1.4
New Hebrides, West-Samoa and Tonga	0.19	1.4
New Guinea and Papua	0.35	2.5
Others[a]	...	...
Sub-total	0.74	6.4
Americas		
Brazil	0.20	1.4
Mexico	0.20	1.4
Trinidad and Tobago	0.06	0.4
Others	...	...
Sub-total	0.46	3.2
Africa		
Mozambique	0.18	1.3
Tanzania and Seychelles	0.13	0.9
Others[a]	...	...
Sub-total	0.31	2.2
.... Rest of the world[b]	0.55	4.0
Estimated world total	14.00[b]	100.0[b]

Sources of data: Country Studies of Ceylon, India, Indonesia, Malaysia, Philippines and Thailand. U.S.A.I.D. Viet-Nam, Annual Statistical Bulletin, No. 10, June 1967. Yan Frémond, Robert Ziller and M. de Nucé de Lamothe. *The Coconut Palm*, Berne/Switzerland International Potash Institute, 1966, pp. 69-80.

[a] Included in "rest of the world".

[b] Rough estimates only.

Major Producers of Coconut and Coconut Products

While the coconut palm is found growing in widely scattered areas of the world, the major producing regions are concentrated mainly in Asia and Oceania. On the basis of rough estimates of area planted with coconut[19], about nine-tenths of the total world coconut acreage is in these two regions, with Asia accounting for more than 80 per cent of the total area under coconut for the whole world (Table II.3). The ten countries with the largest area planted with coconut in 1963 were Indonesia (3.8 million acres), the Philippines (3.4 million acres), India (2.1 million acres), Ceylon (1.1 million acres), Malaysia (0.65 million acres), Thailand (0.56 million acres), New Guinea and Papua (0.35 million acres), Mexico (0.20 million acres), Brazil (0.20 million acres) and Mozambique (0.18 million acres).

More than four-fifths of the total output of coconuts and copra is produced in the region of Asia and the Far East, based on the annual average production for 1962-66, while about 7.5 per cent of total production is accounted for by the Latin American countries, 6 per cent of coconut production and 8 per cent of copra output by the countries in Oceania, and 5 per cent and 3 per cent, respectively, by African countries. (Table II.4). As may be seen in Table II.5, the Asian countries also supplied close to 80 per cent of the total world exports of copra, coconut oil and copra meal and cake and 95 per cent of the exports of dessicated coconut. Imports of coconut products into Asia were less than 15 per cent of the world total.

The ten leading coconut-producing countries of the world are the Philippines, Indonesia, India, Ceylon, Malaysia, Thailand, Brazil, New Guinea and Mozambique (Table II.6). It will be noted that six of the ten major producers of coconut are from the Asian region, two from Latin America and one country each from Oceania and Africa. In the aggregate, these ten leading countries altogether accounted for 88 per cent of the total world coconut production, 90 per cent of the copra output, 85 per cent of the volume of copra exports, 80 per cent of the exports of coconut oil, and about 95 per cent of the exports of dessicated coconut, in 1962-66.

The Philippines is the largest single producer and exporter of coconuts and coconut products in the world, comprising 26 per cent of the total coconut production, 44 per cent of the copra production, 60 per cent of the copra exports, 48 per cent of the exports of coconut

[19] "It is very difficult to arrive at a close estimate of the world's coconut acreages, firstly because the plantings are so scattered and subdivided, and secondly because the figures available are not reckoned on a uniform basis. Some regions have been surveyed by area, whilst in others the trees have been counted without recording their density". (Yan Fremond, *et al., op. cit.*, p. 69).

Table II.4. Estimated Coconut and Copra Production in Selected Countries, by Region, 1962-66 Average

	Coconut production		Copra production	
	Quantity (million nuts)	*Per cent of world total*	*Quantity 1,000 m.t.*	*Per cent of world total*
Asia:				
Ceylon	2,460	9.1	272	8.2
India	4,875	18.1	263	8.0
Indonesia	5,387	20.0	453	13.7
Malaysia	925	3.4	172	5.2
Philippines	7,037	26.1	1,460	44.3
Singapore	12	†	—	—
Thailand	910	3.4	21	0.6
Viet-Nam, Rep. of	146	0.5	25	0.8
Others	202	0.8	7	0.2
Total, Asia	21,954	81.4	2,673	81.0
Americas:				
Brazil	529	2.0	—	—
Jamaica	117	0.4	16	0.5
Mexico	808	3.0	175	5.3
Trindad Tob	113	0.4	13	0.4
Venezuela	173	0.6	15	0.4
Others	319	1.2	26	0.8
Total, Americas	2,059	7.6	246	7.4
Africa:				
Mozambique	403	1.5	51	1.6
Nigeria	200	0.7	5	0.1
Tanzania	252	0.9	25	0.8
Others	418	1.6	23	0.7
Total, Africa	1,273	4.7	104	3.2
Oceania:				
Gr. Solomon	155	0.6	25	0.8
Fiji	219	0.8	36	1.1
Fr. Polynesia	180	0.7	22	0.7
New Guinea	413	1.5	96	2.9
New Hebrides	183	0.7	34	1.0
Others	546	2.0	63	1.9
Total, Oceania	1,696	6.3	276	8.4
Regional totals:				
Asia	21,954	81.4	2,673	81.0
Americas	2,059	7.6	245	7.4
Africa	1,273	4.7	104	3.2
Oceania	1,696	6.3	276	8.4
World Total	26,982	100.0	3,298	100.0

† Less than 0.1 per cent.

— nil.

Source: FAO, *Production Yearbook*, 1967, Vol. 21.

Table II.5. Relative Share of the ECAFE Countries in the World Production and Trade of Coconut and Coconut Products, 1962-66 Average

	World total	*Total ECAFE countries*	*Percentage of world total*
Coconut production (million nuts)	26,982	21,954	81.4
Copra production (1,000 metric tons)	3,298	2,673	81.0
Exports of coconuts in the shell:			
Quantity (1,000 metric tons)	33	20	60.6
Value (1,000 U.S. dollars)	2,142	1,206	56.3
Exports of coconut oil:			
Quantity (1,000 metric tons)	472	369	78.2
Value (million U.S. dollars)	126	98	77.8
Exports of copra:			
Quantity (1,000 metric tons)	1,503	1,193	79.4
Value (million U.S. dollars)	252	203	80.6
Exports of dessicated coconut:			
Quantity (1,000 metric tons)	125	119	95.0
Value (million U.S. dollars)	34	33	97.1
Exports of copra cake and meal:			
Quantity (1,000 metric tons)	447	356	79.6
Value (million U.S. dollars)	27	20	74.1
Imports of coconut and coconut products:			
Quantity (1,000 metric tons)	2,504	370	14.8
Value (million U.S. dollars)	464	67	14.4

Sources: FAO, *Production Yearbook, 1967, Vol. 21.*
FAO, *Trade Yearbook*, 1967, Vol. 21.

Table II.6. Ten Leading Coconut Producing Countries of the World and Their Relative Share in Total Production and Trade of Coconut Products and in Total Area Planted to Coconut, 1962-66 Average

	Country	*Region*	*Percentage of world total*						
			Coconut production	*Copra production*	*Copra exports*	*Coconut oil exports*	*Copra meal and cake exports*	*Dessicated coconut exports*	*Coconut acreage*
1.	Philippines	Asia	26.1	44.3	60.3	48.1	41.2	53.6	24.6
2.	Indonesia	Asia	20.0	13.7	11.0	—	24.4	—	27.4
3.	India	Asia	18.1	8.0	—	†	4.5	—	14.8
4.	Ceylon	Asia	9.1	8.2	3.2	19.7	1.1	40.8	8.0
5.	Malaysia	Asia	3.4	5.2	3.4	5.7	†	—	4.6
6.	Thailand	Asia	3.4	0.6	†	—	1.6	—	4.0
7.	Mexico	America	3.9	5.3	0.4	—	—	0.2	1.4
8.	Brazil	America	2.0	—	—	2.9	—	0.2	1.4
9.	New Guinea	Oceania	1.5	2.9	4.1	0.9	2.9	—	2.5
10.	Mozambique	Africa	1.5	1.6	2.7		0.9	—	1.3
	Total		88.1	89.8	85.1	79.7	76.6	94.8	90.0
	Rest of the world		11.9	10.2	14.9	20.3	23.4	5.2	10.0
	World total		100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Regional totals:								
	Asia		81.4	81.0	79.4	78.2	79.6	94.9	84.2
	America		7.6	7.4	1.3	1.2	—	3.8	3.2
	Oceania		6.3	8.4	13.9	8.7	2.9	0.5	6.4
	Africa		4.7	3.2	5.2	1.7	2.7	0.4	2.2
	Europe		—	—	0.2	10.2	14.8	0.4	—
	Undistributed places		—	—	—		—		4.0

† Less than 0.1 per cent.

Sources of basic data: FAO, *Production Yearbook*, 1967, Vol. 21.
FAO, *Trade Yearbook*, 1967, Vol. 21.
Table II-3 for coconut acreage.

oil and 54 per cent of the exports of dessicated coconut in 1962-66. However, in terms of coconut acreage, the Philippines ranks second, accounting for about 25 cent of the total area planted to coconut, compared to Indonesia's share of 27 per cent of the world acreage. Indonesia takes second place in the production of coconuts and copra and in the exports of copra and copra meal and cake, although it has the largest area under coconut. It contributes 20 per cent and 14 per cent, respectively, of the total world production of coconuts and copra, 11 per cent of the total copra exports and 24 per cent of the exports of copra meal and cake. In recent years, its exports of coconut oil have been nil. In the early part of the twentieth century, Indonesia had the greatest production and exports of copra in the world: from 1909 to 1913, it exported 546 million pounds of copra, compared to 263 million pounds exported from the Philippines, and from 1919 to 1924, Indonesia was still slightly ahead of the Philippines in term of combined oil and copra exports.[20]

India ranks third in copra acreage, coconut production and export of copra meal and cake. While its share in the world production of copra (about 8 per cent) is practically of the same level as Ceylon's, its export of copra and coconut oil have been in negligible quantities; in fact, India imported some 71,000 metric tons of copra annually, on the average, from 1961 to 1966 and about 3,000 metric tons of coconut oil in 1962 and 1963. However, India is a leading exporter of coconut coir products, and, together with Ceylon, practically enjoys a monopoly of this commodity in the world market.

Ceylon is the world's second largest supplier of coconut oil and dessicated coconut. It ranks third in copra production and fourth in coconut production and acreage. Its share of the total volume of exports of coconut oil and dessicated coconut averaged about 20 per cent and 41 per cent, respectively, in 1962 to 1966. Since 1966, exports of oil cake ("poonac") from Ceylon have been stopped with a view to providing the entire quantity produced locally (amounting to 61,000 tons in 1966) to feed the milk cattle of the country. Even during the years when it was exporting this product, the annual volume was generally less than 10,000 metric tons valued at not more than 5 million rupees.

Malaysia is the third exporter of coconut oil and occupies fifth position in terms of number of coconuts produced and area devoted to coconut planting. Its exports of coconut oil comprise about 6 per cent of the total world export trade of this commodity. The area planted to coconuts in Malaysia, representing nearly 5 per cent of the total world coconut acreage, is concentrated in West Malaysia which accounted for 73 per cent of the country's coconut area in 1966, while Sabah and Sarawak made up the remaining 15 per cent and 12 per cent, respectively.

Thailand, while ranking sixth among the leading coconut producing countries of the world in terms of acreage and nut production, does not occupy a significant position in the world's production and exports of coconut products, indicating that a large portion of the 900 million nuts harvested annually from 1962 to 1966 is consumed in the country itself. Of the total estimated area of about 560,000 acres planted to coconut, some 85 per cent are in the south and central regions of Thailand and 13 per cent in the northeast.

The other major coconut producers, outside the six countries in the Asian region mentioned above, are Mexico, Brazil, New Guinea and Mozambique. These four non-Asian countries altogether make up about 8 per cent of the total world production of coconuts, 10 per cent of the total copra output, 7 per cent of the copra export and of coconut acreage, 4 per cent of the export of copra meal and cake, and less than one per cent of the total dessicated coconut exports. Mexico ranks seventh in coconut production but places fifth in copra production. Since Brazil produces and exports practically no copra and coconut oil, it often fails to be mentioned among coconut-growing countries; but it has about 200,000 acres planted to coconuts and produces an average of more than 500 million nuts annually, making it the second largest coconut producer next to Mexico, among the Latin American countries. New Guinea is the third-ranking exporter of copra in the world and occupies fourth position in the export trade of coconut oil and copra meal. Mozambique, with a total acreage of about 200,000 acres under coconut and with an average annual production of about 400 million nuts and 51,000 metric tons of copra in 1962-66, is easily the biggest producer of coconut and copra in Africa. While it ranks tenth in terms of the number of nuts produced, it occupies an important position in the world production and exports of copra and coconut oil, ranking fifth in exports of coconut oil, sixth in copra exports and eight in copra production.

Characteristics of Coconut Farm Holdings in Asian Countries

Coconut is essentially a small holder's crop in the major coconut-producing countries of the world. The small size of farms implies that the coconut industry is not as well organized as the other agricultural export crops of Asia, such as sugar cane, tea and rubber.

[20] Katharine Snodgrass, *Copra and Coconut Oil: Fats and Oils Studies No. 2*, Stanford University Press, 1928, pp. 94 and 128. (As cited in George L. Hicks', The Philippine Coconut Industry: Growth and Change, 1900-1965, p. 195, National Planning Association, June 1967).

In Ceylon, as may be noted from Table II.7, holdings under 20 acres represent as much as 64 per cent of the total area under coconut and contribute about 54 per cent of the total coconut production of the country. "About 20,000 acres of these small holdings constitute small gardens, each under one acre, and generally located around dwelling houses. This smallness of the size of holdings generally renders difficult the application of fertilizers or of scientific cultivation methods. Such holdings are therefore maintained far below the required standard."[21] On the other hand, holdings of 50 acres and over constitute 309,000 acres, or 27 per cent of the total area, and contribute about 37 per cent to production. Even in the large holdings, according to studies made by the Coconut Rehabilitation Department of Ceylon, as much as 100,000 acres have never or rarely received artificial fertilizers. Among the smallholdings which comprise nearly three-fourths of the country's coconut lands, more than 500,000 acres have not used fertilizers at all. This lack of application of scientific cultivation methods and lack of adequate maintenance, particularly in the small holdings, have contributed greatly to low levels of production in small holdings. Large holdings, i.e. estates which are managed efficiently and well maintained, have recorded yields as high as 6,000 nuts per acre though the country's over-all productivity averages between 2,500 and 3,000 nuts per acre. The average yields of small holdings range from 1,000 to 1,500 nuts per acre, or about half the national average or one quarter the yield of the best coconut estates. In plantations established recently, an average of about 50 palms are planted to the acre, compared to 60 in the older plantations.

It is reported that there are no large-size coconut plantations in India. More than 90 per cent of the holdings in the major coconut-growing states of the country are one hectare or less in size and hardly 2 per cent have an area of at least two hectares (Table II.8). A major part of the existing coconut plantations in India is fairly old. On an average, about 53 per cent of the total number of coconut palms in the four major coconut-growing States of Kerala, Madras, Mysore and Andhra Pradesh are between 20 to 50 years of age, and about 10 per cent are over 50 years old. The percentage of bearing palms to total number of palms varies from 50 to 70 with a mean of 65 for the whole country. The average yields per hectare were about 6,000 nuts in 1960-66.[22]

In the Philippines, as reported in the 1960 Census of Agriculture, about 32 per cent of the total number of coconut farms and 8 per cent of the total coconut area were less than two hectares in size, 41 per cent of the number of coconut farms and 27 per cent of the area under coconuts were between two and 5 hectares, while coconut plantations (farms with 50 hectares or more, averaging about 236 hectares) comprised less than one per cent of the total number of coconut holdings and 8 per cent of the total coconut hectarage (Table II.9). Average production was about 4,800 nuts per hectare or about 2,550 nuts per

Table II.7. Distribution of Size of Coconut Holdings, Ceylon, 1966

	Area (1,000 acres)	*Per cent of total acreage*	*Contribution to production (per cent)*
Less than 20 acres	741	64.3	53.7
20 acres and over	411	35.7	46.3
Total	1,152	100	100
Less than 50 acres	843	73.2	62.8
50 acres and over	309	26.8	37.2
Total	1,152	100	100

Source: Ceylon: Country Study on Coconut.

[21] Ceylon: "Country Study on Coconuts", *op. cit.*, p. 15.

Table II.8. Percentage distribution of Coconut Farm Holdings in Major Coconut Producing States, India

Size (in hectares)	*Percentage holdings of different sizes*			
	Kerala	*Madras*	*Mysore*	*Andhra pradesh*
Less than 0.2	37.1	61.5	62.5	61.7
0.2 — 1.0	52.8	33.2	42.9	36.6
1.0 — 2.0	7.9	3.6	3.6	1.7
2.0 and above	2.2	1.7	1.0	—
Total	100	100	100	100

Source: Government of India. Country Study on Coconuts.

Table II.9. Percentage Distribution of Size of Coconut Farms, by Number of Farms and Total Area, Philippines, 1960

Farm size (in hectares)	*Percentage of number of farms*	*Percentage of total area*
Under 1.0	7.7	0.9
1.0 — 1.9	23.9	6.7
2.0 — 4.9	40.5	26.7
5.0 — 9.9	18.5	27.4
10.0 — 19.9	7.7	20.8
20.0 — 49.9	1.5	9.3
50.0 and over	0.2	8.2
Total	100	100

Source: Albert J. Nyberg, "Growth in the Philippine Coconut Industry (1901-66)", *Growth of Output in the Philippines.* (Papers presented at a Conference at the International Rice Research Institute, Los Baños, Laguna, Philippines, Mimeo., December 9-10, 1966).

[22] Government of India, "Country Study on Coconut", *op. cit.*

acre in 1960-66. Yields per tree per year averaged 45 nuts for the Philippines as a whole although in certain regions of the country the average annual nut production per tree has been reported at 80-100 nuts.[23] More than one half of the total number of coconut farms and the total area under coconuts in 1960 were cultivated by full owners, while about one-fourth and less than one-fifth were operated by part-owners and tenants, respectively.

Small holdings also characterize coconut cultivation in Indonesia. As shown in Table II.10, nearly 100 per cent of the coconut crop in Indonesia is produced by smallholders. In 1967, about 56 per cent of the total coconut acreage was planted to trees which were over 44 years old, 13 per cent with trees between 24 and 44 years in age, 3 per cent between 11 and 24 years old or less.[24] Copra production per hectare of planted coconut area ranged from 650 to 900 kilograms, or an average of 760 kilograms, from 1952 to 1965.

In Thailand, despite the fact that there has long been a tradition of coconut planting, it has not been done in the form of large plantations. In fact, except in the major producing areas in the South, people do not even specialize in coconut production. Coconut palms are usually planted, along with other fruit trees, in small holdings. According to the 1963 Census of Agriculture of Thailand, holdings less than 6 acres in size comprise 41 per cent of the total, those between 6 and 18 acres represent 41 per cent also, and those 18 acres and over account for 18 per cent (with less than one per cent being holdings larger than 60 acres in size).[25] Coconut production averaged about 2,600 nuts per acre, or about 70 nuts per fruit-bearing tree in 1960-65. On the average, there were 37 fruit-bearing coconut trees per acre. The number of fruit-bearing trees comprised about 56 per cent of the total number of trees in the whole of Thailand.

In West Malaysia, 85 per cent of the total acreage under coconuts is made up of small holdings (farms of less than 100 acres).[26] Of these small holdings, 75 per cent is below 10 acres in size and 25 per cent 10 acres and above (Table II.11). The average size of small holding is estimated at around 5 acres. Among the coconut estates (plantations with 100 acres or more), 52 per cent of the total number of estates are less than 300 acres in size, and only 16 per cent have 2,000 acres and over. Very broadly, the age distribution of the total palms in small holdings in West Malaysia is as follows: below 5 years, 21.7 per cent; 6 to 15 years, 20.7 per cent; 16 to 30 years, 22.5 per cent; 31 to 60 years, 28.4 per cent; and 60 years and over, 6.7 per cent. Average production in coconut estates in Perak and Selangor is about 2.700 nuts per acre or 8.7 piculs[27] of copra, while for all small holdings, it is 1,360 nuts or 5.1 piculs of copra per acre. In terms of tons of copra, production in estates is estimated to be around 413 tons per acre and in small holdings, 280 tons.

Table II.10. Percentage of Commercial Crops Raised by Small Holdings and Estates, Indonesia, 1938 and 1958

Crop	*Small holdings*		*Estates*	
	1938	*1958*	*1938*	*1958*
Palm oil and plam kernel oil	0	0	100	100
Sugar[a]	1	33	99	67
Cocoa	2	n.a.	98	n.a.
Tea[b]	18	35	82	65
Rubber	48	63[c]	52	37[c]
Nutmeg and mace	80	97	20	3
Tobacco	30	90	70	10
Kapok	83	93	17	7
Coconut products	95	99	5	1
Pepper	99	99.9	1	0.1

[a] In 1958 large quantities of sugar cane were raised by small holders and sold to sugar mills for conversion into centrifugal sugar.

[b] Both in 1938 and 1958 tea factories bought tea leaves produced by small holders.

[c] Export data.

n.a. — Data not available.

Source: J. Panglaykim, "Some Notes on the Indonesian Coconut Situation" (Mimeo.), (April 1968).

Table II.11. Percentage Distribution of Size of Coconut Holdings and Estates, West Malaysia

Size of coconut holding in acres	*Percent of farms on estates*
Small holdings:	
2.99 and below	24
3.00 — 9.99	51
10.00 — 24.99	15
25.00 and above	10
Total	100
Estates:	
100 — 199	31.4
200 — 299	20.9
300 — 499	9.4
500 — 999	4.7
1,000 — 1,999	17.4
2,000 — 2,999	8.1
3,000 — 4,999	5.8
5,000 and over	2.3
Total	100.0

Source: Malaysia: Country Study on Coconuts (Mimeo.), 1968.

[23] Mariano P. Ramiro, "Philippines: Study on Regional Plan Harmonization of the Coconut Industry" (Country Study: Mimeo.) 1968.

[24] Arsjad Anwar and Moh. Sisman, "Country Study on Coconut and other Oil Seeds" (Mimeo.), 1968.

[25] Sura Sanittanont, "Thailand's Coconut", *op. cit.*

[26] Malaysia: Country Study on Coconut (Mimeo.), 1968.

[27] One picul = 133.33 pounds.

Cost of Production of Coconuts and Copra

In view of the widely varying conditions under which coconut is produced and because of the paucity or absence of data on the agricultural phase of the coconut industry and on the management of the farms particularly the numerous small holdings, it is difficult to make an estimate of the cost of production of coconuts which would be truly representative of a national average. Estimates of cost of production vary from one locality to another even within the same country, and depend to a large extent on the assumptions used, especially in respect to imputed items of costs. Therefore, figures on production costs should be taken as a rough approximation of the various factors involved in the production of the particular crop under consideration.

In the Philippines, it was reported that the total cost of production of coconuts was 488.83 pesos per hectare or about 70.54 pesos per 1,000 nuts or 7 centavos per nut, the major portion of which was for the imputed payment of interest on capital and for labour to perform such farm operations as harvesting and assembling the nuts, clearing and cultivation (Table II.12). Based on the value of the nuts produced and the value added in processing the coconut meat products, the value per nut was estimated to average 0.082 pesos from 1960 to 1966.[28] To isolate the value of the nut itself from this estimated 0.082 pesos is not easy since the cost of conversion into the final product is not definitely known.

In Ceylon, Wages Boards have been established for fixing wages for labour engaged in several spheres of industrial and agricultural production, including the coconut industry. This Board takes into account the cost of coconut in determining the quantum of wages payable to labour engaged in production. Accordingly, the Department of Census and Statistics has been computing annually the costs of production per thousand coconuts, using data obtained from a sample selected from the lists of estates indicated in the records of the Commissioner of Coconut Rehabilitations. "However the cost figures derived from these returns should not be regarded as completely representative or reliable. Some estates do not maintain up to date accounts of expenses and income as they are incurred and derived, but prepare later for income tax purposes. For one thing, such accounts cannot be said to present a complete picture: for another, there is a tendency to exaggerate expenses and under-state incomes. — these data have to be accepted for what they are worth."[29]

[28] Mariano P. Ramiro, *op. cit.* (Mimeo.), 1968, p. 24.

[29] Ceylon: "Country Study on Coconut", *op. cit.*, pp. 16-18.

Table II.12. Cost of Production per Hectare of Coconuts, Philippines

Item of expense	*Cost of production per hectare*	*Man labour*		*Animal labour*[a]	
		Days	*Value*	*Days*	*Value*
	(Pesos)	*(No.)*	*(Pesos)*	*(No.)*	*(Pesos)*
I. Farm operation	90.18	24.33	84.80	1.54	5.38
a. Cultivation	15.15	3.86	13.51	0.47	1.64
b. Clearing	20.19	5.74	20.09	0.03	0.10
c. Covering cropping	0.74	0.21	0.74	—	—
d. Fertilizing	0.42	0.12	0.42	—	—
e. Pest and disease control	0.49	0.14	0.149	—	—
f. Harvesting and assembling	26.84	7.33	25.65	0.34	1.19
g. Husking	14.56	4.16	14.56	—	—
h. Handling of nuts	11.79	2.67	9.34	0.70	2.45
II. Interest on capital	396.00[b]	—	—	—	—
III. Miscellaneous	2.65	—	—	—	—
a. Fertilizer cost	0.20	—	—	—	—
b. Interest and depreciation of equipment	0.23	—	—	—	—
c. Others	2.22	—	—	—	—
Total cost	488.83	24.33	84.80	1.54	5.38

[a] Based on minimum wage of ₱3.50 a day.

[b] Computed on the basis of 6 per cent interest per year on ₱6.600 assuming 165 trees per hectare at ₱40 per tree).

Note: Total cost of production per hectare is estimated above at ₱488.83. At the rate of 165 trees per hectare with an average yield of 42 nuts per tree per year, one hectare would produce 6,930 nuts. Average cost of production, therefore, amounts to ₱70.54 per 1,000 nuts, or ₱0.07 per nut.

Source: Mariano P. Ramiro, *op. cit.*

Table II.13: Cost of Production of Coconuts, per 1,000 Nuts, Ceylon, 1960-1964

	1960	1961	1962	1963	1964
Nnmber of estates furnishing returns	95	101	82	85	60
	Rupees				
General charges: Salaries, wages and allowances of labour and supervisory staff	17.09	15.89	16.35	15.06	18.32
Buildings and equipment: Up-keep and maintenance, maintenance of tools, implements	4.20	3.72	3.83	4.10	4.84
Transport: Up-keep of vehicles. costs, etc.	3.33	2.76	4.02	3.45	3.20
Services and charges: Medical aid, maternity benefits, holiday pay, insurance, local rates, E.P.F. contributions	3.77	3.27	3.68	2.77	2.26
Up-keep and maintenance of estates: Clearing, weeding other field work, drains, control of pests	10.89	8.04	9.04	7.69	9.18
Cultivation: Fertilizers, cattle manures, ploughing, etc.	15.28	13.39	15.53	15.53	16.18
Crop works: Plucking wages and allowances, collecting and transporting produce, etc.	6.28	6.49	6.72	5.97	5.92
Cost of production per 1,000 nuts	60.84	53.56	59.17	54.39	59.90

Source: Ceylon: "Country Study on Coconut", p. 18.

The data given on Table II.13 show that the cost of production per thousand nuts in Ceylon for each of the five years 1960 to 1964 ranged from 53.56 rupees to 60.84 rupees, (or a cost of production per nut of 5 to 6 cents). The schedule of the various items of cost of production of coconuts indicated in this table does not include depreciation of buildings, transport vehicles and other equipment and land rent. If these items of costs were included, the cost of production shown therein should increase by at least another ten per cent. However, it was pointed out that the market prices of nuts or other coconut products were not influenced by these costs of production, but by conditions of supply and demand in the local and export markets. It was also made clear that the lack of symmetrical movement of costs with levels of coconut production indicated that cost data relating to production did not reveal a realistic picture of the actual trends in costs of production of coconuts in Ceylon.[30]

In West Malaysia, the average cost of production per 1,000 nuts for smallholdings which sell their produce mainly as nuts is around $88 (Malaysian), of which $66, or 75 per cent, is non-cash costs (cost of family labour, depreciation charges, and cost of use of land), and $22, or 25 per cent, cash costs (Table II.14). The cost of production is approximately 96

Table II.14. Average Cost of Production of Coconuts per 1,000 Nuts on Farms Selling Mainly Nuts, West Malaysia

Items	Average cost per 1,000 nuts (M dollars)	Per cent of total cost
Cash cost:		
Hired and/or contract labour		
Cultivation	5.87	6.7
Harvesting	11.62	13.2
Transport	0.06	0.1
Rates		
Drainage	1.42	1.6
Land and other government rates	2.84	3.2
Cost of materials used	0.20	0.2
Total cash cost	22.01	25.0
Non-cash cost:		
Family labour		
Cultivation	12.41	14.1
Harvesting and processing	2.86	3.2
Transport	1.09	1.2
Depreciation		
Cultivation implements	1.93	2.2
Other implements	0.75	0.9
Transport vehicles	0.65	0.7
Charge for use of land	46.34	52.7
Total non-cash cost	66.03	75.0
Total cost of production	88.04	100.0

Source: Malaysia: Country Study on Coconut.

[30] *Op. cit.*, p. 17.

per cent of the average price of $92 received per 1,000 nuts. Using the average yield of 1,360 nuts per acres among the small holdings as a basis, the costs of production per acre of coconuts would amount to about $120.

The cost of production in West Malaysia per picul of copra in estates and small holdings selling mainly copra averaged $9.20 and $10.27, respectively (Table II.15). On a per-acre basis, the cost of production would be approximately $80 in estates selling mainly copra and $52 in small holdings, using the average yields of 8.7 piculs of copra per acre for estates and 5.1 piculs per acre for small holdings as a basis for computing production costs per acre. Because of the higher yields in estates, resulting from the application of better management and cultivation techniques, the cost of cultivation per acre would be higher, since the larger production of nuts would require greater harvesting labour to be followed by more work in the manufacture of copra, considering the fact that labour costs for cultivation, upkeep, harvesting and copra manufacture make up a substantial portion of the total production costs.

The cost of production per 100 kilograms of copra in Indonesia is estimated to average 1,500 rupiahs, broken down into 300 rupiahs for climbing cost and cost of the nuts 450 rupiahs as processing cost, and 750 rupiahs for transportation cost from the plantation to the processing plant plus the part received by the farmers plus other costs.[31] This average cost is based on the daily wage of 150 rupiahs and on certain other assumptions such as the number of trees a worker can climb, the average number of nuts produced per tree per year, number of times a tree is climbed in a year, number of nuts required to produce a kilogram of copra, number of workers to produce a ton of copra in a day, etc. Assuming that the average yield is 760 kilograms of copra per hectare of planted coconut area, the cost of production per hectare would amount to about 11,400 rupiahs.

Table II.15. Cost of Production per Picul of Copra in Estates and Small Holdings Selling Mainly Copra, West Malaysia

Items	*Estates*	*Small holdings*
	Malaysian dollars	
Upkeep and cultivation labour costs .	4.00	2.88
Harvesting	1.20	3.23
Copra manufacture	3.80	3.40
Tools and implements and material inputs and transport	0.20	0.76
Total costs per picul of copra . .	9.20	10.27

Source: Malaysia: Country Study on Coconut (Mimeo.).

[31] Arsjad Anwar and Moh. Sisman, *op. cit.* (Mimeo.), pp. 17-18.

Unofficial estimates of costs and returns from one acre of coconut trees in Thailand are as follows:[32]

Initial investment:

Deforestation and clearing ...	1,000	baht
Hole digging (55 holes)	100	
Seedlings	100	
Weeding (first three years) ...	1,500	
Total initial investment ..	2,700	baht
Annual expenditure: (after maturity)		
Needing expenses	50	baht
Labour costs for nut collection (10% of revenue)	330	
Total annual expenditure	380	baht
Annual income (after five years from data of planting) ..	3,300	

The above estimates do not include the costs of fertilization and insecticides, which are little used in coconut production, and are based on the following assumptions: 55 trees will be planted in the acre; trees normally will not bear fruits until the sixth or seventh year; each tree will bear an average of 60 nuts annually for a period of 50 years; net price per nut is one baht.

In India the present cost of production is estimated to be approximately 125-150 rupees per thousand nuts, assuming that the coconut crop is maintained on scientific lines.[33] Using the average production of 6,000 nuts per hectare as a basis, the computed cost of production per hectare of coconuts would amount to 750-900 rupees.

General Trends in Production

Table II.16 and II.17 show the changes in coconut and copra production respectively for the period from 1948 to 1966, with comparisons for the production of other oil seeds for the same period. World total production of coconuts increased from an average annual output of 18 billion nuts in 1948-52 to an average of 26.5 billion nuts in the early sixties, with a high point of 27.9 billion nuts being attained in 1962. The average annual output for 1960-64 was about 8 billion nuts or 46 per cent higher than that for 1948-52. In 1966 the total production was about 26 billion nuts, which was 42 per cent greater than the 1948-52 production. Compared to the 1948-52 average [coconut production in 1966] was 37 per cent

[32] Sura Sanittanont, *op. cit.* (June 1968), (Country Study), (Mimeo.), pp. 7-8.

[33] Government of India, *op. cit.*, 1968 (Mimeo.).

higher in Asia, more than double in Latin America, about the same level in Africa, and approximately 14 per cent higher in Oceania.

In the case of copra, the average annual output in 1960-64 of 3.3 million metric tons was about 25 per cent higher than the average world production in 1948 of 2.6 million metric tons and 8 per cent greater than that for 1962-65. Copra production in 1966 compared to the production in 1948-52 represented approximately a 29 per cent increase in Asia, in the Americas particularly in Mexico it was about two and half times greater, in Oceania, 18 per cent, and in Africa, a decrease of about 9 per cent.

The increase in coconut and copra production from 1948-52 to 1966 was generally relatively smaller than that for other oilseeds for the same period. While the total world production of coconuts and copra in 1966 was 42 per cent and 31 per cent respectively higher than the average for 1948-52, production of soybeans was 144 per cent above the 1948-52 level, groundnuts 66 per cent, sunflowerseed 139 per cent, cottonseed 43 per cent, rapeseed 70 per cent, castor beans 52 per cent and tung nuts 125 per cent. On the other hand, the increase in coconut and copra production was greater than in the case of linseed, palm kernels, olives for oil and seame-seed.

It is interesting to note that the growth in copra production was relatively slower than that in coconut production, indicating a faster rate of consumption of coconut for other uses in relation to their use by conversion to copra. Coconut production increased by 23 per cent between 1948-52 and 1952-56 and by 19 per cent between 1952-56 and 1960-64, while copra production grew by 15 per cent and 8 per cent, respectively, for the same periods.

Table II.16. Changes in Coconut Production, Selected Countries, 1948-1966

Country	Average 1948-1952	Average 1952-1956	Average 1960-1964	1961	1962	1963	1964	1965	1966
					million nuts				
Asia									
Ceylon	1,975	2,341	2,387	2,378	2,597	2,270	2,730	2,460	2,244
India	3,656	4,433	4,745	4,478	4,963	4,725	4,919	4,885	4,885
Indonesia	3,627	4,180	5,009	4,530	5,358	5,391	5,395	5,395	5,395
Malaysia	1,006	1,080	1,026	1,087	964	1,055	889	821	896
Philippines	4,453	5,112	7,114	7,396	7,704	7,222	7,052	7,007	6,200
Singapore	13	14	13	13	13	12	11	11	11
Thailand	413	835	870	843	878	918	880	936	936
Vietnam, Rep. of	80	90	159	153	169	146	141	147	129
Others	674	128	22	243	206	167	218	229	190
Total	14,549	18,213	21,545	21,121	22,852	21,906	22,235	21,891	20,886
America									
Brazil	241	278	456	418	429	494	503	529	691
Mexico	204	403	826	818	932	776	788	770	776
Others	611	639	703	746	711	706	716	735	741
Total	1,056	1,320	1,985	1,982	2,072	1,976	2,007	2,034	2,208
Africa									
Mozambique	338	332	434	471	453	470	450	320	320
Tanzania	246	268	242	231	223	250	280	252	254
Others	587	590	568	481	618	614	639	620	601
Total	1,171	1,190	1,244	1,183	1,294	1,334	1,369	1,192	1,175
Oceania									
Fiji	215	235	239	246	241	250	246	190	169
New Guinea	301	447	427	371	371	513	377	430	375
New Hebrides	135	134	176	177	172	193	203	158	188
Others	684	753	864	952	929	777	893	925	881
Total	1,355	1,569	1,706	1,746	1,713	1,733	1,719	1,703	1,613
World total	18,131	22,292	26,488	26,032	27,931	26,949	27,330	26,820	25,882
Regional totals									
Asia	14,549	18,213	21,545	21,121	22,852	21,906	22,235	21,891	20,886
America	1,056	1,320	1,985	1,982	2,072	1,976	2,007	2,034	2,208
Africa	1,171	1,190	1,244	1,183	1,294	1,334	1,369	1,192	1,175
Oceania	1,355	1,569	1,706	1,746	1,713	1,733	1,719	1,703	1,613

Source: FAO, *Production Yearbook*, Vols. 18-21, 1964-1967.

Table II.17. Changes in Production of Copra and Other Oilseeds, 1948-1966

Country	Average 1948-1952	Average 1952-1956	Average 1960-1964	1961	1962	1963	1964	1965	1966
					thousand metric tons				
Copra production:									
Asia									
Ceylon	230	251	264	270	303	240	322	266	230
India	202	241	158	257	258	259	264	266	270
Indonesia	719	763	508	653	373	407	470	486	531
Malaysia	165	184	183	198	174	183	159	167	176
Philippines	875	1,046	1,390	1,301	1,302	1,511	1,428	1,428	1,610
Singapore	—	—	—	—	—	—	—	—	—
Thailand	15	21	22	19	20	21	21	21	21
Vietnam, Rep. of	16	18	26	27	29	26	24	25	22
Others	1	2	8	6	6	6	8	7	8
Total	2,223	2,526	2,659	2,731	2,465	2,653	2,696	2,684	2,868
Americas									
Brazil	—	—	—	—	—	—	—	—	—
Mexico	42	85	179	180	204	165	168	168	170
Others	51	64	68	69	67	72	72	71	67
Total	93	149	247	249	271	237	240	239	237
Africa									
Mozambique	46	46	57	65	58	62	57	39	38
Tanzania	28	25	22	19	19	26	29	26	27
Others	27	32	29	27	25	24	35	27	27
Total	101	103	108	111	102	112	121	92	92
Oceania									
Fiji	35	39	40	41	40	42	42	30	26
New Hebrides	52	76	94	95	97	93	97	107	93
New Guinea	23	24	32	32	32	36	38	29	34
Others	109	122	124	114	111	112	113	112	105
Total	219	261	280	282	280	283	284	278	258
World total, copra	2,636	3,039	3,294	3,373	3,117	3,285	3,341	3,293	3,455
Regional totals:									
Asia	2,223	2,526	2,659	2,731	2,465	2,653	2,696	2,684	2,868
Americas	93	149	249	249	271	237	240	239	237
Africa	101	103	108	111	102	112	121	92	92
Oceania	219	261	280	282	280	283	284	278	258
Other oil seeds:									
Castor beans	482	472	673[a]	—	637	662	719	782	734
Cotton seed	13,740	17,135	19,947	19,000	19,257	20,566	20,912	21,294	19,747
Groundnuts, in shell	9,516	11,339	14,810	13,900	14,823	15,209	16,119	15,507	15,983
Linseed	3,108	3,198	3,331	3,100	3,574	3,472	3,309	3,674	3,142
Olives for oil	4,628	5,148	6,615	7,135	5,028	9,231	4,922	6,452	6,465
Palm kernels	889	975	1,041	1,050	1,012	1,033	1,062	1,104	1,074
Rapeseed	2,820	3,151	3,982	4,000	4,189	3,897	4,025	5,228	4,818
Sesame seed	1,762	1,638	1,552	1,500	1,581	1,554	1,727	1,620	1,569
Soybeans	15,952	20,625	30,627	31,100	30,753	31,652	32,332	36,420	38,953
Sunflower seed	3,915	4,605	7,022	7,070	7,189	6,462	8,281	7,963	9,074
Tungseeds	132	196	224[a]	—	149	243	281	133	298

[a] 1962-64 average.

Source: FAO, *Production Yearbook*, Vols. 18-21, 1964-1967.

The total output of coconut oil has increased much less than that of most other major fats and oils, by only 0.8 per cent annually (compound growth rate) between 1954 and 1963, compared with 2.9 per cent for all fats and oils, 7.5 per cent for soybean oil, 5.9 per cent for fish and fat oil, 5.5 per cent for sunflowerseed oil, 4.6 per cent for groundnut oil, 3.8 per cent for tallow and greases, 3.2 per cent for lard, 2.8 per cent for castorseed oil and 2.1 per cent for cottonseed oil (Table I.18). On a per caput basis, production of cottonseed oil even decreased at the average annual rate of 1.2 per cent (compound) during the same period. From 1955 to 1967, the world total production of coconut oil had hardly varied around the 2.1 million metric tons level, whereas the output of soybean oil increased from 2.3 million to 4.29 million metric tons, sunflowerseed oil from 0.9 million to 2.6 million metric tons, tallow and greases from 2.9 million to 4.3 million metric tons, and groundnut oil from 1.9 million to 2.4 million. Projections made by FAO in the total world production of fat and oils in 1975 indicate large increases in the output of soybean oil, groundnut oil, sunflowerseed oil and animal fats, particularly lard, with increases ranging from 30 to 70 per cent over the 1963 level, while the projected output of coconut oil would only be 26 per cent above the 1963 output level.

Because of the slow rate of growth in the production of coconut oil, its importance relative to other oils and fats decreased rapidly over a long period of time. In 1948-52 its average annual output represented about 8 per cent of the total world production of all fats and oils principally used for food; in 1965-67, this share went down to less than 7 per cent. In contrast the share of other oils increased from 8 per cent to 13 per cent in the case of soybean oil, from 10 to 13 per cent for tallow and grease, and from 4 to slightly less than 8 per cent in the case of sunflowerseed oil.

The declining importance of coconut oil in relation to other fats and oils is also evident in the export trade for these products. The export of coconut oil (including the oil equivalent of copra) grew from 1954 to 1963 at an average annual rate of only 1.1 per cent (compound), compared to the growth rate of 17.4 per cent for sunflowerseed oil, 10.2 per cent for soybean oil, 6.5 per cent for tallow and greases, 3.7 per cent for castorseed oil, and 2.8 per cent for all fats and oils (Table 19). The average export volume of coconut oil and copra in terms of oil 1934-38 was 1.2 million metric tons; in 1965 this amounted to 1.3 million metric tons, an increase of 100,000 tons in a period of about 30 years. For sunflowerseed oil, the increase in export volume was from 40,000 to 316,000 metric tons; for soybean oil, from 470,000 to 1,695,000 metric tons, and for groundnut oil, from 770,000 to 900,000 metric tons. The average annual volume of exports of copra and coconut oil (in term of oil) in 1948-52 accounted for 33 per cent of exports of vegetable oils; in 1956-60 the share of coconut oil exports dropped to 25 per cent, and in 1965, further to 19 per cent. On the other hand the share of soybean oil increased from less than 7 per cent of the export of vegetable oils in 1948-52, to 17 per cent in 1956-60 and to 25 per cent in 1965; rapeseed oil, from about 2 per cent in 1948-52 to 4 per cent in 1965; and sunflowerseed oil from less than 3 to about 5 per cent for the same period.

With the relative stagnation in the output of coconut oil and the increasing supplies of other oils and fats particularly those produced mainly in the developed countries of North America and Europe like soybean oil and sunflowerseed oil, the share of the coconut product and that of the developing countries of Asia in the growing world trade of fats and oils have thus diminished substantially and have been taken over by other competing oils. As will be shown later, such basic rigidity in the supply of copra and coconut oil relative to world demand has caused the prices of coconut oil to be relatively higher than those of other vegetable oils and this has encouraged substitution of coconut oil by lower-priced oils and petroleum-based synthetics in its food and industrial uses.

Production Trends in Selected ECAFE Countries

Philippines.

Changes in the area planted to coconuts, in the number of bearing trees in the quantity and value of production, and in the average yields per bearing tree, in the Philippines from 1910 to 1965 are presented in table II.18.

According to the Census of Agriculture for 1960, of the total cultivated land area of 5.6 million hectares in the Philippines, about 1,497,000 hectares, or approximately 27 per cent, are planted with coconuts. For the crop year 1964-65, the total area devoted to coconuts was estimated to be 1.6 million hectares, with 240.9 milion coconut trees (of which 185.3 million are bearing trees), producing 7,052 million nuts,[34] at an average yield of 38 nuts per bearing tree.

Coconut production in the Philippines grew at the rate of 5.3 per cent per year from 1911 to 1929, and increased by 5.2 per cent from 1952 to 1965 (table II.19). Growth in the number of coconut trees and in the area planted with coconuts progressed at the

[34] The number of nuts produced in the crop year *1964-65* (7.052 million nuts) corresponds to the nut production reported for the Philippines for *1964* in the FAO, *Production Yearbook 1966*, Vol. 20, p. 238-239.

Table II.18. Coconut Production, Hectarage, Number of Trees, Nuts Produced, Yield per Bearing Tree, and Value of Production, Philippines, 1911-1965

Crop year (1)	Area planted (1,000 hectares) (2)	Number of trees (million) Total (3)	Number of trees (million) Bearing (4)	Nuts produced (million) (5)	Value of production (million pesos) (6)	Nuts per bearing trees (number) (7)
1910-11	208.5	32.8	...	937.9	38.9	..
1911-12	230.7	41.7	...	965.1	26.2	..
1912-13	223.2	46.1	...	1,041.2	35.9	..
1913-14	245.9	44.6	...	781.6	30.5	..
1914-15	264.1	49.2	...	591.2	25.6	..
1915-16	270.8	52.8	...	865.8	24.5	..
1916-17	301.2	54.2	...	735.2	24.4	..
1917-18	335.6	60.2	...	880.6	32.0	..
1918-19	373.2	67.1	...	1,506.8	56.5	..
1919-20	397.0	79.4	43.6	1,509.5	128.2	34
1920-21	418.0	83.6	46.5	1,547.6	76.2	33
1921-22	444.6	84.5	49.4	1,467.7	55.3	29
1922-23	456.4	86.7	49.8	1,515.2	64.4	30
1923-24	460.4	87.5	51.2	1,576.6	68.1	31
1924-25	472.0	89.6	53.2	1,584.5	71.8	30
1925-26	485.0	91.9	54.6	1,627.4	81.4	30
1926-27	500.0	94.9	58.4	1,800.0	82.0	31
1927-28	515.5	98.1	61.6	1,906.8	85.4	31
1928-29	531.0	101.5	65.1	2,155.5	89.1	33
1929-30	550.8	105.3	68.7	2,056.7	76.3	30
1930-31	561.4	107.1	69.6	1,869.0	45.6	27
1931-32	566.1	107.9	71.5	1,943.8	33.5	27
1932-33	600.7	114.0	73.4	2,142.4	29.0	29
1933-34	608.2	115.3	74.4	2,114.4	27.1	28
1934-35	617.9	117.0	85.8	2,874.0	45.5	33
1935-36	632.0	119.6	88.4	3,146.9	62.0	35
1936-37	638.0	120.7	90.4	2,982.8	83.4	33
1937-38	634.1	121.7	91.2	3,450.1	92.1	38
1938-39	1,051.2	139.2	84.1	2,303.1	28.0	27
1945-46	960.0	128.1	98.8	917.0	22.7	9
1946-47	960.0	142.4	109.9	4,565.0	233.9	41
1947-48[a]	960.0	137.1	105.8	4,138.3	282.6	39
1948-49	965.5	137.4	106.1	3,590.9	263.0	34
1949-50	185.0	138.1	106.6	3,997.5	260.8	37
1950-51	987.0	180.2	139.0	5,279.6	307.5	38
1951-52	987.8	150.7	116.3	3,406.2	184.2	29
1952-53	990.0	149.3	115.2	4,182.0	246.9	36
1953-54	990.0	164.3	126.8	4,602.9	211.2	36
1954-55	990.0	164.4	126.8	5,321.4	241.4	42
1955-56	990.0	164.4	126.8	5,504.0	255.5	43
1956-57	990.0	164.4	126.8	5,951.0	299.7	47
1957-58	995.6	165.0	127.4	5,973.6	345.8	47
1958-59	1,006.1	166.6	128.6	6,041.3	276.9	47
1959-60	1,059.1	167.1	133.8	6,015.9	426.9	45
1960-61	1,199.9	185.1	149.0	6,189.7	360.0	41
1961-62	1,283.7	197.6	167.1	7,395.5[c]	486.4	44
1962-63	1,392.3	211.7	183.4	7,704.4[c]	631.6	42
1963-64	1,482.9	232.1	191.4	7,222.1[c]	661.4	37
1964-65	1,604.7	240.9	185.3	7,052.0[c]	685.2	38

Source: Albert J. Nyberg. Growth in the coconut industry (1901-1966). *Growth of Output in the Philippines* (Papers presented at a conference at the International Rice Research Institute, Los Banos, Laguna, Philippines, December 9-10, 1966).

[a] Census figures are 860.0 thousand hectares, 113.4 million trees, 87.5 million bearing trees, 3,194 million nuts and 36 nuts per bearing tree, respectively, for Columns 2, 3, 4, 5 and 7.

[b] Census figures are 1,497; 195.6; 117.1; 4,831; and 41, for Columns, 2, 3, 4, 5 and 7, respectively.

[c] Corresponds to FAO figures for the previous years, thus 7,052.0 is for 1964, etc.

Table II.19. Estimated Growth Rates of Coconut Hectarage, Trees, Yield, Production and Value, in the Philippines, Selected Periods

	1911-20	1921-38	1954-59	1960-65
	(per cent)			
Hectarage	8.4	2.5	0.4	8.3
Trees (total)	8.6	2.3		
bearing			1.5	7.3
non-bearing			0.8	7.6
Nuts per bearing tree			3.1	−3.4
Production		5.3[a]		5.2[b]
Value		7.7[c]		9.0[b]

Source: Albert J. Nyberg, *Growth in the Philippine Coconut Industry* (1901-66), pp. 2-1 to 2-20. *Growth of Output in the Philippines* (Papers presented at a conference at the International Rice Research Institute, Los Banos, Laguna, Philippines, December 9-10, 1966).

[a] 1911-1938.

[b] 1952-1965.

[c] 1911-1929.

rate of 8.6 per cent and 8.4 per cent, respectively from 1911 and 1920, and 2.3 and 2.5 per cent, respectively from 1921 to 1938. In the post-war period, the number of bearing and non-bearing trees increased annually by 1.5 per cent and 0.8 per cent respectively, between 1949 and 1959 (the period prior to monetary decontrol), and by 7.3 per cent and 7.6 per cent, respectively, from 1960 to 1965 (the period after decontrol was initiated). In terms of the area planted, the growth rates were 0.4 per cent a year for the time period 1949-59 and 8.3 per cent for 1960-65. Yields as measured by the number of nuts per bearing tree increased at the rate of 3.1 per cent from 1949 to 1959, but decreased at the rate of 3.4 per cent from 1960 to 1965. The value of production of coconuts increased at the rate of 7.7 per cent from 1911 to 1929 and by 9.0 per cent between 1952 and 1965.

The average growth rates of production, domestic consumption, and exports by volume of coconut products in the Philippines, over the period 1930 to 1965, are presented in table II.20.[35] Over the 35-year period covered in the analysis, it may be noted that copra production increased at the rate of 3.4 per cent per year, copra exports rose by 4.7 per cent, coconut oil production by 2.0 per cent, and exports of oil by only 1.4 per cent. Domestic consumption of coconut oil, based on factory-produced quantities of oil only, increased by 4.3 per cent. Desiccated coconut production, which is assumed to be totally exported, increased by 3.5 per cent. Total exports of coconut products during the 35-year period rose by 3.3 per cent, on the average.

For the industry as a whole, the average rate of growth for the period from 1950 to 1960 was relatively slower than in either of the other two periods, 1930-40 and 1960-65. From 1950-60 the total quantity of nuts used for copra and desiccated coconut production increased by 1.3 per cent, compared to 5.6 per cent in 1930-40 and 6.2 per cent in 1960-65. Copra production increased by 1.6 per cent in 1950-60 and 5.6 per cent in the 1930's and 7.1 per cent in the 1960's. The rate of growth in coconut oil production was about the same for the two periods 1930-40 and 1950-60 (2.8 per cent and 2.7 per cent, respectively), compared to the rate of 17.5 per cent in 1960-65. Most of the increase in coconut oil production in 1960-65, however, went to exports rather than domestic consumption, causing oil exports to rise by 32 per cent per year compared to the increase in exports of 0.4 per cent in 1930-40 and the decline by 1.5 per cent in 1950-60. The growth rates for desiccated coconut production and total exports of coconut products in 1950-60 were also relatively slower than in either of the other two periods under consideration.

Table II.20. Average Annual Growth Rates in Production, Consumption and Exports of Coconut Products, Philippines, 1930-65

	1930-40	1950-60	1960-65	1930-65
	(per cent)			
Total nut production	6.6	3.5	5.2[a]	3.6
Nuts used for desicated coconut and copra	5.6	1.3	6.2	3.4
Copra production	5.5	1.6	7.1	3.4
Copra exports	7.9	1.3	1.9	4.7
Coconut oil production	2.8	2.7	17.5	2.0
Coconut oil exports	0.4	−1.5	32.0	1.4
Coconut oil domestic consumption[b]	8.3	6.5	3.3	4.3
Desicated coconut production[c]	7.8	1.2	2.9	3.5
Copra meal/cake exports[c]	2.8	2.7	17.5	2.0
Total exports of coconut products	5.2	0.6	6.9	3.3

Source: George L. Hicks. *The Philippine Coconut Industry: Growth and Change, 1900-65,* Centre for Development Planning, National Planning Association, Field Work Report No. 17 (June 1967), pp. 98-107.

[a] 1925-65 (see Table I-19).

[b] Refers to factory-produced oil only.

[c] Production assumed to be equal to exports.

[35] Analysis of growth in the production, consumption and exports of important coconut products in the Philippines for the 35-year period, 1930 to 1965, was derived from George L. Hicks' the *Philippine Coconut Industry: Growth and Change, 1900-65.* Centre for Development Planning, National Planning Association, Field Work Report No. 17 (June 1967).

Table II.21. Expansion of the Coconut Industry in Ceylon, 1870-1940

Period	Estimated production (million nuts)	Area planted (1,000 acres)	Yield per acre (nuts)	Coconut oil exports (100 cwt)	Copra exports (100 cwt)	Desiccated coconuts exports (100 cwt)
1870-79	374	...	...	174	46	...
1880-89	433	582	830	511	127	...
1890-99	611	818	747	443	169	76
1900-09	861	920	936	554	545	187
1910-19	1,091	972	1,122	493	1,122	326
1920-29	1,507	1,076	1,401	610	1,789	775
1930-39	1,674	1,076	1,556	1,111	1,399	653

Source: D. R. Snodgrass. *Ceylon — An Export Economy in Transition, 1966.* (As cited in Ceylon: *Country on Coconuts,* July 1968, p. 1).

... No data available.

Ceylon.[36]

A reconstruction of the expansion of the coconut industry in Ceylon between 1870 and 1940, given in a recent study of the Country's economy, is presented in table II.21.

Coconut is the one major crop in Ceylon for which the total output and yields have remained more or less stagnant. The data shown in table II.22, regarding the estimated total production of coconuts in Ceylon during the period of thirty-six years from 1932 to 1967, show that there were marked fluctuations in production from the early 1930's until about 1948 when it nearly reached the levels it had recorded in 1934, 1938 and 1943. From 1950, production maintained a fairly steady level during the next nine years and, thereafter, it enjoyed a small rise, with minor fluctuations once in three or four years, until 1964 when it reached its peak level of 3,148 million nuts. In 1965, coconut production was estimated at 2,835 million nuts, showing a decline of about 10 per cent from the record yield of 1964. There was a further decrease in output in 1966 to 1967, to 2,621 million nuts and 2,577 million nuts, respectively, a decline attributable in part to unfavourable weather conditions. If weather conditions are better, the output is expected to increase substantially in 1968.

The main factor contributing to periodic fluctuations in coconut production in Ceylon, as stated above, is drought, while the general increase in production recorded during the past ten years or so is attributable to the Government's Coconut Rehabilitation Programmes, and more specifically to the Fertilizer Subsidy Scheme which was launched in 1956. Besides rainfall and weather conditions, the other factors inhibiting production are the senility of palms in a substantial part of the acreage and the existence of vacancies in coconut lands.

Table II.22. Estimated Total Production of Coconuts in Ceylon, 1932-1967

(million nuts)

Year	Number of nuts	Year	Number of nuts
1932	1,629	1950	2,095
1933	1,806	1951	2,354
1934	2,128	1952	2,574
1935	1,730	1953	2,403
1936	1,553	1954	2,349
1937	1,913	1955	2,746
1938	2,025	1956	2,661
1939	1,848	1957	2,229
1940	1,550	1958	2,201
1941	1,653	1959	2,491
1942	1,666	1960	2,362
1943	2,035	1961	2,796
1944	1,763	1962	2,993
1945	1,861	1963	2,704
1946	1,562	1964	3,148
1947	1,542	1965	2,835[a]
1948	1,978	1966	2,621
1949	1,978	1967	2,577

Source: Ceylon: Country Study on Coconuts, July 1968, p. 13.

[a] Annual output is estimated by adding actual exports to domestic consumption estimated on the basis of *per capita* consumption derived from consumer finance surveys.

[36] Ceylon: *Country Study on Coconuts* (Mimeo.), July 1968, pp. 1-30.

The area under coconut in Ceylon has recorded only a small increase since the 1946 Census. During these twenty years, it has increased from 1.07 million to 1.15 million acres, or by about 8,000 acres only. Although the Ministry of Agriculture had in 1958 estimated that 130,000 acres of new land could be turned over for the establishment of new coconut plantations, according to a more recent estimate made in 1967 by the Land Use Committee, the maximum extent of new land which could be made available for planting coconut (considering both availability and suitability) was placed at about 50,000 acres. The implication seems to be that any substantial increase in production of coconut would have to be obtained from the existing acreage, by applying more fertilizers and replanting old as well as low-yielding palms with high-yielding varieties. The Government's Replanting Programme which is part of the Rehabilitation Scheme has as its objective the filling of vacancies and the replanting of areas containing low-yielding or seniie palms with selected high-yielding grade coconut seedlings which are being supplied to the owners of coconut lands at subsidized prices by the Coconut Research Institute.

India.

The area, production and per-hectare yields of coconuts in India for the period from 1960-61 to 1965-66 are summarized in table II.23 below.

It may be noted from the above table that the area under coconuts in India increased steadily from 722,198 hectares in 1960-61 to 906,637 hectares in 1965-66, or an increase of 184,439 hectares representing 25 per cent for the six-year period. Total nut production, on the other hand, increased from 4,657 million to 5,148 million nuts between 1960-61 and 1965-66, representing only about a 10 per cent increase. As a result, the average yield per hectare declined from 6,448 nuts to 5,678 nuts, or by about 12 per cent, from 1960-61 to 1965-66.

Table II.23. Area, Production and Per Hectare Yields of Coconuts, India, 1960-61 to 1965-66

Year	Area (hectares)	Production (million nuts)	Yield per hectare (number of nuts)
1960-61	722,198	4,657	6,448
1961-62	747,361	4,720	6,316
1962-63	789,789	4,720	5,976
1963-64	839,655	4,936	5,879
1964-65	858,235	5,029	5,860
1965-66	906,637	5,148	5,678

Source: Government of India, *Country Study on the Regional Plan Harmonization and Economic Co-operation in Coconuts—India* (Mimeo.), 1968.

Indonesia.

Recent data on coconut and copra production in Indonesia appear to be conflicting. For instance, the Induk Kooperasi Kopra Indonesia (IKKI) estimated the annual production of copra in Indonesia to be around 821.7 tons in 1960, while the Central Bureau of Statistics claimed that the production of small-holder copra averages more than one million tons annually.[37] On the other hand, FAO estimates copra production in Indonesia in 1961 to have been 653 thousand metric tons.

On the basis of FAO estimates, coconut production in Indonesia increased from an average of 4,180 million nuts in 1952-56 to 5,214 million nuts in 1961-65, or by about 25 per cent. Copra production, however, decreased from 762.7 thousand metric tons in 1952-56 to 467.8 thousand metric tons in 1961-65 or a decline of about 295 thousand metric tons or 37 per cent.[38]

Table II.24 shows the growth in area planted with coconut and the total production and yields of copra in Indonesia from 1940 to 1965. It will be noted that

Table II.24. Estimated Planted and Harvested Area, Total Production and Average Yields of Copra, Indonesia, 1940 to 1965

Year	Planted area (1,000 ha.)	Harvested area (1,000 ha.)	Total production (1,000 m.t.)	Average yields per hectares	
				Planted area (kilograms)	Harvested area (kilograms)
1940	1,600	...	1,146	716	...
1950	1,546	...	1,104	714	...
1952	1,237	...	1,119	904	...
1953	1,284	...	948	760	...
1954	1,497	...	1,202	803	...
1955	1,514	...	1,039	686	...
1956	1,545	...	998	646	...
1957	1,597	...	1,093	684	...
1958	1,651	...	1,078	653	...
1959	1,561	...	1,268	818	...
1960	1,649	1,533	1,239	751	808
1961	1,594	1,535	1,361	854	886
1962	1,584	1,537	1,387	876	902
1963	1,553	1,540	1,379	888	895
1964	1,823	1,508	1,193	655	791
1965	1,870	1,503	1,249	668	831

... Data not available.

Source: Arsjad Anwar and Moh. Sisman. "Country Study on Coconut and Other Oil Seeds" (Mimeo.), 1968, pp. 11-17.

[37] J. Panglaykim. Some Notes on the Indonesian Coconut Situation (Paper submitted to ECAFE (Mimeo.) April 1968).

[38] FAO, *Production Yearbook 1966*, Vol. 20, pp. 238-241. Estimates given in the "Country Study on Coconut and Other Oil Seeds" (p. 9), prepared by a team coordinated by Arsjad Anwar and Moh. Sisman, of Indonesia, placed the average copra production in Indonesia for 1961-65 at 1,312,000 metric tons, however.

the total quantity of copra produced as stated in the country study from which data on this table were obtained was about twice as much as the estimates given by FAO. In 1965, for example, the figure given in the country study was 1,249 thousand metric tons while the FAO estimate was only 486 thousand metric tons. Using the country-study data presented in Table II.24, it will be noted that between 1940 and 1965, the area planted with coconut increased by 270,000 hectares, or about 17 per cent, whereas total production of copra increased by only 9 per cent. Average production per hectare of planted area decreased by about 6.5 per cent from 716 kilograms in 1940 to 668 kilograms in 1965, reflecting the increasing proportion of non-producing trees which are either new plantings or senile palms.

Malaysia.

There has been a decrease in coconut and copra production in Malaysia and this decline has become very apparent in recent years. In 1952-56 the average annual production of coconuts and copra, according to FAO estimates, were 1,080 million nuts and 183 thousand metric tons, respectively, compared to 896 million nuts and 176 thousand metric tons of copra in 1966.[39] The number of coconuts harvested in estates both for consumption and for copra production decreased steadily from 192 million in 1957 to 169 million in 1963, to 150 million in 1966 and further to 141 million in 1967.[40] Copra produced in estates in West Malaysia dropped from 35,843 tons in 1957 to 33,200 in 1963 and then to 27,200 in 1967. The area under coconut holdings in West Malaysia has also fallen from 520,000 acres in 1961 to 506,000 acres in 1966. This decline in acreage may be attributed to the felling of old and unproductive coconut palms and the planting of other more remunerative crops such as oil palm and pineapples. Other factors responsible for the declining trend in output include the diminishing yields from aging palms, poor management and inadequate drainage facilities. The estate and small-holding acreages and production in terms of copra for the last few years in Malaysia are shown in the following table:

Table II.25. Acreage and Production in Terms of Copra in Estates and Small Holdings in Malaysia, 1960-1967

Year	Estate		Small holdings	
	Acreage	Production	Acreage	Production
	(acres)	(tons)	(acres)	(tons)
1960	80,000	32,309	440,000	141,000
1961	90,000	33,841	430,000	128,000
1962	78,000	33,214	432,000	99,694
1963	80,000	32,219	435,000	104,579
1964	72,000	29,670	436,000	...
1965	68,000	30,721	438,000	...
1966	63,100	30,000	442,700	130,000
1967	79,599	30,000	439,672	130,000

Source: *Country Study on the Coconut Industry of Malaysia* (Mimeo.), 1968.

Malaysian exports of copra and coconut oil have also been declining in recent years mainly as a result of increasing local consumption of these two commodities and a general lack of supply of copra in the country, especially in West Malaysia. As indicated by Table II.26 below, exports of copra had decreased by about 63 per cent from 110,200 tons in 1961 to 40,500 tons in 1965. In the case of coconut oil, Malaysian export of this commodity had fallen by 56 per cent from 45,200 tons in 1961 to 20,100 tons in 1965.

Table II.26. Volume and Value of Exports of Copra and Coconut Oil, Malaysia, 1961-1965

Year	Copra		Coconut oil (crude and refined)	
	Volume	Value	Volume	Value
	(1,000 tons)	(million M$)	(1,000 tons)	(million M$)
1961	110.2	46.1	45.2	29.8
1962	65.3	27.7	36.7	23.8
1963	65.8	30.6	32.4	23.4
1964	39.1	19.2	15.7	12.9
1965	40.5	23.7	20.1	18.2

Source: Country Study on the Coconut Industry of Malaysia, *op. cit.*

Thailand

From the very limited data available, it may be noted that coconut acreage and production increased markedly during the late fifties and early sixties but that average yields per acre and per fruit-bearing tree have been declining (table II.27).

[39] FAO, *Production Yearbook 1967*, Vol. 21.

[40] *Country Study on the Coconut Industry of Malaysia*, Mimeo., 1968.

Table II.27. Acreage, Number of Trees, Production and Productivity, of Coconuts in Thailand, 1951-53 to 1961-65

Year	Area (1,000 acres)	Number of trees total bearing (1,000 trees)		Production (million nuts)	Nuts per acre	Nuts per bearing tree	Bearing trees per acre
1951-53	243	17,634	13,109	933	3,839	71	54
1954-56	312	22,768	16,438	1,537	4,926	93	53
1957-59	338	23,932	16,336	1,402	4,148	86	48
1960	412	27,638	16,717	1,300	3,155	78	41
1961	463	30,753	17,923	1,318	2,847	74	39
1962	529	34,490	19,622	1,373	2,595	70	37
1963	563	37,077	20,459	1,434	2,561	70	37
1964	560[a]	37,100	20,500[a]	1,375[a]	2,455	67	37
1965	560[a]	38,000	20,800[a]	1,463[a]	2,217	70	32

Source: *Agricultural Statistics of Thailand, 1965,* Table 33.

[a] Preliminary estimates.

The decrease in yield per acre may be partially explained by the fact that the proportion of fruit-bearing trees to total number of coconut trees and the number of bearing trees per acre have also declined steadily. This apparent decline may mean that there is a large proportion of young trees or a disproportionately large number of over-aged trees. In the absence of adequate information, however, it is not possible to offer any definitive explanation.

Thailand's coconut processing industry is small and still relatively under-developed, consisting mainly of copra and coconut oil production. Copra is produced mainly in the south, especially on Samui Island of Surasthani Province. It is usually produced by sun-drying, although some copra is prepared in simple drying furnaces.

As a result of the primitive techniques used for Thai copra production, the quality is rather poor with a moisture content of as high as 10-12 per cent. Thailand's output of copra is estimated by FAO to have averaged about 20,000 metric tons during the last few years. On the whole domestic copra production has not expanded sufficiently to feed even the existing milling capacity.

Chapter III
DOMESTIC MARKETING

The purpose of this chapter is to examine the system and structure of internal marketing of coconuts and copra in some of the major coconut-producing countries of the ECAFE region, with a view to identifying and analysing the various problems that affect marketing efficiency.

Obviously, the marketing system and structure vary from country to country, but in general some broad patterns of similarity in methods, practices and problems of marketing among the countries in practically the same state of underdevelopment can be observed. In the context of the traditional, peasant economy of the developing countries of Asia, where most crops are produced on small holdings which are widely scattered, often rather isolated and with poor access to the market, and operated by farmers who lack the resources and the facilities to derive greater returns from their produce, this pattern of similarity is discernible in the inter-relatedness of production, marketing and credit.

"There exists considerable evidence of serious imperfections within the marketing structure with possible opportunities for monoposony and monopoly gains at various points of the marketing channel. Obviously, such imperfections tend to lower producers' income and to impair price flexibility at the farm level, and thus badly obstruct an efficient resource allocation and impede investment and effort, unless of course, producers are not sufficiently price conscious to be guided in their decisions by changes in relative commodity prices or in cost-price relationships."[1]

If these imperfections could be removed and the principal sources of the inefficiencies of the marketing system checked, then marketing could be turned into an effective tool of economic development for the coconut industry of Asia. It is hoped that by bringing into focus the serious problems of internal marketing, various policies and programmes could be explored which would likely increase the efficiency of the price mechanism in transmitting economic incentives to the producers of coconuts and coconut products.

Marketing of Coconuts

In Ceylon, the produce of the small-holder finds an outlet as fresh nuts (usually after removal of the husk) for distribution to households, especially in those areas in which production within the respective localities is not sufficient to meet the demand therein.[2] It is here that traders-cum-middlemen come in. The practice is that the producer who has a surplus takes it to the village market or fair, or has standing arrangements with traders of sundry, food and consumption items to take the surplus over for disposal through their normal trade outlets. Nor is it unusual for the middlemen to go to the producers and take over their surplus which they supply in bulk to the traders in the towns, etc.

The prices at which the small producer in Ceylon is able to dispose of his surplus nuts generally vary directly with the changes in the prices which millers offer for copra. Small producers of the type described in the preceding paragraph have no facilities or incentives for converting small surpluses into copra. In these circumstances, the prices they are able to obtain depend to a large extent on the arrangements which exist in regard to the disposal of their surplus through trade channels; and it is understandable that they are invariably exploited by the traders or middlemen.

As far as the household consumers in Ceylon are concerned, the margin of price difference between the ex-farm cost and the consumer price of coconuts is rather wide. During the period from 1960 to 1964, the f.o.b. export prices of coconuts ranged between 6 cents and 32 cents per nut whereas ex-farm prices (based on cost of production per nut) ranged between 5 cents and 6 cents only (table III.1). The difference, ranging from 21 cents to 27 cents, or roughly about 80 per cent of the f.o.b. export prices of coconuts, could be said to constitute farm profits and partly the profits

Table III.-1. MARGIN OF PRICE DIFFERENCE IN COCONUTS, CEYLON, 1960-64

Year	*Quantity exported (1,000 nuts)*	*Total f.o.b. value (Rp 1,000)*	*Value per nut (cents)*	*Ex-farm cost per nut*[a] *(cents)*	*Price difference (cents)*
1960	10	3	30	6	24
1961	5,602	1,474	26	5	21
1962	6,514	1,806	28	6	22
1963	8,706	2,756	32	5	27
1964	7,797	2,272	29	6	23

Source: Ceylon: *Country Study on Coconuts,* July 1968, pp. 18, 53 and 55.

[a] Based on costs of production data per thousand nuts (see Table II-13).

[1] Zdenek Cernohous. "The Marketing of Agricultural Products in the Philippines", *The Philippine Economic Journal,* Number Nine, First Semester 1966, Vol. V, No. 1.

[2] This portion of the discussion on marketing practices in Ceylon is derived from the *Country Study on Coconuts,* pp. 52-55.

of middlemen and of exporters; of course, such costs as handling and transport from the farm to the port are also included in this margin. Reference to the f.o.b. export prices of coconuts seems to be relevant, because the prices the local consumer pays for fresh nuts are to a great extent influenced by the f.o.b. export prices of fresh nuts as well as the prevailing trends in the prices of copra.

In the Philippines, farmers dispose of their surplus coconuts either by selling the unharvested nuts on a contract basis, or by selling the husked nuts; or, alternatively, they process the nuts into copra and then sell the copra.[3] When coconuts are sold on a contract basis, the buyer often pays an agreed price for the estimated quantity that may be harvested, and bears the cost of harvesting, hauling and marketing the nuts. Another method is for the buyer to pay for the husked nuts, usually on a par 1,000 nuts basis, which have been assembled at the farm or at a convenient place by the roadside. The coconut dealer pays the costs after the sale is made. This is the most common way of selling nuts to processors of desiccated coconut and to copra producers. Quite often, the farmer delivers the husked nuts to the market outlet in his own or a hired vehicle and gets paid after delivery of the nuts. In this case, the transportation cost is included in the over-all negotiation. The desiccated coconut manufacturers usually procure nuts directly from the farmers through their agents on a contract-sale basis. In some cases, the factory buys the nuts from dealers. Some dealers give cash advances to the farmers; this practice often results in a contract sale, since the farmers are forced to sell their crop to these dealers in return for the credit extended.

In the assembling and distribution of tender coconuts in India, the people or agencies concerned are the producers, contractors, internal merchants, retailers and hawkers. The price spread in the marketing of tender coconuts from the producer to the consumer ranges from 56 to 75 per cent.[4] For the marketing of mature nuts, those concerned are the producers, contractors, copra makers, *chekku*[5] owners, village merchants, wholesale merchants and commission agents. Co-operative societies have also recently come into the picture, but their impact is insignificant. Size is the important factor considered in selling tender coconuts and mature coconuts. In general, marketing procedures for coconuts and coconut products in India have still not developed along efficient lines and need to be improved considerably.

As noted earlier, coconut and copra in Indonesia are produced by many small holders scattered throughout the country, whose financial condition is very weak. Due to the deterioration of infrastructure and of the credit system in Indonesia, the farmers depend largely on salesmen whose business is purchasing, selling, transporting, and giving credit to the farmers.[6] Because of their weak financial position, possessing neither the tools of production nor the means of transportation and because of the very bad condition of the roads in the producing areas, the farmers are compelled to depend on middlemen who are in fact not only the buyers of farm products but also the suppliers of goods needed badly by these farmers. The loans they give to farmers are chiefly loans in kind, such as rice, textile, thread, sugar, cigarettes and other things needed by the farmers. These loans are repayable in the form of coconut produce or copra. From this, it is very clear that the bargaining position of the small farmers towards these middlemen-creditors is very weak; this results in the farmers' receiving low prices for their produce. Another cause for the relatively low level of prices they receive is the existence of various kinds of levies, either formal or informal, within the marketing process.

The internal marketing of coconuts in Malaysia is done through the sale of coconuts by small holders to dealers who make copra and sell it to mills or exporters, and to dealers or exporters who export half-husked coconuts.[7]

Consumption of Coconuts

Coconuts are used either for commercial purposes (for the production of copra and desiccated coconut) or as food nuts and for the production of home-made oil. In the Philippines, of the total production of about 7.1 billion nuts in 1965, 97 per cent was used for the production of copra, coconut oil and desiccated coconut and only about 3 per cent for food nuts and home-made oil.[8] Of the 6.9 billion nuts for commercial purposes, about 6.6 billion nuts were made into copra, and about 0.3 billion nuts were used for the manufacture of desiccated coconut. Some 107 million nuts were used as food nuts and 66 million nuts for the preparation of home-made oil.

In India, the entire production of coconuts is consumed within the country itself as tender coconuts, mature coconuts, edible copra or coconut oil. Of the total production of nuts in that country, 57 per cent

[3] This discussion of marketing practices in the Philippines is derived from: Fabian A. Tiongson. *Improved Merchandising of Selected Farm Products,* Community Development Research Council, University of the Philippines, Quezon City, Study Series. No. 6 (1964).

[4] Government of India. *Country Study on Coconut,* May 1968, p. 12.

[5] i.e., indigenous oil-crushers.

[6] Arsjad Anwar and Moh. Sisman (co-ordinators). *Country Study on Coconuts and Other Oil Seeds (Indonesia)*, July 1968, pp. 34-35.

[7] Country Study on the Coconut Industry of Malaysia.

[8] George L. Hicks, the *Philippine Coconut Industry: Growth and Change, 1900-65,* Tables 56 and 57, pp. A19-A23.

is used as raw nuts and the rest is processed into different products; 43 per cent is converted into copra, of which approximately 20 per cent goes for edible purposes and the balance for milling. It is estimated that 18 per cent of the total production of mature nuts is retained by the producers for their own needs, and that the balance represents the marketable surplus.[9]

In Indonesia, a large part of the coconut or copra produced is consumed domestically, either in the form of oil out of copra, or in the form of coconut milk consumed as food.[10] In 1960-65, the export of copra amounted to only 12 per cent of the average production.

What is available for local consumption of coconuts in Ceylon is the quantity of total production less what is exported essentially in the form of the four coconut products (coconut oil, copra, desiccated coconut and fresh nuts—all expressed in terms of nuts). It can also be said that the changes in the volume of the production utilized and diverted to local consumption inversely affect the quantity available for export; and the volume of local consumption tends to increase proportionately with the increase in the country's population. This is illustrated by the data shown in table III.2.

Although in the earlier years, local consumption essentially consisted of household consumption of coconuts as a food item, with the gradual development of oil-based industries in Ceylon (soap, margarine, etc.), an increasing proportion (though still a minor proportion) is being diverted to local industrial use. An important feature which emerged from the data shown in table III.2 is that "over the last 45 years or so while the volume of production has increased by about 170 per cent, local consumption has also increased nearly equally—i.e. by about 164 per cent."[11]

As indicated earlier, a large proportion of the total acreage of coconut in Ceylon constitutes small holdings, of which about 20,000 acres are small gardens, each under one acre, and generally located around dwelling houses. Traditionally, the coconuts derived from the few trees in a peasant's dwelling premises or highland garden have been used to satisfy his household needs (as a food item); but whereas, over the last two to three decades, consumption of coconuts in the households generally (including those of the peasants) has undergone a gradual increase, the production per tree has remained fairly static. Hence the margin of marketable surplus from this source has been declining and is now almost negative.

A large firm engaged in the manufacture of oil base products (soap, margarine, cooking oil, etc.) in Ceylon estimated that the total production of coconuts in 1966 was 2,750 million nuts (the estimate of the Coconut Research Institute for the same year was 2,577 million nuts), of which 1,112 million nuts were converted into oils and fats—of these oil, amounting

[9] Government of India, *Country Study on Coconut, op. cit.*
[10] Arsjad Anwar and Moh. Sisman, *op. cit.*
[11] Ceylon: *Country Study on Coconuts,* July 1968, pp. 49-51.

Table III.2. Production, Exports and Domestic Consumption of Coconuts, Ceylon, 1911-65

Period	Total production	Average exports[a]	Percentage of total production	Local consumption	Percentage of total production	Average population	Per capita consumption[b]
	(million nuts)	(million nuts)	(per cent)	(million nuts)	(per cent)	(million nuts)	(no. of nuts)
1911-1914	1,104	562	50.9	542	49.1	4.2	129
1915-1918	1,151	589	51.2	562	48.8	4.3	131
1919-1922	1,456	871	59.8	585	40.2	4.5	130
1923-1926	1,607	994	61.8	613	38.2	4.7	130
1927-1930	1,742	1,086	62.3	656	37.7	5.0	131
1931-1934	1,807	1,096	60.6	711	39.4	5.5	129
1935-1938	1,748	1,007	57.6	741	42.4	5.7	130
1939-1942	1,628	846	52.0	782	48.0	6.0	130
1943-1946	1,593	740	46.5	853	53.5	6.6	130
1947-1950	1,843	887	48.1	956	51.9	7.4	129
1951-1954	2,360	1,295	54.9	1,065	45.1	8.2	130
1955-1958	2,383	2,206	50.6	1,177	49.4	9.0	131
1959-1962	2,556	1,253	49.0	1,303	51.0	10.0	130
1963-1965	2,787	1,374	49.3	1,413	50.7	10.9	130

Source: Ceylon: Country Study on Coconut, p. 51.

[a] In terms of nut equivalent.

[b] Computed by dividing local consumption by average population.

to the equivalent of 592 million nuts was exported while the balance of the oil (equivalent to 520 million nuts) was used in the internal market.[12] The distribution of the oil equivalent to 520 million nuts was: the equivalent of 90 million nuts was absorbed by local industries in the manufacture of margarine, soap, etc., and the balance (the equivalent of 430 million nuts) used by households as coconut oil, hair oil, etc. Desiccated coconut, produced annually, is estimated to amount to a nut equivalent of about 340-350 million nuts and copra used in the production of oil for local consumption to a nut equivalent of about 366 million nuts.

Fresh nuts are used for a variety of purposes in Malaysia.[13] The principal user of fresh nuts is the housewife, who finds an infinite number of uses for both the milk and meat of the coconut. The coconut meat in the form of scrapings or clips is an important component in many varieties of Malaysian cakes, bread, salads, etc., while the milk is used extensively in the preparation of curry (gravy) and for flavouring purposes. There is also a brisk trade in young coconuts for the water and meat, which combine to form a refreshing drink.

Apart from these popular uses of the coconut, the internal demand for fresh nuts in Malaysia also arises from two other sources, though of less importance than the above. First, a considerable number of nuts finds its way into the religious fields. The Hindu community in particular absorb a large proportion of the nuts used for this purpose. The other increasingly important demand for fresh nuts arises from replanting programmes, either on estates or in the smallholders section. In 1966 the Coconut Replanting and Rehabilitation Division of the Ministry of Agriculture and Co-operatives used about 300,000 seed nuts for replanting purposes. With the continued increase in the area under replanting and rehabilitation, the demand for such seed nuts is expected to increase considerably.

The annual consumption of fresh nuts in Malaysia has been increasing steadily at a rate of 5 million nuts per annum. The local consumption of 145 million nuts in 1966 was 20 million more than the 1962 quantity — an increase of 16 per cent (Table III.3). However, it is worth noting that the rate of growth over the previous year has, in fact, been declining from 4 per cent in 1963 to 3.57 per cent in 1966. When related to a population growth of 3 per cent, indications are that the consumption per head of fresh nuts is increasing but at a diminishing rate.

[12] Ceylon: *Country Study on Coconuts,* July 1968, pp. 54-58.

[13] This discussion of coconut consumption in Malaysia is taken from the *Country Study on the Coconut Industry of Malaysia.*

Table III.3. Consumption of Fresh Coconuts in Malaysia, 1962-66

	1962	*1963*	*1964*	*1965*	*1966*
Nuts produced but not processed (million nuts) .	136.1	137.4	150.5	150.1	148.5
Net exports (million nuts) .	11.1	7.4	15.5	10.1	3.5
Local consumption (million nuts)	125.0	130.0	135.0	140.0	145.0
Increase over previous year (per cent) .	—	4.00	3.85	3.70	3.57

Source: Country Study on the Coconut Industry of Malaysia, *op. cit.*

Conversion of Nuts to Copra

Copra is produced from the fresh nut and consists of the kernel which has been shelled and dried. A major portion of the total annual coconut production of the Philippines, India, Ceylon, Indonesia and Malaysia is converted into copra, either for domestic use or for exports. Copra is useful mainly as the source of coconut oil, which is valuable for the production of many kinds of food and industrial products. Generally the coconut farmers themselves process the nuts into copra.

The quality of copra produced depends largely on the drying methods used by the producers. In the drying process, the moisture content of the coconut meat has to be reduced to a certain level (5-6 per cent); otherwise the copra will be of inferior quality. In the Philippines, two drying methods are frequently used by producers; the "tapahan" or open-kiln drying method and the sun-drying method. With the "tapahan" method, the coconut meat is dried by means of artificial heat. In some regions, the coconut meat is heated directly by the smoke and hot gases from the fuel. Copra produced by this method is usually sooty, sorched, or unevenly dried, but there is no clear evidence that its quality is inferior to that of sun-dried copra. It is a method preferred by farmers because it is faster and not affected by inclement weather.

With the sun-drying method, the process and equipment are simple. This method does not necessarily require husking of the nuts. The husked or unhusked nuts, split into halves (horizontally for the husked, and vertically for the unhusked nuts), are left to dry in the sun with the meat exposed. In some areas, sun-drying is used in combination with the artificial-drying method. Moreover, some farmers partially dry the copra in the open-kiln dryer, or "tapahan", and then further dry it in the sun.

According to a survey conducted by the Philippine Coconut Administration,[14] about 88 per cent of the farmers use the "tapahan" method; 10 per cent, the sun-drying method; and 2 per cent, a combination.

Irrespective of the drying method used, good quality copra can be produced only from fully matured nuts. Unripe nuts produce soft copra that has a low percentage of oil and deteriorates easily. Slow drying produces copra of good quality; hence, it is recommended that the drying time should not be less than sixteen hours.[15]

Ceylon produces copra either by sun-drying or by artificial drying of the kernel in wood-fired kilns. The kiln-dried copra is generally produced in large plantations and is classified as "estate copra".[16] Other copra, which is generally sun-dried, is described as "dealers' copra". Dealers' copra is produced by small-holders whose production is bought by dealers and traders who offer it for sale at the Central Copra Sales Room in Colombo; it is also produced centrally by dealers who purchase the fresh nuts from the small-holders. The quality depends on quick and effective drying, and estate copra, being artificially dried and not affected by the uncertainties of the weather, is generally superior to sun-dried copra. Quick and efficient drying prevents the development of free fatty acid during storage, whereas improper drying methods are ineffective in controlling the development of free fatty acids which lower the quality of the oil extracted. Foreign buyers have complained of the increase in free fatty acid content during shipment in copra purchased from other countries, but such problems have rarely occurred in the case of Ceylon copra, mainly because of the high quality of the estate copra that is offered for export.

About 72 per cent of the copra produced in Ceylon consists of dealers' copra. It would not be correct to conclude that dealers' copra is always inferior in quality to the estate copra. Copra is normally graded into three qualities according to moisture content and appearance, and the difference in quality between dealers' copra and estate copra is largely only marginal. There is, however, some potential for improvement in drying methods to ensure greater consistency and uniformity in quality. The price for dealers' copra is on the average about ten rupees lower per ton than the price for estate copra.

Approximately 70 per cent of the coconut produced in Indonesia is converted into copra. For the islands excluding Java this proportion is actually much higher. In Java, about 70 per cent of the coconut is directly used either in coconut-oil industries or domestic/kitchen uses. The needs for copra in Java are met by obtaining it from the other islands like Sumatra, Kalimantan, Sulawesi, Nusatenggara, Maluku and West Irian.[17]

The processing of copra in Indonesia is done by the thermal process and by sun-drying. The nuts are picked, collected and transported later to the processing plant. The means of transportation are human labour, bicycles, ox carts, trucks and boats, depending on the site of the plant and the geography of the area. In the processing plant, the nuts are halved and arranged on six-tiered racks about 40 centimetres deep. Using the husk and the shell of the nuts as fuel, a fire is lit under the racks for 15 to 20 hours. The resulting product is mixed copra, with 10 to 15 per cent water content, which in Sulawesi is generally known as "daily copra". This kind of copra must be dried (by fire or sun) for one or two days before being put on racks to avoid fungus and rot. At this stage, the water content is only about 3 to 5 per cent; this is what is mostly marketed in Indonesia.

The major portion of the copra produced in West Malaysia is kiln-dried but a small percentage, mainly in the East Coast of West Malaysia, is sun-dried in good weather. At present the following types of kilns are used:[18]

(a) Small relatively obsolete kilns formed of an open grill of wooden slats on four posts on which the copra is dried with such combustible materials as dried leaves and twigs. These kilns have no covering of any kind on the top or on the sides.

(b) Small and medium-sized kilns up to a capacity of about 30 piculs. These are made of timber with the sides of the fire-chamber enclosed with planks and the roof of *attap*. while the drying platform is of wooden slats.

(c) Larger kilns with brick and cement walls, often with roofs of corrugated iron sheets and drying platforms with wooden slats or metal sheets.

(d) Well-constructed large estate kilns more or less similar to the description given under type (c) above. Coconut shells are normally used as fuel in kiln types (b), (c) and (d).

The quality of copra varies with the type of kiln and fuel used, and the length of drying time. In kilns of type (a), the fuel used is often unsuitable and the

[14] Republic of the Philippines, Philippine Coconut Administration (Unpublished report) as cited in George L. Hicks' the *Philippine Coconut Industry: Growth and Change, 1900-65*, page 25.

[15] Fabian A. Tiongson, *Improved Merchandising of Selected Farm Products, op. cit.*, pp. 191-192.

[16] Ceylon: *Country Study on Coconuts*, July 1968, pp. 31-33.

[17] Arsjad Anwar and Moh. Sisman, *op. cit.*, p. 26.

[18] Country Study of the Coconut Industry of Malaysia, *op. cit.*

drying methods haphazard. The copra produced is of poor quality, dirty and unevenly dry, having a moisture content of as much as 20 to 30 per cent. The copra produced in kilns of type (b) varies greatly in quality, depending on the drying time. While inadequate drying in these kilns produces copra with moisture up to 15 per cent or more, proper attention to drying often results in the production of good copra with as little as 5 to 6 per cent moisture. Proper drying in type (c) kilns normally produces good copra of 5 to 6 per cent moisture. Estate kilns have maintained a reputation for the production of high-grade copra which has a ready demand with the highest possible prices. Copra produced in estate kilns seldom exceeds 5 per cent moisture content.

The length of drying time is an important factor in the production of good quality copra. In recent years, non-estate Malaysia copra producers have acquired knowledge of the proper methods for high-quality copra production but there seems to be reluctance on their part to adopt such methods, as monetary incentives do not seem to be sufficiently high to induce them to spend the additional time in drying operations. Moreover, a loss of moisture would entail a loss of weight and without a corresponding increase in the price realized by them for their higher quality product, the additional drying operations would only result in a lower return on the copra. In the present free pattern of copra marketing in West Malaysia, there is no one accepted system of quality grading. The individual purchasers, whether dealers or millers, have their own standards of quality and prices but some of the oil mills, especially the larger ones, pay relatively higher prices for copra based on quality. However, this practice normally benefits the larger producers/sellers such as estates and dealers as these oil mills normally purchase their requirements in relatively large quantities which the small copra producers are in no position to supply.

A quality premium for good copra exists in West Malaysia but this premium does not seem to reach the non-estate small copra producers to make it worthwhile for them to produce good copra. The establishment of an organized marketing system and a standard of quality for copra may go a long way to increase production of good quality copra in West Malaysia.

Marketing of Copra

The marketing system for copra typifies the transitional nature of marketing in many countries in Asia and the Far East, like Ceylon, Indonesia and the Philippines. The "transitional nature of marketing refers to the fact that the marketing of copra is, by and large, certainly not part of the modern, mechanized, impersonal economy but also that it is not static, as the rapid adoption of motorized transport shows."[19] This system also brings into focus the control exercised over the marketing of farm products through a system of credit advances to farmers.

The following description of methods of marketing copra in the Philippines extracted from an article written by Mr. Zdenek Cernohous,[20] formerly of USAID/Philippines, very appropriately pictures what may be considered the typical marketing system of the principal crops of the country, with the exception of sugar-cane which is largely determined by an official quota system for raw sugar. The methods and channels are also quite similar in many respects to those in other countries.

"In nearly all instances, the market structure is one of a multiple series of middlemen, most of whom enjoy some degree of monopoly and/or monopoly power.

"Copra trade flows from original producers through successive levels of middlemen, gradually being channeled toward the terminal domestic outlets . . . On the average, about 87 per cent of total production moves into exports abroad, while about 13 per cent is processed by domestic oil millers.

"The collection of copra at the point of production is handled by numerous barrio (village) buyers through whose hands pass about 87 per cent of all copra marketed. The prevailing practice is for the producer to deliver the copra to the buyer at a specific collection point, although some of the buyers own trucks and in some instances may collect the copra directly at the farm.

"The next stage in the marketing channel are the copra town buyers whose bodegas (warehouses) serve as points of primary concentration in the copra trade. The bulk of their supply of copra comes from the barrio buyers, but, in addition, the town buyers also procure copra directly from producers who deliver it at the bodegas. However, because of transportation problems only producers located in the vicinity of a bodegas tend to sell directly to town buyer, bypassing the barrio buyer. Thus, the magnitude of such sales tend to be relatively small, averaging about 8 per cent of total copra production.

"Deliveries from a barrio buying station to a town buyer's bodegas may be in the agent's own truck, but more often the town buyer arranges for the pick-up and

[19] George L. Hicks, *The Philippine Coconut Industry: Growth and Change, 1900-65*, p. 210.

[20] Zdenek Cernohous, "The Marketing of Agricultural Products in the Philippines", *The Philippine Economic Journal*, Number Nine, First Semester, 1966, Vol. V, No. 1. (As reprinted in the UCAP Weekly Bulletin, Vol. II, Nos. 19 and 20, May 8, 1967, and May 15, 1967).

the transportation of the copra. In the interior, truck is the usual means of transportation, but in some coastal areas, copra is transported to the bodegas in boats. The town buyers as a group handle about 95 per cent of copra production, all of which they sell directly to exporters and domestic oil millers. The remaining 5 per cent is procured by the latter two groups directly from producers.

"The trade channel becomes rapidly concentrated towards the top, with the copra moving from more than ¼ million producers via some 10,000 barrio buyers and 3,400 town buyers into the possession of less than 50 exporters and oil crushers. . . . The trade is financed from the top of the channel (exporters and oil crushers) down, with many a town buyer actually being mere agent of either exporter or crusher, and most barrio buyers being sub-agents of town buyers. Thus, each group of middlemen are essentially price takers vis-a-vis the group immediately above them while at the same time being price makers vis-a-vis the group immediately below them. By contrast, producers, being the last link in the chain, are solely price takers with a choice only to sell or not to sell, and frequently, no choice at all.

"The small farmers, particularly, are very much restrained in their resistance to sell by such problems as the lack of proper storage facilities, unvaliability of credit from regular sources, and their perennial need for cash often combined with indebtedness to the buyer. The monopony power of the buyer at the point of production is also enhanced by a lack of accurate and up-to-date price and market information, and by his opportunity to depress prices, surreptitiously under the guise of a deduction for poor quality and/or excessive moisture. This is a widely prevailing practice which is made possible by a lack of adherence by the trade to uniform, rigid quality classification standards and, especially, a lack of objective methods of quality determination. . . . "

If the farmer lives in a somewhat remote area and is unable to transport and sell his copra in an established village market, he will usually have one regular buyer who collects it.[21] The general rule in each case is contract selling, involving the extension of credit and advance agreement on prices. In some cases, the buyer-seller relationship involves the advancing of goods rather than money, but the effect is the same; the farmer is deprived of any opportunity to seek more favourable markets for his products, for he is under obligation to sell his copra to the buyer who extended him credit at a price the latter may dictate. Such an arrangement for extending credit, or prepayment for purchases, is said to permeate the entire marketing system: exporters or factories finance their immediate suppliers who, in turn, extend credit to their suppliers.

[21] George L. Hicks, *ibid.*

In some places, buyers' power is exercised at the expense of isolated sellers and often as a result of weighing and pricing. The buyers' position is generally strongest in areas which are poorly served by transport, where it is frequently true that the farmer confront only one buyer. The poor state of the roads in many areas and the difficulties of inter-island shipping result in high cost of transporting the product to markets, since copra is bulky with a relatively low-per-unit value and production is scattered throughout the archipelago, much of it in remote regions.

One of the basic weaknesses of copra marketing is the system of pricing used in buying copra. At the village and town level, most copra, whether high or low grade, is sold on the "buen corriente" basis (grade 5 of copra, with a maximum moisture content of 15 per cent) at a lower price than that for "resecada" or or first class copra. Exporters and millers require high quality copra, but much of what is produced and marketed is of a low grade. It is generally alleged that the producer has no incentive to produce quality copra, since he believe that whatever quality he produces, the price will be the same. There is evidence to show that the producer does get paid a premium for high quality copra but that his resistance to improving the quality of copra produced continues.

The best available measure of marketing efficiency is indicated by the spread between farm level prices and Manila prices of copra. As can be seen in table III.4, the marketing margin for copra ranged from 25 to 35 per cent for the period from 1957 to 1964. High marketing margins for Philippine copra result not so much from the exercise of monopoly power (since competition is the more typical case), but from the

Table III.4. MARKETING MARGINS FOR COPRA, PHILIPPINES, 1957-64

(Price in pesos per 100 kilogrammes, "Resecada" basis)

Year	*Manila wholesale price*	*Farm level price (implicit)*	*Percentage mark-up*[a]	*Farm level price (actual)*	*Percentage mark-up*[b]
(1)	(2)	(3)	(4)	(5)	(6)
1957	28.43	19.83	43.3%	21.00	35.3%
1958	37.70	26.76	40.8	28.00	34.6
1959	46.66	21.30	119.0	37.02	26.0
1960	39.92	34.09	17.1	31.70	25.9
1961	38.14	27.44	38.9	30.16	26.4
1962	47.31	30.06	57.3	36.72	28.8
1963	54.09	36.94	46.4	43.18	25.2
1964	56.00	40.00	40.0	43.28	29.3

Source: George L. Hicks, *The Philippine Coconut Industry: Growth and Change, 1900-1965.* Table 49, p. 179.

[a] $\frac{(2) - (3)}{(3)} \times 100$

[b] $\frac{(2) - (5)}{(3)} \times 100$

need for multiple handling of the product arising out of the generally underdeveloped transportation and storage facilities and the geographical dispersion of copra production.

The breakdown of the respective shares of producers and middlemen in the average price of copra in 1966 is shown in the following table:[22]

(a) Average price paid to planters

Landowner's share	₱29.00
Tenant's share	₱16.00
Overseer	₱ 3.00
	₱48.00 per 100 kilos of "buen corriente mejorada".

(b) Average price paid by town buyers to barrio buyers ₱55-₱57 per 100 kilos "resecada" basis.

(c) Average price paid by exporters or oil millers, to town buyers ..... ₱59-₱60 per 100 kilos "resecada" basis.

(d) Average export price contracted for by exporters FOB Philippine ports . ₱65 per 100 kilos "resecada" basis.

Based on the above figures, the share of the producers (tenants) of ₱16 per 100 kilos of copra represents 24.6 per cent of the average export (FOB) price of copra. The landowner's share in the amount of ₱29.00 is equivalent to 44.6 per cent, while the overseer's share of ₱3.00 corresponds to 4.6 per cent. The share of the barrio buyers, town dealers and exporters altogether amounts to ₱17.00, accounting for 26.2 per cent of the average export price of copra. The 26.2 per cent is made up of 12.3 per cent representing the share of the barrio buyers, 6.2 per cent for the town dealers and 7.7 per cent for the exporters.

The system of marketing copra in Indonesia follows a pattern similar to that in the Philippines. Farmers sell their copra to agents who operate at the village level. These agents, in Indonesia, are known as *tengkulak*. The general pattern of exercising control over the farmers is through the making of advance payments, supplying equipment and daily necessities, such as sugar, textiles, dried fish, etc., and materials for the maintenance of their holdings.[23] A report from IBRD states this problem as follows:[24] "The principal problems arise from an absence of recognized standards or grades of quality, a lack of uniformity in weights and measures, poor transport and communications facilities in some rural areas, a lack of information on market conditions and the presence of various factors which tend to reduce or eliminate competition among buyers. The most significant of the latter is buyer financing, a system in which the borrowing cultivator commits himself, well in advance of harvest, to sell his crop to the lending buyer at an established price."

All these means of exercising control were channelled through the collectors and their *tengkulak* by the big export firms which at that time before World War II were predominantly Dutch. The *tengkulak* collected all kinds of copra in small quantities, which are transported to the collectors. These middlemen, who received their supply from the *tengkulak* at the village level, sorted the various kinds of copra and delivered the graded copra in large quantity to the exporters at the various ports. The Dutch commercial houses (exporters) left the collecting and sorting of the copra and the bargaining with the farmers to the various types of middlemen. The Dutch exporters or Chinese exporters (dealing with the Singapore market) in turn exercised control over the middlemen through the granting of various facilities. In general, these middlemen did not have direct access to banks and were, therefore, dependent on credit facilities from the exporters. It will be noted that this arrangement for credit advances extends throughout the marketing system and follows the same patterns as in the Philippines. The normal pattern in Indonesia at that time was that the middlemen received advance payments and trade credits in the form of raw materials, textiles, etc., from the Dutch commercial houses and, with this working capital, they were able to organize their collection and distribution functions in the copra trade, and to control the prices paid to the farmers for their copra through short-term credits allowed to farmers in anticipation of delivery of a certain quantity of the product. When copra prices were high, farmers requested other types of credit such as for financing the construction of houses, laying out new gardens and other expenditures "forced" by custom and social pressures.

According to Boeke,[25] the copra farmers in Indonesia received less than fifty per cent of the world market price of copra; the marketing links between the producer and the exporter absorbed more than one-half of the export value. An important element seems to have been transportation cost, estimated to be about

[22] Mariano P. Ramiro, "Philippines: Study on Regional Plan Harmonization of the Coconut Industry", pp. 50-51.

[23] This portion dealing with copra marketing in Indonesia is taken from J. Panglaykim's "Some Notes on the Indonesian Coconut Situation", April, 1968.

[24] International Bank for Reconstruction and Development. The Economic Development of Malaya, September, 1955, p. 54 as cited by J. Panglaykim.

[25] J. H. Boeke, the *Evolution of the Netherlands Indies Economy*, Netherlands and Netherlands Indies Council, New York Institute of Pacific Relations, 1946, pp. 162-165. (As cited in J. Panglaykim's "Some Notes on the Indonesian Coconut Situation", April 1968).

45 per cent in 1940. Export duties, wagons and cost of loading and weighing accounted for about 12 per cent of the local copra prices, while the cost of gunny bags (the most important packing material needed to transport copra to the collectors) was estimated at around 3 to 4 per cent of the local price of copra. More recent data (1965) show that, while the price of copra in Makassar was about Rp 40,000, the farmers received only Rp 19,415 per 100 kilograms of copra sold.[26] About Rp 20,585 for every 100 kilos of copra has to be paid out by the producer to meet various kinds of levy, either formal or informal, within the process of marketing copra, including money interest, storeroom rent, administration and contributions of different sorts. In Java, the price of copra in 1965 was Rp 85,000 per 100 km, so that the farmers received less than 25 per cent, assuming that the levies they had to pay were in the neighbourhood of Rp 20,000. At the beginning of 1968, the condition somewhat improved; when the price of copra in Djakarta was about Rp 4,500 per kilogram, the farmers in the producing areas received between Rp 1,500 and Rp 2,000 or about 34 to 42 per cent of the Djakarta price.

To improve the position of the farmers and to ensure a reasonable price for the consumers, a system of co-operatives was established on June 12, 1957, consisting of four levels of organizations, namely, the primary, the central, the associated and the Indonesian main copra co-operatives. The scope of operation of the primary copra co-operative covers one village. It is in charge of collecting the farmers' copra, processing coconut into copra and delivering it to the Central co-operatives. The Central copra co-operatives operate in districts and from an association of primary co-operatives. They take charge of receiving, collecting and delivering copra to the associated copra co-operatives. The scope of operation of the Associated copra co-operatives covers a province and their function is to receive copra from the Central copra co-operatives, arrange inter-insular transport and deliver copra to the Indonesian Main Copra Co-operatives or on behalf of the latter, to sell the members' copra to oil factories in their region. The Indonesian Main (Mother) Copra Co-operative is an association of copra co-operatives whose task is to receive the copra, arrange interinsular transport as well as export, and sell copra to oil factories.

For every delivery of copra to the primary co-operatives a down payment is paid to the farmers based on the selling price of copra. A part of the down payment is set aside for savings. The facts show that the coconut farmers still do not feel the need for co-operatives, mainly due to the bureaucratic and formal way of operation of these co-operatives, especially in giving credit and the sharing of copra net earnings with the farmers.

[26] Arsjad Anwar and Moh. Sisman, *op. cit.*, pp. 34-35.

Chapter IV

COCONUT PROCESSING INDUSTRY OF THE REGION:

Problems and Prospects

Introduction

This chapter was intended to be a study of the present position of coconut industry in a few ECAFE developing countries aimed at identifying their specific problems and exploring possible solutions through regional co-operation. Since relevant data have not been available from the country sources, the study has been re-designed as an exploratory one; it puts forward a few basic theoretical reasonings supported by available data showing possible economic gains in the hope of inducing the producing countries to undertake a study in depth with a view to finding ways and means of solving their individual and collective problems.

FAO has made several studies of the economic aspects of oilseed crushing in the world and of the question of the future location of the processing plants and an objective analysis of the economic factors—relative technical efficiency, operating costs, management and marketing costs—bearing on the location of the processing of oilseeds produced for export in the developing countries.[1] On the basis of these studies, it has come to the conclusion that there are no overriding reasons, in terms of technical efficiency and operating costs, why such industries in the developing countries should not be able to operate effectively. This paper accepts this conclusion as a starting point for exploring further how, by undertaking extensive modernization and expansion of the existing installed capacities, by rationalizing the domestic trade to reduce raw material cost, by integrating the crushing of oil with the production of margarine, cooking fats, soap, detergents, fatty alcohols and glycerine, and further by simultaneously developing auxiliary industries to use husks and other by-products, the major exporting and consuming countries of the region can achieve considerable reduction in cost while creating an everwidening market within the region itself.

A Historical Background

The causes of the geographical pattern of location of industry are rooted in past economic and political history. With the coming of the industrial revolution in the west in the seventeenth and eighteenth centuries, the hydraulic process was introduced to meet the growing demand of the industrializing countries for vegetable oil for use in soap and for machine lubricants. This demand continued to grow right through the nineteenth century. Naturally the processing industry and its associated technical developments took place in Europe and North America. An increasing demand was thus created for copra and a thriving world trade developed in copra and palm oil. The established industries in Europe and America with experience in oilseed processing and available plant and skill, stimulated the input demand for copra and oil seeds rather than oils, which were made even more profitable because of the availability of a cheap by-product, oilcake, to feed the livestock industries thriving at that time. Since the copra producing countries were under the political and economic influence of the West, there was a substantial flow of capital from copra crushing countries to develop plantations in the Philippines and Indonesia so as to expand and assure the supply of copra. Associated shipping and trading links in "colonial" pattern developed over the years. From 1899, copra exports grew rapidly in response to the growing demand of the French margarine industry. Added to this came in 1916 a substantial demand from the United States to meet the growing requirements of the soap, margarine and explosive industries.

The first World War added a new dimension to the global pattern of trade. To meet growing local demand, factory processing began to spread in India, Ceylon, Malaya and the Philippines. But the old structure of the world market remained intact and the developing countries became more and more suppliers of raw materials for the processing industries of the West. For example, in the Philippines, there was a trend towards marked and continuous decline from 1920 to 1960 in the share of total nuts used in coconut oil manufacturing and coconut oil exports. In 1920, 85 per cent of the total nuts were used in oil manufacture, and 71 per cent represented oil exports. These shares fell to 45 per cent for oil manufacture and 33 per cent for oil exports in 1930. In 1950, 20 per cent of the total nuts were used in oil manufacture and 11 per cent in oil exports. Instead of the industry increasing the degree of processing, there was a marked

[1] FAO: *Structure of the Oilseed Crushing Industry and Factors Affecting Its Location* by J. Stopforth and J. F. O. Hagan, Rome. Also, *The Location of Oilseed Crushing Industries;* case study on the Philippines, case study on Ceylon: FAO study group on Oilseeds, Oils and Fats: First Session, Rome.

decline in the share of nuts entering the industrial sector of the industry. However, there were two other developments which took place after the second World War. The United States entered the world market as the world's largest exporter of oilseeds, chiefly soybean and its products. And secondly, a large number of developing countries began to establish their own crushing industries to supply the export markets.

The Copra Crushing Industry in the Region

There is apparently a serious lack of statistics regarding the magnitude of installed capacity, the rate of annual utilization, the quantum of copra intake and the level of output of even coconut oil, leaving aside the output of further processed products and by-products of the industry in this region. No serious study of the prospects and problems of the industry is possible in the absence of such statistics. The following pages have been prepared on the basis of crude figures to establish the hypothesis of a need for economic co-operation in coconut processing by the producing and consuming countries of the region. A summary of the present position of the crushing industry is attempted in the following pages.

In the Philippines, according to the Ramiro report,[2] ten mills were engaged in 1965 in oil manufacturing and exporting. The following table has been prepared from a table in that report.

Table IV.1. Coconut Oil Crushers, Philippines 1965

	Name of firms	*Rated capacity (tons of copra per day)*	*Nationality*
1.	Lu Du & Lu Ym Corporation . .	380	Chinese
2.	Legaspi Oil Co., Inc.	300	American
3.	Philippine Refining Company, Inc.	275	Filipino
4.	Procter & Gamble, PMC . . .	250	American
5.	Imperial Vegetable Oil Co. . .	175	Chinese
6.	Wee Kun Coprox Ind. Co.. Inc. .	150	Chinese
7.	Batzak, Inc.	150	American
8.	San Pablo Oil Mfg. Co. . . .	140	Filipino
9.	Lucena Oil Factory	100	Chinese
10.	Unifood Mfg., Inc.	—	Filipino

According to Dr. Ramiro, "There are ten leading oil mills in the country, nine of which have an aggregate rated daily capacity of 1,920 metric tons of oil, which is equivalent to 3,047.6 metric tons of copra."[3] One of the leading oil crushing companies—the International Oil Company of Manila—which crushes about 150 long tons of copra daily has not been included in this list most probably because it does not export oil but manufactures refined oil and other oil products for local sales only.

A more comprehensive picture of the oil crushing industry in the Philippines is given in the FAO study, *"Case Study on the Philippines"* (CCPL of 66/12/2). According to this, the combined capacities of all existing mills which number around 20, including small units of 15-20 tons capacity is 3,000 metric tons daily (24 hours) or equivalent to 900,000 tons of copra annually. The total copra crushed is about 575,000 metric tons per year including parings and rejected coconuts from factories manufacturing desiccated coconut. On this basis, therefore, not more than 65 per cent of the total capacity is presently utilized. However, the big oil mills are operating at about 75 per cent of their capacities. The total capital invested in the copra crushing industry would be around ₱300,-000,000 at replacement value, including the cost of machinery, building and land.

In Indonesia, the location of coconut oil factories before the last war was politically decided in favour of the concentrated consuming area — the island of Java. Before the second World War as many as twenty copra crushing plants were established in different parts of Java — five in West Java (three in Djakarta itself), ten in Central Java and nine in East Java. By 1960 they had mushroomed into as many as 143 copra crushing mills throughout Indonesia. The following table is indicative of the present position.

Table IV.2. Number of copra crushing mills, installed capacity and utilization scale, Indonesia, 1960

No. of crushing mills	*Location*	*Average potential capacity (tons of copra per month)*	*Real capacity (tons of copra per month)*	*% of capacity—utilization*
16	Djakarta Raya . . .	20,200	11,733	58.08
19	West Java	9.750	4,739	48.61
15	Central Java . . .	50,050	9,460	18.90
33	East Java	24,590	14,109	57.38
7	North Sumatra . .	245	150	61.22
7	South Sumatra . .	125	75	60.00
7	Central Sumatra . .	1,511	1,239	82.00
19	Central Sumatra . .	2,864	2,058	71.86
10	Sulawesi	7,176	3,156	43.98
9	Nusatenggara . .	5,095	3,000	58.88
1	Maluku	300	180	60.00
143		131,906	49,899	56.45
				Per cent average

Source: Computed from Department of People's Industry, *Ekonomi dan Industri,* 1960, pp. 1-10, quoted in Arsjad Anwar and Moh. Sisman, *op. cit.*

[2] Philippines: *Study on Regional Plan Harmonization of the Coconut Industry* (Mimeo.), 1968.

[3] *Ibid.*

It appears from the above table that Indonesia has an installed capacity for crushing annually 1,572,000 tons of copra. According to the monthly quota of 132,000 tons, the average utilization of capacity works out at 56.45 per cent. The above statistics regarding the installed capacity seem exaggerated and need not be taken seriously. It is more probable that "real capacity" has been used to mean installed capacity which works out around 50,000 tons monthly or approximately 600,000 tons annually.[4]

The number of oil mills in Indonesia has increased from 164 in 1961 to 198 in 1967. In terms of copra input, 1,025 million tons were needed in 1961, compared to 1.044 million tons in 1967, or an increase of less than 2 per cent (table II.3). In 1961 about 54 per cent of the production capacity was utilized; in 1967 this had dropped to less than 40 per cent. This is largely due to the low utilization of factories in Java (where over 73 per cent of the output capacity is situated), particularly West and Central Java which are quite far from copra producing areas. The solvent extraction process is not used at all in the coconut oil industries of Indonesia because the solvent has to be imported and also because of lack of experience in extraction process and lack of capital to construct the factory.

[4] The reason for thinking so is as follows. The latest figures made available to the Central Bureau of Statistics, Indonesia, from 95 large and medium-sized copra crushing factories indicate that the total intake of copra by all such factories in 1960 and 1961 was respectively 243,883 and 217,132 tons, and that the corresponding total coconut oil output was 150,214 and 130,289 tons respectively. The above figures seem plausible because the oil extraction rate from copra works out at 59.8 per cent which approximates the average of 63 per cent for the ECAFE countries. It is also reasonable to estimate, in the absence of available data, that the rate of capacity utilization may not exceed 50 per cent.

In Ceylon, there are thirty nine registered mills with a total capacity for crushing of 430,000 tons of copra annually to produce 270,000 tons oil. According to table 3.2 of the country report,[5] the average annual output of copra in Ceylon during the period 1958-67 was 24,000 tons. The production of coconut oil averaged 122,000 tons annually during the same period. Two facts emerge from the above figures. The mills were operating at 45.4 per cent of their capacity and the local production of copra was not adequate for the full utilization of installed capacity.

Of the thirty nine mills, there are only ten whose annual capacity is 10,000 or more; and these collectively account for approximately two-thirds of the total annual output of oil.

In India, the average annual production of copra is around 316,000 tons, of which 250,000 tons are used for crushing into oil by an estimated 1,500 mills installed in different places. The annual installed capacity of all the crushing mills has been estimated at 450,000 tons of copra annually, but the actual capacity utilized hardly exceeds 50 per cent of the total.

In West Malaysia, there were 65 coconut oil mills in operation in 1966, of which 22 were located in Johore, 15 in Penang, 8 in Perak, 7 in Selangor and 13 in other West Malaysia States.[6] It is reported that the production of coconut oil and copra cake by these oil mills in West Malaysia has been declining during the past few years mainly due to a scarcity of copra in the country. Out of 2.196 million piculs of copra, the 65 mills produced 1.098 million piculs of

[5] Country paper on coconut products: Ceylon.

[6] Country Study of the Coconut Industry of Malaysia, *op. cit.*, page .

Table IV.3. Capacity of Production of Oil Milling in Indonesia, 1961 and 1967

(In terms of copra input in metric tons)

Territory	1961 capacity of production			1967 capacity of production	
	Potentials	Per cent of total	Percentage of capacity used	Potentials	Per cent of total
Java	753,600	73.30	48.93	764,216	73.17
West Java	355,200	34.66	52.38	312,100	29.88
Mid-Java	180,000	17.56	34.60	157,940	15.12
East Java	216,000	21.08	55.72	294,176	28.17
Sumatra	85,500	8.34	56.16	73,734	7.06
Kalimantan	40,800	3.98	64.71	52,244	5.00
Sulawesi	103,800	10.13	69.36	106,681	10.21
Nusatenggara	34,500	3.37	86.96	39,580	3.79
Malkuku/West Irian	9,000	0.88	66.67	8,010	0.77
Total for Indonesia	1,024,800	100.00	53.78	1,044,465	100.00

Source: Arsjad Anwar and Moh. Sisman, "Country Study on Coconut and Other Oil seeds", p. 28(a).

crude coconut oil, 0.184 million piculs of refined oil, and 0.859 million piculs of copra cake.

Many of the oil mills in the country are operating below capacity at about one-third to one-half their normal output, mainly due to the shortage in the supply of copra. Generally the coconut oil mills depend on locally produced copra but a few large mills do import copra to supplement their requirements. The majority of the mills are relatively small and employ outdated techniques of oil extraction. The copra used in these mills are mainly of poor quality and the oil extracted often has a free-fatty-acid content of 0.5 per cent to 1.1 per cent as compared to a free-fatty-acid content of 0.1 per cent in good quality coconut oil.

The extraction rate of oil from copra depends mainly on the types of machinery used. The small mills using rather old machinery have an extraction rate of about 52 per cent and the copra cake produced by them has an oil content of about 10 per cent and a moisture content of about 12 per cent. The large mills using relatively modern processing facilities are capable of an oil extraction rate of 60 per cent or more and could reduce losses of oil in the copra and of refining to a minimum. The copra cake produced by the large mills generally contains about 8 per cent oil.

Some mills produce the oil in one single extraction and some in two or more stages. Some sell the coconut oil directly after decantation while others do so after filteration. Generally no further refinement is done by the small mills though a few of the large oil mills do undertake the refining of coconut oil. Some large edible oil factories limit their activities to the refining of coconut oil for the production of cooking oil, margarine, soap and detergents. Refining is done by the batch system with modern deodorization equipment, and high quality production of oil in these factories is assured through quality control measures and a technically trained staff.

A few of the large oil mills are now looking into the possibilities of installing solvent-extraction units for improving the recovery of oil and for extracting the additional amount of oil contained in the cake. In addition, the solvent-extraction process lends itself to the use of various oil-bearing materials such as oil palm kernels and hence reduces the risk of dependence on one type of raw material. The prevalence of a shortage of copra and the availability of an increasing volume of oil palm kernels in the country may give additional impetus for these units to be established in West Malaysia.

The quantity of copra processed by the oil mills in West Malaysia has fallen from 157,000 tons in 1961 to 118,800 tons in 1966, a decline of 24 per cent. The lowest level was in 1964 when only 108,200 tons of copra were processed, attributed in part to the Indonesian confrontation and the consequent hazards it inflicted on mills whose major source of raw material (copra) was from Sumatra. A contributory reason for the decline in the amount of copra milled is the increasing use of palm kernel in oil extraction. Palm kernel is mixed with copra to as much as one-third of the quantity milled but the more usual proportion is one-fourth. The major factors influencing the increasing use of palm kernels are the existence of excess capacity in local oil mills and the relatively cheaper cost of kernels as against copra. The difficulty of detecting pure coconut oil from adulterated forms has ensured a ready market for coconut oil mixed with palm kernel oil. The exact quantity of kernels that is currently mixed with copra for oil extraction is extremely difficult to estimate since very few mills are willing to reveal such information. The current high price of copra relative to the price of palm kernel will have the effect of inducing the increased use of kernels with copra for extraction.

However, the use of palm kernels with copra has its limitations. The maximum proportion to which it can be mixed is approximately 35 per cent of the quantity to be milled, or one part of kernels to two parts of copra. Any further increase in this proportion results in the oil turning solid in the container. Therefore, palm kernels cannot be substituted for copra indefinitely, though there might be the technical milling capacity to cope with increased intakes. The resulting situation is one where, despite the use of palm kernels, some big mills still have excess processing capacity.

The copra crushing capacity of Singapore has been estimated to be around 10,000 tons of oil monthly or 120,000 tons annually. If extraction rate averages out at approximately 50 per cent, then 240,000 tons of copra can be crushed annually. The following table may be more indicative of the actual performances of the installed capacity.

Table IV.4. Output of Coconut Oil, Soap and Vegetable Cooking Oil, Singapore, 1957-1967

(tons)

Year	Soap	Coconut oil	Vegetable cooking oil
1957	12,749	48,701	—
1958	14,397	30,226	—
1959	10,779	20,470	—
1960	10,690	24,539	—
1961	9,810	28,810	—
1962	8,771	23,785	—
1963	7,706	22,033	18,444
1964	7,924	19,699	21,086
1965	6,360	20,716	18,046
1966	9,988	29,101	24,488
1967	13,223	29,080	30,349

Source: *Monthly Digest Statistics,* Vol. VII, No. 5 (May, 1968). Singapore: Department of Statistics, p. 35.

[7] One picul = 0.06048 metric tons.

At present it seems that the copra crushers are operating far below their capacity, perhaps at not more than an estimated 25 per cent to 30 per cent of their total capacity. Since the Singapore oil millers entirely depend upon imported copra, their crushing level fluctuates with ups and downs in the country's imports. The above statistics suggest that, during the period of conflict between Indonesia and Malaysia, the Singapore millers were seriously cut off from their supply source, so that their level of oil production continued to go down until 1964.

The Government is aware of the serious handicaps to the industry. The present regulation stipulates that, in respect of each shipment of copra imported, at least 60 per cent shall be utilized in Singapore by its coconut oil factories leaving the balance of 40 per cent for re-exports.

Further Processing of Coconut Oil

In the Philippines during the period 1960-1965, about 41.8 per cent of the total annual production of coconut oil was locally used. The oil retained went mainly into the manufacture of soap, cooking oil, lard and margarine. The biggest mill, the International Oil Company, which produces annually about 30,000 tons of oil, does not export oil at all. It manufactures and refines oil and other oil products for the local market. Moreover only 12 per cent of the combined output of the Philippine Refining Company (Unilever) and the Procter and Gamble, PMC—two of the biggest crushers—is exported. The rest is processed into refined oil and soap, cooking oil, margine and other oil products for local sale. Further, with the establishment of the proposed Coco Chemical Plant, a semi-government enterprise, 4,400 metric tons of copra will be needed annually to produce coconut based plasticizer, fatty alcohols and fatty acids and their derivatives, detergents and surfactants. It is also to be noted that though the local production of glycerine from coconut oil fluctuated from year to year it was in 1964, a normal year, that 5,033 metric tons valued at ₱5.2 million was produced. Though it is not possible to determine the destination of export, it is probable that Japan absorbed more of the exports of the Philippines in the field of fatty alcohols, detergents, plasticizers, glycerine and fatty acids. Japan is looking forward to absorbing as much as possible of the output of the proposed Coco Chemical Plant which it is helping to set up on a turn-key basis with the Philippines.

Included in the government sponsored project of the Coco Chemical Plant is an integrated plant with an annual capacity of 6,600 metric tons for producing coconut shells for conversion into charcoal for local use and for export. It was scheduled to start in May, 1968, but there has been no available report since then.

Though the copra crushing industry is primarily in the hands of private enterprise, the Government of the Philippines has been taking active steps to modernize and diversify the industry and to develop further processing. To illustrate this point, it may be pointed out that the recent joint venture of the National Investment Development Corporation and the Coconut Planters to establish at a cost of ₱23 million the Coco Chemical Plant to manufacture fatty alcohols, plasticizer and glycerine is calculated to serve the national interests of the Filipinos. Since Philcoa's abortive attempts to improve the processing of extraction of oil from fresh coconuts by farming out the research to Mr. Stanley Hiller of California and subsequently to San Carlos University, the Government has been trying to buy out the improved technique from the patent holders of the processes through the mediation of the Coco Chemical Plant. The process for converting coconut oil to fatty alcohols known as the methyl esterification process is going to be used under license from the KAO Soap Company of Japan and Messrs. Proctor and Gamble of the United States, the world's two patent holders of this process. The other process is the German Lurgi Process which produces fatty alcohols by way of fatty acids, a round-about route. The process for converting fatty alcohols to PVC plasticizer is also a KAO patent. It is the only known process for producing plasticizers from mixed fatty alcohols. This process will also be bought by the Coco Chemical Plant. It seems that the Government is fully aware of the inefficiency and exhorbitant operating costs of the Robledano-Luzuriaga process (wet process) which is being used in one of the factories in Manila.

In addition to the above mentioned efforts of the Government to diversify the use of coconut and its by-products, there are several experimental pilot plants for mechanized extraction of coconut coir. Of these, the biggest is the Laguna Coco By-product plant which has been in existence for the last seven years, supplying inputs for rubberized coir mattress. The second in size is EPCO Manufacturing Enterprises which operates with indifferent success. The Philippines' export of coir, however, is not as significant as one would expect considering the quantum of its output and the large number of people employed in the production of coir. Its export was barely 389 metric tons in 1965. The leading consumers of coir are Japan, West Germany, Great Britain and the Netherlands, which together consumed 70 per cent of the world's net import of 112,617 tons in 1967. The world's leading coir suppliers are Ceylon and India. Ceylon has been supplying 95 per cent of the world coir trade since 1938. It seems that Ceylon must have acquired specialized knowledge and techniques of manufacturing coir; it has established a reputation for marketing coir and its by-products that can be regionally exploited

for mutual benefit. The prospect seems to be extremely bright as evidenced by the prices of coir fibres originating from Ceylon, which consistently increased from $45.68 for mattress fibres and $85.29 for bristle fibres in 1956 to $70.12 and $163.06 respectively in 1961. Incidentally, the Ceylonese coir fibre export price in 1963 was quoted at $275 per metric ton for bristle fibre and $79 per metric ton for mattress fibre.

In Ceylon, the state-owned Oils and Fats Corporation has a fatty acid complex consisting of a seventeen-ton per day fat splitting plant, matched with a fatty acid distillation plant, and a glycerine concentration plant. However, though this fatty acid complex was installed as early as 1956, it was not immediately put into operation owing to uncertainty as regards export markets, and partially to lack of technical help from the equipment supplying country.

This plant has now come into commercial production and has begun exporting white distilled coconut fatty acids and crude glycerine to Europe at competitive world market prices. The quality of the product is very high and the Corporation is now exporting on an average 299 tons of white distilled fatty acids and 20 tons of crude glycerine per month. It is expected to raise this to the full capacity level of 350 tons of white distilled fatty acids and 35 tons of glycerine.

In Indonesia, moderate progress has been made in the further processing of coconut oil, especially for the manufacture of soap and margarine as shown below:

Table IV.5. Input and Output of Soap and Margarine, Indonesia, 1960-61

(Unit: tons)

Year	No. of factories		Total inputs used		Total output Hard soap
	Large	Medium	Coconut oil	Palm oil	
		Soap production			
1960	25		18,663	17,626	56,161
1961	24		18,479	22,329	64,291
1960		174	16,609	1,902	26,804
1961		183	26,771	3,431	42,696
		Margarine production			
1960	7		31,744	3,752	32,833
1961	7		33,471	3,679	34,389

Source: Computed from Manufacturing Industries B.P.S., 1962, pp. 192-196.

The above table shows that the total intake of copra for producing soap in the two years 1960 and 1961 for which statistics are available was 67,105 and 79,630 tons respectively.

Production of margarine and cooking oil used to be largely concentrated in two foreign-owned companies, one British with a large plant in Djakarta (Unilever) and the other American (Procter and Gamble) located in Surabaja. These two companies used domestic copra—allocated through the Copra Foundation. Their output used to be sold on the domestic market.

There are 886 soap factories in Indonesia with a capacity of 297,000 tons a year. However, only 50 per cent of the production capacity is presently being used, presumably due to the difficulties experienced by the coconut oil mills supplying the oil to the soap industries in getting raw materials (copra). There are two kinds of processes used in the manufacture of soap: (a) the full boiled process, where 675 kilograms of oil are needed to produce one ton of soap. The only factory in Indonesia which uses full boiled processing is the Unilever, with a capacity of 60,000 tons of soap a year. If the capacity of 297,000 tons of all the soap factories were actually used, the oil needed would amount to about 153,075 tons of oil per annum. About 20 per cent of this is palm oil and the rest (about 122,460 tons) is coconut oil.

At present there are only two margarine plants in Indonesia, both of them situated in Java, with a capacity of 18,000 tons per annum. Of this amount, 30-40 per cent, or about 5,400 to 7,200 tons a year, is required in the form of coconut oil as raw material, and the rest in palm oil. There are eight cooking-oil plants in Indonesia, all of which are located in Java. The total capacity of these factories is about 44,400 tons per annum, for which about 50,000 tons of coconut oil are needed annually. Two hydrogenated-fat plants exist in Indonesia with an annual capacity of 4,480 tons. Hydrogenated fat or baking fat is a blend between coconut and palm oils in which the coconut oil content is about 20 per cent. This means a requirement of about 900 tons of coconut oil annually.

If all these industries using coconut oil as raw material were operating at fully capacity, a total amount of 180,560 tons of coconut oil would be required annually. In terms of copra, this requirement would be 300,933 tons of copra per annum.

In Malaysia, local industrial uses of coconut oil are mainly in soap/detergent and margarine production. The 1966 Survey of Manufacturing Industries in West Malaysia reveals that the 45 soap, washing and cleaning compound manufacturing establishments surveyed purchased 54,000 piculs of coconut oil. The quantity of coap produced by them was 73.13 million pounds.

There are two firms in West Malaysia producing margarine for local consumption and for export at the present time. The raw materials used in the manufacture of margarine are principally coconut oil and palm oil, with the proportion used being dictated by both

price and technical considerations. Actual production figures for margarine are not available but some indication may be had from export statistics. In 1966, West Malaysia exports of margarine totalled 1,654 tons.

As mentioned earlier the coconut oil produced in West Malaysia is mostly crude but some quantity of refined coconut oil is also produced. The development and expansion of food processing and other industries in the country may encourage the establishment of facilities for the further processing of coconut oil into fatty acids and glycerine in the future. At the moment some trade circles are studying the feasibility of such ventures.

The local demand for coconut oil in Malaysia is constituted by the demand for human consumption directly as an oil or as a manufactured product, particularly margarine, and for industrial use in the manufacture of non-edible products especially soap. The total local consumption of oil for both purposes was 47,000 tons in 1960, increased to 60,000 tons in 1962 and fell to 48,000 tons in 1966. Of the total amount absorbed within the country, approximately 5,000 to 6,000 tons were used in the manufacture of margarine, compound cooking oil and soap. The two major producers of both margarine and soap, Lam Soon Oil & Soap Manufacturing Ltd. and Lever Brothers (Malaya) Ltd., utilize about 200 tons each per month or a combined offtake of 5,000 tons per annum. The demand for oil is augmented to some degree by small-scale manufacturers of soap, biscuits, etc., but this is not expected to be considerable. Thus, only 10-12 per cent of the total consumption is used by manufacturing industries for conversion into either edible or non-edible products. The rest enter the human diet directly in oil form.

In the field of further processing of coconut oil, India has initiated development projects in many fields. The estimated annual production of soap in both the manufacture and other cottage industry sectors is said to be 520,000 tons. There is no information regarding the amount of coconut oil used in manufacturing detergents, which India is using for various industrial uses in increasing quantity year after year. India has a well-established industry for hydrogenation of oil. The extraction of coir fibre from coconut husks and the manufacture of products such as matting, ropes, cordage, etc., is employing in the south as many as 600,000 people. It earns foreign currency averaging about Rs 140 million annually. The present level of production is around 155,000 tons a year.

Coconut Desiccators

There are three desiccated coconut factories in the Philippines which shared the dried meat of coconut for use in the preparation of candies, chocolate bars, cakes and other confectionery products. The total installed capacity is not indicated in any of the available studies. The Ramiro report estimates that as much as 72,693 metric tons of desiccated coconut valued at $22.2 million was exported in 1965.

A modern government-owned desiccated coconut plant, built at Sukur in the Minahasa district in Indonesia has been operated for some time by an American company (Peter Paul). Up to the time of reporting by the United States Mission, the firm had failed to compete in markets abroad with Philippine desiccated coconut from firms which were all owned and operated by the United States industrialists.[8]

In 1967, there were 85 mills in operation in Ceylon with a combined capacity for producing desiccated coconut in the region of 60,000-65,000 tons per annum. The actual annual production averaged 51,248 tons for the period 1958-1967. The production of desiccated coconut has shown a declining trend in terms of total volumes of coconut output in the country.

Technical Efficiency of the Coconut Industry in Asia

Capital Intensity

The capital composition of the oil crushing and other industries based on coconut oil varies widely in the region. In Indonesia, a sample survey report by the Institute of Economic and Social Research in 1957 provides the following information based on an intensive investigation of six copra crushing mills: It was found that the average annual capacity of plants was around 150-350 tons a year, that the extractive capacity fluctuated between 35-55 per cent and that, on an average, two persons were required to run the plant.[9]

In the Philippines, except for the new KRUPP expellers (German) installed by Batzak, Inc., at Davao City and Gimenez, Occidental Misamis, practically all the machines are of the V.D. Anderson Duo and Super Duo types and were acquired before World War II. Machines installed in the Philippines after the second World War came from dismantled V.D. Anderson expellers previously used in the United States. Duo and Super Duo, even when brand new, are small and inefficient machines for crushing copra. The Duo type has a rated capacity to crush 15-20 tons of copra a day with as high as 8 per cent residual oil in cake. It costs around $21,000 f.o.b. per unit. Where as Super Duo has a capacity for crushing 25-30 tons a day with 6.5 per cent residual oil in cake costing around $41,000 including the cooker.

[8] See *Investment in Indonesia,* US Department of Commerce, 1956, p. 53.

[9] See *The Mechanization of Small Scale Industries Second Report,* University of Indonesia, 1957, pp. 4-6.

In Ceylon, the mills use the conventional screw type expeller for the extraction of oil, but some of them are equipped with high pressure expellers which bring down residual oil content in cake from 12-14 per cent to below 10 per cent. Like India, Ceylon also possesses two mills equipped with solvent extraction plants that have a crushing capacity of 170 and 100 tons of copra a day. These plants are being used to extract residual oil in the oilcake processed by low pressure expellers. Their combined capacity is such that they could process all the available oilcake and recover approximately 5,000 to 6,000 tons of additional oil. They were for a long time under-utilized owing to technical problems related to losses of solvent which inflated the cost of reprocessing beyond the limits of economy, and also owing to the lack of adequate markets for oil with a high free fatty acid content. But as soon as the Oil and Fats Corporation, a State firm, started splitting coconut oil into fatty acid, alcohols and glycerine, the problems of high unit cost and marketing both disappeared. As a result, the solvent extraction capacities in the state mills are now being more fully utilized. This experience gives further testimony to the economic soundness of having a multi-product firm.

In addition to having two up-to-date solvent extraction plants, Ceylon also possesses three mills equipped for refining and decoloring oil. Although a premium export price can be obtained for refined oil, these mills are not utilized fully because of the faulty domestic market structure and of the degree to which the international market for refined oils is dominated by cartels. This is a clear case of waste of a precious investment incurred by a developing country which could be avoided if regional co-operation in the production and consumption of coconut products were undertaken.

There is but scanty information on the capital composition of the Indian oil industry, apart from the fact that the 1,500 copra crushing mills use 4,500 rotaries (equivalent to power-driven crushers) and 300 expellers of various vintages. On the fringe of the industry, a few solvent expellers operate at Bombay to extract oil from oilcake produced by a host of inefficient rotaries in the country.

In most of the countries, a large proportion of the oil output is produced in mills which use crude techniques and can hardly be regarded as anything more than cottage industries.

Of the total installed capacity in the five countries (Philippines, Indonesia, Ceylon, Malaysia and India) an estimated 50 per cent of the capacity is composed of village or household crushing which rightly belongs to cottage industry proper. In estimating world crush of transportable oilseeds, the data used did not exclude such capacity. In many of these countries, because of poor transport and internal marketing arrangements, these primitive and inefficient mills survive to cater to local demand. Sometimes, inspite of their inefficiency, they make a profit at the cost of the copra farmers. This unorganized sector of the crushing industry cannot be dispensed with unless the rest of the economy develops and, simultaneously, the village economy is integrated with the urban sector. This process can be hastened by positive measures and planning of the kind adopted by the Philippine Government. It should be borne in mind that the continued existence of a huge inefficient sector in the national economy seriously hinders the pace of technical progress and the long-run growth rate.

For organized oil extraction in large mills, power-driven process and expellers or solvent extraction equipment have been installed either to serve a large domestic and mostly urban market or to serve export markets. To illustrate the former, the case of India is relevant. The domestic market for factory-produced oil is found only in big cities and heavily populated industrial areas where distribution is less of a problem and there is an affluent section of the population able to buy the product. Hence, the adoption of a better technology is clearly a function of the availability of an adequate domestic market, but such a market cannot be obtained unless the cost per unit is reduced through better technology and other improvements. This is the inherent contradiction facing countries in this region. The alternative available to developing countries is to build up a modern factory-based oil industry completely export-oriented, as the Philippines has done. But even the Philippines could not have succeeded to the extent it has if its oil output had not enjoyed exclusive preferential treatment in the United States market for over four decades. In either case, the number of modernized mills is bound to be extremely limited in each country owing to narrow domestic markets and vulnerable export markets.

Capital cost: comparative efficiency

Modern oil mills are generally capital intensive; nonetheless some economies to help overcome capital scarcity are possible because of the excess supply of labour in the developing countries. Since labour supply is plentiful, costly mechanical handling equipment is sometimes a waste. In such cases technical duality—utilization of indigenous methods side by side with highly mechanized tools—for the sake of maximizing the effectiveness of investment, is advisable. Thus, for shelling, drying and handling raw materials at the points where they are received and stored, or at the points where the finished products and particularly the cake are dispatched, can be done by available cheap

labour. Even the drying and preparation of oil bearing materials need not be completely mechanized and a significant proportion of hand labour can be used. But for efficiency in crushing, refining and separating acid fats, it will be necessary to employ expensive and capital intensive equipment such as modern expellers or solvent extractors. By applying the principle of technical duality, scarce capital is saved, the volume of employment is increased and the domestic market is expanded. The developing countries would have a definite advantage over the developed countries if the structure of investment and the proportion of fixed equipment and labour used in production were well planned after a careful comparison of the relative benefits of alternative compositions.

The other capital costs include the cost of buildings and storage space, and the cost of erecting the plant. The costs of trucks, spare parts, and laboratory and office equipment, etc., make up the balance. The FAO study[10] makes a significant point when it says that the cost of the oil milling plant is likely to be higher by the amount of the transport costs **except** in cases such as India's, where it is manufactured within the country. In case plan harmonization takes place among these countries, it will be possible to benefit from the low cost of transport of plant obtained from within the region and enjoy the added advantage of being able to pay in terms of processed or semi-processed domestic goods. The cost of erection of plants need not be higher than in developed countries, because the technical level of labour available in the region has gone up considerably in recent times and it would generally be possible to dispense with the services of foreign experts engaged at exhorbitant rates. The costs of constructing buildings and of land would of course be considerably lower than in the developed countries.

Given a particular expeller design or solvent equipment with rated capacity, its technical efficiency in terms of extraction rates depends, among other things, on its age, the level of management and maintenance the quality of raw material, the skill of labour and the suitability of the location. A possible temporary shortage of technical personnel may be overcome by an accelerated scheme of training and by pooling the trained personnel available in the region. As to management efficiency, there is nothing which cannot be acquired within a very short time. If modern mills are installed in the producing country, the quality of oil produced is likely to be better than in the developed countries, since, by using fresher copra, it will be possible to produce crude oil with a lower fatty acid content. According to the FAO calculation, it appears that every additional 1 per cent free fatty acid adds $2 to $3 per ton to the cost of refining; hence differences of only 1 or 2 per cent of free fatty acid become a significant saving in cost where crushing is also associated with quality refining.[11]

Unit Cost of Production

Among the other factors which enter into unit cost labour and raw material costs, there are two which together roughly comprise the bulk of the total unit cost.

One of the greatest bottlenecks to the economic development of these countries is the very poor and primitive transport between the farmer and the processing plant; this results in there being a very uneconomic trading channel which sustains an army of traders placed in hierarchial tiers. The farmer often has to sell his produce at a price 50 to 60 per cent lower than the port or factory site price.

One piece of evidence substantiating this estimate is provided by the present regime of Indonesia's Decision No. 009 in which the Department of Trade was asked "to guarantee as well as ensure that the farmers receive at least 60 per cent of the 'port-godown' prices and to publish this periodically." If one analyses the structure of the domestic copra market in Indonesia and the Philippines in proper depth, the estimate of a gap of 50 to 60 per cent would seem to be on the conservative side. This margin sustains the trading sector engaged in giving place-utility to copra. Apart from the disincentive aspect of the system to copra output, which has stagnated in all countries in recent times, there is considerable room to reduce the raw material cost of processing plants without further depressing the price received by the actual grower. If it is possible to guarantee a pre-fixed sale price of copra for, say, three years and also provide an incentive clause to the effect that, if producers exceed their normal yearly quota, their extra supply can be sold at a higher price than the guaranteed normal price, the supply of copra could be made elastic over a time horizon. This scheme has a better potentiality of creating an effective demand spread all over the country and on a more stable foundation than the Keynesian method of creating demand in the urban sector.

The degree of elasticity in the supply of copra that can be achieved by the operation of incentive prices at farmers' level will obviously depend on the ability to eliminate superfluous traders in copra, coupled with modernization of actual transport, handling and storage and also with an adequate supply of short-term credit to the marketing sector. It appears from the country studies that most of the governments of

[10] *Structure of the Oilseed Crushing Industry and Factors Affecting Its Location,* J. Stopforth and J. P. O'Hagan, FAO: Rome.

[11] *Structure of the Oilseed Crushing Industry and Factors Affecting Its Location,* J. Stopforth and J. P. O'Hagan, *op. cit.*

the producing countries are aware of the chaotic conditions prevailing in the domestic markets and that some, including the Philippines, have taken measures to correct them.

Raw Material

The economic implication of a smooth and even supply of raw materials at the plant site all the year round is not adequately appreciated. If the nuts are bought in discrete loads and stored for pressing all the year round, the amount of working capital which the crushers will have to employ in inventory and warehouses will be significant in comparison to a plant which gets a regular supply of raw material supply all the year round. The latter system has also the additional benefit of ensuring a supply of fresh copra which contains approximately a level of only 0.5 per cent fatty acid content, whereas the copra crushed abroad has not less than 1.5 per cent and sometimes more. In terms of saving in cost of refining this is a significant comparative cost advantage enjoyed by crushers in the developing countries.

If the industry were located in the producing zones, not only would less capital be needed for the purchase of raw materials, but less funds would be locked up in holding the year's stock of semi-finished products. The crusher would also undertake refining and further processing of the oil and its by-products. Under such circumstances, there would be a considerable saving in the transport cost of oil and cake to the ports. In terms of cost, transport and handling costs of oil and cake have been as important as capital and processing costs in the developing countries. With the improvement of road and canal links, domestic transport of nuts may become more competitive.

Assuming that a more elastic supply of copra at a cheaper price is made available to the processing plant to enable it to run at near-optimum capacity, i.e. for 300 days per year, then cost per unit will depend upon the total cost of unskilled labour, and the cost of steam, power and maintenance of the plant. The labour cost should be significantly lower and, with a little incentive payment, could easily be made more stable and efficient.

The provision of cheap transport and power is tied up with the supply of infrastructure for the overall industrial growth of the country. It is the experience of quite a few countries in the region that, after a cheap supply of power has been provided, there is a dearth of industries growing up to take advantage of it. In such cases, the cost of power supplied to the industry would be minimal. The maintenance and spare-parts costs are likely to be high at the initial stages, until the country itself or a country within the region sets up specialized industries to make spare parts and repair materials. In any case, they are not likely to constitute a serious obstacle if there is a little planning and co-operation among the interested countries. The past experience in this matter should provide enough incentive for such collective action.

The expected cost of land and the local rates are likely to be low and might give added scope for reducing unit cost.

The other possible source of saving in cost would come from lower freight for oil or finished by-products if trade were developed within the region. Under such conditions, the coconut industry might be able to escape being sheared by the international cartels of shipping lines. There would be a corresponding saving on handling and insurance charges which are now largely in the hands of agencies of the developed countries.

Rate of Oil Extraction

The case for rationalizing crushing capacity in the countries under consideration is very strong in view of the threat to this industry from the developed countries. Of the estimated 50 per cent of the capacity for crushing that belongs to the organized sector, the bulk of it uses either low pressure or high pressure expellers with an extremely uneconomic rate of oil extraction. Apart from the relative market value of oil and cake, the objective of crushing should be to maximize oil extraction. The conventional belief that good feed cake should contain at least 10 per cent oil is not based on a scientific foundation. It is now held, on the basis of experiments, that the oil content may be lowered to 3 to 4 per cent without lessening the cake's nutritive value as cattle feed. If this is accepted as an irreducible minimum, the case for further extraction is not completely foregone because cheaper varieties of oils and fats may be mixed in copra cakes to compensate for the loss due to improved oil extraction. Pending further study, the following information may be relevant to the subject of modernizing the present installed capacity in the developing countries.

Expellers

There may be valid economic reasons for preferring expellers to solvent extraction equipment under a particular market structure. For instance, in the groundnut crushing industry of Nigeria, the millers prefer expellers to solvent equipment because they are relatively easy to operate and permit gradual expansion of capacity. Furthermore, the expellers' lower

extraction rate is partly offset by the premium that expeller cake usually commands over solvent extracted cake in the international market. It seems that the availability of cheap labour further strengthens the case against solvent equipment; but this particular situation is probably a product of narrow domestic markets and the uncertainty of export outlets.

Investment Costs of Extraction Equipment

The general extraction techniques, the efficiency as measured by the residual oil content in the cake or defatted meal, and the costs of the equipment with reference to the installed capacity may be indicated as follows, in general terms:

Table IV.6. Investment Costs of Extraction Equipment, by Techniques, Efficiency and Installed Capacity

1. Extraction Technique	Power-Operated Rotaries	Screw Press		Solvent Extraction	
		Low Pressure	High Pressure	Batch	Continuous
2. Capacity of the plant/24 hrs.	2 M.T. (copra)	12 M.T. (copra)	50 M.T. (copra)	30-40 M.T. (copra cake)	70-80 M.T. (copra cake)
3. Residual oil content in oilcake or defatted meal	14%	12%	8%	1-2%	1%
4. Cost of the plant	US$1,000	US$7,000	US$20,000	US$100,000	US$200,000

Installed Oil Crushing Capacity in Developed Countries

According to the FAO study entitled *Economic Aspects of the Location of Oilseed Crushing* (*ccp.* of 66/12), in 1962-63, the total estimated installed capacity (in terms of utilization) of world crush of transportable oilseeds including copra was 56.3 million tons, of which the ECAFE region (excluding Oceania) possessed 11.1 million tons or 19.7 per cent. If the Japanese crush capacity (3.9 per cent of the world total) included in the Asian figure were added to that of North America, Europe and the USSR, their share of the world total in the 1962-63 period would be approximately 73 per cent and that of the Asian developing countries taken together would be around 27 per cent only. It is to be noted that, of all kinds of oilseeds crushed, copra occupies only 5.3 per cent and that Asia crushes less than 50 per cent of it. If soyabean is included in the calculation, North America alone accounts for half of the crushing industry in developed countries. More ominous is the fact that more than 53 per cent of the recent increase in the total crushing capacity has taken place during the last ten years. The regions in which rapid increases have taken place are Western Europe, Latin America and Eastern Europe.

Economic and Technical Efficiency

It appears from the FAO report that the crushing plants in the developed countries have achieved a high level of excellence both in processing and in supplying intermediate or end-products to industries and the and the wholesale trading sector. It should be an object lesson to the developing countries to know that, over the last ten years, a substantial part of the crushing plant in the developed countries has been re-equipped for solvent processing of between 100 and 150 tons of oilseeds or copra per day. With their modern equipment, they have a large capacity of which hardly more than 60 per cent has been used annually in Western Europe compared to 82 per cent in the United States. Although the total installed capacity has been increasing, the number of plants has been diminishing owing to conversion to solvent processing because of the higher extraction rate of this method. (The minimum economic size is a capacity for crushing 100 tons a day.) The reduction in number has also been due to the need to secure economies of scale. Another lesson to be learnt from the experience of the developed countries is also of extreme importance. One of the basic characteristics of the European and Japanese industry is that oil crushing operations frequently constitute only part of a firm's operations. Apart from refining, the operations also include manufacture of margarine or shortening, detergents, fatty alcohols and fatty acids, soap and animal mixed feeds. Such multi-product firms have ensured for themselves a steady high level of profit in a competitive market.

Solvent crushing capacity accounted for 60 per cent of the total capacity of Western European countries as early as 1961. In the United States, over 95 per cent of soyabean processing is now done by the solvent method. On the basis of the facts, two inferences have been deduced in the FAO report: (a) that much of the capital equipment of the industry in the developed countries is up-to-date; (b) that a significant amount of excess capacity has been created in the process of modernization, and installation of solvent equipment to handle the growing volume of soyabean more efficiently. If so, then the surplus capacity must be in the form of expellers.

Another significant feature of the installed capacity in Western Europe and Japan is that many plants are equipped to crush several different kinds of seed. This not only indicates the variety of sources of raw materials but also the ability to keep the mills in operation all the year round—an advantage which the developing countries do not possess.

It is to be noted specifically that the markets for the processed oil products of crushing in Western Europe are very largely domestic and, in Japan, entirely so. This means that they have a secure and sheltered expanding domestic market.

Another basic feature of their expanding industry is that they are now obtaining the bulk of their oilseeds from developed countries, particularly from North America. It is clear that these peculiarities of the structure of business and industry in the developed countries make it very difficult for the copra crushing industries of this region to make any dent in their well-entrenched markets except in their own terms.

Chapter V

FOREIGN TRADE OF ECAFE COUNTRIES IN COCONUT AND COCONUT PRODUCTS

Introduction

As was seen in chapter II, the ECAFE countries account for the great bulk of world production of coconuts and copra. The major producers of coconut and copra in the region are also exporters of *copra* and/or *coconut oil,* the most conspicuous exception being India which, although the third largest producer of copra in the world, has a substantial deficit in domestic production of coconuts in relation domestic consumption. As in the production of coconut and copra, the Philippines is at present the world's largest exporter of both copra and coconut oil. In 1966, it exported 866,200 metric tons of copra and 313,000 metric tons of coconut oil. Indonesia follows the Philippines as the world's second largest exporter of copra, its exports of copra in 1966 being some 176,000 metric tons. Since, however, Indonesia's domestic production of coconut oil falls short of its consumption requirements, it is not an exporter of coconut oil. Ceylon comes next in the ECAFE region as an exporter of copra, with exports of 21,200 metric tons in 1966. In the case of coconut oil, it comes next to the Philippines as an exporter, with exports of the order of 73,800 metric tons in 1966. West Malaysia and Singapore considered as one entity exports as well as imports copra and coconut oil, but while this area is a net importer of copra it is a net exporter of coconut oil. West Malaysia and Singapore's net exports of coconut oil amounted to 40,100 metric tons in 1966. The place of some other ECAFE countries in the region's export trade in copra and coconut oil is of minor importance. In 1966, as a group, ECAFE countries' exports of copra amounted to about 1,164,000 metric tons and of coconut oil to 434,000 metric tons.

In addition to copra and/or coconut oil, some of the major producers of coconut in the ECAFE region export copra cake and meal, which are important by-products of the processing of copra into coconut oil and are valued as animal feed. The Philippines again heads the list of exporters, followed closedly by Indonesia. In 1966, the former exported 244,100 metric tons of copra meal and cake and the latter 141,300 metric tons. India, though a net importer of copra, figures as a sizable exporter of copra meal and cake, with exports of 21,000 metric tons in 1966. Ceylon and Thailand also export copra cake and meal but in much smaller quantities. West Malaysia and Singapore is, however, a net importer of these commodities. In 1966 net exports of copra cake and meal of ECAFE countries taken together were of the order of 400,000 metric tons.

Compared to copra, coconut oil and copra cake and meal, in terms of volume, desiccated coconut is of much less importance in the export trade of ECAFE countries. The Philippines and Ceylon are the only two significant exporters of desiccated coconuts in various forms. The former exported 68,550 metric tons of desiccated coconut in 1966 and the latter 47,280 metric tons.

A fifth category of coconut and coconut products figuring in ECAFE's export trade is coir (i.e. coconut fibre) and coir manufactures. The major exporters of these commodities are India, Ceylon and the Philippines.

A number of ECAFE countries are sizable importers of coconut and coconut products. Japan has for several years past been the largest importer of copra in the region, followed by India. In 1966 Japan imported as much as 107,600 metric tons of copra and India 33,800 metric tons. Australia has also been a substantial importer of copra, with imports of the same order as India in 1966. As seen earlier, West Malaysia and Singapore is a net importer of copra, with the imports of about 10,000 metric tons in 1966. Mainland China imported 9,000 metric tons of copra in 1964.[1] Pakistan, mainland China and Burma have been sizable importers of coconut oil in recent years: In 1966, Pakistan's imports amounted to 15,700 metric tons and mainland China's to 8,000 metric tons. Among ECAFE countries, west Malaysia and Singapore have been the main net importers of copra cake and meal. Australia is probably the most substantial importer of desiccated coconut in the region.

Associated with the ECAFE's predominant position in the world production of coconuts and copra is the region's preponderant role in the world export trade of copra and coconut oil. In 1966, out of world gross exports of 1,445 million metric tons of copra, ECAFE countries accounted for about 1,164 metric tons, or 80 per cent of the total. In the same year the

[1] Later figures of the copra imports of mainland China are not available.

share of Oceania, comprising the islands of the Pacific Ocean but excluding Australia and New Zealand, was 14.6 per cent and that of Africa 4.5 per cent. Similarly, ECAFE countries contributed as much as 433,900 metric tons or 82.5 per cent towards world gross exports of 525,500 metric tons of coconut oil in 1966. In the same year western Europe's share was 8.4 per cent and that of Oceania 6.7 per cent. Taking coconut oil and copra together, in terms of oil, world indigenous exports[2] in 1966 totalled 1,374 million metric tons, of which the ECAFE countries accounted for 1,100 million metric tons or 83.5 per cent. The high share of ECAFE countries in the world export trade in copra and coconut oil is not just a consequence of the region's high share in the world production of coconuts and copra; it is partly also a reflection of the relatively low *per capita* consumption levels of coconut products in the countries of the region.

Recent Trends in Trade

Gross world exports and exports from the ECAFE region of copra and coconut oil from 1956 to 1966 are shown in table 1. Further details, such as, gross copra and coconut oil exports of individual ECAFE countries, as well as gross exports of those commodities from other regions, viz. Oceania, Africa and the Americas are given in appendix statements I and II to this chapter.

[2] "Indigenous" exports include only copra and coconut oil produced in the exporting country. Coconut oil produced from imported copra is excluded.

The trends in gross world exports and exports from the ECAFE region of copra and coconut oil during the period 1956 to 1966 may be visualized more clearly from charts 1 and 2. The movements in copra production in the world as a whole and in the ECAFE region over the same period may similarly be seen from chart 3.

The charts show that world trade in copra and coconut oil was influenced to a considerable degree by variations in copra production. And since the ECAFE region accounted for around 80 per cent of world production, the movements of its gross world exports of copra and coconut oil were parallel to those in gross exports of these commodities from the ECAFE region.

World production of copra which amounted to 3.48 million and 3.5 million metric tons in 1956 and 1957 respectively, fell to 2.9 million and 2.73 million metric tons in 1958 and 1959, owing mainly to low rainfall in the coconut producing countries of Asia. The recovery in world copra production which began in late 1959 continued in 1960 and 1961, thanks to adequate rainfall conditions in Southeast Asia, causing production to improve to 3.39 million tons in the latter year. There was, however, a setback in 1962, when the figure declined to 3.11 million tons. This was followed by a moderate recovery in 1963 but the next two years witnessed a virtual stagnation at around 3.3 million tons. There was an appreciable increase in production in 1966, when it rose to 3.45 million tons. Taking the period 1956-1966 as a whole there was,

Table V.1. Gross exports of copra and coconut oil: World and ECAFE, 1956-66

(Thousands of metric tons)

Year	*Copra: Gross exports*			*Coconut oil: Gross exports*		
	World	*ECAFE*	*(2) as % of (1)*	*World*	*ECAFE*	*(5) as % of (4)*
	(1)	(2)	(3)	(4)	(5)	(6)
1956	1,769.0	1,479.2	83.62	407.0	306.2	75.23
1957	1,902.0	1,617.6	85.05	380.6	259.0	68.05
1958	1,442.6	1,169.4	81.06	321.7	201.8	62.73
1959	1,312.0	1,027.0	78.28	273.9	179.5	65.53
1960	1,783.5	1,505.8	84.43	271.9	163.7	60.21
1961	1,815.4	1,488.8	82.01	328.7	233.1	70.92
1962	1,498.5	1,190.1	79.42	412.8	303.3	73.47
1963	1,561.7	1,250.0	78.76	441.8	336.9	76.26
1964	1,471.8	1,146.1	77.87	484.9	376.0	77.54
1965	1,368.3	1,082.1	79.08	461.8	362.5	78.50
1966	1,445.2	1,163.7	80.52	525.5	433.9	82.57

Source: FAO, Coconut Situation.

Chart 1

Gross world and ECAFE exports of copra, 1956-1966
(Thousands of metric tons)

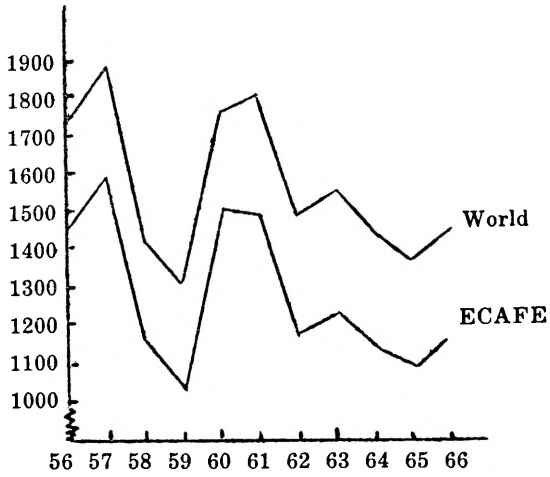


Chart 2

Gross world and ECAFE exports of coconut oil, 1956-1966
(Thousands of metric tons)

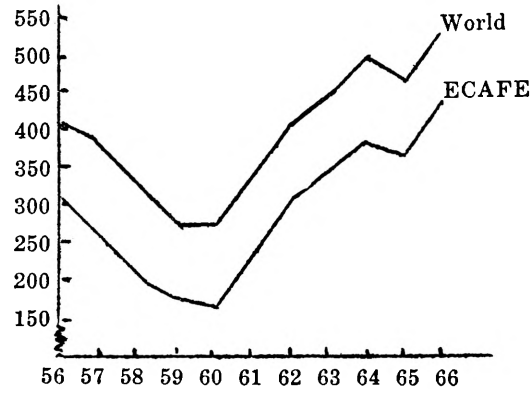
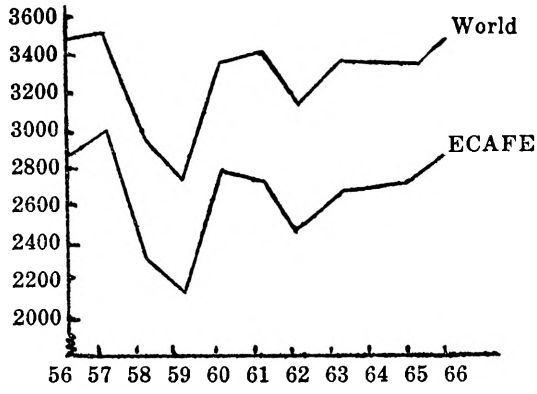


Chart 3

Estimated production of copra: World and ECAFE, 1956-1966
(Thousands of metric tons)



however, no long-term growth in the production of copra in the ECAFE region or the world as a whole.

The variations in world and ECAFE production of copra were reflected clearly in the movements in gross exports of copra and coconut oil, between 1956 and 1961, with trade in both commodities moving with variations in copra production. Since, 1961, however, the trends in trade in the two commodities have tended to diverge. Thus, while exports of coconut oil showed a marked upward trend, those of copra have registered a generally downward one. This contrast is largely attributable to the increasing oil-crushing activity in the producing countries. Furthermore, as may be seen from table V.2 for the period 1956-1966 as a whole, while world copra exports (and along with them exports from the ECAFE) registered a significant decline, world exports of coconut oil recorded a marked increase. Gross world exports of copra averaged 1.84 million metric tons a year during 1956 and 1957; they fell to 1.41 million metric tons on an average per year during 1965 and 1966. On the other hand, while gross world exports of coconut oil averaged 394,000 tons in 1956 and 1957, they increased to 494,000 tons a year in 1965 and 1966.

Table V.2. GROSS EXPORTS OF COPRA AND COCONUT OIL: WORLD AND BY REGIONS, ANNUAL AVERAGES 1956-57 AND 1965-66

(Thousands of metric tons)

Area	Copra exports		Coconut oil exports	
	Annual average 1956-57	Annual average 1965-66	Annual average 1956-57	Annual average 1965-66
World	1,835.5	1,406.75	393.8	493.65
ECAFE	1,548.4	1,122.9	282.6	398.2
Ceylon	47.0	31.35	70.6	81.05
Indonesia	331.2	151.5	—	—
Philippines	1,021.8	888.45	101.7	277.3
Sabah	62.4	25.7	—	—
West Malaysia and Singapore	79.25	16.7	104.4	34.95
Others	6.75	9.2	3.8	4.9
Oceania	209.6	210.5	36.35	37.5
Africa	76.1	66.2	12.7	8.55
Americas	0.95	5.2	4.55	5.7
Europe	0.65	1.95	57.6	43.7

Source: FAO, Coconut Situation.

Since gross world imports are of the same magnitude as gross world exports when looked at from the point of view of importing countries,[3] trends in gross world imports of copra and coconut oil since 1956 have been very similar to those in gross world exports of those commodities, reviewed earlier. The trends in gross world imports of copra and coconut oil and in gross imports of these commodities into western Europe, the United States, eastern Europe (including the Soviet Union) and the ECAFE region since 1956 are shown in Table V.3. Further details in regard to the gross import trade in these commodities are given in appendix statements III and IV.

[3] Allowing for differences in coverage and timing, these factors account for appreciable divergences between magnitudes of gross world exports and gross world imports in certain years.

Table V.3. GROSS WORLD IMPORTS AND GROSS IMPORTS OF COPRA AND COCONUT OIL INTO WESTERN EUROPE, THE UNITED STATES EASTERN EUROPE AND THE ECAFE REGION, 1956-1966

(Thousands of metric tons)

Year	Copra					Coconut oil				
	World	Western Europe	USA	Eastern Europe	ECAFE	World	Western Europe	USA	Eastern Europe	ECAFE
1956	1,709.9	884.9	303.0	4.5	381.9	383.4	184.9	88.1	23.6	38.2
1957	1,963.6	1,038.2	292.4	3.6	496.6	385.4	170.3	83.2	27.7	55.7
1958	1,565.4	759.9	272.7	4.5	407.5	315.0	116.6	98.3	21.5	29.6
1959	1,298.8	542.8	320.1	6.5	341.2	261.8	95.4	89.4	14.3	24.2
1960	1,698.9	826.6	353.8	—	418.3	264.5	113.4	70.8	12.0	27.1
1961	1,783.1	882.7	349.6	24.5	424.3	308.7	123.9	73.9	13.7	43.9
1962	1,528.7	708.0	324.2	20.4	370.2	377.1	128.8	120.5	31.8	43.0
1963	1,441.1	764.8	236.3	22.3	342.6	416.3	142.1	168.9	18.0	41.0
1964	1,410.8	803.3	248.3	17.0	230.7	453.0	146.6	180.1	33.5	49.7
1965	1,362.1	767.7	278.9	14.0	240.4	435.1	154.1	182.5	17.0	41.0
1966	1,445.2	865.3	243.3	15.0		473.3	137.8	232.5	24.0	33.3

Source: FAO, Coconut Situation.

Table V.4. GROSS WORLD IMPORTS AND RETAINED WORLD IMPORTS OF COPRA AND COCONUT OIL, BY REGION, 1966

Area	*Copra: Gross imports*		*Coconut oil: Gross imports*		*Copra and coconut oil (oil basis): Retained imports*	
	1,000 metric tons	*% of world total*	*1,000 metric tons*	*% of world total*	*1,000 metric tons*	*% of world total*
World	1,445.2	100	473.3	100	1,317	100
ECAFE	240.4	16.63	33.3	7.04	160	12.15
Western Europe	865.3	59.87	137.8	29.11	647	49.13
of which: EEC	(618.9)	(42.82)	(75.0)	(15.83)	(430)	(32.65)
Americas	316.5	21.90	260.7	55.08	459	34.85
of which: USA	(243.3)	(16.84)	(232.3)	(49.08)	(386)	(29.31)
Eastern Europe[a]	15.0	1.04	24.0	5.07	34	2.58
Africa	1.5	0.10	16.4	3.47	17	1.29
Oceania	[b]	—	1.1	0.23	[b]	—
Other Asia	6.5	0.45	—	—	—	—

Source: FAO, Coconut Situation.

[a] Including the Soviet Union.

[b] Excluding Australia and New Zealand, whose imports are included in ECAFE imports.

The geographical distribution, by region, of gross world imports of copra and coconut oil, and of retained world imports[4] of these commodities, in terms of oil, in the year 1966 is shown in table V.4.

Of the gross world imports of 1.445 million metric tons of copra in 1966, imports into the ECAFE region accounted for only 240,000 tons, or 16.6 per cent. The region's major importers of copra are Japan, India, Australia and mainland China. The principal markets for copra exports are however western Europe and the Americas. These two regions accounted respectively for about 60 per cent and 22 per cent of gross world imports of copra in 1966. In Western Europe, the EEC countries constitute the largest market, the principal importers in the latter group being Western Germany, the Netherlands and France. Outside the EEC Group, the main importers in western Europe are Sweden, the United Kingdom, Denmark and Norway. In the Americas, the United States provides by far the largest market for copra; in 1966, it absorbed as much as 243,300 tons out of the region's total gross imports of 316,500 tons.

The distribution of gross world imports of coconut oil, by region, is broadly similar to that relating to copra. The share of the ECAFE region in gross world imports is even smaller than in the case of copra. Its main importers are Pakistan and mainland China. Western Europe and the Americas are once again the principal markets for coconut oil exports, but the relative importance of the two regions has altered considerably in recent years. While in the 1950s and early 1960s gross imports of this commodity into western Europe were substantially larger than those into the Americas, the position changed in 1962. Thus, in 1966, the Americas accounted for 55 per cent and western Europe for 29 per cent of gross world imports of coconut oil. In the Americas, the United States is the predominant importer; and, in western Europe, the United Kingdom, Western Germany, Italy, Austria and Belgium-Luxembourg have been the principal buyers in recent years.

World retained imports of copra and coconut oil, in terms of oil, amounted to 1,317 million tons in 1966. Of this total, western Europe accounted for 49 per cent, the Americas 35 per cent and the ECAFE region 12 per cent.

The trends in gross imports of copra and coconut oil into western Europe may be seen from chart 4. Copra imports into this region were influenced greatly by year-to-year variations in world production. Thus, while imports were high in 1956 and 1957 they fell sharply in 1958 and 1959, which were years of low world production and supply. On the other hand, while coconut oil imports into western Europe reflected variations in world copra production during the second half of the 1950s, the trend in these imports from the beginning of the 1960s has been persistently upward, notwithstanding the level of world copra production. As in the case of world imports, there thus appears to have been a significant replacement of copra imports by coconut oil imports into western Europe.

During the period reviewed, the most striking feature of imports of both commodities into the Americas, and particularly into the United States which accounts for most of them, was a substantial expansion in the tonnages of coconut oil (see chart 5). Coconut oil imports into the United States averaged 207,000 tons a year during 1965 and 1966, as compared to 81,000 tons in 1956 and 1957. On the other hand, there was an appreciable decline in copra imports over the period as a whole. In the United States, where the annual average amounted to 298,000 tons in 1956 and 1957, they decline to 261,000 tons in 1965 and 1966.

[4] "Retained" imports are copra and coconut oil imported and not re-exported, with deductions for oil produced from imported copra and subsequently exported.

Chart 4

Gross imports of copra and coconut oil into Western Europe 1956-1966
(Thousands of metric tons)

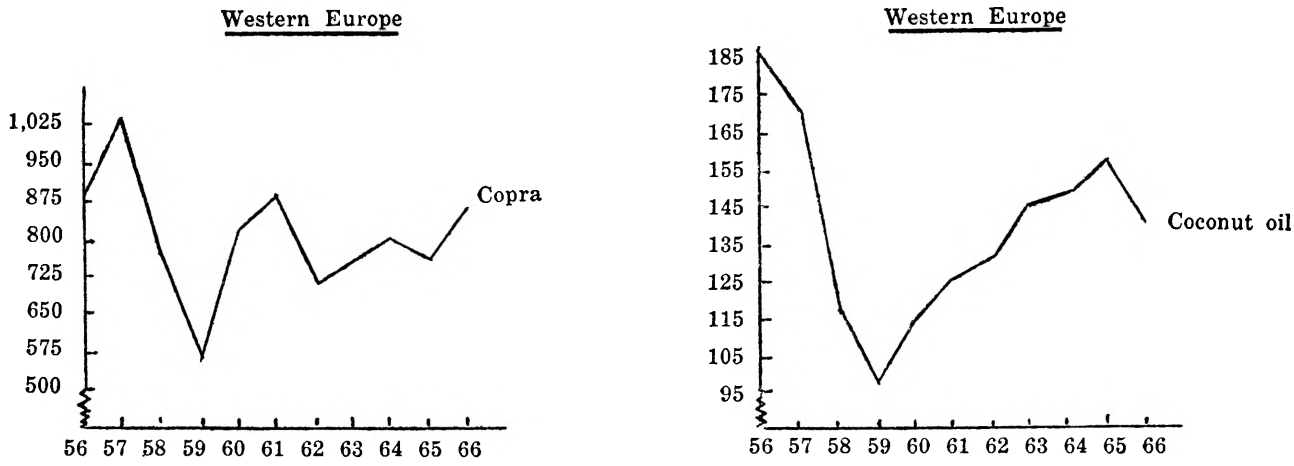


Chart 5

Gross imports of copra and coconut oil into the Americas and the United States, 1956-1966
(Thousands of metric tons)

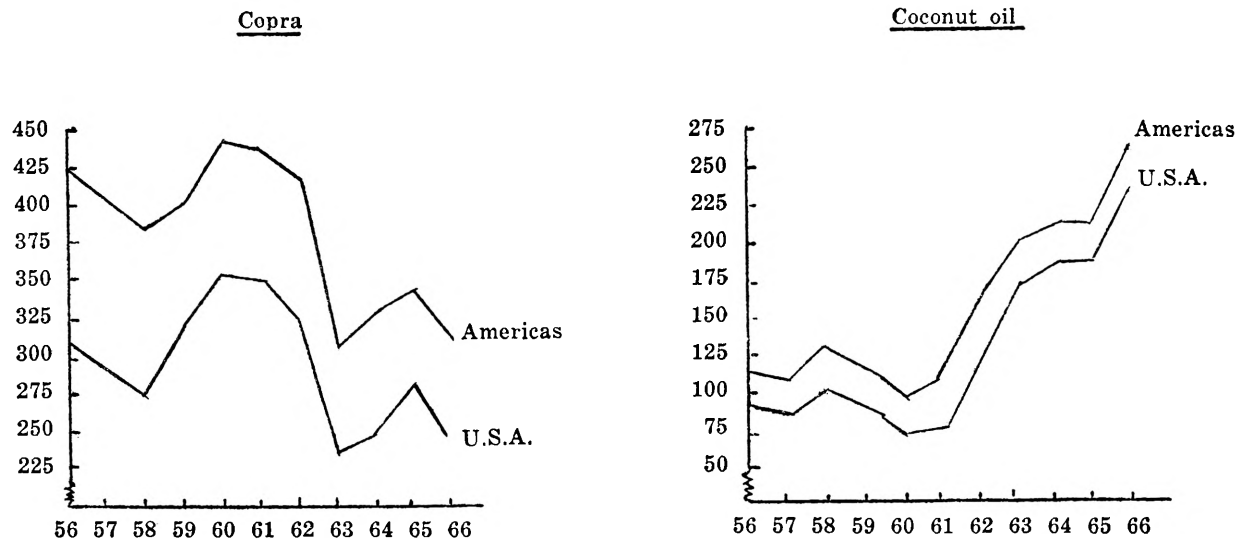


Table V.5. WORLD IMPORTS OF COPRA AND COCONUT OIL[a], 1957-59 AND 1964-66

(in copra equivalent)

Area or country	1957-1959		1964-1966		Annual growth rate (percentage)
	Average per year (1,000 metric tons)	Percentage	Average per year (1,000 metric tons)	Percentage	
Western Europe	1,144.0	50.47	1,044.1	49.10	− 1.2
North America	585.1	25.81	683.9	32.16	2.0
Developing ECAFE countries	423.0	18.66	183.4	8.62	−10.0
Japan	44.8	1.98	95.8	4.51	10.0
Rest of world	69.9	3.08	119.2	5.61	6.9
World	2.266.8		2,126.4		− 0.8

Source: Compiled from FAO: *Coconut Situation.*

[a] Coconut oil has been converted into its copra equivalent by dividing the oil import by 0.63.

Imports of copra into eastern Europe, including the Soviet Union, were low in the second half of the 1950s, ranging from 3,500 to 6,500 tons a year. They increased substantially in the early 1960s — from 20,000 to 24,500 tons a year — but showed a moderately declining trend after 1963. There was also no apparent trend in imports of coconut oil into this region during the period reviewed. Relatively high imports — 32,000 tons and 33,500 tons — were recorded in 1962 and 1964, but the average level in 1965 and 1966 was somewhat lower than that reached in 1956 and 1957 (see chart 6).

Imports of both commodities into the ECAFE region may be divided between those into the developed part of the ECAFE region, comprising Japan, Australia and New Zealand, and those into the developing part, consisting of all other ECAFE countries. The relevant trends are shown in charts 7 and 8. Whilst, among the developed countries Japan and Australia are substantial importers of copra, New Zealand imports far less. Gross imports of copra into the developed part of the region showed a strong upward trend during the period reviewed, owing largely to the increasing share of Japan. Imports of coconut oil into the three countries concerned are insignificant. As for the developing countries of the ECAFE region, gross imports of copra have shown a markedly downward trend. Gross imports of coconut oil have fluctuated from year to year, with no significant trend except that in 1965 and 1966 average annual imports were somewhat smaller than in 1956 and 1957.

It will be seen from table V.5 that total world imports of copra and coconut oil have remained more or less stationary in recent years at a level of slightly over 2 million metric tons of copra equivalent.

This stagnation is due to the failure of the coconut-producing countries to increase their output of nuts. The share of the developing ECAFE countries, however, shows a substantial decline from 19 per cent to 9 per cent. The rate of decline of around 10 per cent per year has been almost entirely in copra and very little in oil. Over 70 per cent of the decline has been in the imports into West Malaysia, Sabah and Singapore. In Singapore and Malaysia an oil-crushing industry developed on the basis of imported copra while in Sabah an entrepot trade developed in copra. During the years of political difficulties between Malaysia and Indonesia, this trade was interrupted, which accounted for the decline in intra-regional import. This however is likely to be a temporary phenomenon and the trade could be expected to resume its former pattern. The rapid rise of imports into Japan and eastern Europe is due to such basic factors as the development of processing industries in these countries and growth of new markets.

The major traditional importers, namely western Europe and North America, show very little change— a fact which, in view of their growth in income, should be a matter of great concern to the coconut-producing countries, as will be seen from table V.6.

Table V.6. RELATIVE GROWTH OF COPRA AND COCONUT OIL IMPORTS AND GROSS NATIONAL PRODUCT (GNP), 1957-1959 TO 1964-1966

Area or country	Growth rate of imports of copra and coconut oil (percentage per year)	Growth rate of GNP (percentage per year)	Ratio
Western Europe[a]	− 1.2	4.4	−0.27
North America	2.0	3.2	0.61
Developing ECAFE countries	−10.0	3.7	−2.70
Japan	10.0	9.1	1.10

Sources: Compiled from FAO: *Coconut Situation* and United Nations: *Monthly Bulletin*, several issues.

[a] Gross domestic product (GDP).

Chart 6

Imports of copra and coconut oil into Eastern Europe, including the Soviet Union, 1956-1966

(Thousands of metric tons)

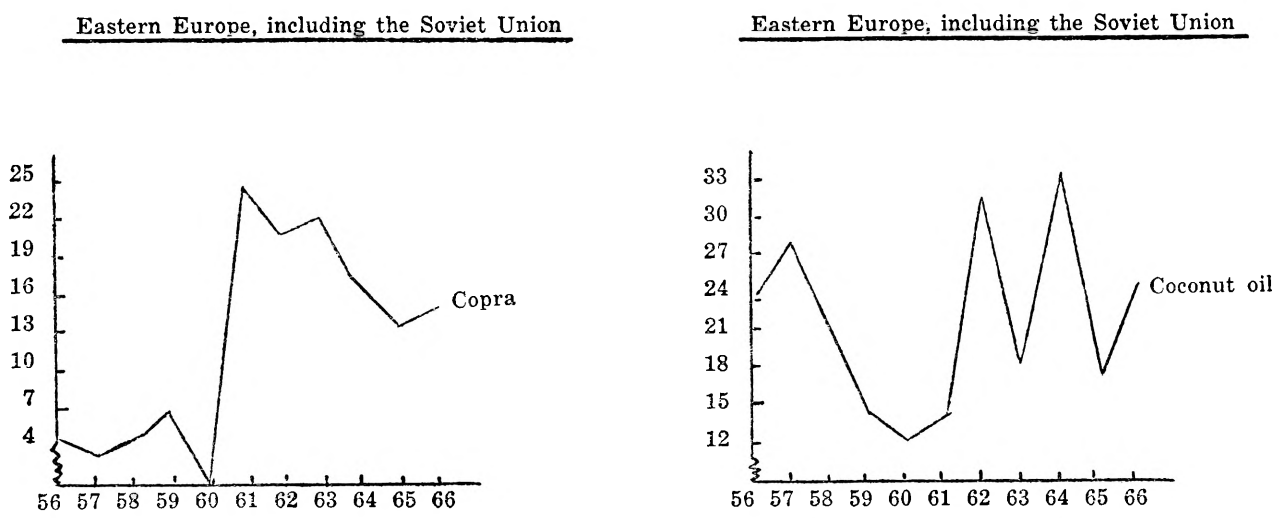


Chart 7

Imports of copra and coconut oil into developing ECAFE countries, 1956-1966
(Thousands of metric tons)

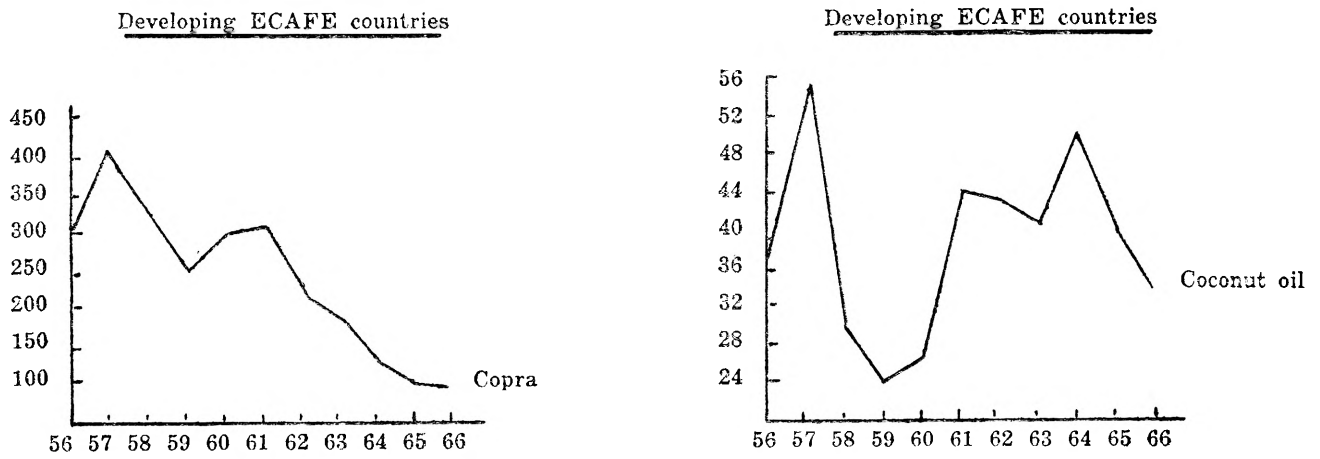
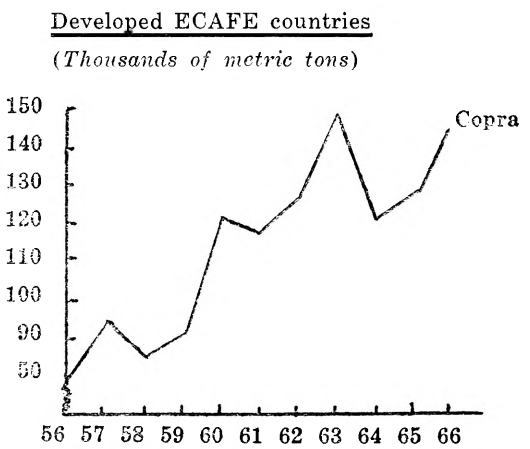


Chart 8

Imports of copra into developed ECAFE countries, 1956-1966



No information is available with regard to the income elasticities of demand for coconut products in their various uses in these markets. In the absence of such information it is not possible to deduce any firm conclusion regarding the future trend in the demand for coconut products in relation to the expected rise in income. Drawing upon the discussions in chapters II and III, it may be concluded, however, that the low elasticities observed above may be due partly to substitution and partly to the limitation in supply. Supply having been limited to 2 million metric tons, the rise in demand which accompanied the rise in income will have been met by substitutes, wherever possible, thus releasing the supply for the more specific uses. If this hypothesis is valid, it would imply not only a serious loss of opportunity for the coconut trade but also an invitation to the substitutes, and this could well lead to the ultimate destruction of the coconut industry.

Trade of Major Exporting Countries

The principal exporters of copra in the ECAFE region are the Philippines, Indonesia and Ceylon. West Malaysia-Singapore exports copra but, on net, this area is an importer of copra. Sabah, on the other hand, is a net exporter of copra. Small quantities of copra are also exported from elsewhere in the ECAFE region, notably Sarawak. The Philippines and Ceylon are the major exporters of coconut oil, followed by West Malaysia and Singapore which is a substantial net exporter. Sabah does not export any coconut oil. Data on trade in copra and coconut oil *by destination,* during the period 1956-1966, for the Philippines, Indonesia (copra only), Ceylon, West Malaysia and Singapore and Sabah (copra only) are given in appendix statements VI to XII. Although a fairly clear idea is thus offered of the geographical distribution of this trade, it should be noted that these data are not sufficiently detailed; nor are those for the other, smaller countries of the ECAFE adequate for the presentation of accurate statistics on the intra-regional and extra-regional trade of ECAFE countries as a whole in copra and coconut oil. The discussion that follows will, therefore, deal only with the trade of the individual countries mentioned above.

The Philippines. This country's export trade in the two commodities is strongly oriented towards the United States, which for many years has been far the largest buyer of Philippine coconut oil and a substantial buyer of its copra (see appendix statements V and VI). In 1966, of the Philippines' total exports of 313,000 tons of coconut oil the United States took as much as 250,000 tons or 80 per cent of the total. On the other hand, of the copra exports of 909,000 tons in that year, the United States absorbed only 262,000 tons or 28.8 per cent. Western Europe accounted for a far larger share—63 per cent—of the Philippines' copra exports. Whilst the breakdown of the category "other countries" is not available, it may be assumed that in the case of copra exports these were mainly countries in the ECAFE region. This would mean that the latter countries took only approximately 8 per cent of the Philippines' copra exports in 1966. In the case of coconut oil, the Philippines' exports to countries other than the United States and western Europe were negligible.

The orientation of the Philippines' copra and coconut oil exports towards the United States is due partly to historical and political factors, and partly to the special trading privileges which it enjoys there vis-a-vis other countries. Before the 1910s the United States was an insignificant market for the Philippines' coconut products; and it was not until 1916 that it began to import sizable quantities of copra and coconut oil to meet the growing demand of the soap, margarine and explosive industries. Ever since, the exports of coconut products have increased, not only to the United States but also to western European countries.[5]

Preferential tariffs or other trade privileges have been accorded to Philippine coconut products in the United States for a long time.[6] Without going into the details of early history, if may be noted here that between 1934 and 1966 there were three tariff duties or taxes chargeable to coconut oil imported into the United States, viz. (a) a basic tariff duty of US 2 cents/lb, (b) a US 3 cents/lb processing (excise) tax converted into a customs duty in 1962, and (c) an additional excise tax (converted into a duty in 1962) of US 2 cents/lb. As against the basic tariff duty, mentioned under (a), payable on oil imported from countries other than the Philippines, under the US Internal Revenue Act of 1934 this duty was levied on Philippine oil only in excess of a duty-free quota of 200,000 long tons. Later, under the United States-Philippine Trade Agreement of 1946, this duty was reduced to US 1 cent/lb in excess of the duty-free quota. Again, the processing tax, mentioned under (b), imposed in 1934, was not in principle applicable to the Philippines from 1934 to 1946, since the taxes collected on Philippine oil were refunded to the Philippine Government for the improvement of the coconut industry. Later, from 1946 to 1956 the revenue from this tax was not refunded. The processing tax itself, however, was suspended from 1957 till June 1963 and finally abolished in 1966. Moreover, the additional tax of US 3 cents/lb imposed also in 1934 was not applicable

[5] See Mariano P. Ramiro, *op. cit.*

[6] A detailed historical discussion of the tariffs, taxes and quota arrangements in the United States in relation to coconut products since the early 1920s is available in George L. Hicks, *op. cit.* This and the following two paragraphs are based on Hick's discussions.

to Philippine oil. Thus until the abolition of the processing tax, while oil imported from countries other than the Philippines was charged at a total rate of US 7 cents/lb, Philippine oil was subjected to a duty of only US 3 cents/lb plus a duty of US 1 cent/lb on exports in excess of the duty-free quota. Since the abolition of the processing tax, Philippine oil has been chargeable at the rate of only US 1 cent/lb in excess of the duty-free quota and all oil from other countries at a rate of US 4 cents/lb.

The privilege of a duty-free quota and a one-cent duty on coconut oil exports in excess of this quota, granted to the Philippines in 1934 and 1946, respectively, has been continued under the revised United States-Philippine Trade Agreement of 1955 (also known as the Laurel-Langley Agreement). Under the revised agreement, the duty-free quota for Philippine oil exports to the United States declines progressively from 190,000 tons fixed for the period 1955-59, till it falls to zero by 1974. Moreover, after expiry of the Laurel-Langley Agreement in July 1974, the preferential treatment accorded to Philippine oil in respect of the additional tax of US 3 cents/lb will no longer apply. In short, after the termination of this Agreement, not only will Philippine oil no longer enjoy the privilege of a duty-free quota, it will be subject to the full import duty of US 4 cents/lb now payable on imports from other sources.

Copra imports into the United States, unlike those into most other countries, are subject to tariff. Along with the processing tax of US 3 cents/lb on coconut oil, imposed in 1934, a corresponding tax of US 1.87 cents/lb was levied on copra. Likewise, the additional tax of US 2 cents/lb was linked with a corresponding copra tax of US 1.25 cents/lb. Since Philippine oil was subject only to the three-cent tax, the corresponding copra tax of US 1.87 cents/lb was paid until the suspension of the processing tax in 1957, which meant a parallel suspension of the copra tax. At present, copra imports from the Philippines are not subject to any tariff in the United States market, whilst those from other sources are charged an import duty of US 1.25 cents/lb. After the termination of the Laurel-Langley Agreement in 1974, Philippine copra will no longer enjoy this preferential tariff treatment; it will be subject to a tariff of US 1.25 cents/lb like any other.

The termination of the Laurel-Langley Agreement in 1974 will thus mark an end to the preferential treatment received by Philippine coconut products which gives them an edge over similar products from other sources.

This country's exports of coconut oil to the United States showed a pronounced upward trend during the period 1956-1966, except from 1959 to 1961, when they were relatively low. Indeed, over the period as a whole these exports expanded nearly threefold, from about 90,000 tons in 1956 to 250,000 tons in 1966. Exports to western Europe were negligible until 1963, except in 1956 when they rose to about 9,000 tons. As from 1963 they assumed sizable proportions, mounting from 28,000 tons in that year to 62,400 tons in 1966.

The Philippines' exports of copra to western Europe—its principal market for this product—showed large fluctuations in some years, but, unlike the case of exports of coconut oil to the United States, there was no significant upward trend over the period reviewed. Shipments to western Europe amounted to 558,000 in 1956 and 574,000 tons in 1957, they still ranged between 530,000 ton 570,000 tons during the period 1964-66. There was a significant decline in exports to "other countries", i.e. to regions other than western Europe and the United States; they fell as low as 75,000 tons in 1966, as compared to 150,000 tons in 1956 and 169,000 tons in 1957.

Ceylon:[7] Ceylon's principal exports of coconut products comprise—in declining order of importance as export earners—coconut oil, desiccated coconut, copra and fibre. Other products, such as fresh nuts, poonac (i.e. copra cake or meal) and coir yarn, are also exported, but the earnings from them are very much smaller.

India and Pakistan have been the principal purchasers of Ceylon's copra (see appendix statement VII). Of the total of 41,500 metric tons exported in 1965, India took as much as 27,000 tons and Pakistan 3,400 tons. Exports to other countries have generally been of much smaller amounts. Those to western Europe were nil or negligible between 1956 and 1963, rising, however, to 2,000 in 1964 and 3,400 tons in 1965. Similarly, exports to eastern European countries (including the USSR) were insignificant until 1964. The USSR has become an important purchaser since 1965. Eastern Germany absorbed about 2,000 and 2,600 tons in 1966 and 1967, respectively. Mainland China has from time to time bought fair amounts of copra from Ceylon, particularly in 1959 and 1962, but does not appear to have been a regular purchaser.

India and Pakistan, whose domestic production of copra falls short of domestic requirements apparently find it convenient to import substantial quantities of copra from neighbouring Ceylon. Moreover, as stated in the country study, "the export prices secured for copra during certain seasons in specific markets such as India and Pakistan have been extremely favourable.

[7] This section is based mainly on the Ceylon country study on coconut and coconut products. However, the trade data mentioned are derived from the FAO's *Coconut Situation*, unless otherwise indicated.

These prices have earned the country more foreign exchange than what it would have earned had it extracted the oil and sold the oil and oilcake at the prevailing prices for these commodities in the international market." (p.33 para. 6). To quote further from the study: "The possibility of exports to India at these (high) prices is due to the fact that prices in India for both coconut oil and copra are much higher than international prices." (p.65, para.6).

Ceylon's exports of copra averaged 42,000 tons a year during the period 1956-1959 and some 46,000 tons during the period 1960-67. But there has been a marked downward trend since 1963, which reached 21,200 tons in 1966 and 15,800 tons in 1967.[8]

Ceylon's export markets in coconut oil have been far more diversified. Those in western Europe have comprised mainly Western Germany, Italy, the Netherlands and the United Kingdom; in Asia: Pakistan and mainland China; and in the Americas: Canada. In eastern Europe, particularly the Soviet Union and Eastern Germany have emerged as important buyers of the 1960s (see appendix statement VIII). Exports to all destinations varied widely during the period 1956-1966. In the second half of the 1950s they averaged 64,000 tons a year; and, during 1960-1966, 88,000 tons. However, the trend has been persistently downward since 1964. In 1966 and 1967 the figures were as low as 77,000 and 7,000 tons, respectively.

The fall in Ceylon's exports of both copra and coconut oil in recent years, particularly since 1964, is attributable to the progressive decline in exportable surpluses owing to a rising domestic consumption.[9] The fall in domestic production of copra also contributed to the reduction in the exportable surplus in recent years.

Ceylon's desiccated coconut also has a wide market. In western Europe, the principal purchasers are the United Kingdom, Western Germany, the Netherlands, Belgium-Luxembourg and France. Among other countries, the major buyers are Canada and Australia. During the period 1960-67, shipments ranged between 46,000 and 54,000 tons, earning substantial foreign exchange for Ceylon owing to the high unit value of this product.

Since January 1963, Ceylon has levied a system of export duties on a sliding scale on various coconut products;[10] and this has had an import influence on the export trade in these products. The rates of duty in operation at the beginning of 1968 were based on the average London c.i.f. price of Philippine copra, as follows:

Export duties on coconut products in Ceylon

Product	*Average c.i.f. (London price of a ton of Philippine copra (range)*	*Duty payable (range)*
Copra	US$124 or less to US$280	Rs 115 to Rs 469 per ton
Coconut oil	US$124 or less to US$280	Rs 4.76 to Rs 576.19 per ton
Desiccated coconut	US$124 or less to US$280	Rs 4.04 to Rs 489.32 per ton
Fresh coconuts	US$124 or less to US$280	Rs 28.75 to Rs 117.39 per ton

The export duty levied on copra is thus higher than those on coconut oil and desiccated coconut. The Ceylon country study explains: "It has been the Government policy to discourage the export of copra and fresh nuts and to promote the export of oil and desiccated coconut by levying preferential export duties." The purpose of the sliding scale of duties is to ensure "an element of stability in the cost structure of the industry. . . . The duties move directly with the prices, that is, when the prices fall, low duties are levied with a view to provide relief to the exporters and conversely when the prices rise in the export market the duties are also raised with a view to discourage the export of large quantities of copra, thereby providing adequate quantities for the local millers as well as to siphon off excess incomes accruing to producers." (pp.8 and 25).

Indonesia: Indonesia exports substantial quantities of copra and copra cake, but very little coconut oil. According to the country study,[11] annual exports of copra and of copra cake averaged 156,500 metric tons and 121,800 metric tons, respectively, during the period 1960-1965. The corresponding data for the period 1950-1958, are given as 299,600 tons and copra

[8] See Ceylon country study, table 5.5.

[9] Ceylon country study, p. 7.

[10] *Ibid.*, p. 8.

[11] Country study on coconut and other oilseeds: Indonesia, chapter V, pp. 45, *et seq.*

cake 110,000 tons, respectively. Thus, while exports of copra registered a drastic decline between 1950-58 and 1960-65, those of copra cake rose significantly. Coconut oil exports averaged 900 metric tons a year in the earlier period; and there appear to have been no exports in the latter period.

The decline in copra exports is stated to have been due, on the one hand, to the inadequate increase in domestic production between the two periods in relation to the expansion of home consumption and, on the other, to an increase in illegal exports.[12] Illegal exports were stimulated by the price disparity between the effective export rate and the black-market rate.[13]

Traditionally, the principal markets for Indonesia's copra have been the Netherlands, Western Germany and Malaysia-Singapore, imports into the last-mentioned area being mostly re-exported subsequently. Thus, of Indonesia's average copra exports of 333,000 tons in 1956 and 1957 (see appendix statement IX), 43,500 tons went to the Netherlands, 33,000 tons to Western Germany and 150,000 tons to Malaysia-Singapore. Among Asian countries, substantial quantities were also exported to Japan, Sabah and mainland China. As a result of Indonesia's policy towards the Netherlands at the end of 1957, Indonesia's exports to that country sharply declined, falling from 47,000 tons in 1957 to 1,700 tons in 1962. Similarly, the commencement of a similar policy between Indonesia and Malaysia and Singapore has led to a diversion of Indonesia's copra exports away from Malaysia and Singapore to other destinations. As the country study shows, the political situation between Indonesia and Malaysia was reflected in a sharp reduction in the share of Asian countries from 1964 onwards.[14] Thus, while in 1962, it amounted to as much as 63 per cent of the total, on account largely of heavy imports into Malaysia-Singapore, it fell to as low as 11 per cent in 1964 and 6.3 per cent in 1965. Furthermore, it should be noted that, after the commencement of the confrontation policy against the Netherlands, Indonesia's exports to the United States tended to increase. Part of these, however, came via Singapore. This trend was intensified in the period of Indonesia's political difficulties with Malaysia. As table V.7 shows, the United States share in Indonesia's copra exports went up from 32 per cent in 1961 to as high as 76 per cent in 1964, but dropped to 44 per cent in 1965. Indications also are that Indonesia's copra exports to that country have recovered in recent years, particularly since 1966. In 1965, western Europe's share in Indonesia's copra exports rose to 34 per cent, compared to 8-9 per cent during 1961-64.

Table V.7. TREND OF INDONESIAN COPRA EXPORTS, 1961-1965

(Percentages)

Total exports (1,000 metric tons)	*1961*	*1962*	*1964*	*1965*
	251.2	109.8	175.5	123.4
Regions:				
Asia	52.04	63.11	10.62	6.30
United States	32.42	15.67	75.64	44.16
Western Europe	9.30	7.48	7.72	33.73
Others	6.24	14.74	6.02	15.81
Total	100.00	100.00	100.00	100.00

Source: Country study on Indonesia.

The country study on Indonesia draws attention to the sharp decline in coconut oil exports between 1950-58 and 1960-65; and attributes this mainly to the "high production cost" of coconut oil in Java, where most of the oil mills are located. The high and rising production costs of coconut oil in Java is in turn attributed to "the increasing interinsular transportation costs" and "the increasing levies either formal or informal" imposed on copra in the course of transportation from the other islands to Java.[15] Inadequacy of copra supplies in Java and the high cost of copra imported from the other islands are a major factor underlying the substantial under-utilization of capacity in Java's oil mills.

[12] *Ibid.*, p. 46.

[13] There is some difficulty in interpreting the trends in Indonesia's trade in coconut products, owing to the inadequacy and incomplete nature of the statistical data. The data on copra exports given in the country study and those reported in the FAO's Coconut Situation (on the basis of which appendix statement IX has been compiled) are widely divergent, as will be seen from the following figures:

Indonesia's copra exports
(1,00 metric tons)

	Country Study: Indonesia	*FAO: Coconut Situation*
1956	260.4	307.3
1957	297.4	358.7
1958	116.9	249.9
1960	170.4	201.5
1961	251.2	280.4
1962	109.8	176.2
1963	108.5	133.1
1964	175.5	186.1
1965	123.4	126.6

It will be seen that the export figures as reported in the FAO publication are generally higher than those given in the country study. This is probably because the FAO figures sometimes include illegal shipments — it is known that substantial illegal shipments from Indonesia to Sabah and West Malaysia and Singapore took place in certain years — whereas those in the country study do not.

[14] Data relating to Indonesia's copra exports by *destination* are not available in the FAO's *Coconut Situation* for the period after 1962. The country study, however, gives the percentage distribution between different regions for the period 1961-1965.

[15] See Country Study on Indonesia, pp. 46-48.

Indonesia's copra cake exports expanded substantially between 1950-58 and 1960-65. This is stated to have been due to the rising domestic consumption of coconut oil occasioned by the growth in population, which has resulted in larger export surpluses of copra cake, this commodity being a by-product of the oil-crushing process.[16]

Malaysia: The volume and value of Malaysia's exports of copra and coconut oil have fallen in recent years. As may be seen in table V.8 below, exports of copra declined by 62.7 per cent from 110,200 tons in 1961 to 40,500 tons in 1965, and in the case of coconut oil exports, by 55.5 per cent from 45,200 tons in 1961 to 20,100 tons in 1965. The decline in the exports of these commodities from Malaysia is mainly the result of increasing local consumption of copra and coconut oil and a general lack of supply of copra in the country, especially in West Malaysia.

Table V.8. Exports of Copra and Coconut Oil, Malaysia, 1961-1967

Year	Copra		Coconut oil (crude and refined)	
	Volume 1,000 tons	Value Million $	Volume 1,000 tons	Value Million $
1961	110.2	46.1	45.2	29.8
1962	65.3	27.7	36.7	23.8
1963	65.8	30.6	32.4	23.8
1964	39.1	19.2	15.7	12.9
1965	40.5	23.7	20.1	18.2
1966[a]	12.7	7.1	25.1	19.9
1967[a]	—	—	29.1	22.8

Source: Country Study of the Coconut Industry of Malaysia.

[a] West Malaysia only; figures for Sabah and Sarawak not available.

Generally, Malaysian copra exports originate from West Malaysia and Sabah. The amount of copra exported from Sarawak is negligible. The bulk of Malaysia's exports of copra went to Singapore, Japan, India and Formosa in recent years. Exports from West Malaysia went mainly to India, Singapore and Formosa, while those from Sabah went mainly to Singapore and Japan.

Malaysian coconut oil exports originate from the three countries of the Federation (West Malaysia, Sabah and Sarawak), but West Malaysia is the major source accounting for about 90 per cent of the total amount of coconut oil exported from Malaysia in 1965. The main importing countries of Malaysian coconut oil are Singapore, Canada, Italy and the United Kingdom. Recently, Canadian offtake of West Malaysian coconut oil has been increasing, from 2,139 tons or 14.3 per cent of total coconut oil export from that country in 1964 to 9,484 tons or 38 per cent of the total export of the commodity in 1966. Singapore and Canada together imported about 78 per cent of the total West Malaysian export of coconut oil in 1966.

Malaysian coconut oil has found a steady demand overseas but the coconut oil industry of the country finds it difficult to increase its production mainly because of the short supply of copra.

Exports of coconut oil and copra from Malaysia are mainly handled by the large oil mills and export organizations. Their overseas trade are usually done in hard currencies, with credit facilities up to 60 days. Most of the financing of the coconut oil or copra export is done by the exporters themselves but commercial banks in Malaysia do extend "packing credit" facilities to them to finance their export. Usually such credit have to be settled by the exporters within 30 days.

Problems and Prospects of Export Trade

Against the background of the foregoing analysis of the structure and trends in world trade in copra and coconut oil since 1956, it will now be appropriate to consider the problems of and prospects for the export trade of ECAFE countries in these commodities. And since traditionally western Europe and the Americas, mainly the United States, (and in more recent years, Japan) have absorbed the major proportion of ECAFE exports, it is necessary in the first instance to devote considerable attention to the pattern of and trends in the utilization of coconut oil in these regions, as well as to the difficulties, chiefly in the shape of barriers to trade, faced there by exporting countries.

Detailed and continuous series of the utilization of coconut oil for different uses are not available from all the important consuming countries. However, fairly adequate data are available from many of the major consuming countries in the West and from Japan for various recent periods so as to permit a broad appraisal to be made of the patterns and trends in the utilization of coconut oil.[17]Data on the utilization of coconut oil from eleven major importing, non-producing countries during the years 1955-1961 are given in table V.9. Of these, seven belong to western Europe: Denmark, France, the Netherlands, Norway, Portugal, the United Kingdom and Western Germany; and two to the Americas: the United States and Canada; the other two are Japan and Australia.

[16] *Ibid.*, p. 48.

[17] The main source of data on this subject is the publication of FAO, notably the issues of the *Coconut Situation*. The discussion on the utilization of coconut oil that follows draws heavily on the various issues of the "Coconut Situation".

Table V.9. DISPOSITION OF COCONUT OIL IN ELEVEN NON-PRODUCING COUNTRIES,[a] 1955-1966

Item	*1955*	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*
				(Thousands of metric tons)			
Edible uses	532	637	669	602	379	397	491
Inedible uses	296	307	325	307	290	397	420
Total disappearance	828	944	994	909	670	794	911
				(Percentages)			
Edible uses	64	67	67	66	57	50	54
Inedible uses	36	33	33	34	43	50	46
Total disappearance	100	100	100	100	100	100	100
				(Thousands of metric tons)			
Retained imports into non-producing countries[b]	1,019	1,145	1,215	991	838	1,053	1,102
World retained imports	1,182	1,300	1,407	1,127	942	1,191	1,264

[a] Denmark, France, the Netherlands, Norway, Portugal, the United Kingdom, Western Germany, the United States, Canada, Japan and Australia.

[b] Europe, North and South America, Japan, Australia and New Zealand.

The eleven countries mentioned above accounted for a large share of world trade. They took more than 80 per cent of retained imports into all non-producing countries in 1961 and about 75 per cent of world retained imports. World trade in copra and coconut was drastically reduced in 1958 and 1969, following severe and prolonged droughts in major producing areas. This was reflected in a sharp decline in the utilization of coconut oil in these countries. Total utilization of coconut oil thus fell from 944,000 and 994,000 tons in 1956 and 1957, respectively, to 909,000 tons in 1958 and as low as 670,000 in 1959. The recovery in world copra production in 1960 and 1961 led to a recovery in world trade in and utilization of coconut oil. By 1961 coconut oil utilization in these eleven countries had increased to 911,000 tons, but it was still substantially below the level reached in 1957.

Table V.10 shows the utilization of coconut oil in different products in the food and non-food sectors in the United States from 1955 to 1961.

Table V.10. DISPOSITION OF COCONUT OIL IN THE UNITED STATES, 1955-1961

Product	*1955*	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*
				(Thousands of metric tons)			
Margarine	2.7	3.6	2.2	1.8	1.8	1.8	1.8
Shortening	1.8	2.7	3.8	5.3	9.1	4.5	11.8
Others	83.5	96.2	99.8	107.5	70.8	71.7	73.5
Total edible	88.0	102.5	105.7	114.6	81.6	78.0	87.1
Soap	78.5	80.3	78.6	73.1	65.3	65.8	62.6
Foot and loss	11.3	12.2	12.4	11.7	12.2	13.6	17.2
Others	74.9	83.0	82.8	85.6	85.7	129.3	140.6
Total inedible	164.7	177.5	173.8	170.4	163.3	208.7	220.4
Grand total	252.6	277.9	279.6	285.0	244.9	286.7	307.5
				(Percentages)			
Margarine and shortening	2	2	2	2	4	2	4
Other edible uses	33	35	36	38	29	25	24
Soap	31	29	28	26	27	23	20
Other non-food uses	34	34	34	34	40	50	52
Grand total	100	100	100	100	100	100	100

Source: FAO, *Coconut Situation*, No. 8, p. 6.

Non-food uses clearly dominate in the total utilization of coconut oil in the United States. Indeed the share of non-food uses increased from a little over 60 per cent and the total in 1957 and 1958 to 70 per cent and more in the early 1960s. Use in soap fell steadily from around 80,000 tons in 1955-57 to about 63,000 tons by 1961, in line with a declining trend in soap manufacture. However, the percentage share of coconut oil in the total fatty ingredients of soap amounted to 15 per cent in each year of the period. The stability in the share of coconut oil is attributable to the fact that this percentage is close to the minimum required to produce good lathering qualities. Another factor which tended to keep the proportion of coconut oil in soap manufacture to this minimum was the keen competition offered by sample supplies of low-priced tallow produced in the United States.

By contrast, the use of coconut oil in non-food products other than soap showed a persistently upward trend. Including "foot and loss" most of which sent into the production of fatty acids, utilization of coconut oil in non-food uses other than soap increased from around 95,000 tons in 1956 and 1957 to nearly 160,000 tons by 1961. These uses related largely to products sold to the chemical industries which used coconut oil as a source of lauric acid. These products were converted into various derivatives—synthetic detergents and plasticizers being among the main non-soap products in the making of which coconut oil was used.

Margarine and shortening accounted for a small proportion of consumption of coconut oil in food products. The use of coconut oil in margarine, which amounted to only 2,200 tons in 1957, fell to 1,800 tons in 1958 and remained at that level for the rest of the period. Use in shortening, however, showed greater buoyancy during the period, rising from 3,800 tons in 1957 to 11,800 tons in 1961. However, the two products together accounted for only 15.6 per cent of the total food uses in 1961. The low consumption of coconut oil for margarine and shortening is attributable to the abundant supplies of domestic soybean and cottonseed oils and the ability of manufacturers to process these oils into products that meet the needs of the United States market. Food products other than margarine and shortening, on the other hand, provided much larger outlets for coconut oil in the United States. Thus, the bakery and confectionary industries used substantial quantities of coconut oil. Use in the bakery and confectionery industries, however, declined after reaching the high level of 107,000 tons in 1958, still in 1961 they accounted for about 25 per cent of the total utilization of coconut oil in the United States.

The pattern in western Europe was almost exactly the opposite of that in the United States (see table V-11). Food uses bulked much larger than non-food uses. During the years 1955-1959 food uses accounted for well over 80 per cent of the total usage of coconut oil, falling moderately to 75 per cent in 1961. Margarine provided the principal outlet for coconut oil,

Table V.11. Estimated utilization of coconut oil in seven European countries, 1955-1961

Product	*1955*	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*
			(Thousands of metric tons)				
Six countries							
Margarine	184	217	216	163	100	110	131
Shortening	32	30	33	30	28	32	36
Other food products	27	37	46	52	29	25	37
Soap	44	53	55	45	29	35	42
Other non-food products	12	10	10	17	11	16	29
Total	299	347	360	307	197	218	275
Germany (Fed. Rep)							
Food products	168	222	234	216	129	137	179
Non-food products	15	15	30	19	14	31	32
Total	183	237	264	235	143	168	211
Seven countries							
Food products	411	506	530	461	286	304	384
Non-food products	90	86	104	86	66	105	117
Total	501	592	634	547	352	409	501
			(Percentages)				
Food products	82	85	83	84	81	74	75
Non-food products	18	15	17	16	19	26	25
Total	100	100	100	100	100	100	100

Source: FAO, *Coconut Situation*, No. 8.

accounting for nearly one-half of the total consumption in 1961. The other half was divided fairly evenly among shortening and other food products and soap and other non-food products. In the food sector, utilization of coconut oil in margarine showed a markedly dowwnward trend. From a high of 217,000 tons in 1956 it slumped to 100,000 tons in 1959, the year of the shortest supply and the highest price of coconut oil. There was some recovery in utilization by 1961, but it was still substantially below the level reached in 1955. This decline is mainly attributable to the high prices of coconut oil in relation to competing oils, such as, soybean, groundnut and palm oils, which encouraged substitution.

Substantial quantities of oils and fats are used in the manufacture of "shortening" in the United Kingdom, France and the Netherlands, where the use of coconut oil for this purpose showed small annual fluctuations in the 1955-61 period, although no long-term trend emerged. Coconut oil is not widely used in food products other than margarine and shortening in western Europe, except in the United Kingdom.

As for the non-food sector, it is to be noted that soap production in the six western European countries (i.e. excluding Western Germany) declined in 1955-61, as a result of competition from synthetic detergents. Whilst the impact on the utilization of coconut oil for soap manufacture was moderate. There were large annual variations in the quantities so used; in particular the high prices of coconut oil in 1958-60 led to a significant substitution of low-priced animal fats, especially inedible tallow and greases. Consumption for making other non-food products showed a marked increase over the period 1955-61.

The pattern in Canada, Australia and Japan during the period under review was similar to that of the United States (see table V-12). Non-food uses were preponderant and their share increased progressively.

The use of coconut oil in non-edible products increased from 41,000 tons in 1955 to as much as 83,000 tons in 1961—i.e. from 55.5 per cent of the total to 80 per cent—while that in edible products fell away from 33,000 tons to 20,600 tons. A principal factor underlying the growth in the former case was the strong upward trend in soap manufacture in Japan which emerged as one of the world's leading producers. Another contributory factor was this country's rising production of synthetic detergents, calling for increasing quantities of coconut oil.

Table V.12. Disposition of coconut oil supplies in Canada, Australia and Japan, 1955-1961[a]

Product	*1955*	*1956*	*1957*	*1958*	*1959*	*1960*	*1961**
				(Thousands of metric tons)			
Margarine	19.4	21.3	26.7	18.7	5.6	5.8	9.4
Shortening[b]	10.0	7.1	6.1	7.5	5.4	6.1	8.7
Total edible uses[c]	32.9	29.1	33.3	27.0	12.1	14.4	20.6
Total inedible uses	41.1	44.8	47.0	50.6	61.2	83.7	82.7
Total disappearance	74.0	73.9	80.3	77.6	73.4	98.1	103.3
				(Percentages)			
Margarine	26.2	23.8	33.3	24.1	7.6	5.9	9.1
Shortening[b]	13.5	9.6	7.6	9.7	7.4	6.2	8.4
Total edible uses[c]	44.5	39.4	41.5	34.8	16.5	14.7	19.9
Total inedible uses	55.5	60.6	58.5	65.2	83.4	85.3	80.1
Total disappearance	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: FAO, *Coconut Situation,* No. 8, p. 12.

* Preliminary.

[a] For Australia, split years, starting with 1954/55.

[b] No data available for Australia.

[c] Including small amounts of "other edible uses".

Consolidated data on the utilization of coconut oil for North America (United States and Canada) and eleven western European countries[18] for the years 1957 to 1962 are given in FAO's *Coconut Situation,* No. 10. Since the pattern and trends of utilization revealed by them corroborate the picture seen earlier, the relevant table is not reproduced here. It will suffice to note the broad picture of utilization in 1962. The thirteen countries referred to used some 860,000 tons of coconut oil in 1962, accounting for about 70 per cent of world retained imports. The western European countries absorbed 516,000 tons—422,000 tons (82 per cent) in food uses and 94,000 tons in non-food uses (18 per cent). North America registered a total of 347,000 tons—70,000 tons in food uses and 167,000 tons in non-food uses. By contrast with the western European countries, the shares for food and non-food uses were 32 per cent and 68 per cent, respectively.

Detailed data of the kind reviewed above on coconut oil utilization in the major importing countries are not available after 1962. However, such data are available for the United States for the period upto 1966, and these are given in table V-13.

Utilization of coconut oil in the United States increased moderately, from a total of 313,400 tons in 1961 to 371,400 tons in 1966, except for a small drop in 1965. Apart from an appreciable increase in 1962, use in edible products on the whole stagnated till 1965. The following year, however, saw a sizable expansion in this area of use. The bulk of the increase took place in uses for edible products other than margarine and shortening, e.g. bakery confectionery, icecream, etc. Use in inedible products hardly showed any increase during this period, except in 1962 and 1963. Even the category of "other edible products", which for several years had been the most dynamic segment of the country's global demand for coconut oil, appeared to lose momentum after 1963; in fact, in 1965 and 1966, it marked downward trend. Although demand in this sector had earlier shown relative inelasticity in regard to price, the high price of coconut oil in 1965 appears to have inhibited its use. Indeed, high coconut oil prices are likely to encourage further efforts to substitutes petroleum-based synthetics in certain uses, especially in the manufacture of detergents.

For lack of adequate data it is not possible to assess the developments in coconut oil consumption for western Europe as a whole after 1962. But it would appear that the predominance of inedible uses noted earlier has continued in more recent years. Margarine and shortening provided the main outlets for coconut oil, and the output of these products increased in western Europe in 1964. There has been evidence of a continuous, though not very pronounced, rise in the main inedible use, viz. soap manufacturing. As in the United States, this was probably due to a growing demand for quality soaps, for which lauric acid oils are an essential ingredient.

Japan has continued to be an important consumer of coconut oil. Total consumption increased by 45 per cent between 1960 and 1963, reaching a level of 70,000 tons, and this country became one of the major consumers, after the United States and Western Germany, among non-producing countries. In Japan, which follows a utilization pattern similar to that of the United States, the share used for soap and synthetic detergents remained high in 1964, but there was a moderate fall in that reserved for inedible products in 1965.

[18] i.e. the seven considered earlier (Denmark, France, the Netherlands, Norway, Portugal, the United Kingdom and Western Germany) together with Austria, Belgium, Finland and Sweden.

Table V.13. Utilization of coconut oil in the United States, 1962-1966

Product	*1962*	*1963*	*1964*	*1965*	*1966*
			(Thousands of metric tons)		
Margarine	2.3	1.8	2.7	2.3	5.9
Shortening	12.2	8.6	8.2	9.1	17.2
Other edible products	106.6	89.4	103.9	106.1	127.9
Total edible products	121.1	99.9	114.8	117.5	151.0
Soap	65.0	68.9	71.7	65.8	68.0
Fatty acids	25.4	23.1	24.5	24.5	27.2
Refining loss	14.5	14.5	11.8	12.7	16.3
Other inedible products	106.6	135.5	136.5	120.7	108.9
Total inedible products	210.5	242.0	244.5	223.6	220.4
Grand total	331.6	342.0	359.2	341.1	371.4

Source: FAO, *Coconut Situation,* Nos. 14 and 18.

Attention has been drawn in several instances to the competition from other suitable oils and fats. Along with technical considerations, the relative supplies of alternative oils and fats, and the price relationship between these and coconut oil have been important factors affecting the utilization of coconut oil in major importing, non-producing countries. Supply conditions having remained unchanged, an appreciable increase in the price of coconut oil relatively to those of competing oils and fats has encouraged the substitution of the latter for the former. This was more evident in the food sector than in the others.

World production and supplies of copra showed no long-term expansion during the period 1956-66, despite wide variations from year to year. This basic supply or availability limitation explains the strong inverse relationship noticed during this period between copra and coconut oil prices and world supplies of copra; as also the high premia enjoyed by coconut-oil prices over those of competitive oils and fats in periods of low copra production.

Copra and coconut oil prices rose from relatively low levels in 1956 and 1957 to unusually high levels in 1958 and 1959, owing to the sharp fall in world copra production in the latter years (see table V.14) compared to US$177 and US$172 per metric ton in the earlier years, copra prices jumped to $203 and $251 in 1958 and 1959. Similarly, coconut oil prices rose sharply from $265 and $274 per ton to $316 and $383 per ton, respectively. With the recovery of copra production in 1960 and 1961, prices of both commodities slumped, falling to $165 per ton for copra and $254 per ton for coconut oil in 1961. Their prices, however, showed a marked upward trend in the period 1963-1965; particularly in 1965, when world copra production virtually stagnated. In 1966, copra and coconut oil prices slipped back again with an appreciable increase in copra production. Reduction of supplies in 1967 caused an upward movement in prices, particularly in that of copra.

Table V.14. COPRA AND COCONUT OIL PRICES, 1956-1967

(US dollars per metric ton)

Year	*Copra Philippines (bulk, c.i.f. Europe)*	*Coconut oil Ceylon, 1% bulk (c.i.f. North Sea ports)*
1956	177	265
1957	172	274
1958	203	316
1959	251	383
1960	202	312
1961	165	254
1962	164	249
1963	184	284
1964	194	296
1965	226	347
1966	185	312
1967	202	319

Source: FAO, *Coconut Situation*, No. 18, p. 50-52.

Data on the international prices of coconut oil and some competing oils and fats from 1956 and 1957 to 1967 are given in table V.15.

Table V.15. AVERAGE INTERNATIONAL PRICES OF SPECIFIED FATS AND OIL, C.I.F. EUROPE, 1956-1967

Product	*1956 and 1957*	*1959*	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*	*1967*
					(US dollars per metric ton)					
Coconut oil[a]	256	367	299	254	249	284	297	354[h]	312	319
Soybean oil[b]	322	231	224	287	227	224	235	269	262	...
Groundnut oil[c]	364	300	327	330	274	269	315	324	297	...
Palm oil[d]	255	237	224	228	210	221	236	268	234	...
Whale oil[e]	250	219	209	195	135	205	231	248	237	...
Fish oil[f]	195		143	135	103	139	194	205	209	...
Lard[g]	...		...	278	258	216	251	293	282	...

Source: FAO, *Coconut Situation*.

[a] Ceylon, 1% bulk. (For 1956 and 1957, 1959 and 1960, Straits 3½% bulk).
[b] Any origin, Extank, Rotterdam. (For 1956 and 1957 and 1959-1963, United States crude bulk).
[c] Nigeria, 3-5% bulk. (For 1959, British West African, bulk).
[d] Nigeria, 5% bulk. (For 1959, Sumatra, 5% bulk).
[e] Crude, bulk.
[f] Monhaden, crude, tankers, f.o.b. Baltimore.
[g] United States prime steam, tank. (For 1961 and 1962 pure refined 37 lb cans, f.a.s., New York).
[h] Including estimates for March, April and May, when the price was unquoted.

As this table shows, coconut oil prices were appreciably lower than those of soybean and groundnut oil and on a par with those of palm and whale oils in 1956 and 1957. This price relationship changed drastically in 1958 and 1959, when the price of coconut oil rose to substantial premia over prices of other competing oils specified in the table. And although the fall in the price of coconut oil in 1960 and 1961 re-established the previous relationship with soybean, groundnut and palm oil prices, the price of coconut oil still remained high in relation to fish and whale oil prices.

The relationship between the prices of coconut oil and some competing oils and fats over the period 1961-67 may be seen more clearly from table V.16, which shows the premium or discount on the price of coconut oil in comparison with those of other oils and fats. It is noteworthy that throughout the period coconut oil enjoyed a substantial preium in price over those of competing oils and fats, except for soybean and groundnut oils in 1961 and groundnut oil in 1962 and 1964. The premia were particularly large in relation to whale and fish oils.

The substantial price premia enjoyed by coconut oil over other competing oils and fats in the period reviewed above is attributable mainly to the long-run rigidity in total supplies of copra. Whilst, no doubt, in periods of high prices of coconut oil relatively to those of other competing oils and fats, replacement by other suitable oils has been encouraged, the need for coconut oil in specific uses has helped to maintain its position. Looking ahead, however, it seems doubtful whether this continue to be maintained in the face of a persistent price premia in relation to other competing oils and fats, especially since, as will be seen later, a substantial expansion in the output of some of the latter is expected.

Exports of coconut products from the developing countries meet with various obstacles in the markets of developed, industrial countries, in the form of customs tariffs, quantitative restrictions, internal taxes, importing monopolies and so on. The gravity of the obstacles, however, differs according to the commodities, depending in general on the stage of processing or manufacture. Copra, which is generally reckoned as an unprocessed raw material, is by and large free of customs tariffs and quantitative restrictions. However, in the United Kingdom, there is a general tariff of 10 per cent on copra imported from "non-preferred" sources; imports from the Commonwealth, which are treated preferentially, are not subject to any import duty. In western Europe, a major country which imposes a tariff on copra is France, with a duty of 7 per cent. The rates of general (non-preferential) customs tariffs in force in some of the major industrial countries in 1962-63 are given in table V.17.[19]

[19] In the case of the United States, while the general tariff on copra is shown as zero, there were in fact two taxes on copra imports corresponding to the processing (excise) taxes on coconut oil. Until the suspension of the processing tax of US 3 cents/lb on coconut oil in 1957, there was a corresponding tax of 1.87 cents per pound on copra imported into the United States. In addition there was an additional tax of US 1.25 cents/lb on copra corresponding to the additional duty of US 2 cents/lb on coconut oil. The US 1.25 cents/lb tax on copra has continued since the suspension of the US 1.87 cents/lb tax on copra corresponding to the additional duty of US 2 cents/lb on coconut oil. In copra exports the Philippines was treated preferentially in as much as the US 1.87 cents/lb tax on copra did not apply to copra imports from that country in line with the exemption of Philippine coconut oil from the US 3 cents/lb processing tax on coconut oil.

Table V.16. PREMIUM (+) OR DISCOUNT (−) FOR COCONUT OIL IN RELATION TO SOME COMPETING OILS, AVERAGES, 1961-1967

Product	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*	*1967*
Coconut oil versus							
Soybean oil	− 33	+ 22	+ 60	+ 66	+ 76	+ 50	+103
Groundnut oil	− 76	− 25	+ 16	− 19	+ 21	+ 15	+ 36
Palm oil	+ 26	+ 23	+ 66	+ 62	+ 76	+ 79	+ 95
Whale oil	+ 59	+114	+ 79	+ 65	+ 98	+ 75	+153
Fish oil	+116	+150	+127	+ 93	+129	+117	+192

Source: Coconut Situation, No. 18.

Table V.17. GENERAL (NON-PREFERENTIAL) TARIFFS IN FORCE IN MAJOR INDUSTRIAL COUNTRIES, 1962/63[a]

(Percentage *ad valorem*)[b]

	Copra	*Coconut oil*
United States	0	$10
United Kingdom	10	15
Japan	0	10
Benelux	0	(5-12) 7
Federal Republic of Germany	0	(7-24) 10
France	7	(12-16) 13
Italy	0	(9-19) 9
Netherlands	0	7
European Economic Community	0	(5-10) 9

Source: United Nations, United Nations Conference on Trade and Development, vol. III, tables on pp. 68-71 (table I.B-5) and pp. 72-75 (table I.B-6).

[a] The commodities have been specified in terms of their SITC category at the four-digit level. Since this is a much less detailed breakdown than most tariff classifications, the tariffs (for coconut oil) have had to be specified in terms of a range and a particular rate. The range refers to opposite ends of the quality of "degree of processing" spectrum, the lowest rate applying to the crudest material, the highest rate to the most refined. The particular rate indicated alongside the range represents a judgement concerning the tariff under which most of the item not coming from a preferential source was in fact—or in some cases would have been—imported in 1962.

[b] Where duties are specific in the original tariff (indicated by an "s" in the table) they have been converted to their *ad valorem* equivalent on the basis of the 1962 trade quantities and values. All figures have been rounded to the nearest integer.

Customs tariffs on coconut oil in industrial countries are, on the other hand, much more widespread and onerous. This is because these countries generally maintain a structure of import duties which discriminate in favour of the raw materials (e.g. oilseeds) against the processed products (e.g. oil) and also usually in favour of the less processed products (crude oils) against the more processed (refined oils). Likewise, as the products become still more processed (margarine, shortening, soap), the degree of discrimination against such products tends to increase still further.

In 1962/63, the United Kingdom maintained a customs tariff as high as 15 per cent on coconut oil imported from "non-preferred" sources, while imports from Commonwealth sources faced a zero-rate of duty. In the EEC countries, the tariff rate ranged from 5 to 24 per cent; the rates applicable to imports from the overseas associated territories of France were, however, lower. In Japan the rate was 10 per cent and in the United States also 10 per cent.[20] Until 1957 there was, in addition, in the United States a processing (excise) tax of US 3 cents/lb on coconut oil imported from all sources other than the Philippines.

An illustration of the degree of discrimination in the import tariff structure of certain European countries (at the beginning of 1963) in favour of copra and against coconut oil and further processed products is given in table V-17.

Table V.18. DIFFERENTIAL IMPORT DUTIES ON COPRA, COCONUT OIL AND FURTHER PROCESSED PRODUCTS IN CERTAIN EUROPEAN COUNTRIES, JANUARY 1963

Item	*United Kingdom*[a]	*Western Germany*[b]	*France*	*EEC common external tariff*
Copra	10	Free	7.0	Free
Coconut oil[c]				
Crude	15	6.5	12.0	5
Refined	15	11.5	15.0	8
Crude or refined if in packages of 1 kg or less	—	23.5	20	20
Margarine or shortening	10	25	27	25

Source: United Nations, United Nations Conference on Trade and Development, vol. III, p. 197.

[a] Non-preferential rates.

[b] Tariffs on imports originating outside the EEC and its associates.

[c] For edible purposes.

Following the conclusion of the Kennedy Round of tariff negotiations in 1967 (mainly among developed industrial countries),[21] changes in the import tariffs on some vegetable oilseeds and oilseeds products are envisaged. A major change relates to soybeans, the duty on imports of which a number of countries agreed to reduce. Along with other oilseeds they were already duty free in many of the major importing countries. However, no significant changes were negotiated for vegetable oils, including vegetable oils from developing countries. Most countries impose duties on imports of vegetable oils from sources other than "preferred" sources for the benefit of their domestic crushing industries or "preferred" suppliers, or both. This was particularly true of coconut oil, hardly any reductions in import tariffs being envisaged for this oil.[22]

[20] This corresponded to the 1 per cent/lb basic tariff duty — expressed on an *ad valorem* basis — applicable to imports of coconut oil from GATT member countries. For non-GATT countries, the full rate was US 2 cents/lb. Coconut oil from the Philippines, which is not a GATT member but is treated preferentially, pays at present a duty of US 1 cent/lb.

[21] A number of developing countries also participated in the negotiations in respect of commodities of particular interest to them.

[22] See report of the third session of the FAO Study Group on Oilseeds, Oils and Fats to the Committee on Commodity Problems, appendix III (pp. 22-25).

Adequate data are not available on the non-tariff barriers imposed by major industrial countries on imports of copra and coconut oil. However, it is known that several European countries, notably Western Germany and France, operate various quantitative restrictions, including regulations on mixing for imports of those commodities. In the absence of detailed data it is not possible to assess the incidence or effects of these restrictions on trade.

The tariff and non-tariff restrictions imposed by industrial countries on imports of copra and coconut oil constitute a major obstacle to the expansion of the export trade of developing countries in these commodities. Hence the need for the exporting developing countries to press firmly and continuously for the progressive reduction and eventual elimination of these obstacles.

Freight rates are high for coconut products carried in the ships of established shipping lines from Asian countries to the industrial countries and this tends to raise unduly the cost to purchasers. The rates for copra and coconut oil in bulk, from 1963 to 1966, are shown in table V.19.

Freight rates for copra in bulk transported from the Philippines to western European ports in 1965 and 1966 amounted to 165 sh. 10 d. (or US$23.21) and 162 sh. 9 d. (or US$22.78) per long ton, respectively. Prices, c.i.f., in Europe of copra in bulk from the Philippines were US$230 and US$188 per long ton,[23] respectively. Freight rates thus accounted for 10 and 12.1 per cent, respectively, of c.i.f. prices of copra in Europe in 1965 and 1966. Similarly, the freight rates for copra shipped from the Philippines to the United States west coast and Japan were as high as US$22.50 and US$8.52 per long ton, respectively, in 1965. For coconut oil in bulk, the freight rate from the Philippines to western European ports in 1966 was 170 sh., or US$23.80, per long ton; and from Fiji to these ports 187 sh. 6 d., or US$26.25, per long ton from 1963 to 1965. Measured against the c.i.f. price of Ceylon coconut oil in North Sea ports, which was US$317 per long ton in 1966,[24] the freight rate for coconut oil was about 8 per cent of the c.i.f. price.

These high rates have placed copra and coconut oil exported from ECAFE countries to industrial countries in the West at a disadvantage vis-a-vis competing oils and fats. ECAFE exporting countries should thus direct their urgent attention to this area. One line of action would be for the ECAFE exporters to take up the question with the conference and other shipping lines of the industrial countries and seek to bring about reductions in freight consonant with the actual costs of transportation entailed. Another, and in the long run more satisfactory solution, would be for the exporting countries to arrange for the pooling of shipping tonnage under their own flags, and to acquire additional tonnage—in tankers and other vessels—to the extent necessary for the transportation of coconut products to developed industrial countries and to countries in the ECAFE region.

Along with the tariff and non-tariff barriers imposed by industrial countries on imports of copra and coconut oil from ECAFE exporting countries, a major obstacle confronting these countries is the import restrictions maintained by developing ECAFE countries themselves, for reasons of foreign exchange scarcity or for the protection of their domestic oil-crushing industry, or both. As will be seen later, not only is there considerable scope for the expansion of trade in coconut products among ECAFE countries, there is also urgent need for such an expansion, in view of the relatively limited prospects in the coming years for the increase of exports to the traditional markets in the

[23] The c.i.f. prices per metric ton were US$226 and $185, respectively. (See FAO, *Coconut Situation*, No. 18, table 37).

[24] The price of Ceylon coconut oil, 1 per cent bulk in North Sea ports in 1966, amounted to $312 per metric ton.

Table V.19. FREIGHT RATES FOR COPRA AND COCONUT OIL IN BULK, 1963-1966

Year	To: / From:	Copra in bulk				Coconut oil in bulk	
		Western European ports		United States west coast	Japan	Western European ports	
		Fiji	Philippines	Philippines		Fiji	Philippines
		(sh./d. per long ton)		(US$ per long ton)		(sh./d. per long ton)	
1963		202/6	...	...	...	187/6	...
1964		206/6	...	...	...	187/6	...
1965		206/6	165/10	22.50	8.52	187/6	...
1966		207/8	162/9	...	...	...	170/–

Source: FAO, *Coconut Situation*, No. 18, table 38.

West, particularly in North America and western Europe. Trade liberalization among ECAFE countries in coconut products must, therefore, be an important objective of policy in the region. True, liberalization of trade in the ECAFE region is fraught with many practical difficulties, the more important being the shortage of foreign exchange resources from which most countries of the region suffer, and the policies for the development of national industries producing essential commodities, e.g. vegetable oils, to which various countries attach great importance. But, with the demonstration of the benefits that are likely to follow from greater economic co-operation and harmonized planning among the countries of the region, many of the immediate objections to a scheme for trade liberalization will lose much of their force. This will be so particularly when trade flows in one direction and when one or more commodities are sought to be matched by reverse trade flows in other commodities.

Thus trends in the utilization of coconut oil in major industrial countries over a number of years have been analysed and some of the major obstacles faced by ECAFE countries in expanding their exports of coconut products have been discussed. An attempt must now be made to visualize, to the extent possible, the future prospects for the export trade of these countries in coconut products.

A major factor affecting the utilization of copra and coconut oil in the coming years will be the supplies and prices of competing oils and fats. Coconut oil is replaceable, in varying degrees, by other oils and fats in both its food and non-food uses. The principal competing oils are soybean, groundnut, cottonseed and palm oils. Among animal oils and fats, lard, marine and whale oils also compete with coconut oil in many uses. In a recent study made by the FAO for the Study Group on Oilseeds, Oils and Fats, projections of world production and consumption of oils and fats are given for the year 1975 with reference to the base period (1961-63).[25] The production projection shows an increase in total world production of oils and fats from 33 million tons in the base period to about 46 million tons in 1975. The projections for individual oils and fats and for the total are given in table V.20.

These projections indicate a very large increase in the production of soybean oil (from the United States) —from an average level of 3.83 million tons in 1961-63 to 6.51 million tons in 1975. Considerable increases are also envisaged for animal fats in line with the expected increase in meat production. Somewhat smaller increases are projected for groundnut oil and sunflowerseed oil. In the case of coconut oil, an increase from 2.08 million tons in the base period to 2.62 million tons in 1975 is projected.

The large increases envisaged in the production of soybean oil, groundnut oil and animal fats, especially lard, are likely to affect the demand for coconut oil adversely in the industrial countries in the coming years. Larger supplies of these oils and fats, which may be directly substituted for coconut oil in both its edible and inedible uses, may be expected to change the price relationship between coconut oil and these competing oils and fats and thus to encourage substitution.

Table V.20. FATS AND OILS: WORLD PRODUCTION BY TYPE, AVERAGE 1961-63 AND PROJECTIONS FOR 1975 (LOW ASSUMPTION)

(Millions of tons)

Oil or fat	*Average 1961-63*	*1975*
Butter	4.51	5.95
Lard	4.96	6.42
Soft oils		
Groundnut oil	2.56	4.02
Soybean oil	3.83	6.51
Cottonseed oil	2.21	2.91
Rapeseed oil	1.29	1.88
Sunflowerseed oil	1.98	3.29
Olive oil	1.30	1.49
Total	13.17	20.10
Lauric acid oils		
Coconut oil	2.08	2.62
Palm kernel oil	0.48	0.61
Total	2.56	3.23
Hard oils		
Marine oils	1.02	0.81
Palm oil	1.17	1.78
Tallow	3.55	4.80
Total	5.74	7.39
Industrial oils	1.29	1.44
Other fats and oils	0.83	1.13
Grand total	33.04	45.65

Source: FAO, Study Group on Oilseeds, Oils and Fats, *ibid.*, p. 8.

Note: The FAO documents also shows the breakdown of world production by zone, viz. developed countries, centrally planned countries and developing countries.

[25] FAO Study Group on Oilseeds, Oils and Fats: Second Session (*Long-term Situation and Outlook with Special reference to commodities of interest to developing countries,* July 1967). In regard to consumption, projections have also been made for the year 1985.

The FAO document referred to above visualizes a substantial increase in export supplies of oils and fats from North America by 1975. For western Europe it envisages a slower growth in demand in the future, with virtually the whole of the increase being met from domestic production. A substantial increase in imports into Japan is projected. For the centrally planned countries the projections show a substantial excess of demand over domestic production. For the developing countries, the projections indicate that a number of such countries in Asia, the Near East and Latin America would meet a large part of their increase in demand by expanding very considerably their imports of fats and oils from other countries, including other developing countries.

Summing up the prospects for the export trade of developing countries in oils and oilseeds, the FAO document states as follows:

"It might be difficult to find commercial markets for all the increase in export supplies projected from North America. On the other hand, soybeans are expected to account for much of the increase and these might well find a more ready market in western Europe and Japan than oils and oilseeds from developing countries. Japan has relied heavily on imports of United States soybeans since the war and in the absence of special market sharing arrangements could be expected to continue to do so. In western Europe, duty-free soybeans with their low oil and high cake content would also be particularly well placed to meet the requirements of the European crushing industry. Developing countries, particularly those not associated with the EEC or enjoying duty-free access to the United Kingdom, might therefore have some difficulty in maintaining, let alone expanding, their exports in the main commercial markets under the present trading arrangements. They would consequently be even more dependent on the possibility of increasing their shipments to the centrally planned and developing countries, but it is precisely in these countries where the increased import demand shown in the projections is most uncertain."

The major finding of the FAO study is that developing countries will face increasing difficulties in maintaining their exports of vegetable oils, including coconut oil, in the traditional markets in North America and western Europe, mainly because of increasing supplies of competing oils and fats. In addition, it must be noted that coconut oil is likely to lose ground to petroleum-based synthetics with the increase in world production of petroleum.

It follows from the foregoing that developing ECAFE countries must turn increasingly to each other for the maintenance and expansion of their export trade in coconut products in the future. Another avenue open to them is the cultivation of the markets in eastern European countries, where demand for oils and fats is expected to increase much faster than in the past. Indeed, ECAFE exporting countries of coconut products must assiduously explore and develop both these markets.

The scope for expanding exports to developing ECAFE countries, however, appears to be greater than for expanding exports to European countries, in view of the low *per capita* consumption of oils and fats in the developing ECAFE countries. In the centrally planned countries (excluding mainland China) *per capita* consumption of oils and fats in 1961-63 was 16 kg, whereas in the developing countries it was rather less than 6 kg.

Statement I

GROSS EXPORTS OF COPRA FROM ECAFE AND OTHER REGIONS, 1956-1967

(Thousands of metric tons)

Area	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*	*1966 Jan-Jun*	*1967 Jan-Jun*
Asia													
Ceylon	58.7	35.3	28.1	43.3	29.6	55.9	73.5	43.8	59.0	41.5	21.2	9.7	6.3
Hong Kong	—	—	0.5	—	—	—	0.2	—	0.4	2.6	8.0	—	0.1
Indonesia[a]	307.4	365.0	195.8	179.3	202.0	286.6	173.7	133.1	186.1	126.6	176.4	...	...
Philippines[b]	1,006.3	1,037.3	779.1	670.6	1,067.8	960.8	853.5	961.7	856.3	866.2	910.7	455.7	347.1
Sabah	60.1	64.7	68.3	60.4	81.0	69.0	45.4	40.3	33.3	24.5	26.9	12.5*	7.4
West Malaysia and Singapore	40.0	118.5	90.1	66.7	114.8	109.2	38.9	45.5	6.0	15.7	17.7	9.3*	3.9
Other Asian countries	6.7	6.8	7.5	6.7	10.6	9.3	4.8	5.6	5.0	5.0*	2.8*	...	...
Total	1,479.2	1,617.6	1,169.4	1,027.0	1,505.8	1,488.8	1,190.1	1,230.0	1,146.1	1,082.1	1,163.7	557.9	449.0
Oceania	208.3	210.9	189.6	199.1	198.7	220.5	213.7	204.1	219.2	210.1	210.9	106.1	98.9
Africa	78.9	73.3	82.1	19.9	74.4	92.8	84.0	88.5	90.2	66.9	65.5	28.2	29.3
America	1.7	0.2	—	6.0	4.6	6.5	9.7	35.1	15.0	6.5	3.9	2.9	3.1
Europe	1.3	—	—	—	—	6.8	1.1	4.0	1.3	2.7	1.2	0.6	0.8
World total	1,769.0	1,902.0	1,442.6	1,312.0	1,783.5	1,815.4	1,498.5	1,561.7	1,471.8	1,368.3	1,445.2	695.7	581.1
Of which ECAFE region	1,479.2	1,617.6	1,169.4	1,027.0	1,505.8	1,488.8	1,190.1	1,230.0	1,146.1	1,082.1	1,163.7	557.9	449.0

Source: FAO, *Coconut Situation*, several issues.

[a] Including unrecorded shipments to Sabah and West Malaysia and Singapore.

[b] Including recorded shipments to Sabah.

Statement II

GROSS EXPORTS OF COCONUT OIL FROM ECAFE AND OTHER REGIONS, 1956-1967

(Thousands of metric tons)

Area	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*	*1966 Jan-Jun*	*1967 Jan-Jun*
Asia	306.2	259.0	201.8	179.5	163.7	233.1	303.3	336.9	376.0	362.5	433.9	189.4	153.7
Ceylon	86.3	54.9	45.0	70.5	56.4	93.3	103.8	82.4	119.4	88.3	73.8	29.5	29.4
Hong Kong	0.4	1.6	1.2	0.3	0.1	0.5	0.2	—	—	0.1	0.1	0.1	0.2
West Malaysia and Singapore	106.0	102.8	69.6	39.9	41.3	58.1	42.2	37.2	21.6	27.5	42.4	20.5	19.5
Philippines	108.9	94.5	83.5	65.4	60.1	74.1	151.3	212.6	233.1	241.4	313.2	138.0	102.9
Sarawak	1.4	1.5	1.5	1.4	1.6	3.2	2.0	2.1	1.6	2.0	2.8	1.1	1.3
Other Asian countries	1.0	1.7	1.0	2.0	3.0	1.0	2.0	2.5	0.3	3.2	1.6	0.2	0.4
Western Europe	50.7	64.5	60.0	42.0	63.1	42.9	61.5	47.2	40.2	43.5	43.9	24.0	23.3
Of which EEC	41.7	49.6	41.4	32.0	58.8	33.9	58.7	43.9	34.0	35.9	34.9	19.3	17.1
Eastern Europe, including the USSR	—	—	—	—	—	—	—	—	—	—	—	—	—
America	4.5	4.6	3.0	3.7	3.3	2.4	2.2	4.0	5.4	5.4	6.0	2.6	7.5
Africa	10.8	14.6	9.9	5.8	5.4	6.2	7.3	13.5	13.6	10.3	6.8	3.2	4.1
Oceania	34.8	37.9	47.0	42.9	36.5	44.2	36.7	40.1	49.7	40.1	34.9	15.4	16.8
World total	407.0	380.6	321.7	273.9	271.9	328.7	412.8	441.8	484.9	461.8	525.5	234.6	205.4
Of which ECAFE region	306.2	259.0	201.8	179.5	163.7	233.1	303.3	336.9	376.0	362.5	433.9	189.4	153.7

Source: FAO, *Coconut Situation*, several issues.

Statement III

Gross imports of copra into ECAFE and other regions, 1956-1967

(Thousands of metric tons)

Area	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*	*1966 Jan-Jun*	*1967 Jan-Jun*
Asia													
Burma	1.7	3.9	2.8	3.4	4.2	5.0	4.8	3.7	0.1	—	—	—	—
China, mainland	37.0	24.8	11.1	6.4	2.4	24.4	17.6	6.0	9.0	...	...	...	...
Hong Kong	—	—	0.4	—	—	—	0.3	—	0.9	1.6	10.9	0.5	—
India	87.9	127.3	101.1	91.4	99.4	88.5	91.8	85.4	74.9	48.7	33.8	20.5	10.7
Japan	40.7	45.9	47.8	54.7	85.3	80.4	88.5	108.3	85.6	94.2	107.6	54.0	49.8
Pakistan	2.1	0.1	0.3	1.1	1.7	3.5	3.4	3.0	4.8	3.5	0.4	0.2	0.1
Sabah	43.6	48.9	55.5	46.5	65.5	50.0	28.8	22.5	14.2	9.9	10.5	4.5	1.3
West Malaysia and Singapore	123.8	191.4	146.9	94.1	120.4	127.3	83.8	63.5	22.4	25.7	27.4	14.4	10.1
Other Asian countries	7.4	8.0	5.0	8.0	7.2	9.4	14.1	10.5	7.0	6.6	8.6	2.1	3.2
Total above	344.2	450.3	370.9	305.7	382.6	388.5	333.1	302.9	218.9	198.2	203.2	101.7	80.6
Iraq	0.6	2.4	1.4	1.6	3.6	3.2	4.1	2.0	1.2	0.4	...	...	...
Israel	10.7	14.8	9.0	2.2	4.8	9.0	3.8	3.8	5.7	5.8	6.5	...	...
Total Asia	355.5	467.5	381.3	309.5	391.0	400.7	341.0	308.7	225.8	204.4	209.7	101.7	80.6
Western Europe	884.9	1,038.2	759.9	542.8	826.6	882.7	708.0	764.8	803.3	767.7	865.3	463.2	412.2
Of which EEC	569.9	683.7	474.2	321.8	535.6	574.6	484.6	510.5	571.1	531.5	618.9	321.9	302.6
Eastern Europe, including the USSR	4.5	3.6	4.5	6.5	—	24.5	20.4	22.3	17.0	14.0	15.0	5.0	5.0
America	421.2	404.4	383.4	400.4	441.6	434.5	418.5	303.8	327.0	342.0	316.5	147.6	142.8
Of which the United States	303.0	292.4	272.7	320.1	353.8	349.6	324.2	236.3	248.3	278.9	243.3	119.1	123.6
Africa	5.1	3.6	4.2	4.1	4.0	4.4	3.7	1.8	2.0	1.5	1.5	1.3	1.1
Oceania[a]	37.7	46.3	36.6	35.5	35.7	36.3	37.1	39.7	35.7	32.5	37.2	15.6	16.4
Of which Australia	36.0	43.1	36.0	32.3	31.5	32.1	32.7	36.4	32.6	28.9	34.0	14.3	13.7
World total	1,709.9	1,963.6	1,565.4	1,298.8	1,698.9	1,783.1	1,528.7	1,441.1	1,410.8	1,362.1	1,445.2	134.4	658.1
Of which ECAFE	381.9	496.6	407.5	341.2	418.3	424.8	370.2	342.6	254.6	230.7	240.4	117.3	97.0

Source: FAO, *Coconut Situation*, several issues.

[a] Comprising Australia and New Zealand.

Statement IV

GROSS IMPORTS OF COCONUT OIL INTO ECAFE AND OTHER REGIONS: 1956-1967

(Thousands of metric tons)

Area	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*	*1966 Jan-Jun*	*1967 Jan-Jun*
Asia													
Burma	39.1	56.3	30.1	24.9	27.6	44.3	43.2	41.1	49.8	41.5	33.3	15.8	19.3
China, mainland	5.5	19.4	5.3	5.5	2.7	4.2	6.1	2.7	8.8	7.6	0.5	0.1	2.0
Hong Kong	0.5	6.6	3.8	3.2	3.9	13.2	12.8	15.0	15.0	12.0	8.0	2.5	5.0
West Malaysia and Singapore	1.6	2.9	1.9	0.9	1.0	1.9	0.9	0.7	0.7	0.5	0.7	0.2	0.2
India	1.2	1.2	1.0	1.9	2.9	3.0	1.8	2.2	2.7	3.2	2.3	0.8	1.1
Pakistan	20.1	17.5	7.3	2.8	1.0	—	3.1	2.6	0.1	—	—	—	—
Sabah	4.3	3.2	6.2	4.7	9.2	14.3	13.1	12.7	17.3	11.7	15.7	9.0	7.7
Iraq	—	0.1	—	0.2	0.3	0.2	0.1	0.1	0.1	—	0.1	0.1	0.1
Other Asian countries	0.9	0.6	0.5	0.7	0.5	0.4	0.2	0.1	0.1	0.5	...	...	...
Western Europe	5.0	4.8	4.1	5.0	6.0	7.1	5.1	5.0	5.0	6.0	...	...	...
Of which EEC	184.9	170.3	116.6	95.4	113.4	123.9	128.8	142.1	146.6	154.1	137.8	67.2	76.0
Eastern Europe,	(91.6)	(73.1)	(55.7)	(53.4)	(68.4)	(61.2)	(59.5)	(74.4)	(76.3)	(87.9)	(75.0)	(36.6)	(50.2)
including the USSR	23.6	27.7	21.5	14.3	12.0	13.7	31.8	18.0	33.5	17.0	24.0	11.0	10.0
Americas	111.5	106.3	126.3	114.4	95.5	108.6	157.1	193.1	205.0	206.0	260.7	170.3	178.5
Of which the United States	88.1	83.2	98.3	89.4	70.8	73.9	120.5	168.9	180.1	182.5	232.3	157.1	165.6
Africa	24.3	24.6	20.5	12.6	15.5	18.1	15.8	21.1	17.5	16.5	16.4	5.4	4.8
Oceania	—	0.2	—	0.4	0.5	0.1	0.4	0.9	0.6	—	1.1	0.7	0.4
World total	383.4	385.4	315.0	261.8	264.5	308.7	377.1	416.3	453.0	435.1	473.3	270.4	289.0
Of which ECAFE	38.2	55.7	29.6	24.2	27.1	43.9	43.0	41.0	49.7	41.0	33.3	15.8	19.3

Source: FAO, *Coconut Situation,* several issues.

Statement V

PHILIPPINES: COPRA EXPORTS, BY DESTINATION, 1956-1966

(Thousands of metric tons)

Country or area	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*
United States	297.2	295.0	267.8	314.2	364.5	354.1	272.8	263.0	247.6	261.0	261.9
Western Europe	557.9	573.7	400.5	261.9	589.6	536.1	551.1	630.5	547.7	531.6	571.5
Other countries[a]	151.2	168.6	110.8	93.3	114.3	64.7	55.9	62.4	57.2	66.6	75.4
Total	1,006.3[b]	1,037.3[b]	779.1[b]	669.4	1,068.4	954.9	879.8	956.0	852.5	859.2	908.8

[a] Including ECAFE countries.

[b] Including unrecorded shipments to Sabah.

Statement VI

PHILIPPINES: COCONUT OIL EXPORTS, BY DESTINATION, 1956-1966

(Thousands of metric tons)

Country or region	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*
United States	89.9	87.0	94.7	70.7	55.1	73.8	151.3	184.7	190.1	199.6	249.8
Western Europe	...	8.9	0.1	0.2	0.2	0.1	—	27.9	40.8	35.0	62.4
Other countries	19.0	—	—	—	—	—	—	—	2.3	6.8	0.9
Total	108.9	95.9	94.8	71.1	55.5	74.1	151.3	212.6	233.1	241.4	313.1

Statement VII

CEYLON: EXPORTS OF COPRA, BY DESTINATION, 1956-1966

(Thousands of metric tons)

Area	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*
Western Europe	—	—	0.5	—	—	—	0.1	—	2.0	3.4	—
Eastern Europe, including the USSR	—	—	—	—	—	0.6	1.9	—	—	7.3	5.9
America	—	—	—	—	—	—	—				
Asia											
Burma	0.5	0.1	0.1	0.4	0.9	4.9	4.8	2.7			
China, mainland	—	—	—	2.7	—	10.8	3.0	—			
India	57.2	34.4	27.1	38.6	27.0	35.8	59.2	37.8	51.5	27.0	11.1
Iran	0.1	0.3	0.1	0.2	0.1	—	—	—	0.2	0.3	0.3
Iraq	0.3	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.2
Pakistan	0.3	0.2	0.2	1.1	1.4	3.5	4.3	3.0	5.0	3.4	3.7
Africa	—	—	—	—	—	—	—	—	—	—	—
Other countries	—	0.1	0.2	0.2	—	0.2	—	—	0.2	—	—
	58.7	35.3	28.3	43.3	29.6	55.9	73.5	43.9	59.0	41.5	21.2

Source: FAO, *Coconut Situation*, several issues.

Statement VIII

CEYLON: EXPORTS OF COCONUT OIL, BY DESTINATION, 1956-1966

(Thousands of metric tons)

Area	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*
Western Europe											
Belgium and Luxembourg	—	—	—	0.4	—	—	—	—	—	—	—
France	—	—	—	0.3	0.7	1.2	1.5	1.7	0.9	0.4	—
Germany, Federal Republic of	4.7	—	2.3	12.4	—	2.0	3.5	1.4	2.6	1.9	0.7
Italy	19.6	6.7	7.9	14.5	16.4	11.2	11.5	12.8	13.6	10.6	5.9
Netherlands	10.2	3.0	5.3	8.5	5.8	5.2	6.2	5.8	4.3	2.5	2.6
Total EEC						19.6	22.7	21.7	21.4	15.4	9.2
United Kingdom	11.9	9.8	2.3	3.5	2.2	8.3	3.5	7.6	14.0	8.0	2.1
Other countries	1.7	0.2	0.5		0.4	0.1	—	1.4	1.6	1.4	0.5
Eastern Europe, including the USSR	—	1.0	1.5	4.6	2.3	7.6	18.2	12.2	26.2	20.9	31.4
Americas											
Canada	15.5	11.9	5.8	10.0	10.7	24.7	16.5	10.9	10.3	8.4	0.9
Peru	0.1	0.2	0.3	0.3	0.4	0.5		1.2	0.9	0.6	1.1
Other countries	1.3	1.9	2.3	2.5	1.9	2.1	3.2	1.1	2.1	3.0	0.9
Asia											
Burma	—	—	—	0.4	2.6	4.4	4.2	1.8	10.1	2.2	0.2
China, mainland	—	—	2.8	0.2	—	10.3	12.2	11.6	14.7	10.8	6.6
India	9.7	7.8	3.2	1.9	—	—	5.6	1.9	0.3	0.1	—
Pakistan	2.8	2.9	3.4	3.9	8.3	11.6	12.9	9.1	16.1	12.7	19.6
Saudi Arabia	0.1	0.1	0.1	0.1	0.2	0.1	—	0.2	0.1	0.2	0.3
Other countries	0.8	6.4	3.4	4.8	3.6	1.2	—	0.2	0.9	1.0	0.1
Africa											
Morocco	0.1	1.3	2.1	1.1	0.7	1.5	2.1	0.7	0.1	1.4	0.7
South Africa	0.2	0.2	0.3	0.2	0.2	0.1	0.7	0.4	0.2	1.7	—
Sudan	0.1	0.2	0.1	0.1	0.1	0.1		0.1	0.2	0.2	0.1
Other countries	2.4	1.1	1.4	0.6	0.1	—	0.1	0.1	—	0.3	0.1
Oceania	—	—	—	—	—	—		0.1	0.2	0.1	—
Other countries	—	—	—	0.1	0.2	1.0	2.0	0.1	—	0.1	—
	86.3	54.9	45.0	70.5	56.6	93.3	104.0	82.4	119.4	88.3	73.8

Source: FAO, *Coconut Situation*, several issues.

Statement IX

INDONESIA: COPRA EXPORTS, BY DESTINATION,[a] 1956-1966

(Thousands of metric tons)

Region	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*
ECAFE region	204.1	215.1	156.6	109.5	148.0	158.5	115.6	—	—	—	—
China, mainland[b]	37.0	2.8	—	2.0	—	10.3	14.0	—	—	—	—
Federation of Malaya and Singapore	118.2	181.3	142.3	89.9	116.0	118.4	80.6	—	—	—	—
Japan	33.0	15.0	0.4	3.2	4.6	7.9	11.9	—	—	—	—
North Borneo	16.5	16.0	13.9	14.0	26.1	20.4	8.7	—	—	—	—
Sarawak	—	—	—	0.4	1.3	1.5	0.4	—	—	—	—
Countries outside ECAFE region	102.6	143.6	93.3	61.8	53.5	121.9	60.6	—	—	—	—
Australia	—	—	—	—	0.2	0.7	0.5	—	—	—	—
Belgium and Luxembourg	2.5	4.6	—	1.0	—	9.2	1.5	—	—	—	—
Denmark	20.3	8.9	—	—	2.9	—	—	—	—	—	—
Finland	—	0.1	—	—	3.0	2.0	1.3	—	—	—	—
France	11.8	14.8	1.8	2.4	17.1	11.6	7.6	—	—	—	—
Germany, Federal Republic of	20.3	45.8	60.0	22.2	13.4	21.3	9.2	—	—	—	—
Italy	—	0.1	0.1	4.2	1.0	7.4	1.3	—	—	—	—
Netherlands	40.1	47.0	11.4	0.9	7.3	6.5	1.7	—	—	—	—
Norway	3.0	3.0	3.4	0.9	0.1	7.8	4.5	—	—	—	—
Sweden	3.6	19.3	13.7	22.2	2.8	9.3	7.0	—	—	—	—
Switzerland	—	—	—	—	1.3	4.6	1.0	—	—	—	—
Eastern Europe, including the USSR[b]	—	—	—	—	—	15.2	2.0	—	—	—	—
Latin America	—	—	1.9	6.4	1.5	22.3	19.0	—	—	—	—
Others	1.0	—	1.0	1.6	2.9	4.0	4.0	—	—	—	—
World total	307.3	358.7	249.9	171.3	201.5	280.4	176.2	133.1	186.1	126.6	176.4

Source: FAO, *Coconut Situation*, several issues.

[a] Derived from data on imports into specified countries from Indonesia.

[b] Derived from data on Indonesia's exports.

Chapter VI

GOVERNMENT POLICIES FOR DEVELOPMENT OF COCONUT AND COCONUT-BASED INDUSTRIES

Production and Marketing Policies

Coconut has received considerable attention in the producing countries of the region. In the area of agriculture, efforts have been directed to improvement in the quality of seeds, better farming methods, use of fertilizers, control of pests and diseases, etc. In Ceylon and the Philippines in particular, research institutes have been set up to deal with these problems. As in other agricultural products, major difficulties have been met with in introducing improved methods of cultivation in the peasant sector of coconut production. In all countries of the region peasant production is quite substantial, varying from 64 per cent in Ceylon to 99 per cent in Indonesia. In the peasant sector, the task of persuading the farmers to introduce modern methods of cultural practice has been found to be extremely difficult.

A second problem which arises from peasant farming and dispersal of production over discontiguous areas, such as in Indonesia and the Philippines, has been the problem of internal marketing of coconuts.

As pointed out earlier, the very large number of intermediaries in the internal marketing systems intercepts a larger part of the income, exceeding more than 60 per cent in case of Indonesia, for example, that originates from the exports and urban sale of coconuts. One deleterious effect of this usurpation is that the peasants' incentive to increase production is destroyed.

It has already been noted that during the last few years, despite considerable invasion of the markets by substitutes, the demand for copra and coconut oil has been quite high. Despite this high demand, the crushing mills in every country have been working at as little as half capacity, largely for want of copra. It is true that typhoons and diseases have done considerable damage to the plantations. Yet it is equally possible that the peasants have not been making good this damage and the natural mortality of coconut plants by planting new trees. The failure of the countries to increase their copra production to meet the demands of the local mills and the exporters, have resulted in considerable loss in foreign exchange earning opportunity and industrial growth of the countries.

The governments of the region have been conscious of the serious nature of this problem and have tried various policies, programmes and regulations relating to coconut and copra production and marketing. These policies and programmes are generally directed towards raising the productivity of the industry at the agricultural and industrial level, increasing the economic efficiency of the marketing system for coconuts and coconut products, developing and expanding international trade in these products, and, by and large, helping the producers to achieve higher incomes and better living standards.

In *India,* both the Central and state Governments giving more and more attention to expanding production on a short-term as well as a long-term basis.[1] Short-term measures place emphasis on improving the yield from existing plantations by popularizing improved methods of coconut cultivation among growers through arranging, large-scale demonstrations of package programmes and making available the necessary production inputs in sufficient quantities and in time. Prophylactic and control measures against pests and diseases and provision of irrigation facilities are also receiving adequate attention. Fertilizer subsidies are extended to coconut growers by certain states, but only on a small scale. Production of quality coconut seedlings on a larger scale is presently receiving very great attention and large numbers of nurseries are being raised under government auspices. The current target of production is 4,000,000 seedlings annually, sufficient to plant about 20,000 hectares, mostly for underplanting in existing farms. Credit facilities on easy terms will be extended to cultivators by the Government and banking institutions. Coconut research is being promoted on an increasing scale, to solve local problems in the important growing states. Steps have been initiated to modernize the industrialization of the coconut industry.

In the *Philippines,* the policies and programmes touch on the development of the coconut industry, with particular emphasis on the development of high-yielding varieties of coconuts, improvement of the quality of copra produced, control of pests and diseases of coconut, particularly "cadang-cadang", industrialization and by-product utilization, basic and applied research, and assistance to farmers.[2] The establishment of the Philippine Coconut Administration (PHILCOA) in 1954,

[1] Government of India, *Country Study on Coconuts.*

[2] Mariano P. Ramiro, Philippines: *Study on Regional Plant Harmonization of the Coconut Industry* (March 1968).

with the passage of Republic Act No. 1145, ushered in the period of policy-making for the coconut industry in the Philippines. This government corporation was given wide authority to recommend legislation and implement policies covering all economic aspects of the industry. The corporation pressed successfully for the passage of the Moisture Meter Law (Republic Act No. 1365) in 1955, which required buyers of copra to use moisture meters for determining the percentage of moisture content in copra. It was hoped that the introduction of a premium for copra with a low moisture content would serve as an incentive for the production of higher grade copra. Over the decade 1955-65, policies of this corporation concentrated on five major problem areas: low quality of copra, exploitation by middlemen, the need to industrialize the coconut industry, by-product utilization, and control of the cadang-cadang disease. In 1966 it announced a four-year development plan for the industry with the primary object of establishing and operating coconut seedling nurseries to provide free seedlings of high quality to replace average trees.

One of the most original and potentially effective measures, which is worthy of emulation in other copra producing countries, was the Philcoa decision to set up copra bonded terminals (COBONTER), at strategic ports with subsidiary collecting centres spread all over the producing areas, with the objectives stated below:

(a) To reduce costs of copra storage, handling and loading through centralization and mechanization, by constructing a loading terminal and warehouse complexes where mechanized handling operations would reduce the cost of handling and loading copra;

(b) To establish a more effective system of copra grading and inspection including laboratory examination of copra samples at the terminal sites;

(c) To provide centres of trade and information.

The whole point was to make copra "bankable" in the same manner as sugar and rice to enable the Government and planters to break through the control of aliens and powerful intermediaries now operating warehouses for coconut products.

Early in 1965, the Government passed an amendment to R-A 1145 by virtue of which it transferred the authority to promote, organize and supervise agro-industrial coconut co-operatives from the Agricultural Credit Administration (ACA) to Philcoa. This is designed to create a new type of co-operative which will engage in both domestic and foreign trade in coconut products and by-products with the objective of placing full control of the coconut industry in the hands of local and not alien businessmen.

Philcoa was authorised to prepare articles of incorporation, by-laws, regulatory procedures, marketing agreements, economic survey reports, and other documents needed to help the coconut planters and processors to organize themselves into co-operatives. The objectives of such co-operative organizations are:

(a) To encourage the commercial development of coconut and by-products through co-operatives;

(b) To establish strong and big co-operatives capable of handling exportation of copra, oil and other by-products;

(c) To increase the share of Philippine nationals in the coconut industry through direct Philippine participation in coconut trade;

(d) A wide distribution of profits of the industry among coconut farmers, especially small farmers.

The Government has appreciated that the central problem of the coconut industry in the Philippines is that coconut producers do not get as much money as people in other branches of the industry such as traders, processors and exporters. In order to reduce the middlemen's transactions between coconut farmers as producers and the ultimate buyer of coconut and coconut products, in both the domestic and foreign markets, several efforts have been made. For example, the Government passed R-A 4403, which seeks to promote the co-operative way of life in the coconut provinces. The principle objective of the new law is to help coconut planters and copra processors to organize themselves to get greater control in the marketing of their produce and to help these to obtain more credit facilities and greater participation in the income of the coconut industry. Under R-A 2282, the coconut planters can borrow from the Development Bank of the Philippines and use the loan for buying capital goods at the low rate of 2 per cent. This credit is intended to provide for the cost of acquiring fixed assets, such as processing machinery and plant sites, and acquiring other facilities. It also provides sufficient initial working capital to cover the cost of raw material supplies and other operational expenses.

The large number of middlemen is partly a reflection of the existence of disguised unemployment in the developing countries. It is difficult, therefore, to eliminate them entirely so long as employment opportunities are not created in sufficient number. Nevertheless, it is necessary to initiate measures aimed at improving the efficiency of the marketing system so that producers get a better deal and exporters and domestic manufacturers get a regular supply of quality products. With a large number of small dealers, it is extremely difficult to put the marketing chain into any

organized shape and bring order into its operation. Large-scale co-operatives organizations of producers are a step in the right direction which, if properly developed, can not only improve marketing, but act as an agent for spreading modernization ideas into the peasant sector. The success of the co-operatives depends to a large extent not only on able and honest management but also on the availability of credit, improvement in internal transport, warehousing, better trading facilities, and the introduction of an efficient system of grading.

The establishment recently of the Philippine Coconut Research Institute is another major step taken by the Government to intensify research activities relating to coconuts. The enactment of the new agricultural Land Reform Code might indirectly affect the increase in area planted to coconuts, since coconut farms are not included in the size limitations imposed by the Code on crop lands. The Special Financing Plan for Coconuts of the Development Bank of the Philippines is an effort to assist the coconut farmers in their needs for capital.

The development strategy for the coconut industry in Ceylon is to concentrate on two elements: (1) a programme to maximize output from existing capacities, including more intensive land use and the optimum extraction of coconut oil; and (2) a programme for further industrial processing of coconut products.[3]

The Government of Ceylon, in an effort to increase coconut production as well as to improve the conditions of coconut land generally, inaugurated a coconut rehabilitation scheme in 1956 consisting of two parts: (a) improving the yields of coconut lands by the application of fertilizers (fertilizers are issued at subsidized prices to owners of coconut lands—subsidy of one-third the cost of fertilizer for owners of coconut lands of 20 acres and over in size, and one-half the cost of fertilizer to smallholders); and (b) filling vacancies in planted areas, and replanting low-yielding palms and areas with senile palms with selected high-yielding varieties of coconut seedlings (for this purpose the Ceylon Coconut Research Institute raises nurseries of high-grade seedlings which cost about 85 cents to raise but are sold at the subsidized price of 25 cents each). While the fertilizers and coconut seedlings are being issued at subsidized prices, there does not now exist any arrangement or scheme for providing credit facilities to owners of coconut lands to finance the cost of these supplies. However, an official committee has recommended a scheme for provision of credit through the two national banks to finance the purchase of fertilizers at subsidized prices.

[3] Ceylon: *Country Study on Coconuts*, July 1968, pp. 18-25.

In order to organize the marketing and export of coconut products, a government-sponsored organization called the Ceylon Coconut Board was established in 1953. The main responsibilities of this Board under the law are to assist the producers to market their products abroad, to regulate such exports through a system of licencing and at the same time to ensure the quality of such products. The Board does not concern itself with the actual export of these products or with such matters as regulating prices or entering into contracts for supplies, which are the concern of the exporters themselves.

With a view to promoting accelerated economic growth, the Government provides a wide range of incentives and concessions under the Ceylon income tax system to investors in industry and agriculture. These incentives and concessions, which are common to all agricultural enterprises, are available to those engaged in coconut cultivation as well, and include deductions, allowances or exemptions and subsidies.

It has been the Government's policy to discourage the export of copra and fresh nuts and to promote the export of oil and desiccated coconut by levying preferential export duties. This is for the reason that the manufacture and export of coconut oil creates employment in the country and a high duty on poonac (oil cake) helps to retain within the country a valuable source of cattle feed. The export duties payable on these products are fixed every week on the basis of the prevailing market prices in London for coconut oil. The duties move directly with the prices; that is, when prices fall, low duties are levied to provide relief to the exporters, and conversely, when prices rise in the export market the duties are also raised to discourage the export of large quantities of copra, thereby providing adequate quantities for the local millers as well as to siphon off excess income accruing to the producers.

For some time Ceylon has been exploring ways and means of reshaping its agricultural pattern and in this respect coconut looms large as providing suitable land which would lend itself to additional farming of a mixed nature. These considerations led the Government a few years back to appoint a sub-committee to investigate and report on the feasibility of growing additional crops within coconut lands. The Government is at present also examining the possibilities of developing the oil palm as an alternative source of vegetable oil. This palm has been grown in Ceylon but has still not been established on a commercial basis. The Government has decided to sponsor two pilot projects in the private sector, which will initially bring about 4,000 acres under oil palm. The present subsidy granted for replanting of rubber will be offered to planters who are prepared to replace rubber with oil palm in land which is due for replanting.

In *Indonesia,* till the outbreak of the second World War, the farmers used to sell their copra to the village agents of big exporting firms, who were mostly Dutch or Chinese. These big firms used to exercise their control over the coconut producers by making advance payments and supplying equipment and daily necessities, such as sugar, textiles, dried fish, etc. through their regional collectors and village agents. Since there were no recognized grades of quality, a lack of uniformity in weights and measures, extremely poor transport and few buying agents, the producers used to be squeezed to their limit by the buyer financing system, in which the borrowing cultivator had to commit himself, well in advance of harvest, to sell his crop to the lending buyer at an agreed price. Debts were paid on delivery of the copra including a fine if the agreed quantities were not fulfilled, which often they could not be because growers had to promise larger quantities to get higher loans. Imposition of fines used to be a normal procedure and the ultimate take-over of the cultivators' coconut growers in lieu of payment of debts followed as a normal consequence.

Even this kind of domestic trade collapsed during the second World War. After the war, a new organization known as the Fond was created to deal with the coconut trade. The Fond revived the old system of collection by middlemen created under the pre-war Netherlands rule. Though the Fond succeeded in taking the trade from the hands of the Netherlands commercial houses, it had to be financed by foreign aid which originated in the Marshall Plan in Europe and was channelled through the Netherlands to Indonesia. With this money the Fond supplied its buying agents and middlemen with textiles, rice and sugar to be bartered for copra. The freedom of action of the Fond was actually threatened after the surrender of sovereignty by the Netherlands Government to the Indonesian Government in 1949. Voices were raised against the Fond for its alleged exploitation of the farmers and the Government was obliged to form a Committee on Copra. The Committee came to the conclusion that government participation was necessary to serve the interest of the farmers. The Fond was therefore liquidated to yield place to the Copra Foundation in 1950. The activities of the Copra Foundation, known as Japop, were aimed at increasing the share of Indonesian copra in the world market, developing the coconut industry, rationalizing the internal copra trade and finally assisting the co-operative movement among the farmers to help them to improve their own lot.

Among the achievements of the Copra Foundation were the maintenance of Bitung port, the purchase of coasters and establishment of a desiccated coconut factory in Sukar (Macassar) in 1953. But conflicting regional claims and the Government's failure to satisfy all, led to liquidation of the Copra Foundation in 1957. Its place was taken by the Copra Co-operative of Indonesia (IKKI), a semi-governmental agency.

Among other objectives, IKKI was supposed to improve copra processing and operate co-operative purchasing centres, but its purchasing capacity was limited because of lack of finance and other facilities. The Government attempted to solve this problem by establishing a new Government-owned trading firm (Central Trading Company) with the monopoly of copra purchase and the supply of badly needed daily necessities to the cultivator. In fact IKKI became a national semi-governmental agency in charge of collecting copra, inter-insular copra trade and exports. The collecting was assigned to the regional foundations, while state trading corporations performed the function of exporting copra on its behalf. The prominent role of state trading corporations, supported by huge government credit, was terminated by the present Government. The present Government is treating private and state trading corporations as equal partners, and it has withdrawn the special credit facilities which were granted to the state trading corporations.

The important new policies affecting the copra trade are those which pertain to the allocation of the copra trade to merchants in possession of government recognition or permits, the quantitative targets periodically set by the Government for inter-insular and export trade based on the proposals of the governors of the copra producing regions, the guarantee that farmers should receive at least 60 per cent of the "port-godown" prices of copra, the authority given to the governors of the copra producing regions to levy a maximum of 10 per cent tax of the "port-godown" prices to be used for regional economic development purposes, and the establishment of a *Badan Koordinasi Kopra* (Copra Co-ordination Agency) at the provincial level which will take charge of co-ordinating and implementing government copra policy as well as the co-ordination of replanting, expansion of trade and improvement of quality of copra.[4]

In the efforts to increase the output and productivity of coconut in Indonesia, the Government's policies are directed to (a) increasing the potential production of the coconut trees, and (b) encouraging the farmers to increase production from existing trees, to undertake replanting and to increase new planting of coconut trees.[5] The coconut plantation rehabilitation programme is being given much attention by the Government, especially by the Department of Agriculture. The M.P.R.S. Decision No. 11 of 1960

[4] J. Panglaykim, *Some notes on the Indonesian Coconut Situation,* April 1968.

[5] Arsjad Anwar and Moh. Sisman (co-ordinators), *Country Study on Coconut and Other Oil Seeds (Indonesia),* pp. 19-25.

showed this concern when it was decided that in the first phase of the national over-all development plan (1961-1968), the rehabilitation and stabilization of coconut covering 800,000 ha and the replanting and new planting of 160,000 ha should be done. To stimulate coconut farmers to increase replanting, the Government plans to give a premium as an incentive (the amount of the premium depending on the grade of the plantation), and to supply high-grade seeds. Government policy is also aimed at improving the marketing of copra, as a means of improving the existing productive capacity, including the formation of copra co-operatives at various levels of organization.

A bilateral agreement was signed by the Philippines and Indonesia on 24 September 1963 at Manila, on the initiative of the Philippines, to improve the market position of their products, especially copra, in the world market. There was a growing feeling among officers of both the countries that by joining hands they would be able to counteract the arbitrary price dictation from big cartels in the coconut consuming countries. This aspect of the world coconut trade has been raised time and again in the international conferences since 1955 by the coconut producing countries but so far no satisfactory solution of the problem has been in sight. The agreement between the two major producing countries proposed the establishment of a Philippine-Indonesia Coconut Commission with the objectives among others of controlling quality for copra, accelerating industrialization of the coconut and coconut by-products, creating a Joint Coconut Bank to finance such industrialization, and finally providing mutual assistance in the marketing of coconut and coconut by-products. However, serious opposition was created against the trans-shipment of Indonesian copra through the Philippines on the plea that Indonesian crop might replace Philippine copra in the high and preferential market enjoyed by Philippine copra. As the price of trans-shipment of Indonesian copra through the Philippines, it was proposed that Indonesia should buy Philippine manufactured goods equivalent to 70 per cent of the dollar value of the proceeds of the Indonesian copra sold. It appears that the Agreement between the two countries is at present inoperative.

As a means to arrest the declining trend of the area under coconut and the average yields per acre, the Government of *Malaysia* has introduced a Coconut Replanting and Rehabilitation Scheme for small holders in selected areas of the country.[6] The main object of the Replanting Scheme is to improve the economic position of the coconut small holders by making coconut cultivation more lucrative and net income per acre from coconuts comparable to the other crops in the country. The Replanting and Rehabilitation Scheme aims at assisting small holders in the selected areas to replant or rehabilitate their coconut holdings and thus improve production from the crop. Under the Scheme, the coconut lands will be intensively cultivated as specified inter-crops will be planted between the rows of coconut palms.

Under the Replanting Programme each participating small holder receives a total subsidy of M$500 per acre spread over four years. Under the Rehabilitation Programme, participants receive a subsidy of M$300 per acre made in three installments. In both programmes the first installment is the largest as more of the work has to be completed in the first year.

It is emphasized that subsidies for replanting and rehabilitation are not all paid in cash. There are both subsidies in kind and in cash. Subsidies take the form of supplies of fertilizers, planting materials including the coconut seedlings and the recommended inter-crops, etc. The cash subsidies are paid only on the completion of the prescribed cultivation practices after the work in the coconut area has been inspected and certified as satisfactory.

Industrial Development Policies

Though Asia accounts for more than 81 per cent of world's production of copra, its share in coconut oil production is less than 50 per cent. In the production of margarine, soap, glycerine and other products which require further processing, the output of the coconut producing countries in Asia is almost insignificant. One of the major difficulties preventing the development of the processing industries in these countries has been the heavy import duty imposed by the developed countries. As shown in chapter I, when computed on a value added basis the import duty exceeds 100 per cent or more, and rises progressively with the degree of processing.[7] The market of the developed countries are, therefore, almost closed to the processing industries in this region except where a small opening has been permitted by some kind of preferential arrangement. The domestic markets of the individual countries are also limited by the low income of the mass of the population. The upper income groups which use margarine, shortening and hydrogenated oil are extremely small in any single country to permit these industries to operate on an economic scale. The domestic demand for industrial uses is also limited by the absence of a sufficiently large and broad-based industrial structure within the frontiers of any single country. The third limitation arises from the absence of know-how and capital in these countries. Government policies in the region

[6] Country Study of the Coconut Industry of Malaysia.

[7] See Introduction, p. 2.

have been directed by and large to meet the last difficulty. Some success has also been achieved in arriving at special arrangements with developed and centrally planned countries for export of coconut oil and some processed products. No effort, however, has been made to remove the second limitation, namely, to increase the size of the domestic market by setting up some regional arrangement.

To remove the difficulties of capital shortage and absence of know-how the major policy objective has been to invite foreign enterprises to establish processing plants in the countries. In the Philippines this policy has led to the establishment of a number of foreign-owned enterprises in the country. However, with the growth of national business enterprises, this policy has been facing increasing opposition within the country. In Ceylon and to some extent in the Philippines, an alternative has been sought in the creation of public enterprises to undertake these new and somewhat risky ventures which indigenous capital fought shy of entering.[8]

It should be noted that no concerted effort by the coconut producing countries has been made in any international forum to reduce tariffs and other trade barriers in the developed countries, except in the second UNCTAD Conference, where a broad general case was made for all manufactures of all developing countries. Individual efforts have been made in a number of international forums, such as GATT and the FAO Study Group on Oils and Fats, on behalf of coconut and oil palm products without any success. There is an urgent need for the coconut exporting countries to present a joint front to the developed countries for reduction of the 100 per cent effective tariffs and for special arrangements to set up processing industries in the coconut producing countries.

Much greater reliance needs to be placed, however, in developing regional markets by special arrangement among the producing countries themselves, so that adequate support is provided for the newly established processing industries in the region. In order to do this successfully, it is necessary to develop a scheme of specialization and market sharing arrangements so that the benefits are distributed equally among the participating countries. It is only on the basis of equal benefit to each of the member countries that any such regional arrangement will become acceptable and operative.

[8] For details see section 3 of this chapter.

Chapter VII

THE THREAT OF SUBSTITUTION TO THE COCONUT INDUSTRY

Of the total world trade in oils and fats coconut oil occupies only 5.4 to 6 per cent. The rest of the supplies come from soft oils (e.g. from soyabean, groundnut, cotton seed), animal fats (e.g. from hogs, sheep, cattle), marine oils (e.g. from whales, sharks) and lastly industrial oil (e.g. largely petrochemicals based). Coconut oil has two principal uses. Coconut oil as an ingredient of food is facing serious competition from soyabean and cotton seed oils, and also of late from tasteless fish oil, which are being used for the manufacture of margarine and shortening. The second main use of coconut oil arises from its lauric acid content an ingredient for toiletry products—but here again it is facing competition from palm kernel oil from Africa and babassu oil from Brazil, and also from synthetics.

The price of coconut oil produced by a single country fluctuates with the world price, which again fluctuates with the general market trends for fats and oils. There is a large market consisting of many potentially substitutable products mentioned above, and on the demand side coconut oil is subject to fluctuations of the prices of hogs and butter. Even if it was possible to have a competitive world market the position of coconut oil would have remained extremely vulnerable because of competition from both natural and synthetic sources.

Almost 50 per cent of the world's total coconut oil exports originates in the Philippines. Coconut oil exports from the Philippines to the United States represented 96 per cent of total exports in a five-year average (1958-62). The preferential treatment of Philippine oil in the United States market is scheduled to expire by 1974. In the past the United States has always preferred to import oil rather than copra because, unlike Europe, it has an ample supply of animal feedstuffs and has little use for the by-products of copra. But the United States market for coconut oil has been subject to continuous invasion by coconut oil substitutes since the second World War. The relative costs of substitutes such as soyabean, cotton seed, sunflower seed and corn oil make them cheaper for the United States market though not for the European market. To the extent that petroleum-based derivatives have replaced coconut oil in the manufacture of synthetic detergents, United States technological superiority will be a continuous threat to coconut oil in future.

The trend in United States coconut oil consumption has shifted in recent years to industrial uses as a raw material in the manufacture of quick-lathering soaps, synthetic rubber, hydraulic brake fluids for aeroplanes, synthetic resins, plasticizers, insecticides and germicides. While the main food uses of coconut oil alone are in confectionary and bakery products, it appears that even the level of consumption here was sustained by two outstanding factors contributing to an increase in domestic consumption of coconut oil in the United States from 1959 to 1964 which no longer hold true today. The first was the relatively low stable price level and the second was the liquidation by the General Service Administration of a 266 million pound stockpile of coconut oil.

It is true that while throughout the 1950-65 period the percentage of total Philippine copra exports to the United States fell almost continuously from 50 per cent in the early 1950s to below 30 per cent in the mid-1960s.

European markets took increasingly large amounts of the Philippines' copra exports. By the middle of the 1950s Europe had replaced the United States as the major market for Philippine copra and by 1965 was importing twice as much as the United States. But this market is also going to be lost with the coming into force of the EEC proposal to apply 5 per cent *ad valorem* taxes to crude coconut oil and 10-15 per cent to refined coconut oil. The proposal is intended to protect and subsidize the dairy industries of the member countries, which have a surplus production of butter fats, and at the same time to give a premium to the member African countries' exports to EEC.

The general structure of world demand for coconut oil has been subject to recent invasion by synthetics. The industrial uses in the United States and Canada of coconut oil, other than for soap, represented a large and growing segment of world import demand. This constituted an import value (f.o.b. Philippines) of about $45 million in 1965. The major non-food use of coconut oil other than for soap is for synthetic detergents, and this constitutes 76 per cent of the total consumption in the United States and 83 per cent in Canada. A large part of the industrial usage of coconut oil is in the manufacture of fatty acids and fatty alcohols which are ingredients of detergents. Most of the industrial uses of coconut oil have recently become vulnerable to replacement by synthetic raw materials

because of lower price differentials enjoyed by synthetics compared to coconut oil-based detergents. Five plants for the production of synthetic fatty alcohols have already been built or are under construction in the United States, with an estimated total capacity of 150,000 metric tons per year. The production of fatty acids is expected to begin within a few years. Exporters in the ECAFE region will soon suffer from loss of demand for the two main remaining uses of coconut oil derivatives. An FAO report submitted by the Study Group on Oils and Fats on 26 September 1966 estimates that these will be a 30 per cent decrease in all uses, e.g. surface active agents, detergents, textiles, cosmetics, leather, surface coatings, rubber chemicals, oil additives, metal working compounds and plastics by 1970, and the total is likely to be further depressed to 50 per cent in 1975.[1]

Coconut oil and copra prices have varied considerably since the second World War, but the trend has generally been downward. The postwar high of 26.3 cents per pound of oil (annual average price) was registered in 1948 and the postwar low of 10.8 cents in 1962. Prices between 1961 and 1964 were fairly stable, averaging about 11.4 cents per pound. The coconut oil price during 1964 averaged 12.4 cents per pound, slightly above the 1963 level of 118 cents per pound because of a contraction in world supply. Since then it has been steady on the high side. But there are grave reasons, as will be explained later, why it would not be prudent for the exporting countries to sit back happily and enjoy their prosperity.

It is also pertinent to inquire to what extent the present high price of copra and coconut oil can be explained in terms of inflationary pressures in the economies of importing countries because of the Viet-Nam war and to what extent such high earnings have been eroded by high prices of imported capital and manufactured goods from the West. The terms of trade have been deteriorating in absolute terms since the volume of exports has little positive correlation with export earnings. In a few cases there are signs of a negative correlation, confirming the gloomy prognostications of M.K. Atallah.[2] Further, all empirical evidence collected by UNCTAD and GATT so far point to the soundness of the 1958 GATT annual report (p. 52) to the effect that "technological changes so far have been mostly unfavourable to the demand for primary products, mainly because the impact of newly invented synthetic materials seems to exceed substantially that of new uses of minerals and other primary goods."

The capacity to import of the primary goods exporting countries is determined chiefly by their export earnings since exports are the major foreign exchange earners in their balance of payments. Hence it follows that as most of them do not manufacture significant amounts of capital goods, their rate of domestic capital formation hinges on their export-based capacity to import.[3] A study of the ECAFE primary producing countries (ECAFE, annual *Economic Survey* 1957) reveals that in most countries fluctuations in export-based capacity to import were attributable more to changes in the terms of trade than to variations in export volume. This is confirmed by the export figures of recent times. There have been substantial changes in the capacity to import of the ECAFE countries since 1958, largely because of the massive entry of foreign aid and loans; the bulk of imports to these countries thereafter were largely aid-financed till 1965, and thus the countries did not feel the rigors of their unfavourable terms of trade. But today the situation has changed and the inflow of aid and loans into this region has been drastically reduced.

If we consider with the above basic fact the policy implications of the developed countries, their entrenched position as regards their demand for processed oil becomes much more formidable and the arguments for regional co-operation come into clearer perspective. It is clear their policy of price supports and other national policy measures for competing edible fats and oils will continue to lead to serious problems for the exporters of coconut oil. There is at present in many developed countries tariff discrimination against semi-processed products such as coconut oil in favour of the raw material, copra. This is directly retarding industrial development in the developing countries with a coconut processing industry, and has been adversely affecting their foreign exchange earnings. For example, oil crushed and traded with EEC has a tariff advantage over oil imported from non-associated producing countries. Under the present plans, this advantage will progressively increase. If recent proposals made by EEC materialize the Associated African States will have a guaranteed position in the EEC market. The policy trend in the United States seems also to be equally unfavourable to the region. Under the Laurel-Langley trade agreement, Philippine coconut oil exports to the United States were reduced from 200,000 tons to 160,000 tons in 1963. They were further reduced to 120,000 tons in 1964 and further reductions will continue till 1974 when all exports will be subject to duty.

[1] FAO: *Survey of US and Canadian Non-Food Uses of Coconut oil,* September 1966.

[2] See *The Long-term Movement of the Terms of Trade Between Agricultural and Industrial Products,* Netherlands Economic Institute, Rotterdam, 1958.

[3] The "capacity to import" is distinguished here from "the export-based capacity to import" since most of the developing countries are by now disillusioned with the other possible supplementary sources of imports, which include capital inflows, aid, profit remittances and other invisibles. Trade and not aid is now seen by them as the only way out.

As regards tariffs on oil seeds and their products, the FAO study mentioned above comes to two broad conclusions. Each oil importing country, without exception, imposes tariffs which protect the domestic crushing industry from competition from imports of oils, i.e. the structure of import duties favours imports of the unprocessed product. In general the level of the tariff appears to be somewhere around the value added by processing. In a number of cases, a higher duty is levied on refined rather than on crude oil. The second conclusion is that the protective duty incorporates a preference which must have a strong influence on the geographical pattern of trade. The United Kingdom and Canadian tariffs, for instance, give duty-free entry to Commonwealth products, while the proposed EEC common tariff will not be imposed on imports from the Associated States. Similarly, the United States grants a preference through the duty-free quota of imports from the Philippines. The parity provisions of the constitution of the Philippines and the non-discrimination clause of the Laurel-Langley Agreement make reciprocal granting of business privileges to giant American corporations compulsory although this arrangement is due to come to an end as from the end of 1973. It is apparent that these preference schedules are dovetailed to the national interests of the developed rather than the producing countries. Hence the industrialization policy of the developing countries has been put into reverse gear.

It may be wondered why statistics showing recent trends do not substantiate even remotely the reality of this threat. Even the projections of demand sounds an optimistic note about the future demand for coconut oil within the ECAFE region as well as in countries outside the ECAFE region, which it indicates will tend to expand. This projection is further corroborated by the fact that the price recovery in copra trade starting in the last quarter of 1962 has been fairly well maintained since then and the trend from August 1963 to early 1964 averaged about 12 per cent above the yearly average of 1962, with a complete absence of price fluctuations. It may also be argued that coconut oil in the United States market has consistently been sold at a higher price than soyabean oil, unedible tallow and marine oil. In 1964, the price premium for crude coconut oil averaged 3 cents per pound above tallow and marine oil.

The above empirical evidence might seem formidable against the argument that the trade is threatened, but it can be plausibly explained in terms of the following factors. The evidence shows that copra and coconut oil have been enjoying a sort of inelastic demand because of the oils specific industrial use through it has been losing its field as edible oil in markets outside the region. Such specificity, causing inelasticity in demand resulting from industrial spurts in the West in recent years, is vulnerable to technological progress, which is not incorporated in projections of future demand reflected adequately in past prices and quantities. As soon as there is a technological breakthrough in producing petrochemical-based detergents comparable in quality with those based on coconut, the market for coconut oil in the industrial fields will be lost. The following facts about coconut oil markets in the developed countries are recorded as support for the above prognostication.

Coconut oil has less tendency to become rancid than other oils, has a high melting point (75° F.) and contains more than 40 per cent solids at 50°F. Its lauric acid content, necessary to produce the lathering quality of soap and shampoo, has helped in the past to sustain a high level of demand. Coconut oil also contains glycerine, a substance used for the manufacture of explosives, explaining the phenomenal rise in demand during the First World War and the huge investment in the coconut industry in the Philippines.

The copra oil pressing plants in the West have been further processing the oil into fatty acids and fatty alcohols for the use of chemical and industrial operators. In recent times the focus of attention has shifted to the possibilities of manufacturing a detergent base from coconut oil. This is the result of recent findings (1964) in Federal Republic of Germany that the extensive use of petrochemical-based detergents has brought about a serious water pollution problem. This problem was reported to have become so serious in Germany that a law was passed in October 1964 restricting the use of detergents to those that are 80 per cent decomposable or non-water polluting. Coconut oil derivatives as a detergent base have been found to be non-water polluting, so that they are expected to have a big market in the Federal Republic of Germany and other European countries. In the United States there is reported to be a similar trend towards the use of coconut oil as a base for detergents for the same reason.

The high costs of labour in the Federal Republic of Germany and other industrial countries of Western Europe have induced a bigger demand for semi-processed products instead of raw materials. For instance, the Federal Republic of Germany will be more in the market for fatty alcohols and fatty acids to be used in its chemical and industrial plants than for traditional products iike copra and coconut oil. It will also prefer curled fibre to unprocessed coconut fibre to be used in the manufacture of upholstery and cushion products.

The next important variable causing inelasticity in the demand for coconut oil is the fact that in spite of a good deal of now solvent extraction equipment

that has been installed in Western Europe and Japan since the war for processing soyabeans, a significant proportion of the tropical oil seeds imported is understood to be processed by screw presses installed soon after the war, so that in some cases at least mills in the industrialized countries are probably technically less efficient than those installed more recently in the producing countries.

The above discrete facts show that the variables causing inelasticity in demand for coconut oil in the developed markets are not likely to be permanent. As long as there is not a major breakthrough in substitution coconut can have a future and the projection of demand may come true. But there are reasons for apprehending a breakthrough in technology, especially because of the huge investment that has already taken place in this field. Under the circumstances it is dangerous for the exporting countries not to go immediately into further processing of coconut oil and at the same time to find possible alternative markets in this region as well as in the centrally planned countries. They must appreciate that the danger to copra and coconut oil has come from cheaper substitutes. Hence, it is imperative to devise ways and means to reduce the cost of processing coconut oil and its derivatives through better technology and to reduce transport costs and middlemen profits in the supply of copra, so that in the long run coconut oil and its derivatives can compete with synthetics in the markets of the developing countries at least.

There are reasons why this specificity in the demand for coconut can be utilized for the purpose of transition from the supply of crude oil to the supply of derivatives and finished products, and from the developed markets to the markets of the emerging developing countries. This degree of freedom is allowed to the producing countries by the tardiness in technological flow.

As the developing countries take to industrialization, along with the increase in population and rising standard of living, copra will continue to supply the cheapest industrial oils, which will be needed within the region in ever increasing volume, as testified by the experience of the industrialized West. Even if synthetics or substitutes are discovered in the West, copra oil may still continue to be the cheapest source of industrial oils in terms of low cost of manufacturing, transport and foreign exchange for import-sensitive countries in the region. All projections that have been done by FAO and other organizations, including the projections presented in this report, show that Asian consumption by 1975 will be at a much higher level than the region could produce.

Under the circumstances, unless the producers of the region make the Western buyers aware of other actual and potential markets as well as the possibility of modernization and installing further processing capacity for manufacturing coconut products for food and non-food use jointly with other big producers of copra within the region, the coconut industry cannot attain parity with Western competitors in the world's fats and oil markets.

FAO estimates that the actual present market for copra and coconut oil in the Eastern European countries amounts to 40,000 tons per annum. Among them the German Democratic Republic and Poland are the biggest users of coconut oil and also have the biggest potential for coconut oil in industrial use. Czechoslovakia, Hungary and Romania are also large importers of coconut oil. The USSR is self-sufficient in fats and oils; its sunflower oil production is so huge that it exports a substantial amount to the world market. Moreover, the USSR's imports of coconut oil during the last five years have come exclusively from Ceylon as payment for loans and economic aid to Ceylon. In spite of its self-sufficiency, the Soviet Union's intention to buy coconut oil from the Philippines early in 1967 was thought to have been the primary cause for the new spurt in prices of copra and coconut oil. The copra price was reported to have advanced to $170 per ton from $167 per ton a month earlier as a result of Soviet inquiries.

Possible solutions

Solutions to the present problems of the coconut industry may be sought at both the national and regional levels. Considering the present position of international trade, and the tendency of even developed countries to form economic groups, simple national solutions may not be adequate even if possible to execute. At the same time, collective action at the regional level is likely to be fruitless unless each Government has first organized and streamlined its own industry in order to acquire significant control to execute the regional policy effectively.

At the national level the objectives of state policy regarding the coconut industry should be to achieve more efficiency.

(a) In growing coconuts;

(b) In the manufacturing and utilization of coconut and coconut by-products;

(c) To achieve considerable efficiency in the disdistribution and marketing sector of the industry.

The crux of the problem lies in giving individual farmers appropriate incentives to increase their output, which has been stagnating. As suggested earlier, a

viable solution of this problem lies within the competence of national Governments. To achieve efficiency in processing and in the production of further items from coconut oil, a planned policy of diversification of the oil's use has to be undertaken at the national level. The application of the latest technological processes for the extraction of oil and for the exploitation of many other uses in the most efficient manner must form part of the national plan. The position of the industry will be further strengthened by the development of newly-found uses for other parts of the coconut such as the shell, husk and leaves. Moreover, the progressive elimination of middleman transactions between coconut farmers as producers and the ultimate buyer of coconut in both the domestic and foreign markets is the only way to attain the twin objective of achieving efficiency in distribution and marketing and creating a domestic market by increasing the margin received by the producer. This policy might help in widening the domestic market while increasing the supply of copra to the millers.

But it is not possible for a single country to combat unfavourable terms of trade resulting from the present world market structure developed through unequal trade with industrialized countries in the West. Nor is it feasible for a single country progressively to remove the serious constraints created by an underdeveloped limited domestic market except through the introduction of partial integration of the complementary economies of several coconut growing countries; this can provide an ever expanding regional market by simultaneously lowering per unit cost through scale effect, by increasing utilization of the existing and potential comparative cost advantage in transport and input mix, and, indirectly, by collectively taking advantage of the rising trend of labour costs in the industrially developed countries. To formulate a concerted policy of plan harmonization it is necessary to take a census of existing installed capacity in the countries of the region, and to undertake studies in depth not only of problems in coconuts but also in the other sectors so that a scheme of regional specialization can be evolved.

To combat the problem of unfavourable terms of trade successfully, a joint effort must be made by the countries producing a substantial volume of exports for the world market. Amalgamation of two or more countries is not enough unless it is followed by measures to develop alternative markets for copra and coconut oil and further processed products within the region. The optimum scale of production in the technological sense may not coincide with national boundaries. The optimum size of the industry or the plant is not a fixed concept. The higher the level of technology and the greater the flow of technology entering into its pool, the bigger must be the scale of output and the consuming market thereof. On the other hand, it is not possible for a single individual country, under the present level of technology available as well as used by the developed West, to reach the irreducible minimum output and sales scale to have access to a declining per unit cost unless countries producing the bulk of copra such as Ceylon, India, Indonesia, Malaysia and the Philippines come to a sort of common agreement to harmonize their production and consumption of copra on a joint basis. In this connexion, the countries should remember that the policy of import substitution as a strategy of industrialization operates within the narrow horizon of national boundaries, surrendering the crucial benefits of economies of scale and making the under-utilization of installed capacity under the constraint of narrow domestic markets inevitable. Under the circumstances, there is no alternative but to go for plan harmonization on a limited basis.

Chapter VIII

QUALITY STANDARDIZATION OF COCONUT PRODUCTS

Introduction

International trade in agricultural commodities would not have developed to the dimensions of the present day if trade specifications throughout the world had not been established for these commodities. The original motivation for such standards was purely practical; farmers and consumers, often separated by thousands of miles, had to come to common terms to specify the products desired, offered and finally traded. Remote pricing and, thereafter, credit and insurance during shipping were compelling reasons to specify and value the quality of supplies as correctly as possible, on the basis of specifications and standards.

In modern days, large-scale food processing, financing, transport and integrated distribution have added new dimensions which are actually enforcing the use of exact specifications for agricultural products; without guaranteed quality standards neither of these mass operations would be possible. The large-scale food processing industries in Western countries, with their refined manufacturing and packing techniques as well as the scientifically organized wholesale and retail trade, offering products of absolute uniformity under established brand-names to the final consumer, must have primary products of uniform quality for their operations.

Apart from the processing industries, farmers have also been strong advocates for quality standards for agricultural products in advanced countries, because standards facilitate payment and credit on a quality basis; without quality standards, there is a distinct tendency for higher quality products to be under-priced. The close association of price with quality on the basis of standards provides an incentive for farmers to produce better quality commodities, and credits for primary products of an uncertain quality are normally limited.

In mutual agreement with their clients the farmers and the processing industries have established their own *quality standards;* under self-imposed controls they produce, select, refine and pack their products in such a manner that warranted quality standards are maintained, throughout production, pre-processing and shipping. As a result, the consumers can feed the primary products into their large-scale processing operations without prior testing, selection or further pre-processing.

A conspicuous example of a prudent policy in this respect is provided by the manufacture of natural rubber in Malaysia. Previously traditional grades of natural rubber in the form of smoke-dried sheets and crude crepes were traded solely on visual appearance. However, the highly competitive market forced industries and authorities to develop new methods of production and presentation by which natural rubber can be produced and exported according to standardized technical specifications, the qquality of which can be measured. The previous thirty-one internationally recognized visual grades, largely arbitrary, have now been substituted by three clearly specified quality standards, which limit impurities (dirt, ash), metal content (copper, manganese) and other undesired ingredients (volatiles, nitrogen) to minimum levels which in turn are acceptable to the consumers.

Natural rubber is now offered to foreign buyers in the form of small pellets, granules or crumbs of standard size, comminuted in cutting or mechanical-chemical processes. After drying in furnaces, the crumbs are pressed into manually handleable bales of standard dimensions and wrapped in specified polythene foil which prevents soiling in transit. Finally, the wrapped bales are staggered and strapped on standard four-way pollets, permitting easy mechanical handling and thus reducing the danger of damage during transport. Marked and wrapped rubber bales can then, after shipping, be fed into large-scale moulding and vulcanization processes without even unpacking the bales.

This achievement, which covers by now about 75 per cent of all rubber exports from Malaysia, is the result of concerted efforts by the major industries land authorities concerned. In 1965/66, the Rubber Research Institute of Malaysia made a world-wide inquiry to ascertain the consumers' views as to which properties should be specified and how the products should be packed and presented. On the basis of the collected data, specifications were provisionally formulated, subsequently discussed at international meetings with the producing and consuming industries and finally announced in the form of an agreed scheme. The dual objective of providing the consumers with satisfactory criteria of quality as well as setting standards with which the majority of producers can comply has proved to be a complete success. Other less developed industries have not yet achieved this standard of true, faithful and loyal reproduction of the quality of their

agricultural products. Uniform supplies of guaranteed quality according to mutually agreed standards are, however, an essential procondition for the functioning of subsequent large-scale processing operations. It is one of the main reasons why advanced industries sometimes give preference to synthetic substitutes in spite of functional deficiencies and higher prices, because synthetics are normally of absolute uniformity. As long as suitable quality standards are not aimed at in a determined way and not adhered to under firm self-imposed controls, the producers of primary agricultural products without proper quality standards will be the losers in the long run.

The rapid development of large-scale food industries in advanced countries was only feasible after quality standards for supplies of agricultural products had been introduced and established. The tremendous progress of these industries during the last decades offers ample evidence for this. Mutually agreed and strictly observed quality standards are the most solid pillars of prospective co-operation between primary producers and secondary progressing industries.

Future Trend in Coconut Processing

For some reason, it appears that coconut products have never fully entered this field, obviously the main consideration being that copra, however bad its quality may be, can still be further processed and refined to produce edible oil and technical oils, without impairing the final quality.

This apparent merit, however, could prove to be a detriment if in future coconut meat is processed to edible protein. The traditional methods of copra production would then have to be basically changed and quality considerations for many coconut products introduced, to obtain and maintain standards conforming to the principles of health and hygiene.

Most of the coconut products grown and manufactured in the ECAFE region are at present being exported to European and North American countries which are fully familiar with quality standards for agricultural products. It is therefore only natural for the coconut-producing countries of the region to establish at the earliest opportunity quality standards for their products, which should lead to better terms in trade with their foremost foreign partners.

Establishing internationally acceptable standards, however, requires considerable effort and large investments. Intensive research is needed to discover foolproof standards. Organizational efforts are needed to have these standards accepted in international markets. A costly administrative apparatus must be set up to implement the standards in both the national and international markets. It is reasonable, therefore, to argue that the standardization effort should be directed to lines of production which have a somewhat lasting future and to commodities for which demand in the international market is likely to persist and remain high. Therefore in specifying quality standards for coconut products, the terms and definitions of the processes currently applied and likely to be developed in the near future, as well as the products yielded, must be set out. Some of the traditional techniques for processing copra into various edible and technical products have been described in chapter IV of this report. However, more modern processes are in the making, further applications are being found and other derivatives of coconut oil are increasingly being used in the form of technical oils in industrialized countries; also, it is more and more widely recognized that the high nutrition value of the proteins contained in coconut could more profitably be used for human consumption than for feeding to cattle and other livestock. In connexion with the major advantages which the producer countries of coconuts could eventually achieve through quality production and standardization, the trend in the future use of coconut products need to be assessed. The future pattern of demand for coconut oil and copra is discussed in chapter X. The projections developed there have been based on the assumption that the basic demand structure will remain the same as in the past and that no revolutionary technological innovation will be introduced in the production processes. In order to obtain a more accurate picture of the future, it is necessary to modify these assumptions and to bring in certain trends both in the demand structure and in the technological possibilities, though because of their qualitative nature, they cannot be incorporated in the projections.

In studying the pattern of use of coconut products in the developed countries which are the major importers, it may be noted that the imports of coconut oil into North America, which mainly come from ECAFE countries, averaged about 200,000 tons a year during 1962-1966, compared to about 100,000 tons during 1957-1961, i.e. they more than doubled within one decade. This trend is continuing, as coconut oil imports into North America increased from 147,000 tons in 1962 to 252,000 tons in 1966. (Contrary to this, copra imports declined by about 10 per cent during the same period, resulting in a decrease of coconut oil equivalent of about 22,000 tons annually.)

The foremost reason for the rise in coconut oil consumption in the United States is its growing *utilization for technical purposes* besides the conventional processing into edible oil, as shown in chapter V.

In analysing the over-all increase in the consumption of coconut oil in the United States during the last

decade, one finds that its consumption for food purposes appears to have settled at a level of about 100,000 tons per year, whereas the utilization of coconut oil for soap seems to be on the decline, due to the increasing use of substitutes and synthetics. The utilization for other technical purposes is distinctly on the rise and has increased by more than one half within one decade.

It is not unlikely that imports and consumption in western Europe, which has so far been easily the largest consumer of copra with about 800,000 tons per year,[1] will continue to follow the same pattern. The additional import of coconut oil has also risen to a considerable extent, from an annual average of 108,100 tons during 1958-1960 to 145,000 tons during 1964-1966. Increased freight charges arising from the closure of the Suez Canal and the growing capacity of ECAFE countries to manufacture crude and refined coconut oil themselves may lead to decreasing copra exports in favour of coconut oil exports. In addition, some of the advanced technological processes developed in the United States may more and more be applied in Western Europe too, resulting in increased consumption of coconut oil for technical purposes in those countries.

In the long run, however, some of the coconut oil derivatives now being used for certain technical purposes, mainly in the form of lauryl alcohol and salts of the lauryl sulphate group, especially as surface active agents for soap, detergents and textiles, will be replaced by petroleum derivatives. Fatty acide, alcohols and amines are more and more being manufactured synthetically. In view of the decreasing prices of petroleum and electric power the future prospects for coconut oil derivatives for these technical purposes may not be very bright. However, applied research in one of the leading coconut producing countries to develop new avenues for large-scale application of coconut oil derivatives for other technical purposes may result in a new breakthrough.

Coconut oil has some superior qualities, compared to synthetics and other oils. Coconut oil itself cannot be made synthetically. Its saponification value is the highest of all commonly used oils (see tables VIII-1 and 2). Also, it contains nearly 14 per cent glycerol, more than any other commercially available oil or fat. Further, coconut oil excels in a comparatively high content of lauric acid and, therefore, in a high degree of saturation (see table VIII-3). (It contains no linolenic acid and a negligible amount of linoleic acid; the content of oleic acid is higher, but its degree of unsaturation is low.) All these attributes make coconut oil very suitable for many technical purposes. For example, coconut oil does not irritate the human skin in any way. This fact, together with its high degree of saturation preventing rancidity or discoloration through oxidation, forms an excellent basis for the use of coconut oil in cosmetics and pharmaceuticals. This application is hardly threatened by substitutes and the fast-growing 'beauty business', which in the United States alone has reached an annual turnover of more than US$3,500 million for cosmetics and toiletries and is growing by more than 10 per cent per year, is likely to grow similarly in other countries.

Another possible large-scale use of coconut oil derivatives in the form of various salts of lauric and other shorter chain fatty acids as stabilizers or polymerizers for plastics has not yet been sufficiently explored. The present scale of application for this purpose is rather small but it could be widened through proper research.

In Europe, the large amount of copra and coconut oil imported from ECAFE countries has up to now mainly been processed into various *food ingredients for human and livestock consumption.* Usually conventional methods of expressing and extracting oil by solvents are employed to obtain coconut oil and meat cakes. However, more modern processes are in the making, especially now that it has been realized that coconuts contain protein of high nutritive value which might well serve as a human dietary complement.

The manufacture of desiccated coconut in the form of sweetmeats was the first major industry in this line, originally beginning in the United States during the prohibition period. It is now increasingly manufactured in Europe too, and amongst the ECAFE countries Ceylon has been able to establish an important industry of this kind. Desiccated coconut meat of good quality is made from the inner part of the copra, after the brownish rind has been removed, thus enriching the average oil content to about 70 per cent. The moisture content should be low and free fatty acids should not exceed 0.1 per cent of the oil present.

The ideal method of obtaining high quality oil and protein for human consumption from coconuts would be direct processing of the wet meat out of fresh coconuts, without producing dried copra first. This must be done in the countries of coconut production themselves, because the export of whole coconuts for wet processing abroad would increase the shipping costs enormously, since the undried nut, after removal of the husk, yields only about a quarter of its weight of copra. On the other hand, the natural shall forms a perfect protection against impurities, oxygen (rancidity), bacteria and fungus.

Various methods are being experimented with to process the wet coconut meat directly into oil, in the

[1] The coconut oil equivalent would be about 510,000 tons per year.

same way as palm oil is derived from fruit pulp, the oil and water being expressed together and separated with the aid of contrifuges or by boiling and settling. Unlike palm oil, however, the emulsion of coconut oil and water is very difficult to separate and all existing experimental processes have wrestled with this problem without much success. If the problem of breaking the emulsion could be solved in an economic way through applied research, the wet processing of coconut meat in the region could open up entirely new avenues. The result would probably be a high-quality edible oil requiring practically no refining, and a residual cake containing valuable protein to be consumed in the form of either flour or protein concentrates. The pressing need for protein nutritives in some major countries of the region might well be relieved through these valuable by-products, whereas the quality oil could continue to be exported to earn much-needed foreign exchange.

If human consumption of the rich proteins contained in coconuts is to be promoted, the quality of dried coconut meat (copra) will have to be considerably improved. The present pre-processing and presentation methods for coconut meat, in the form of open-air dried, unpacked, bulk transported copra which at no stage is protected against soiling and infection, are not suitable for direct processing into human food. Only the oil embedded in the copra can be expressed or extracted and thereafter be cleaned and refined to such an extent that human health is no longer endangered when it is consumed. The residual cake, still containing many impurities, can only be utilized for cattle feeding.

However, endeavours are being made to improve on this process. With rather simple methods the infection of fresh coconut meat during open-air drying can be largely prevented by prior dipping of the chips in a solution of soda ash or acetic and sulphuric acid. Proper storing of dried copra in rat-proof and rain-sheltered warehouses with water- and vapour-tight flooring, but providing for free air circulation to keep the moisture content at a uniform low level, serves to maintain the quality standard of the copra.

Even more hygienic is the artificial, indirect drying of fresh coconut meat in hot air tunnel furnaces or on vertically staggered flat beds in an oven with hot air circulation. If the further use of the dried copra so permits, prior comminuting into small pellets or granules helps to accelerate the drying process and to shorten the drying period. This is important, because the temperature of the circulating air should not exceed 95°C to avoid any destruction of some amino acids which are essential components of the protein for human nutrition.

Various sophisticated processes and pilot plants have been developed to integrate the comminuting, drying (partly under vacuum), expressing and extracting operations with the aim of obtaining high quality coconut oil as well as edible cakes or flour for human consumption. It is obvious that coconut meat, if dried and treated within one continuous process, would be less exposed to impurities and infection, and the products yielded would therefore be perfectly suitable for human nutrition. But it seems that the economic problems of these processes have not yet been solved because it has not been possible to establish large-scale operations. Further, the marketing of coconut-based protein would still have to be developed and eating habits correspondingly changed.

It could form one of the foremost tasks of the research institutes of the region to develop suitable processes and to promote the manufacture and marketing of edible protein products made out of coconut. In view of the fast-growing population in southeast Asia and the pre-eminent need for protein-rich food in countries such as India, it would be most worthwhile to start such ventures on a larger scale.

If coconuts could be increasingly processed in that way into protein flour or cakes and these products could be offered to needy countries at prices corresponding to their low *per capita* income, the demand pattern for coconuts would probably change substantially.

Quality Standards for Coconut Products

The lessons of these facts and trends for the quality standardization of coconut products are obvious. It will probably be of little value to try to establish standards for improved quality for commercial copra as long as it continues to be processed into coconut oil, which can easily be refined to any desired degree. On the other hand, the technical and organizational difficulties for copra producers to comply with quality standards in regard to impurities, moisture content, flavour and colour, freedom from insects, bacteria or fungus would be considerable.[1] Therefore, it would be uneconomic to try to achieve a better quality copra as long as the deficiencies mentioned do not substantially impair the quality of the refined oils offer they have been cleaned, bleached, neutralized and deodorized. The cost required to obtain and maintain an improved quality of commercial copra through drying, storage and shipping would probably be prohibitive, compared to the small bonus which an oil mill could pay in view of the negligible benefit for its own purposes.

[2] The difficulties in standardization of copra are well illustrated by the attempt made in the Philippines to introduce the moisture meter, which did not achieve great success because of the refusal of both exporters and sellers to comply.

Only copra which is intended for direct human consumption, in the form of desiccated nut meat or protein flour and cakes, demands special treatment conforming to principles of health and hygiene. Technically, this is not too much of a problem. Infection during drying can be controlled by dipping the copra chips in diluted acetic and sulphuric acid or a solution of soda ash. The meat so prepared should then preferably be dried artificially in vertical or tunnel-type hot air furnaces. If the further use so permits, prior comminution of the copra into granules or pellets will shorten the drying time to a fraction of the period required for sun-drying. The product resulting from such a process will be a clean, non-infected, white copra, with a strictly controllable moisture content. Immediate packing thereafter into sealed polyethylene bags will prevent soiling or infection during storage or transportation. Such copra will then quite fit for human consumption.

Certainly, this special treatment would involve additional cost, but if the whole process is properly organized and streamlined, that cost can be kept within limits. It goes without saying that edible copra must fetch a higher price than copra processed by conventional methods. From the economic point of view, therefore, edible copra would not be suitable for further processing into coconut oil where it would have to compete with conventionally treated, commercial copra. But if increased use for human nutrition in the form of protein flour or cakes is aimed at, the prescribed processing will be essential.

Quality standards for edible copra are not difficult to establish. The legislation of other countries in regard to maximum admissible impurities in food imports can be taken as a basis. Precautions must be taken against possible adulteration with cheaper ingredients. Standards for maximum moisture and minimum oil content as well as for fatty acid content must be worked out in agreement with major consumers and producers. Flavour, colour and appearance may not be easily specified but standards for these properties do exist for other food products and can be used as a guide. Finally, test methods and tolerances would have to be agreed upon, so that specified properties can be measured and test results reproduced within prescribed limits.

Commercially expressed or extracted coconut oil will probably remain the chief commodity derived from coconut. Its qualitative properties will depend on the methods of production and the degree of refining. Analytical data for coconut oil and its component (stearine, olein) and for hardened (hydrogenated) oils are shown in tables 2 and 3. Further, table 2 shows the admissible limits laid down by the American Oil Chemists Society and in the British Standard System. For internationally acceptable quality standards, the differences between these two as well as other recognized national standards would have to ironed out. Also generally acceptable test methods and tolerances would have to be agreed upon, to be commonly applied by producers, consumers and controlling authorities.

Table VIII.1. Analytical data on coconut oil

Determination	*Usual limits*	*American Oil Chemists Society*	*British Standard System*
Melting point, °C, complete fusion .	23 — 26	23 — 26	
Saponification value	254 — 258	248 — 264	Not below 254
Refractive index, at 40°C (Zeiss) . .	34.7 — 35.5	33.9 — 26.7	34.6 — 35.6
Iodine value	7.9 — 9.5	7.5 — 10.5	7.0 — 9.5
Free fatty acids, as lauric, % . . .	1 — 6	—	up to 5
Unsaponifiable matter, %	0.15 — 0.7	below 0.5	up to 0.6
Reinchert value[a]	6.5 — 8	6 — 8	—
Polenake value[b]	15 — 17	14 — 18	—

Source: Williams K. A., *Oils, Fats and Fatty Foods*, J. & A. Churchill Ltd., London, 1966.

[a and b] Tests designed to measure the water-soluble and the water-insoluble volatile fatty acids in an oil.

Table VIII.2. ANALYTICAL DATA ON COCONUT PRODUCTS

Determination	Stearine[a]		Olein[a]		Hardened oils	
	Usual limits	Typical specimen	Usual limits	Typical specimen	Typical specimens	
Melting point, °C						
Incipient fusion	—	29	—	21	25.0	23.7
Complete fusion	26 — 31	30	16 — 23	22.5	31.0	27.5
Solidifying point, °C	24 — 29	27.4	14 — 22	19.1	25.6	24.0
Saponification value	252 — 253	252.1	257 — 262	258.3	252.0	255.0
Refractive index at 40°C	34.5 — 34.8	34.7	35.5 — 35.7	35.2	...	...
Iodine value (Wifs)	2 — 7.9	4.1	11 — 15	14.2	3.2	6.5
Specific gravity at 15.5°C	0.860 — 0.869	0.866	...	0.870	...	...
Free fatty acids, as lauric, per cent	0.2 — 5.0	4.1	3 — 13	0.2	0.1	0.08
Reinchert value	4.5 — 6.0	5.6	8 — 10	9.2	5.7	7.0
Polenake value	8.0 — 15	10.7	17 — 20	18.0	9.3	13.2
Kirschner value	1.0 — 1.5	1.3	2.0 — 2.5	2.1	...	...

Source: Williams K. A., *Oils, Fats and Fatty Foods,* J. & A. Churchill Ltd., London, 1966.

[a] As these products were manufactured at a great variety of melting points, only extreme figures are given, and almost all commercial samples gave figures well within the above limits.

Table VIII.3. FATTY ACID COMPOSITION OF COCONUT OIL

Chain length (Number of C=atoms)	Name of fatty acid in coconut oil	Percentage of total fatty acid (lowest and high values)
	Saturated	
6	Caproic	0 — 0.8
8	Caprylic	7.8 — 9.5
10	Capric	4.5 — 9.7
12	Lauric	44.1 — 51.3
14	Myristic	13.1 — 18.5
16	Palmitic	7.5 — 10.5
18	Stearic	1.0 — 3.2
	Unsaturated	
18	Oloic	5.0 — 8.2
18	Linoloic	1.0 — 2.6
18	Linolenic	nons

Source: FAO, PL:CNP/68/1, 27 May 1968.

It is obvious that the chief consumers must have a substantial voice in establishing quality standards by mutual agreement; it would be neither practicable nor prudent to formulate specifications without their advice and consent. However, as an initial approach, drafts can be put forward by the producers or their industrial organizations to establish a basis for further discussions. For this purpose, it would be essential to investigate the present and likely future pattern of supplies of processed and refined coconut products, the installed capacity for processing and refining coconut products in the ECAFE countries, and the major trade channels and consumer industries. Subsequently the attitude for major consumers would have to be sounded and their opinions invited with a view to establishing quality standards in mutual agreement.

The major producers must be asked to what extent they would be willing and able to comply with quality standards, the level of which may (and should) lie above the present average quality plateau. They should be informed that any additional efforts on their part will not automatically result in better prices, but are likely to lead to more stable prices in future.

The governments of the producer countries must be encouraged to establish a regional research centre as well as national control centres which would preferably operate on a voluntary basis and be financed partly by contributions from the producers and consumers in proportion to the use they make of the centres. A control system would have to be organized on the basis of samples sent regularly to the centres for analysis, evaluation and certification. Last but not least, a code of ethics should be established to which producers would have to adhere, and provision would have to be made for penalizing or expelling producers in case of misuse or violation of the code.

Conclusion

The demand pattern for coconut products is likely to change substantially during the next decade or two. Mineral oil derivatives will probably more or less entirely replace all the coconut-based chemicals which are now used in the large-scale soap and detergent industries abroad. Similarly in other industries which use coconut oil derivatives as surface active agents, synthetics will probably largely replace them in the future. Fatty acids, which form the most important part of coconut oil for industrial applications, were already being produced synthetically thirty years ago in Germany through oxidation of hydrocarbons. More economic large-scale manufacturing units are now being planned and installed in other advanced countries (United States, USSR). The industrial synthesis of fatty alcohols has progressed even further and a similar development can be expected for fatty amines.

In principle, this development is probably a change for the better. From the viewpoint of an impartial observer it is highly irrational that the major part of the copra and coconut oil produced in the region is expected to industrialized countries and to a large extent processed into chemicals and cattle feed cake, while the region, lacking as it is in protein and fat, has to import food in large quantities in various other forms to nourish a fast growing population. If the demand for coconut oil for technical oils and industrial chemicals should decline, this may well give the impetus for coconut meat and oil to be increasingly processed into edible products for consumption within the region. In reality, coconut products are much too valuable to be consumed for technical and livestock feeding purposes.

Quality standardization should therefore aim at developing quality food products such as edible copra, protein flour, protein cakes and coconut oil for direct consumption of for use in high quality margarine and cooking fat. Similarly, quality standardization can stimulate increased utilization of the more valuable properties of coconut oil for applications in cosmetics and pharmaceuticals.

One of the major tasks of the proposed regional organization would, therefore, be to draft, guide and promote quality standards for coconut products. Recommendations can be worked out together with the national standards institutions of various regional and advanced countries as well as the International Organization for Standardization. The foremost target of all recommendations for quality standards should be to promote those coconut products which promise a lasting and high return in the future.

CHAPTER IX
COCONUT RESEARCH IN ASIA

To achieve growth and development of the coconut industry basic and applied research is required, directed towards the solution of pressing problems of the industry. In the coconut-producing countries of Asia, research activities on coconuts are directed to the agricultural, economic and industrial aspects of the industry. Little has been done however, compared to the amount of research work that has been done on other crops, particularly rice. There are strong indications that coconut research is now being pursued with greater intensity in the important coconut-producing countries; in general, it is directed towards improving productivity and quality, reducing production costs, increasing marketing efficiency, and finding new and better uses for coconut products. The important coconut research organizations and programmes in some leading coconut producing countries are summarized below.

Agricultural Research on Coconut

Ceylon.[1] A scheme for research on coconut was initiated in Ceylon in 1929 under Ordinance No. 29 of 1928. Originally called the Coconut Research Scheme, it was given higher status in 1951 and renamed "the Coconut Research Institute". The Headquarters and the main laboratories are situated at Bandirippuwa Estate in Lunuwila with three substations on estates in other parts of the coconut areas. In 1954, an Isolated Seed Garden was established for the production of coconut seedlings of selected high yielding varieties.

From a small beginning the Institute has now grown to six Research Divisions in addition to the Administrative, Planning and Advisory Divisions. It is now in a position to make advances in breeding, cultivation, management and utilization of the coconut crop for the benefit of industry and the country as a whole.

At the present time, the Coconut Research Institute is mainly organized for agricultural research. Limited facilities, however, exist for laboratory investigations into the chemistry and technology of coconut products. In other words, the Institute is not engaged in applied research for industry, though it does assist to some extent in the solution of process and production problems encountered in the coconut industry.

Work on the Chemistry Division of the Institute embraces two fields of inquiry, viz. Plant Chemistry and Coconut Technology. At present this Division undertakes studies on the fundamental aspects of the nutrition of the coconut palm (especially during its early phases of growth) on the basis of sandpot-culture experiments. In the latter, field investigations are being projected to improve the fermentation efficiency of coconut toddy and the quality of products derived therefrom.

The Botany Division is working on the production of early bearing and high-yielding strains of coconut palms. Much experimental work has also to be done on crossing selected varieties and forms of coconut and studying the first generation palms. An Isolated Seed Garden for mass production of seed has been established and already 125 acres of it have been planted. The programme of future research in this Division includes the testing of new strains of coconut in different parts of the island; the identification of prepetents from palms within the seed garden; and the working out of methods for mass production to improve seed.

The present scope of research of the Division of Soil Chemistry has been extended to cover soil surveys in addition to field experiments (mainly concerned with the suitability of various components and dosages of fertilizers) and laboratory investigations (including the analysis of soil samples from surveys, chemical composition of the leaf and root samples, chemical composition of nut-fall palms, etc.). Experiments on the manuring of palms under different conditions of young plantations have been laid down on a number of estates. A reconnaissance survey of the coconut soils in the Southern Province of the island is in progress and the soils are being classified at a series level.

The Division of Agrestology was created in 1955, to study the development and management of pastures that might be grown on coconut estates and used as fodder for cattle raised for meat and milk, without detriment to the coconut palm, and also to study the wider problem of maintaining and improving soil fertility in areas where the one crop has been, and perhaps will be grown for hundreds of years. The current programme of research of this Division includes the evolution of the nutrient status of coconut soils by the use of indicator plants in pots, and a study on the competition between coconuts and pastures, with ancillary studies on the selection and management of mixed

[1] Ceylon: Country Study on Coconuts, Government of Ceylon. July 1968, pp. 25-28.

pastures with particular reference to light, microclimate and breeding.

Pests and diseases associated with the coconut crop in Ceylon were considered to be sufficiently serious to warrant the establishment of the Crop Protection Division in 1955. Included in the current research activities of this Division are the study and control of the red weevil pest, the coconut caterpillar pest and the coconut scale pest, and investigation of the causes of and remedy for such diseases as leaf-scorch, bud rot, etc.

The Division of Bio-Chemistry was established in 1956 to assist other research divisions in the design of experiments and in the statistical analysis and interpretation of results. The chief of this Division has also been entrusted with the maintenance of all agri-meteorological work. The current research programme of this Division includes evolving ways and means of reducing error in experiments both by adoption of available designs as well as evolving various methods of calibration, and studying the statistical distribution of variables normally used in the quantification of information relating to coconut research.

India.[2] The first atttempt at promoting research on the coconut crop in India, was taken by the Madras Government which established four research stations on coconut in the Malabar area as early as 1916. Though these stations did achieve some good results, they could not accomplish much for want of sufficient staff and facilities. It was only after the creation of a statutory body called the Indian Central Coconut Committee, in 1945, that coconut research in India got the required encouragement. This Committee not only established two Central Coconut Research Stations directly under its control, viz., the Central Coconut Research Station, Kayangulam and the Central Coconut Research Station, Kasagaroo, but it also financed the setting up of Regional Coconut Research Stations in important coconut growing states to solve local problems. It also financed from time to time special schemes to investigate specific problems. Since April 1966, the Indian Central Coconut Committee has been abolished and research has been made the responsibility of the Indian Council of Agricultural Research. To a limited extent, the state governments are also promoting coconut research themselves.

More and more attention is being given to research activities that will step up production on a short-term as well as a long-term basis, such as improving the yield from existing plantations, prophylactic and control measures against pests and diseases, and production of quality coconut seedlings. Results of agricultural research of great practical benefit have already been obtained in different disciplines.

[2] Government of India: Country Study on Coconuts, May 1968, p. 6.

Malaysia.[3] In Malaysia, a coconut research centre and seed garden has been established in 1964 on a 127-acre site at Parit Botak which is in the centre of a coconut-growing area. Another station for demonstration on mixed cropping with coconuts has also been set up in the midst of small holdings. Research is being carried out mainly on the selection of mother palms, progeny testing, vegetative propagation by tissue culture, development of varieties which are resistant to the lethal yellowing disease of coconuts, and nutrition of coconut palms.

Philippines.[3] In the Philippines, agricultural research on coconut is carried out mainly by the College of Agriculture and Central Experiment Station of the University of the Philippines at Los Banos, Laguna, the Bureau of Plant Industry of the Department of Agriculture and Natural Resources; the Philippine Coconut Administration (PHILCOA), and recently, the Philippine Coconut Research Institute (PHILCORIN). Some special research projects to study specific problems are financed from time to time by the National Science Development Board.

The College of Agriculture, University of the Philippines, is located at Los Banos, Laguna (about 67 kilometers south of Manila). It was founded in 1909, and entrusted with the responsibility of giving higher instruction, conducting basic and applied research, and carrying out extensive education in tropical agriculture. Based on published results of researches, the College of Agriculture is said to do about 80-85 per cent of agricultural research in the Philippines. Since its establishment, the College has been engaged in research on tropical crops, covering different aspects, including plant breeding, soils and fertilizers, agricultural chemistry, agronomy, farm management, economics of production and marketing, and others. In coconut research, it is giving particular attention to the production of high-yielding, early-bearing varieties of coconut and the effective control of pests and diseases of coconuts, such as the rhinoceros beetle, the coconut leaf miner, the Asiatic palm weevil, bud-rot of coconut and especially the *cadang-cadang* disease of coconut trees. The College also co-operates with other agencies in the conduct of research.

The Bureau of Plant Industry, Department of Agriculture and Natural Resources, conducts research on various crops in the Philippines, particularly on the cultural requirements of these crops, with a view to increasing production and productivity. It maintains experimental stations all over the country, where research is carried out to meet the particular problems

[3] The major portion of this discussion on coconut research in the Philippines is derived from the Country Study on Coconuts prepared by Mariano P. Ramiro of the National Economic Council, Manila, March 1968.

of crop production in local areas. Thus, coconut experimental stations are operatetd by the Bureau in the major coconut-producing provinces of the country where research work on the agronomic aspects of coconut growing, and the control of pests and diseases, is being undertaken.

The Philippine Coconut Administration (PHILCOA) is a government corporation established in 1954, under Republic Act No. 1145. It was given wide authority to recommend legislation and implement policies covering all economic aspects of the coconut industry. In 1966, the PHILCOA management prepared a four-year General Development Plan (1966-70), embodying certain projects to be undertaken, including extensive farm extension work to improve the health and productivity of coconut plantations with the establishment of a nation-wide chain of coconut seedling nurseries, the intensification of research and control work on coconut pests and diseases, improvement of coconut processing methods, and the establishment of experimental stations to serve as permanent sites for improving breeding stocks and promoting agricultural practices. Among the research projects included in the development plan are the following:

(a) Studies of the etiology of *cadang-cadang*.—The objective of these studies is to determine the cause or causes of *cadang-cadang* disease, with particular emphasis on how the disease is transmitted and what species of insect is responsible, with a view to formulating positive control measures. These studies involve experiment currently in progress on the virus theory seeking to determine how the disease is transmitted from *cadang-cadang* infected coconut palms to healthy seedlings and grown-up palms, as well as to indicator test plants other than the coconut through mechanical means of inoculation and through the use of insect vectors. The total research effort of *cadang-cadang,* which has been going on for the last fifteen years or so, involves a number of government and private entities working on various theories. To spur progress thereon, this project will likewise extend financial and technical assistance to, and co-operate with, other agencies involved in the study of *cadang-cadang,* such as the Cadang-Cadang Research Foundation, the Philippine Coconut Research Institute and the College of Agriculture, University of the Philippines.

(b) Studies on the eradication and control of other coconut pests and diseases. These studies aim to determine the cause or causes of coconut pests and diseases, their nature and characteristics, with a view to formulating positive control measures to curb any reported incidence and to formulate measures to prevent similar occurrences in the future in the same as well as other coconut producing areas.

(c) Experimental stations and farm development, to determine and breed the most suitable varieties of coconuts, to study the best intercropping methods and the best intercrop for coconut farms, and to demonstrate to farmers the best method of coconut farming with the aim of increasing yields from the coconut farms.

(d) Establishment and operation of coconut seedling nurseries, to provide selected coconut planting materials to replace overage trees and to plant new areas, as well as to rehabilitate coconut plantations in areas heavily damaged by typhoons.

(e) Philippine-FAO Coconut Statistical Survey, for the purpose of providing an updated and accurate statistical record of coconut production, marketing and utilization.

In response to the clamour of the coconut growers for more research on coconut, Congress enacted Republic Act No. 4059 in 1965 creating the Philippine Coconut Research Institute (PHILCORIN). The purposes and objectives of this Institute are to conduct scientific research and investigations on the botanical and genetic aspects of coconut improvement, the agronomical problem relating to coconut culture, the etiology and control of *cadang-cadang* and other diseases of coconut, and the biology and control of important insect pests of coconut; to compile scientific information and disseminate results of scientific and technological researches on coconut; and to train people for the development of the coconut industry. Its immediate activities include studies on the culture of coconut, the use of fertilizers and cover crops, the effect of intercropping, the establishment of regional nurseries for propagation of coconut seedlings, green manuring, farm operation and control of diseases, as well as improvement of coconut breeding methods and techniques.

There is a proposal currently under consideration by the United States Agency for International Development (USAID) for the establishment of a Coconut Research and Development Regional Center in the Philippines to serve the needs of coconut producing countries. The basic objective of this proposed Regional Center is to pursue integrated agricultural, industrial and economic research for the development of the coconut industry. Its main functions are:

(1) To conduct research and development work on coconut, encompassing all agricultural, industrial and economic phases—coconut production, farm management, industrial processing, etc.—with a view to determine the cause or causes of coconut pests and benefits for the people of Asia and other coconut-growing areas;

(2) To publish and disseminate research findings and recommendations to all interested sectors;

(3) To distribute improved plant materials and technology to countries where they might be of significant value in agricultural and industrial programmes;

(4) (a) To develop and train promising young scientists along lines connected with or related to coconut production, utilization and distribution, through a resident training program under the guidance of experienced and distinguished scientists;

(4) (b) To design and carry out, in co-ordination with universities, in the Philippines and elsewhere, fellowships on coconut farm management, industrial production and marketing for promising young scientists; and

(5) To organize and hold annual conferences, forums and seminars, whether regional, local or international, for the purpose of discussing current problems on the agricultural, industrial and marketing aspects of the industry.

Industrial Research on Coconut

Ceylon.[4] The staff of the Ceylon Institute of Scientific and Industrial Research (CISIR) includes research personnel on the industrial processing of coconut, but although specific assignments have been undertaken, the Institute has not initiated a systematic programme of research in this field. The major processing firms have laboratories attached to their plant which serve production needs but are not equipped for extensive research. The CISIR now proposes to strengthen its staff and expand its facilities for more fundamental work on Ceylon's primary products: tea, rubber and coconuts.

Some of the specific fields in which research could improve the commercial value of coconut products in Ceylon are indicated as follows:

(a) Use of coconut for food preparation — The process used in households where the kernel is scraped and squeezed to obtain milk for food preparation is a wasteful process. The residue contains a high percentage of oil (approximately 35 per cent), and protein matter which could be recovered. An effort has been made to produce a spray dried substitute, but the process has not yet been perfected.

(b) Fibre products — Research on this product would include processing improvements for improving the quality of fibre and yarn, research on new end uses, further refinements of the products compounded with latex, etc. Coir dust, which is produced in the process of cleaning the fibre, now goes to waste. Although proposals were formulated at one time for the use of coir dust for the manufacture of board, the processes were not perfected, and the project did not appear to be technically feasible. Further research needs to be done on the possible uses of coir dust.

(c) Coconut shell — A limited quantity is now ground and exported as filler in plastics. A systematic research programme on possible new and end uses is required.

(d) Chemical products based on oil. — There has been little or no research done on improving the properties of coconut oil for its end uses by process changes, use of additives, etc., to make it more competitive with synthetics. At present only the conventional processes of de-colorization refinement, etc., are being adopted. Research in this field would be of a fundamental character, and a pooling of regional resources may be necessary.

There is also need for research into the development of chemicals and other products from coconuts. If industrial research is to be effective, it will have to be undertaken increasingly by the producer countries themselves, since the advanced countries have a tendency to concentrate on the development of synthetic substitutes rather than on the natural products.

India.[5] Some of the lines indicated for industrial research on coconuts in India are: process improvements for the extraction of oil, including the development of a method which can be used by small operators, and improvements in the solvent extraction methods; processing of coconut fibre, such as reducing the period of retting, imparting colour fastness to the fibre, etc.; and development of industrial uses of the coconut shell, including the preparation of activated shell charcoal and various products that can be obtained by destructive distillation, research on the use of shell powder in plastics, etc.; and modernization of industrial plants for coconut products.

Malaysia.[6] Research into further processing of coconut products and improvements in the extraction of oil are currently undertaken by the larger oil mills in Malaysia. The Government in looking into the question of improving the quality of copra produced especially by small holders and the possibilities for increasing the range of products from coconuts. Research is also being carried out into the possibilities for the utilization of coconut in human nutrition in addition to its being a source of oil.

[4] Ceylon: Country Study on Coconuts, July 1968, pp. 46-47.

[5] Government of India: Country Study on Coconuts, May 1968, p. 10.

[6] Country Study of the Coconut Industry of Malaysia.

Philippines. In the four-year (1966-1970) General Development Plan of the Philippine Coconut Administration, the following industrial research projects are included:[7]

(1) Improvement of coconut processing methods, demonstration and information. This project aims at determining the best method of copra making that will yield the maximum recovery from coconuts and of the best quality. It also intends to formulate a process by which the residual meal from copra can be used as human food.

(2) Operation of four pilot plants, with the objective of creating industries of coconut by-products to give employment to the rural population, to enable coconut producers to derive more income from coconut, and to develop and expand various industries from by-products of coconut to avoid complete dependency on copra.

(3) Laboratory research in coconut by-products.

(4) Manufacture of coconut fibre curlings.

(5) Establishment of defibering plants and coir processing centrals.

(6) Establishment of a baling plant for coconut coir fibre.

(7) Establishment of a machine shop for industrial mechanization of coconut processing.

The Industrial Division of the proposed Coconut Research and Development Regional Center is intended to be responsible for studies and programmes directed towards a greater utilization of coconut products and by-products, up to and including manufacturing and process designs, as well as consultation facilities on investment, manpower training and other industrial aspects of the coconut industry.

The National Institute of Science and Technology of the National Science Development Board of the Philippines has given top priority to the industrialization of coconut products and by-products, recognizing the economic necessity for diversifying the coconut industry and orienting it towards a new direction of development and growth. The NIST five-year (1963-68) programme for the coconut industry consists of two complimentary and simultaneous phases: the laboratory research phase and the pilot plant development phase.[8] Under the first phase, inter-related research problems selected after thorough literature and patent survey and project evaluation are being undertaken with the object of finding new, technologically and economically feasible processes of producing specific end-products to suit local materials and conditions. Experimental projects completed in the laboratory are then tried or tested under pilot plant conditions to obtain more reliable techno-economic data as bases for commercial-scale production. The primary objective of the programme is the development of an optimum integrated process for the complete utilization of the components of the coconut and the design and construction of a continuous coconut by-products processing plant utilizing fresh matured nut as the raw material.

Co-ordinated research work operations on selected projects under this programme being undertaken by the Institute's Industrial Research Center has been divided/distributed to several teams of coconut researchers based on specific raw material to be used and end-product objective, to wit: (1) projects centered on the *husk;* (2) projects centered on the *shell;* (3) projects centered on the *meat* and *oil;* and (4) projects centered on the *coco water.*

(1) Research projects centered on the husk:

  (a) Development of optimum processing method of converting coco husks into marketable products, particularly for pulp and thermal insulating materials.

  (b) Utilization of the short fibres and coir dust for the manufacture of hardboards.

  (c) Extraction of the lining content of the husk and study of its commercial value.

  (d) Microbiological method of retting the husk to improve the spinning quality of coco fibres.

  (e) Fabrication from an improved design of a mechanical dehusking machine.

  (f) Design, development and construction of an automatic, electronic coconut maturity sorter for husked or unhusked coconuts to separate the young from the matured nuts without slowing down the flow of nuts in a conveyor belt.

  (g) Design and fabrication of an improved decorticator.

(2) Research projects centered on the shell:

  (a) Grinding the shell and, by flash carbonizing, recovering the distillate as crude creosote.

  (b) Recovering the charcoal and processing this into briquetted charcoal fuel without using binders.

[7] Mariano P. Ramiro, Philippines: Study on Regional Plan Harmonization of the Coconut Industry, March 1968, Annex I.

[8] This discussion of the programme of the NIST for industrial research on coconut products is derived from the paper, "Industrialization of Coconut and By-Products" prepared by Conrado E. Lotho of the Industrial Research Center, National Institute of Science and Technology, for the Coconut Training Seminar conducted by the College of Agriculture, University of the Philippines, May 1968.

(c) Processing the charcoal to produce carbon black or carbon electrodes.

(d) Processing the shall, using an NIST-developed method, to extract and produce furfural.

(e) Design and fabrication of a mechanical de-shelling machine that can efficiently and rapidly remove the fresh coconut shell without breaking the meat.

(f) Fabrication of a mechanical coconut paring machine for scraping the brown outermost thin portion of the meat.

(3) Research projects centered on the meat:

(a) Processing the fresh meat to produce in marketable form "granulated coconut" as the main food product by fluidized bed method, with coco flour as a secondary product.

(b) Production of high-grade, mater-white edible oil with low fatty acid.

(c) Production of coconut sweetened condensed milk.

(d) Production of coco breakfast cereal substitutes from coco flour.

(e) Production of coco cheese.

(f) Production of coco soft drinks.

(g) Production of coco protein.

(h) Coconut oil as a source of a potent biological insecticide and a fungal enzyme.

(i) Utilization of coconut oil soapstock by esterification of the fatty acids with n-butanul and with 85% H_3PO_4 as catalyst for the production of quarternary ammonium compounds.

(4) Research projects centered on the coconut water:

(a) Use of coco water as a medium in a microbiological process of producing (by means of a polysaccharide) a thermoplastic material that can be used for paint lacquer and plastic materials.

(b) Use of coco water for the propagation of protein-rich and Vietamin B-rich food yeast using a strain of *Torulopsis-utilis* (Henneberg) Lodder.

(5) Coconut pilot plant project:— The development of an integrated continuous process for the full utilization of the coconut which combines the following steps: (a) husking the nuts; (b) shredding the husks and separating the coir dusts; (c) processing the fibres and coir dusts into pulp or for construction materials; (d) shelling the dehusked nuts; (e) grinding the shells and other husk wastes and carbonizing the mixture, recovering the creosote distillate and separately recovering the charcoal for briquetting or for carbon electrodes or carbon black; (f) grinding the cleaned meat to micron size; (g) drying the ground meat in a fluidized bed dyer with simultaneous production of edible grade, white granulated coconut with controlled oil content as desired or producing coco flour for food product uses; and (h) evaporation of the coconut water to produce a 50% coconut concentrated syrup or using it for the microbiological production of yeast or plastic materials. Patents have been applied for, for some of the unit processes, equipment design and end-products.

The brief description of the research projects of Ceylon, India, Malaysia and the Philippines given above indicates clearly the vast number of technical problems which are engaging the attention of the governments in these countries. If in addition, the research problems connected with marketing, financing, extension work, peasant motivation, foreign markets etc. are taken into account, the list becomes too large to be implemented effectively by the resources available to any single country. Yet great and strenuous efforts to improve the productivity of coconut and the coconut processing industries and marketing and discovery of new uses are urgently called for, if the threat of the substitutes is to be adequately met. It is not known how much money and national effort the developed countries are now investing in synthetic and other substitutes for coconut oil. It may safely be predicted that the developing countries of Asia can never hope to compete with these efforts unless they pool their resources developing specialization in research and putting maximum effort on each project. For it is a common experience in research, that very little progress is made if inadequate funds are spread over a large number of projects. To achieve a breakthrough it is necessary to concentrate-efforts intensively and to carry the investigation to a finish, instead of keeping it starved of funds and proceeding slowly, as and when funds become available. It is desirable therefore, that each country should concentrate on a few items, applying maximum effort to obtain quick results. At the same time a joint research fund should be created from which research grants could be given to finance projects. Similarly, the training of young scientists, economists and management experts could be undertaken jointly with greater economy and better results.

Chapter X

THE PROSPECTS AND PROJECTIONS FOR COPRA/COCONUT, 1970–75

The nature and magnitude of the future demand for coconut and coconut products, to a large extent, determine the nature of the co-operative efforts needed in this commodity. Clearly, if the future points to an increasing demand with sufficient stability, the nature of the co-operative efforts would be more in line with higher production, better marketing, etc. In contrast with this situation is the case of a stagnating or even declining demand which calls for the curtailment of production, increasing productivity, reducing costs; and putting land and other resources to other usage.

Unfortunately, the inadequacy of data does not permit a careful analysis of the future demand for this commodity. What is attempted here is a quantitative basis for a qualititative evaluation of the future demand referred to earlier in this study. A thorough analysis of the demand for this commodity has to wait until better data are made available.

The methodology adopted in this study is largely dictated by the availability of data and a considerable degree of aggregation has been unavoidable. The estimate of total demand for this commodity (world-wide) has been attempted on the basis of two separate components; (1) the estimate of the world's trade for this commodity, (2) the estimate of the domestic demand of the producing countries. The domestic demand by the producing countries has been estimated by the help of the study of the markets of the major producing countries and, that of the world's trade on the basis of the regional trade flows (see Appendix I on methodology).

The results of this exercise are in line with expectations as they are largely based on past trends (projection B). A general pattern that has emerged is that the world's trade of copra would decline while that of the coconut oil would increase by 1975. Having said that, however, the intra-regional as well as the inter-regional flows and their break downs are significant enough, both in trends and magnitudes, to warrant further elaboration.

Table X-1 shows the summary of the projections of demand for copra and coconut oil on the world-wide basis. Generally the base year has been 1967, but due to inadequacy of data (the Indonesia market), the 1962 figures are shown in the table for the sake of completeness of presentation. The situation in 1967, however, has not been much different from that of 1962, especially with regard to the trade flow and domestic demand of the major producing countries.

According to these projections, both flows, intra-regional and inter-regional trades of coconut oil, would approximately double by 1975 if the past trends continue (projection B). According to these projections, the import of coconut oil into the ECAFE region will reach the 73.0 and 94.0 thousand tons marks by 1970 and 1975 respectively. The corresponding figures for the import of coconut oil into the world (inter-regional) are 808.0 and 1046.0 thousand tons.

The break down of the inter-regional trade in coconut oil is of some interest. The import of coconut oil into American continents (North and South) would increase by a rate greater than the average for the group and would reach to 444.0 and 611.0 thousand tons by 1970 and 1975 respectively. The common market countries rank next in this respect and their import of coconut oil would increase by about the same rate as the average of the group and would reach 150.0 and 180.0 thousand tons by 1970 and 1975. The comparable figures for the Eastern European countries are 75.0 and 113.0 thousand tons marks. The only group which, according to these projections, will be importing less by 1975 are the Western European countries excluding the common market countries (see table X-3 for percentage distribution).

The copra situation, as referred to earlier, is different and a declining trend is being indicated. The intra-regional trade in copra, however, according to these projections, would decline by a faster rate as compared with its inter-regional trade counterpart; the import of copra into the ECAFE region will decline to 164.0 and 123.0 thousand tons by 1970 and 1975 and that of the inter-regional trade flows would reach the 1059.0 and 991.0 thousand tons marks by the same target dates.

The breakdown of the inter-regional trade of copra is also of some interest since the common market countries, according to these projections, will increase their importation of copra by 1975. This figure will be as large as 550.0 thousand tons by 1970 and will reach the 573.0 thousand tons mark by 1975. The import of copra by the other groups will decline, however, by different rates; the Eastern European countries' trade in copra will reach an insignificant figure

Table X.1. Projection of Demand for Copra in the World, 1970 and 1975

(Thousand metric tons)

(Copra equivalent)

	1962	1970			1975		
		A	B	C	A	B	C
1. Imports of coconut oil into ECAFE region[a]	59.8	71.31	73.18	75.10	87.95	94.32	100.96
2. Imports of coconut oil into the world excluding ECAFE region[b]	528.59	782.56	808.81	835.59	979.75	1,046.18	1,167.20
(a) Common markets	92.96	147.68	150.65	153.73	170.98	180.23	190.40
(b) Western Europe minus common markets	102.28	90.40	89.78	89.17	90.40	85.54	84.00
(c) Eastern Europe	49.68	72.53	75.43	80.06	102.26	113.09	124.90
(d) Americas	236.09	426.42	444.39	462.26	562.34	611.17	709.14
(e) Africa	24.68	29.73	29.79	29.85	30.12	30.31	30.43
(f) The rest	8.28	15.78	18.75	20.50	23.62	25.28	28.31
3. Coconut oil domestically produced and consumed by the coconut producing countries (excluding the major six)[c]	37.5	48.31	56.51	66.71	61.15	82.15	105.78
4. Coconut oil consumption by the major six	975.3	1,271.60	1,487.20	1,755.79	1,609.4	2,161.81	2,783.9
5. Imports of copra into the ECAFE region[d]	336.1	170.67	163.93	154.43	135.75	122.78	99.05
6. Imports of copra into the world excluding ECAFE region[e]	1,172.6	1,070.88	1,059.56	1,048.22	1,019.83	991.28	963.77
(a) Common markets	484.6	550.45	552.63	554.89	566.99	573.08	579.23
(b) Western Europe minus common markets	223.4	204.94	200.62	196.44	175.58	173.09	163.65
(c) Eastern Europe	20.4	1.42	1.58	1.60	1.78	1.87	1.44
(d) Americas	418.5	289.06	283.36	277.86	258.88	227.02	203.55
(e) Africa	3.7	3.9	3.82	3.60	3.71	3.62	3.15
(f) The rest	22.0	21.10	17.55	13.83	12.89	12.60	12.25
World's demand for copra	3,110.0	3,415.35	3,649.20	3,938.87	3,893.82	4,498.00	5,221.15

[a] On the basis of the country projections this component has been derived by the residual method.

[b] Rate of increase of *per capita* income: 3.8%. Projections are on the basis of *per capita* income rate of: A = 3.0% B = 4.0% C = 5.0%

[c] On the basis of 1962 figures, this component was 3.84% of the consumption of the major six countries.

[d] Rate of increase of *per capita* income: 3.8%. Projections are on the basis of *per capita* income rate of: A = 3.0% B = 4.0% C = 5.0%

[e] Rate of increase of *per capita* income: 3.3%. Projections are on the basis of *per capita* income rate of: A = 3.0% B = 4.0% C = 5.0%

Table X.2. Percentage Distribution of Projections of Demand for Copra and Coconut Oil in the World, 1970 and 1975

	1962	1970			1975		
		A	B	C	A	B	C
1. Imports of coconut oil into the ECAFE region	1.92	2.09	2.00	1.91	2.26	2.10	1.93
2. Imports of coconut oil into the world excluding the ECAFE region	16.99	22.91	22.16	21.21	25.16	23.26	22.36
3. Coconut oil domestically produced and consumed by the coconut producing countries (excluding the major six)	1.21	1.41	1.55	1.69	1.57	1.83	2.03
4. Coconut oil consumption by the major six	31.4	37.23	40.75	44.58	41.33	48.06	53.32
5. Imports of copra into the ECAFE region	10.81	5.00	4.49	4.00	3.49	2.72	1.90
6. Imports of copra into the world excluding the ECAFE region	37.70	31.35	29.03	26.61	26.19	22.04	18.46
7. Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Table X-1.

Table X.3. Percentage Distribution of Projections of Demand for Coconut Oil in the World (excluding ECAFE), 1970 and 1975

	1962	1970			1975		
		A	B	C	A	B	C
1. Common market	17.88	18.87	18.63	18.40	17.45	17.24	16.31
2. Western Europe minus common market	20.82	11.55	11.10	10.67	9.23	8.18	7.20
3. Eastern Europe	9.55	9.27	9.33	9.58	10.44	10.82	10.70
4. Americas	45.4	54.49	54.94	55.32	57.40	58.45	60.76
5. Africa	4.75	3.80	3.68	3.57	3.07	2.90	2.61
6. The rest	1.59	2.02	2.32	2.45	2.41	2.42	2.42
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Table X-1.

Table X.4. Percentage Distribution of Projection of Demand for Copra in the World (excluding ECAFE), 1970 and 1975

	1962	1970			1975		
		A	B	C	A	B	C
1. Common market	41.33	51.40	52.16	52.94	55.59	57.81	60.10
2. Western Europe minus common market	19.05	19.14	18.93	18.74	17.24	17.46	16.98
3. Eastern Europe	1.74	0.13	0.00	0.00	0.00	0.02	0.20
4. Americas	35.69	26.99	26.74	26.51	25.38	22.90	21.11
5. Africa	0.31	0.36	0.36	0.00	0.00	0.36	0.33
6. The rest	2.73	1.97	1.66	1.32	1.26	1.27	1.27
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Table X-1.

while that of the Americas will decline to 283.0 and 227.0 thousand tons in 1970 and 1975 respectively (see table X-4 for percentage distribution).

Of considerable interest are the prospects of domestic demand of the producing countries. In 1962 the domestic demand by the producing countries constituted as much as 31.6 per cent of the total demand. According to these projections this flow will gain in importance and reach the 43.3 per cent mark in 1970 and 42.20 per cent mark in 1975 (see table X-2 for percentage distribution and chart 1). The big consumers among the major six are India, Indonesia and the Philippines (see the country tables in the Appendix).

According to these projections, however, the rate of increase of domestic consumption by the major producing countries is not identical and the Philippines seems to indicate a greater domestic demand among the major six.

The total demand for copra in the world, according to these projections, will increase from 3195 thousand tons in 1967 to as much as 3649.0 thousand tons in 1970 and reach the 4498.0 thousand tons mark by 1975 (Projections B).

What lies ahead for this commodity? All indications point to the fact that if prices and the rate of substitution observed in the past continue, the demand for this commodity will increase by as much as 5-6 per cent per annum until 1975. This is not too surprising since these projections are on the basis of constant prices and in the recent past the price rise is what has brought the equilibrium of supply and demand in this commodity. In order to have some rough idea about the future trend of prices of this commodity, an estimate of the future supply of coconut has been made (see table A-I.7 in Appendix I). According to these projections which are on the optimistic side, the supply though sufficient in 1970 will fall short of demand by

1975. Under such circumstances it is expected that the price will rise.

Though it is difficult to foresee all the possible developments in this field, it is safe to say that if the past trend in supply continues, the price of this commodity will be increasing in the future. This seems to be valid even if we take note of the under-estimation of the effect of substitutes in this field which has been brought on by the inadequacy of data. An important consideration in this connection is the fact that most countries are aiming at a higher rate of growth in the future and in the ECAFE region, this desire or objective is coupled with the growth of consumer goods industries which means even a higher demand for this commodity. Under such circumstances, the projections "C" might be more representative.

In general, it is not unrealistic to say, that if the higher rate of growth is what is in the making for the world as well as for the countries in the ECAFE region, the pressure on the supply of coconut in future will be even greater than in the past. Unless the production is stepped up, a rise in price seems inevitable. The danger of a break through in the substitutes under such a situation would be quite great.

Appendix I

The Methodology for Projection of Demand and Supply of Copra/Coconut

The methodology for projection of demand and supply of copra and coconut oil in this study has been severely limited by the insufficiency of the available data and their reliability. The existing data are that of exports, imports and production of copra and coconut oil on a worldwide as well as on the major producing country basis. The proposed methodology is aimed at arriving at a rough estimate of demand for coconut oil and copra in 1970 and 1975; it specifically calls for external as well as internal demand for copra and coconut oil in the major producing countries. The global demand for copra and coconut oil has been estimated with the aid of the global demand as well as with the aid of the countries' internal demand.

1. Domestic demand: The demand for coconut oil is postulated to be a function of income, price of coconut oil and the price of close substitutes as follows:

$$C^*_{c.o} = f(Y,\ P_{c.o},\ P_s)$$

Where:

$C_{c.o}$ = *per capita* consumption of coconut oil

Y = *per capita* income

$P_{c.o}$ = Price of coconut oil (Wholesale)

P_s = Price of the close substitute (Wholesale)

This general approach has been modified in some countries. In addition to the fact that in some markets, total consumption (real terms) instead of *per capita* has been employed, additional explanatory variables such as freight rates and exports have been introduced in some markets. As much as possible, the prices have been deflated by the wholesale prices or other general deflators. Obviously in markets where a close substitute did not exist it has been omitted from the function.

2. External demand: Generally the approach adopted for this portion of the total demand is similar to that of the internal demand. That is, *per capita* exports (copra or coconut oil) is postulated to be a function of *per capita* income of the importing countries, export price and prices of the substitutes. In markets where it was difficult to identify a close substitute, the price of the competing market was introduced in an attempt to take note of the extent of the shift of the buyers from one market to another.

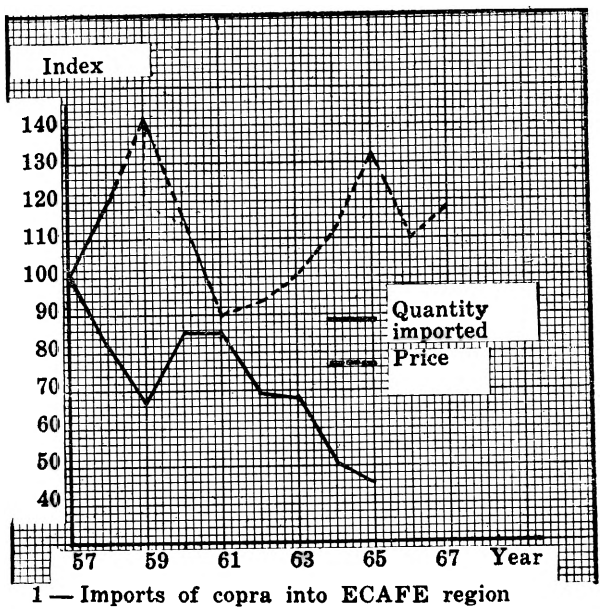
Generally price variables, especially in the export markets, were found to be quite significant. A few graphs are presented for the purpose of exposition (see Charts 1-10).

The nature of the parameters: Considering the availability of data, the results are generally satisfactory and one is tempted to refer to these coefficients as elasticities. However, a closer inspection throws considerable doubt on this premise. The following line of reasoning is presented in this connexion.

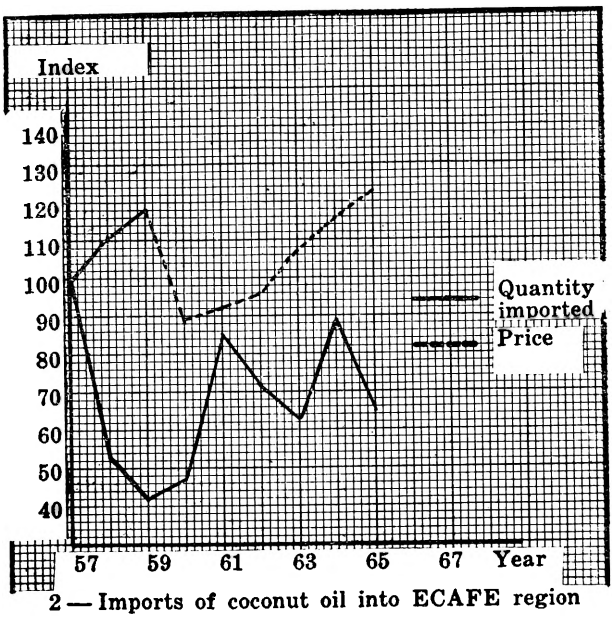
(a) It is known that in any market study, in order to estimate the structural parameters of a given market, the supply and demand should be considered simultaneously. This approach, however, has not been adopted in this study partly because of the inadequacy of the data, but primarily because it is not quite clear whether or not at this level of aggregation this method would be the appropriate approach. For instance, it is possible to visualize such a simultaneity in the soap or shampoo markets where the current price simultaneously determines the quantity supplied and demanded; but, when it is applied to the coconut shell market, it seems to lose its validity. In such a market the supply is determined by a price lag of 5 to 7 years; in fact, delay in picking or marketing in general would reduce the quality and consequently the price received by the producers. Under such circumstances, a single equation approach would seem to be more appropriate.

(b) Assuming that the above argument were valid, still there would be no assurance that the coefficients established in this study should be referred to as elasticities (price, income and cross-elasticities). As shown in figure 1, part (1), if the demand during the period under study had not shifted and the supply had varied, then there would have been a good reason to believe that the calculated coefficients represented elasticities. However, there is no assurance that such a situation had in fact prevailed, and as shown in figure 1 part (2) chances are that both demand and supply had shifted and therefore the coefficients are neither that of the demand nor of the supply.

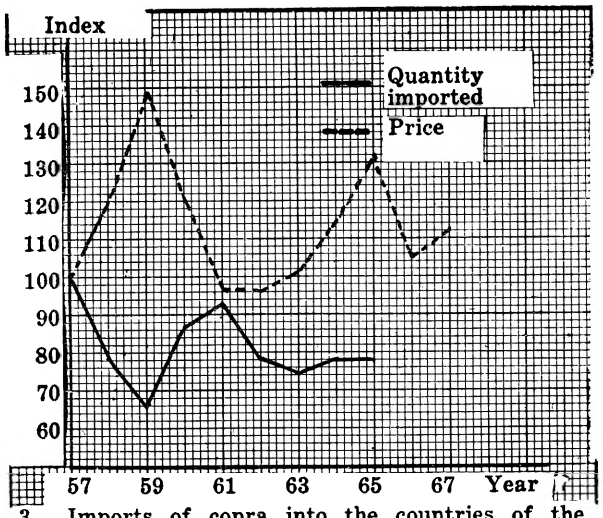
* A linear in log function which leads to constant elasticities has been adopted.



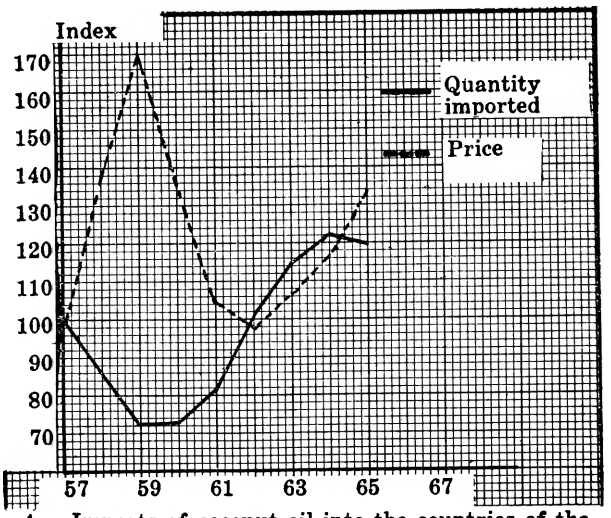
1 — Imports of copra into ECAFE region



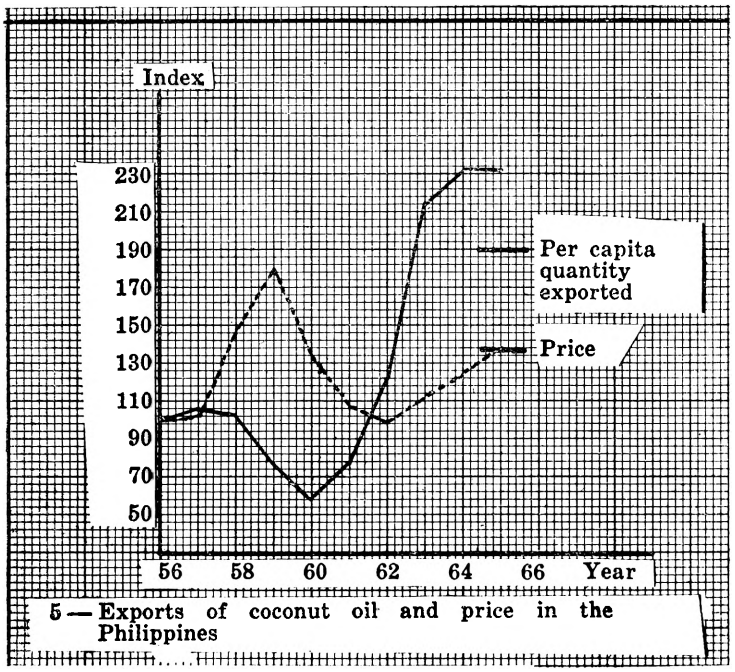
2 — Imports of coconut oil into ECAFE region



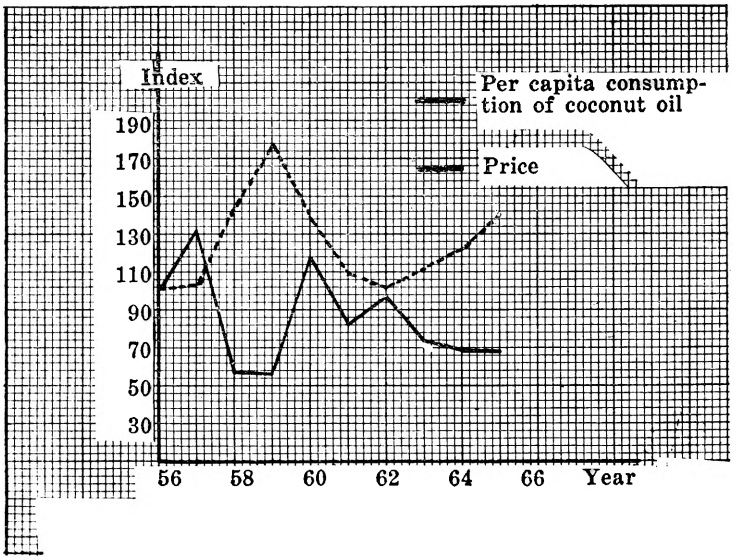
3 — Imports of copra into the countries of the world (excluding ECAFE region)



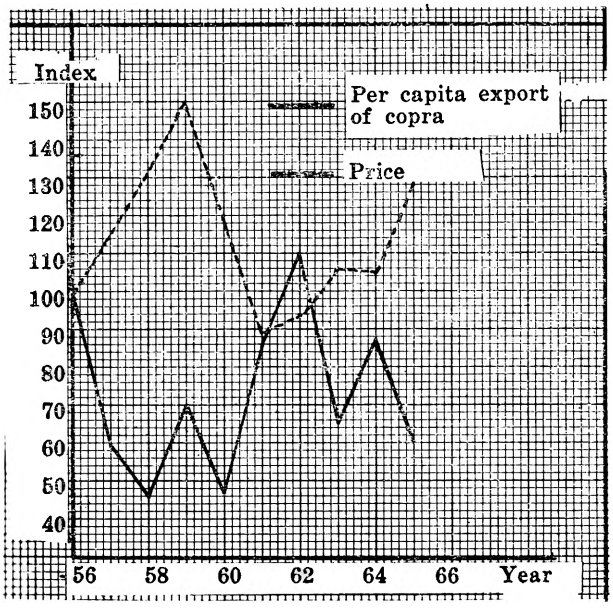
4 — Imports of coconut oil into the countries of the world (excluding ECAFE region)



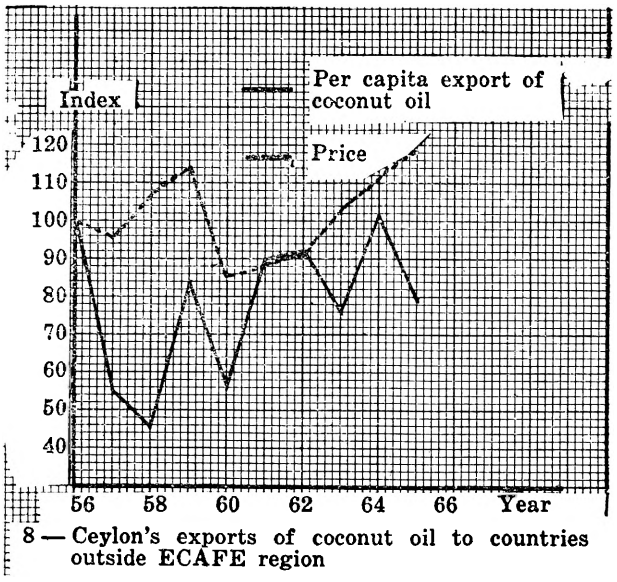
5 — Exports of coconut oil and price in the Philippines



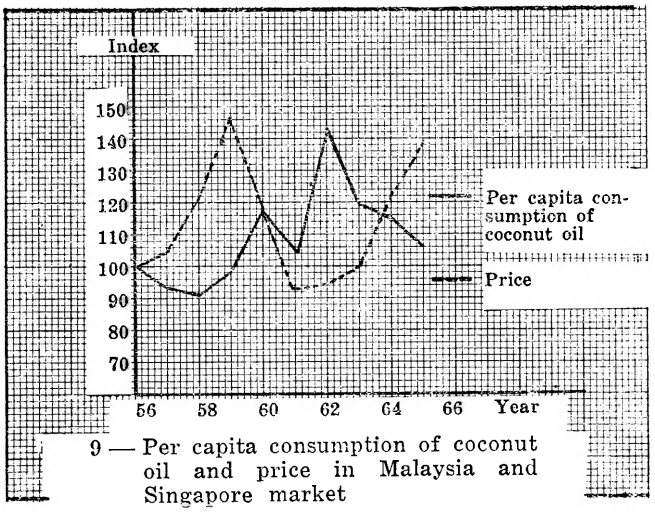
6 — Price and consumption of coconut oil in the Philippines



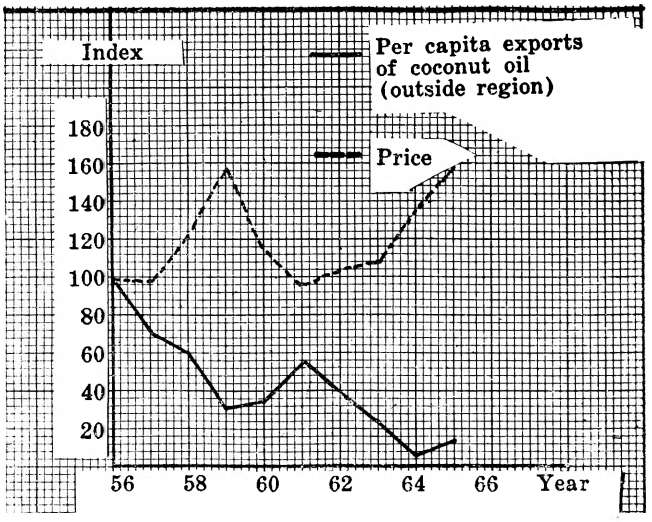
7 — Ceylon's exports of copra to ECAFE region



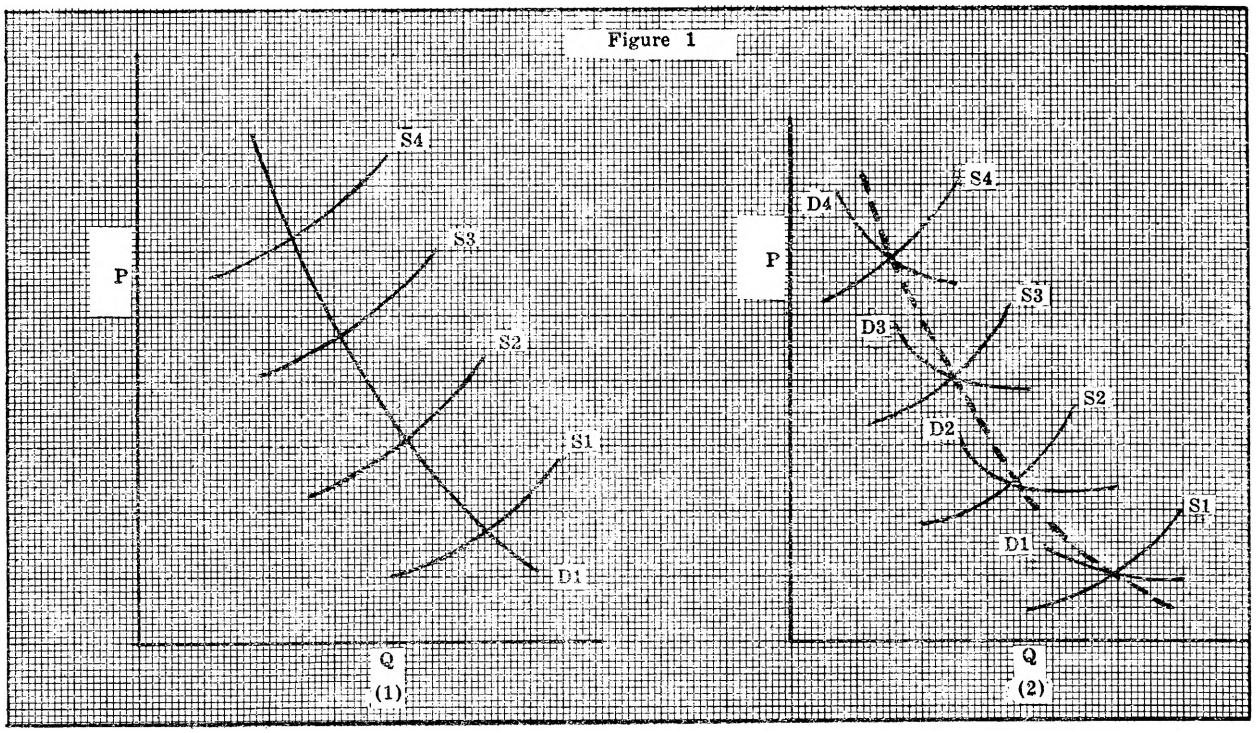
8 — Ceylon's exports of coconut oil to countries outside ECAFE region



9 — Per capita consumption of coconut oil and price in Malaysia and Singapore market



10 — Export of coconut oil from Malaysia and Singapore to countries out-side ECAFE region



(c) Apart from the above explanation, there is yet another reason why reference to elasticities should be avoided as much as possible. This is due to the hybrid nature of these coefficients. For example, in the case of coconut oil, the function relates *per capita* consumption of coconut oil to the income of the consumers, prices, etc. Now, a great portion of this demand is the demand by industry (input) while only a small portion of this total is the direct demand for coconut oil by the consumers. Even this portion generally would not reach the consumers without some processing. It is true that the incomes of the consumers are indirectly an important variable but though statistically significant, the calculated coefficients are not easily identifiable.

In spite of the above shortcomings, it is generally accepted that these alleged demand functions are suitable for projection purposes, provided that the characteristics of these projections are constantly kept in mind. The country results as well as the global demand, along with the projected values in their original units, are presented in a later section (see table A-I.1 - A-I.6).

B. Supply

Except under unusual circumstances, the long-term projection of supply is extremely difficult. This is, perhaps, a good example of an area in econometric work where considerable work needs to be done. The difficulty exists regardless of whether we are dealing with the long-term supply of a firm, an industry or a sector.

A realistic approach to the projection of the supply of coconuts should take note of the following points:

(1) acreage under cultivation

(2) trend in productivity

(3) yield per acre.

Unfortunately, data on none of the above items are readily available. A simple method, utilizing past trends, has been employed and use has been made of the regression technique as follows:

$$Q = f(t)$$

It is to be noted that the result of such a method should be considered as a first approximation and generally ought to be supplemented with additional additional information. Wherever there were reasons to believe that the past did not represent the future at all, other methods were employed (see table A-I.7 in this appendix).

World Trade in Copra and Coconut Oil

A — Copra

1. *ECAFE region*

$$\log M_{cop.1} = 11.23 - \underset{(.14)}{1.43} \log Y_1 - \underset{(.19)}{.87} \log P_1$$

$$R = .97$$

2. *Outside ECAFE region*

$$\log M_{ocp.2} = 5.67 - \underset{(.23)}{.37} \log Y_2 - \underset{(.20)}{.56} \log P_{cop.2}$$

$$R = .73$$

a) *Common Market Countries*

$$\log M_{cop.2.1} = 5.06 + \underset{(.28)}{.14} \log Y_{2.1} - \underset{(.37)}{.93} \log P_{cop.2}$$

$$R = .69$$

b) *Western Europe minus Common Market Countries*

$$\log M_{cop.2.2} = 6.91 - \underset{(.27)}{.74} \log Y_{2.2} - \underset{(.28)}{.50} \log P_{cop.2}$$

$$R = .74$$

c) *Eastern Europe and USSR*

$$\log M_{cop.2.3} = 5.62 + \underset{(1.25)}{.54} \log Y_{2.3} - \underset{(.16)}{1.32} \log P_{cop.2}$$

$$R = .35$$

d) *Americas*

$$\log M_{cop.2.4} = 5.25 - \underset{(.23)}{.69} \log Y_{2.4} - \underset{(.24)}{.12} \log P_{cop.2}$$

$R = .73$

e) *Africa*

$$\log M_{cop.2.5} = -.66 + \underset{(.61)}{.26} \log Y_{2.5} + \underset{(.73)}{.40} \log P_{cop.2}$$

$R = .23$

f) *The rest*

$$\log M_{cop.2.6} = 9.32 - \underset{(.38)}{.16} \log Y_{2.6} - \underset{(.50)}{1.69} \log P_{cop.2}$$

$R = .77$

B — Coconut Oil

1. *ECAFE region*

$$\log M_{c.o.1} = -5.39 + \underset{(.62)}{.91} \log Y_3 - \underset{(.96)}{.36} \log P_{c.o.c} + \underset{(1.26)}{1.29} \log P_{c.o.s}$$

$R = .50$

2. *Outside ECAFE region*

$$\log M_{c.o.2} = -5.69 + \underset{(.30)}{1.15} \log Y_4 - \underset{(.24)}{.76} \log P_{c.o.m} + \underset{(.54)}{1.55} \log P_{p.o.n}$$

$R = .90$

a) *Common Market Countries*

$$\log M_{c.o.2.1} = -3.36 + \underset{(.24)}{.69} \log Y_{4.1} - \underset{(.29)}{.29} \log P_{c.o.m} + \underset{(.65)}{.92} \log P_{p.o.n}$$

$R = .80$

b) *Western Europe minus Common Market Countries*

$$\log M_{c.o.2.2} = 1.77 - \underset{(.24)}{.24} \log Y_{4.2} - \underset{(.21)}{1.28} \log P_{c.o.m} + \underset{(.51)}{1.57} \log P_{p.o.s}$$

$R = .92$

c) *Eastern Europe and USSR*

$$\log M_{c.o.2.3.} = -2.82 + \underset{(.65)}{1.33} \log Y_{4.3} - \underset{(.80)}{.94} \log P_{c.o.m} + \underset{(1.92)}{1.80} \log P_{p.o.n.}$$

$R = .70$

d) *Americas*

$$\log M_{c.o.2.4.} = -7.47 + \underset{(.40)}{2.42} \log Y_{4.4} - \underset{(.34)}{.07} \log P_{c.o.m} + \underset{(.82)}{0.01} \log P_{p.o.n.}$$

$R = .92$

e) *Africa*

$$\log M_{c.o.2.5} = 4.36 + \underset{(.37)}{.06} \log Y_{4.5} - \underset{(.38)}{0.70} \log P_{c.o.m} + \underset{(.90)}{1.03} \log P_{p.o.n}$$

$R - .60$

f) *The Rest*

$$\log M_{c.o.2.6} = -19.17 + \underset{(.49)}{6.70} \log Y_{4.6} - \underset{(.68)}{3.86} \log P_{c.o.m} + \underset{(.90)}{2.48} \log P_{p.o.n.}$$

$R = .99$

Philippines

1. Coconut oil consumption

$$\log C_{c.o} = -8.91 + \underset{(3.85)}{6.74 \log Y_5} - \underset{(.73)}{2.12 \log P_{c.o.m}} + \underset{(.15)}{1.27 \log F_r} - .42 \log E_{c.o}$$

$R = .88$

2. Export of coconut oil

I. Exports to ECAFE countries is negligible

II. Exports of coconut oil (outside ECAFE region)

$$\log E_{c.o} = -10.44 + \underset{(1.80)}{5.75 \log Y_6} - \underset{(.96)}{.58 \log P_{c.o.m}} + \underset{(1.95)}{1.05 \log P_{p.o.n}}$$

$R = .84$

3. Export of copra

I. Exports of copra to ECAFE countries

A. Exports of copra to Japan

$$\log E_{1.cop} = -7.75 + \underset{(.73)}{6.39 \log Y_7} - \underset{(.98)}{2.06 \log P_{cop.m}}$$

$R = .98$

B. The rest of exports of copra

$$E_{3.cop} = 128.41 - \underset{(6.31)}{14.59\ t}$$

$R = .91$

II. Exports of copra to countries outside the ECAFE region

$$\log E_{2.cop} = 4.02 - .37 \log Y_8 - 1.10 \log P_{c.o.m} + .43 \log P_{c.o.c}$$

$R = .73$

Malaysia and Singapore

1. Consumption of coconut oil

$$\log C_{c.o.} = 2.13 + \underset{(.42)}{1.10 \log Y_9} - \underset{(.20)}{.18 \log P_{c.o.s}} - \underset{(.37)}{.99 \log P_{p.o.2}}$$

$R = .84$

2. Copra

I. ECAFE region

$$\log E_{cop.1} = -3.37 + \underset{(3.67)}{3.13 \log Y_{10}} - \underset{(3.23)}{7.22 \log P_{cop.s}} + \underset{(3.42)}{6.89 \log P_{cop.c}}$$

$R = .79$

II. Outside ECAFE region

$$\log E_{cop.2} = 9.33 - \underset{(2.82)}{2.42 \log Y_{11}} - \underset{(3.52)}{4.27 \log P_{cop.s}} + \underset{(3.62)}{3.12 \log P_{cop.c}}$$

$R = .84$

III. Imports of copra by Federation of Malaya and Singapore

$$\log M_{cop} = 17.88 - \underset{(.80)}{6.74 \log Y_{12}} - \underset{(.53)}{1.18 \log P_{cop.s}}$$

$R = .96$

3. Coconut oil

I. ECAFE region

$$\log E_{c.o1} = 8.22 - \underset{(1.29)}{7.06 \log Y_{13}} - \underset{(.77)}{.025 \log P_{c.o.s}} + 4.06 \log P_{p.o.s}$$

$$R = .94$$

II. Outside ECAFE region

$$\log E_{c.o.2} = 18.40 - 6.82 \log Y_{14} - 1.44 \log P_{c.o.s} + 57 \log P_{p.o.n}$$

$$R = .93$$

Ceylon

1. Consumption of coconut oil

$$\log C_{c.o} = - 1.00 + \underset{(.20)}{.56 \log Y_{15}} - \underset{(.35)}{.12 \log P_{c.o.c}} + \underset{(.26)}{1.07 \log F_r}$$

$$R = .92$$

2. Copra

I. ECAFE region

$$\log E_{cop.2} = 13.58 - \underset{(2.44)}{4.52 \log Y_{16}} - \underset{(1.38)}{4.07 \log P_{cop.c}} + \underset{(1.30)}{2.79 \log P_{cop.s}}$$

$$R = .83$$

II. Outside ECAFE region

$$E_{cop.1} = - 296.6 + \underset{(89.3)}{110.3\ t}$$

$$R = .62$$

3. Coconut oil

I. Outside ECAFE region

$$\log E_{c.o.1} = - 3.91 + \underset{(1.42)}{1.00 \log Y_{17}} - \underset{(.99)}{.88 \log P_{c.o.c}} + \underset{(3.88)}{2.81 \log P_{p.o.s}}$$

$$R = .71$$

II. ECAFE region

$$\log E_{c.o.} = - 1.88 + \underset{(.96)}{3.52 \log Y_{18}} - \underset{(1.43)}{1.58 \log P_{c.o.c}}$$

$$R = .93$$

Indonesia

1. Consumption of copra

$C_{cop} = .00396$ past average
$C_{cop} = .044\ t$ high
$C_{cop} = .0035\ t$ medium
$C_{cop} = .033\ t$ low

2. Exports (copra)

I. ECAFE region

$$\log E_{cop.2} = 9.22 - \underset{(1.22)}{2.52 \log Y_{19}} - \underset{(.93)}{1.76 \log P_{cop.s}} + \underset{(.88)}{.68 \log P_{cop.c}}$$

$$R = .96$$

II. Outside ECAFE region

$$\log E_{cop.1} = 15.49 - \underset{(1.55)}{4.82 \log Y_{20}} - \underset{1.10)}{3.22 \log P_{cop.c}} + \underset{(.75)}{1.31 \log P_{cop.m}}$$

$$R = .91$$

List of Variables

$M_{cop.1}$ = Imports of copra into ECAFE region

$M_{cop.2}$ = ,, ,, ,, ,, outside of ECAFE region

$M_{cop.2.1}$ = ,, ,, ,, ,, common market countries

$M_{cop.2.2}$ = ,, ,, ,, ,, western Europe minus common market countries

$M_{cop.2.3}$ = ,, ,, ,, ,, eastern Europe and USSR

$M_{cop.2.4}$ = ,, ,, ,, ,, Americas

$M_{cop.2.5}$ = ,, ,, ,, ,, Africa

$M_{cop.2.6}$ = ,, ,, ,, ,, the rest of the world

$M_{c.o.1}$ = Imports of coconut oil into ECAFE region

$M_{c.o.2}$ = ,, ,, ,, ,, ,, outside of ECAFE region

$M_{c.o.2.1}$ = ,, ,, ,, ,, ,, common market countries

$M_{c.o.2.2}$ = ,, ,, ,, ,, ,, western Europe minus common market countries

$M_{c.o.2.3}$ = ,, ,, ,, ,, ,, eastern Europe and USSR

$M_{c.o.2.4}$ = ,, ,, ,, ,, ,, Americas

$M_{c.o.2.5.}$ = ,, ,, ,, ,, ,, Africa

$M_{c.o.2.6}$ = ,, ,, ,, ,, ,, the rest of the world

Y_i = domestic income and income of the importing countries

$P_{cop.1}$ = price of copra (inter-regional trade)

$P_{cop.2}$ = price of copra (inter-regional trade)

$P_{c.o.c}$ = price of coconut oil, Colombo

$P_{c.o.s}$ = price of coconut oil, Singapore

$P_{c.o.m}$ = price of coconut oil, Manila

$P_{p.o.n}$ = price of palm oil, Nigeria

$P_{p.o.s}$ = price of palm oil, Singapore

F_r = freight rate

$E_{c.o}$ = Philippines export of coconut.

Table A-I.1. PROJECTIONS OF DEMAND FOR COPRA AND COCONUT OIL IN THE WORLD, 1970 AND 1975

(thousand metric tons)

	1962	1970			1975		
		A	B	C	A	B	C
1. Imports of coconut oil into ECAFE region[a]	38.3	45.64	46.84	48.07	56.29	60.37	64.62
2. Imports of coconut oil into the world excluding ECAFE region[b]	338.3	500.84	517.64	534.78	627.04	669.56	747.01
(a) Common markets	59.5	94.52	96.42	98.39	109.43	115.35	121.86
(b) Western Europe minus common markets	69.3	57.86	57.46	57.07	57.86	54.75	53.76
(c) Eastern Europe	31.8	46.42	48.28	51.24	65.45	72.38	79.94
(d) Americas	151.1	272.91	284.41	295.85	359.90	391.15	453.85
(e) Africa	15.8	19.03	19.07	19.11	19.28	19.40	19.48
(f) The rest	5.3	10.10	12.00	13.12	15.12	16.18	18.12
3. Coconut oil domestically produced and consumed by the coconut producing countries (excluding the major six)[c]	24.0	30.92	36.17	42.70	39.14	52.58	67.70
4. Coconut oil consumption by the major six	624.2	813.83	951.81	1,123.71	1,030.02	1,383.56	1,781.70
5. (1 + 2 + 3 + 4)	1,024.8	1,391.23	1,552.46	1,749.26	1,752.49	2,165.72	2,661.33
6. Copra equivalent	1,601.3	2,173.80	2,425.71	2,733.22	2,738.26	3,383.94	4,158.33
7. Imports of copra into ECAFE region[d]	336.1	170.67	163.93	157.43	135.73	122.78	99.05
8. Imports of copra into the world excluding ECAFE region[e]	1,172.6	1,070.88	1,059.56	1,048.22	1,019.83	991.28	963.77
(a) Common markets	484.6	550.45	552.63	554.89	566.99	573.08	579.23
(b) Western Europe minus common markets	223.4	204.94	200.62	196.44	175.58	173.09	163.65
(c) Eastern Europe	20.4	1.42	1.58	1.60	1.78	1.87	1.94
(d) Americas	418.5	289.06	283.36	277.86	258.88	277.02	203.55
(e) Africa	3.7	3.9	3.82	3.60	3.71	3.62	3.15
(f) The rest	22.0	21.10	17.55	13.83	12.89	12.60	12.25
World's demand for copra (6 + 7 + 8)	3,110.0	3,415.35	3,649.20	3,938.87	3,893.82	4,498.00	5,221.15

[a] On the basis of the country projections this component has been derived by the residual method.

[b] Rate of increase of *per capita* income: 3.8%. Projections are on the basis of *per capita* income rate of: A = 3.0% B = 4.0% C = 5.0%

[c] On the basis of 1962 figures, this component was 3.84% of the consumption of the major six countries.

[d] Rate of increase of *per capita* income: 3.8%. Projections are on the basis of *per capita* income rate of: A = 3.0% B = 4.0% C = 5.0%

[e] Rate of increase of *per capita* income: 3.3%. Projections are on the basis of *per capita* income rate of: A = 3.0% B = 4.0% C = 5.0%

Table A-I.2. PROJECTIONS OF DEMAND FOR COPRA AND COCONUT OIL IN THE PHILIPPINES UNDER SPECIFIED ASSUMPTIONS, 1970 AND 1975

(thousand metric tons)

	1962	1970			1975		
		A	B	C	A	B	C
1. Consumption of coconut oil[a]	108.8	201.7	281.3	390.6	330.1	610.7	930.6
2. Exports of coconut oil (outside region)[b]	241.4	409.3	438.4	469.9	498.4	521.9	635.2
3. (1 + 2)	350.2	611.0	719.7	860.4	828.5	1,132.6	1,565.8
4. Copra equivalent	547.2	954.7	1,124.5	1,344.4	1,294.5	1,769.7	2,446.6
5. Exports of copra (ECAFE region)[c]	45.3	10.9	26.4	30.7	5.6	12.9	18.8
6. Exports of copra (outside region)[d]	853.9	796.5	784.4	766.3	829.5	799.5	772.1
7. Total demand for copra	1,446.4	1,762.1	1,935.3	2,141.4	2,129.6	2,582.1	3,237.5

[a] The *per capita* income of the Philippines increased by 1.4 per cent during the 1956-65. Population by 3.2%. Projections are on the basis of *per capita* rate of increase of: A = 1.0% B = 2.0% C = 3.0%

[b, c] Arrived at by the residual method based on the world trade of coconut oil and copra.

[d] The *per capita* income of this group of countries increased by 2.8 per cent during the 1956-65 and population by 1.6%. Projections are made on the basis of: A = 2.0% B = 3.0% C = 4.0%

Table A-I.3. PROJECTIONS OF DEMAND FOR COPRA AND COCONUT OIL IN CEYLON UNDER SPECIFIED ASSUMPTIONS, 1970 AND 1975

(thousand metric tons)

	1962	1970			1975		
		A	B	C	A	B	C
1. Consumption of coconut oil[a]	51.2	49.60	51.00	52.40	55.40	58.10	61.60
2. Export of coconut oil (outside region)[b]	59.6	88.32	92.67	97.28	109.44	120.54	132.64
3. Export of coconut oil (ECAFE region)[c]	25.8	40.75	48.38	58.67	60.15	84.81	119.09
4. (1 + 2 + 3)	136.6	178.87	192.05	208.35	224.99	263.45	313.33
5. Copra equivalent	213.5	279.17	200.08	325.55	351.55	411.64	481.58
6. Export of copra (outside ECAFE region)[d]	10.8	8.15	8.15	8.15	11.46	11.46	11.46
7. Export of copra (ECAFE region)[e]	41.5	40.65	32.53	26.09	33.82	21.66	14.17
8. Total demand for copra	265.8	327.97	340.76	359.79	396.83	444.76	515.21

[a] The past rate of growth of GNP 4.3%. Projections on the basis of rates of growth GNP:
A = 4.0% B = 5.0% C = 6.0%

[b] The past rate of growth of *per capita* income 3.7%. Population rate: 1.35%. Projections are on the basis rates of *per capita* income:
A = 3.0% B = 4.0% C = 5.0%

[c] The past rate of growth of *per capita* income 2.4%. Population rate: 1.85%. Projections on the basis of *per capita* increase:
A = 2.0% B = 3.0% C = 4.0%

[d] As a function of time.

[e] The past rate of growth of *per capita* income 1.3%. Population rate: 1.85%. Projections on the basis of *per capita* increase:
A = 1.0% B = 2.0% C = 3.0%

Table A-I.4. PROJECTIONS OF DEMAND FOR COPRA AND COCONUT OIL IN MALAYSIA AND SINGAPORE UNDER SPECIFIED ASSUMPTIONS, 1970 AND 1975

(thousand metric tons)

	1962	1970			1975		
		A	B	C	A	B	C
1. Consumption of coconut oil[a]	63.8	77.83	82.14	86.64	101.21	112.62	123.87
2. Coconut oil imports	3.2	—	—	—	—	—	—
3. Export of coconut oil (outside region)	3.7	—	—	—	—	—	—
4. Export of coconut oil ECAFE region)	22.7	—	—	—	—	—	—
5. (1 + 3 + 4) — 2	87.0	77.83	82.14	86.64	101.21	112.62	123.87
6. Copra equivalent	136.0	121.60	128.34	135.38	158.38	175.97	193.55
7. Export of copra (outside region)	2.8	—	—	—	—	—	—
8. Export of copra (ECAFE region)	12.9	—	—	—	—	—	—
9. Import of copra	25.7	—	—	—	—	—	—
10. (6 + 7 + 8) — 9	126.0	121.60	128.34	135.38	158.14	175.97	193.55

[a] The past rate of growth of *per capita* income: 2.7%. Population rate: 3.1%. Projections are on the basis of the following rates of growth of *per capita* income:
A = 2.0% B = 3.0% C = 4.0%

Table A-I.5. Projections of Demand for Copra in Indonesia under Specified Assumptions, 1970 and 1975

(thousand metric tons)

	1962	1970			1975		
		A	B	C	A	B	C
1. Consumption of copra[a]	197.0	349.5	407.5	466.0	389.7	454.6	519.6
2. Export of copra (ECAFE region)[b] .	115.6	89.72	73.68	60.66	64.89	50.76	37.01
3. Export of copra (outside region)[c] .	60.6	18.14	12.51	8.66	8.93	4.87	2.69
Total demand for copra	373.2	457.36	493.99	535.32	463.52	510.23	559.3

[a] Projections are based on the following assumptions with regard to *per capita* consumption of copra:
A = 3.0 grams B = 3.5 grams C = 4.0 grams

[b] Projections are on the basis of *per capita* income:
A = 2.0% B = 3.0% C = 4.0%

[c] Projections are on the basis of *per capita* income:
A = 3.0% B = 4.0% C = 5.0%

Table A-I.6. The Projections of Demand for Copra in India under Specified Assumptions, 1970 and 1975

(thousand metric tons)

	1962	1970			1975		
		A	B	C	A	B	C
Consumption of copra	314.7	407.85	431.85	462.23	459.22	486.25	520.46

Projections:

A = .75 grams
B = .80 grams
C = .85 grams

Apparent consumption in the past:
.79414 grams

Table A-I.7. Projections of Supply of Copra in the World, 1970 and 1975

(thousand metric tons)

	1965	1970	1975
ECAFE region . . .	2,680	3,037	3,421
Ceylon	265.8	306	341
Federation of Malaya	126.0	150*	180*
India	266.0	289	309
Indonesia	...	600*	750*
West N. Guinea . .	3.0	3*	5*
North Borneo . . .	34.0	38	43
Philippines . . .	1,446.4	1,593	1,722
Sarawak	10.1	10	13
Thailand	...	21*	30*
Viet-Nam	25.3	27	28
Oceania	280.9	286	292
Africa	90.0	95	89
Latin America . . .	240.0	262	272
World	...	3,680	4,074

* Not based on past trend.

APPENDIX II

World Trade in Copra and Coconut Oil, 1956-1967

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Table A-II.1. Estimated production of copra of ECAFE region and other regions, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Asia	2,860	2,890	2,330	2,130	2,750	2,730	2,460	2,652	2,696	2,686	2,880	2,595
Cambodia								4.8	5.4	5.4	6.3	7.0
Ceylon	259.3	187.7	167.1	224.0	187.3	269.6	303.2	240.4	322.1	265.8	235.0	220.0
India	233.0*	226.0*	240.0	240.8	249.7	256.0	258.1	259.0	264.0	266.0	270.0	...
Indonesia	752.0	755.0*	570.0*	530.0	630.6	647.5	368.1	403.5	467.4	482.6	528.3*	...
Philippines	1,375.0	1,500.0	1,159.0	921.0	1,408.0	1,301.0	1,301.7	1,511.3	1,428.4	1,446.4	1,610.0	1,335.0
Portuguese Timor	1.2	1.3	1.8	1.3	1.7	1.7	1.4	1.0	1.0	1.0	...	...
Sabah	27.0*	22.5*	24.0*	30.0	15.0	26.0	29.0	33.0	33.0	34.0	34.0	...
Sarawak	3.5*	6.0	2.4	...	...	...	...	11.2	9.9	7.1	12.5	...
Thailand	...	24.0*	21.0*	20.0*	28.0*	19.1	19.9	20.8	21.0	23.4	...	...
Viet-Nam	17.8	26.0	24.3	25.5	26.0	26.8	29.0	25.5	24.5	25.3	22.3	22.5
West Irian	5.1	5.0	5.6	5.0	5.8	5.6	5.1	3.0	3.0	3.0	...	...
West Malaysia	156.6	132.1	110.0	127.5	178.0	165.0	136.0	139.0	116.0	126.0	130.0	138.0
Oceania	280	270	260	270	270	280	280	280	282	279	256	260
Africa	110	110	110	100	90	110	100	114	118	92	94	100
Latin America	230	230	240	220	240	270	270	276	245	242	240	240
World	3,480	3,500	2,930	2,730	3,350	3,390	3,110	3,320	3,340	3,299	3,470	3,195

Source: FAO, *Coconut Situation.*

Table A-II.2. Ceylon: Copra exports by destination, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Asia	58.4	35.2	27.6	43.1	29.6	55.1	71.5	43.7	56.8	30.8	15.3	12.7
Burma	0.5	0.1	0.1	0.4	0.9	4.9	4.8	2.7	—	—	—	—
China	—	—	—	2.7	—	10.8	3.0	—	—	—	—	—
India	57.2	34.4	27.1	38.6	27.0	35.8	59.2	37.8	51.5	27.0	11.1	8.3
Iran	0.1	0.3	0.1	0.2	0.1	—	—	—	0.2	0.3	0.3	0.1
Iraq	0.3	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.1
Pakistan	0.3	0.2	0.2	1.1	1.4	3.5	4.3	3.0	5.0	3.4	3.7	4.2
Western Europe	—	—	0.5	—	—	—	0.1	—	2.0	3.4	—	—
Eastern Europe and USSR	—	—	—	—	—	0.6	1.9	—	—	7.3	5.9	3.0
Other countries	0.3	0.1	0.2	0.2	—	0.2	—	—	0.2	—	—	0.3
World	58.7	35.3	28.3	43.3	29.6	55.9	73.5	43.8	59.0	41.5	21.2	16.0

Source: FAO, *Coconut Situation.*

Table A-II.3. CEYLON: COCONUT OIL EXPORTS BY DESTINATION, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Asia	17.7	17.2	12.9	11.4	14.7	27.6	34.9	24.8	32.2	27.0	26.8	21.9
Burma	—	—	—	0.4	2.6	4.4	4.2	1.8	10.1	2.2	0.2	—
China	—	—	2.8	0.2	—	10.3	12.2	11.6	14.7	10.8	6.6	9.5
India	9.7	7.8	3.2	1.9	—	—	5.6	1.9	0.3	0.1	—	—
Iran	4.3	5.2	3.0	4.0	3.3	1.0						
Saudi Arabia	0.1	0.1	0.1	0.1	0.2	9.1	—	0.2	0.1	0.2	0.3	0.1
Others	0.8	1.2	0.4	0.9	0.3	0.2	—	0.2	0.9	1.0	0.1	0.1
Common Market Countries	34.5	9.7	15.5	35.7	22.9	19.6	22.7	21.7	21.5	15.4	9.2	12.3
France			—	0.3	0.7	1.2	1.5	1.7	0.9	0.4	—	0.3
Germany, Fed. Rep.	4.7	—	2.3	12.4	—	2.0	3.5	1.4	2.6	1.9	0.7	2.7
Italy	19.6	6.7	7.9	14.5	16.4	11.2	11.5	12.8	13.6	10.6	5.9	7.7
Netherlands	10.2	3.0	5.3	8.5	5.8	5.2	6.2	5.8	4.3	2.5	2.6	1.6
Eastern Europe and USSR	—	1.0	1.5	4.6	2.3	7.6	18.2	12.2	26.2	20.9	31.4	19.4
USA and Canada	15.5	11.9	5.8	12.2	11.8	24.7	16.5	10.9	10.3	8.4	0.9	8.1
Other countries	18.6	15.1	9.3	6.6	4.9	13.8	11.7	12.8	29.3	16.6	5.5	5.7
World	86.3	54.9	45.0	70.5	56.6	93.3	104.0	82.4	119.4	88.3	73.8	67.4

Source: FAO, *Coconut Situation.*

Table A-II.4. MALAYSIA AND SINGAPORE: COPRA EXPORTS BY DESTINATION, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Asia	20.5	94.4	66.9	42.1	87.9	71.8	34.5	21.4	6.3	16.3	12.6	2.1
Burma	1.1	1.9	0.5	1.4	3.2	—	—	—	—	—	—	—
China	—	7.5	5.1	—	—	—	—	—	—	—	—	—
India	18.5	69.4	43.5	27.0	64.7	38.3	19.2	16.7	1.1	12.8	10.6	1.7
Iraq	0.9	2.8	2.5	2.1	3.6	3.3	2.7	1.9	0.9	0.4	—	—
Japan	—	12.3	14.7	10.9	15.7	27.9	6.1	—	—	—	—	—
Korea, Rep. of	—	—	0.5	0.7	0.1	1.2	4.1	0.7	0.5	—	0.2	0.1
Singapore								0.8	0.8	1.5	1.2	0.2
Others		0.5	0.1	—	0.6	1.1	2.4	1.3	3.0	1.6	0.6	0.1
Common Market Countries	7.4	18.6	5.2	16.3	12.8	18.4	1.9	3.6	—	—	0.3	0.1
Belgium—Luxembourg	—	6.7	—	—	2.0	7.6	0.6	—	—	—	—	—
France	0.7	—	—	—	0.8	0.5	—	—	—	—	—	—
Germany, Fed. Rep.	1.5	—	1.1	7.9	2.2	0.3	—	—	—	—	—	—
Italy	1.0	—	1.1	1.2	1.1	0.6	0.7	2.1	—	—	—	—
Netherlands	4.2	11.9	3.0	7.2	6.7	7.5	0.3	2.5	—	—	0.3	—
Eastern Europe and USSR	1.9	0.4	—	—	—	—	0.4	—	—	—	—	—
Other countries	10.2	5.1	18.0	8.3	14.2	19.0	2.5	1.6	—	—	—	—
World	40.0	118.5	90.1	66.7	114.9	109.2	38.9	26.6	6.3	16.3	12.9	2.2

Source: FAO, *Coconut Situation.*

Table A-II.5. Malaysia and Singapore: Coconut oil exports by destination, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Asia	17.2	40.6	16.6	17.5	15.2	12.2	13.4	1.0	2.4	0.5	0.3	0.7
Burma	5.0	20.3	5.1	4.9	1.7	—	1.9	—	2.1	—	—	—
China	0.5	6.6	1.0	3.0	3.8	2.7	0.6	—	—	—	—	—
Hong Kong	1.4	3.1	1.6	0.5	0.5	1.2	0.4	0.1	0.1	—	—	—
Iraq		—	0.2	0.5	0.4	0.2	—	—	—	—	—	—
India	10.3	6.8	5.0	1.1	—	0.1	—	—	—	—	—	—
Korea, Rep. of	—	0.8	0.6	0.2	0.9	0.1	—	—	—	—	—	—
Pakistan	—	0.6	0.5	1.0	1.7	1.8	1.5	0.9	0.2	0.5	0.3	0.7
Common Market Countries	47.3	29.7	29.4	11.8	9.4	20.4	3.3	5.1	0.2	0.5	1.2	2.3
Belgium—Luxembourg	—	—	—	—	—	—	—	0.2	—	—	—	0.1
France	1.5	1.5	—	0.2	0.6	1.0	—	0.2	—	—	0.1	—
Germany, Fed. Rep.	11.6	8.1	11.3	1.6	0.2	4.6	—	1.6	—	—	—	—
Italy	9.7	15.0	13.0	5.3	5.4	6.2	2.6	2.8	0.2	0.5	0.8	1.9
Netherlands	24.5	5.1	5.1	4.7	3.2	8.6	0.7	0.3	—	—	0.3	0.3
Eastern Europe and USSR	11.2	16.1	11.8	1.0	—	—	—	—	0.8	—	—	—
USA and Canada	—	—	2.4	2.8	2.1	1.2	7.7	4.2	2.2	8.3	9.6	8.3
Other countries	30.3	16.4	9.4	6.8	14.6	24.3	17.7	27.9	17.0	19.2	32.2	7.5
World	106.0	102.8	69.6	39.9	41.3	58.1	42.1	47.0	29.9	35.6	53.7	31.6*

Source: FAO, *Coconut Situation.*

* Preliminary.

Table A-II.6. Indonesia: Copra exports by destination, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Asia	204.7	223.2	157.0	109.8	150.0	159.7	117.0	—	—	—	—	—
China	37.0	2.8	—	2.0	—	10.3	14.0	—	—	—	—	—
Federation of Malaya and Singapore	118.2	192.2	142.3	89.9	116.0	118.4	80.6	—	—	—	—	—
Japan	33.0	12.2	0.4	3.2	4.6	7.9	11.9	—	—	—	—	—
Sabah	16.5	16.0	13.9	14.0	26.1	20.4	8.7	—	—	—	—	—
Sarawak	—	—	—	0.4	1.3	1.5	0.4	—	—	—	—	—
Others (difference of Asia and above countries)	—	—	0.4	0.3	2.0	1.2	1.4	—	—	—	—	—
Common Market Countries	74.7	75.6	73.3	30.7	38.8	46.0	21.3	—	—	—	—	—
Belgium—Luxembourg	2.5	0.8	—	1.0	—	9.2	1.5	—	—	—	—	—
France	11.8	—	1.8	2.4	17.1	11.6	7.6	—	—	—	—	—
Germany, Fed. Rep.	20.3	50.6	60.0	22.2	13.4	21.3	9.2	—	—	—	—	—
Italy	—	—	0.1	4.2	1.0	7.4	1.3	—	—	—	—	—
Netherlands	40.1	24.2	11.4	0.9	7.3	6.5	1.7	—	—	—	—	—
Eastern Europe and USSR	—	—	—	—	—	15.2	2.0	—	—	—	—	—
Other countries	28.0	56.2	16.3	38.8	13.2	55.7	33.4	—	—	—	—	—
World	307.4	355.0	246.6	179.3	202.0	286.6	173.7	136.5	186.1	126.6	175.0	130.0

Source: FAO, *Coconut Situation.*

Table A-II.7. PHILIPPINES[a]: COPRA EXPORTS BY DESTINATION, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Asia	26.8	39.8	42.1	32.9	43.4	33.9	16.0	30.0	35.0	45.3		
Japan	—	6.7	0.5	0.5	4.0	4.3	11.9	25.8	31.2	41.3	47.8	
Sabah	26.8	33.1	41.6	32.4	39.4	29.4	15.4	5.4	7.0	7.0	1.9	0.9
Common Market Countries	370.9	450.6	328.6	170.4	392.8	420.5	368.9					
Belgium—Luxembourg	42.7	38.7	15.5	7.5	24.1	26.2	21.2					
France	0.4	16.0	22.7	12.3	18.8	17.6	26.4					
Germany, Fed. Rep.	70.2	265.5	216.1	103.3	211.1	235.8	208.2					
Italy	9.3	3.1	4.4	2.5	6.2	3.8	10.6					
Netherlands	248.3	127.3	69.9	44.8	132.6	137.1	102.5					
Western Europe								630.5	547.7	531.6	571.5	400.4
USA	328.6	291.9	272.4	308.7	343.9	340.3	319.6	263.0	247.6	261.0	261.9	258.7
Canada	6.1	15.2	4.1	—	—	—	—					
Other countries												
World	993.1	1,020.8	861.4	656.0	999.0	946.9	828.8	955.9	852.5	859.2	908.8	763.0

Source: FAO, *Coconut Situation.*

[a] Data derived from imports into specified countries from the Philippines.

Table A-II.8. PHILIPPINES[a]: COCONUT OIL EXPORTS BY DESTINATION, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
ECAFE region	—	—	—	0.2	0.2	0.2	—					
Sabah	—	—	—	0.2	0.2	0.2	—					
Western Europe	...	8.9	0.1	0.2	0.2	0.1	—	27.9	40.8	35.0	62.4	23.1
United States	89.5	87.0	94.7	70.7	55.1	73.8	151.3	184.7	190.1	199.6	249.8	211.5
Other countries	19.4		—	—	—	—	—	—	2.3	6.8	0.9	0.3
World	108.9	95.9	94.8	71.1	55.5	74.1	151.3	212.6	233.2	241.4	313.1	234.9

Source: FAO, *Coconut Situation.*

[a] Data derived from imports into specified countries from the Philippines.

Table A-II.9. Gross imports of coconut oil into ECAFE region and other regions, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Asia		62.7	34.8	29.7	33.5	55.5	47.4	46.6	56.0	43.6	33.3	
Burma	5.5	19.4	5.3	5.5	2.7	4.2	6.1	2.7	8.8	7.6	0.5	2.0
China	0.5	6.6	3.8	3.2	3.9	13.2	12.8	12.4	14.8	10.7	6.6	...
Hong Kong	1.6	2.9	1.9	0.9	1.0	1.9	0.9	0.7	0.7	0.5	0.7	0.5
Iran		5.2	3.0	4.0	3.3	1.0	—	—	—	—	—	
Iraq	0.9	0.6	0.5	0.7	0.5	0.4	0.2	0.1	0.1	0.5	0.9	...
India	20.1	17.5	7.3	2.8	1.0	—	3.1	2.6	0.1	—	—	—
Malaya, Fed. of	1.2	1.2	1.0	1.9	2.9	3.0	1.8	2.0	1.6	1.4	1.3	0.9
Korea, Rep. of			0.8	0.6	0.2	0.9	0.1	—	—	—	—	
Sabah	—	0.1	—	0.2	0.3	0.2	0.1	0.1	0.1	—	0.1	...
Pakistan	4.3	3.2	6.2	4.7	9.2	14.3	13.1	12.7	17.3	11.7	15.7	16.0
Singapore								9.9	8.0	10.0	12.8	15.0
Others		4.8	4.1	5.0	6.0	7.1	6.1	10.5	5.0	6.0	...	
Western Europe	184.9	170.3	116.6	95.4	113.4	123.4	128.8	142.6	145.6	153.7	135.3	152.7
Eastern Europe and USSR	23.6	27.7	21.5	14.3	12.0	13.7	31.8	18.9	40.2	31.3	47.9	36.1
Americas	111.5	106.3	126.3	115.0	95.5	108.6	157.1	196.5	208.2	209.3	252.6	254.8
Africa	24.3	24.6	20.5	12.7	15.5	18.1	15.8	19.2	17.6	18.4	25.2	18.2
Oceania	—	0.2	—	0.4	0.5	0.1	0.4	0.9	0.6	—	1.1	1.0
World	383.4	385.4	315.0	262.7	264.5	308.7	377.1	426.8	470.9	481.2	407.7	411.5

Source: FAO, *Coconut Situation.*

Table A-II.10. Gross imports of copra into ECAFE region and other regions, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Asia	355.5	467.5	381.3	309.5	391.0	400.7	341.0	308.5	227.9	201.9	218.5	172.9
Burma	1.7	3.9	2.8	3.4	4.2	5.0	4.8	3.7	0.1	0.1	—	—
China	37.0	24.8	11.1	6.4	2.4	24.4	17.6	6.0	9.0	6.0	6.0	...
Hong Kong	—	—	0.4	—	—	—	0.3	—	0.9	1.6	10.9	—
India	87.9	127.3	101.1	91.4	99.4	88.5	91.8	85.5	74.9	48.7	33.8	18.0
Iraq	0.6	2.4	1.4	1.6	3.6	3.2	4.1	2.0	1.3	0.4	—	—
Israel	10.7	14.8	9.0	2.2	4.8	9.0	3.8	3.8	5.7	5.1	6.5	3.3
Japan	40.7	45.9	47.8	54.7	85.3	80.4	88.5	108.3	35.6	94.2	107.6	112.1
Pakistan	2.1	0.1	0.3	1.1	1.7	3.5	3.4	3.0	3.6	1.5	0.4	...
Sabah	43.6	48.9	55.5	46.5	65.5	50.0	28.8	22.5	17.6	10.1	10.5	2.1
West Malaysia	123.8	191.4	146.9	94.1	120.4	127.3	83.8	22.2	0.9	1.1	2.1	3.3
Singapore								43.1	22.8	26.8	26.7	15.0
Others	7.4	8.0	5.0	8.0	3.7	9.4	14.1	8.4	5.5	6.3	14.0	19.0
Common Market Countries						574.6	484.6	510.5	571.1	532.0	618.9	509.6
Belgium—Luxembourg	32.9	44.5	18.9	10.7	29.1	36.8	24.5	26.5	34.8	34.7	43.5	40.0
France	90.6	105.3	95.7	76.1	86.2	89.2	96.5	89.6	100.8	96.0	96.7	85.9
Germany, Fed. Rep.	298.5	336.9	248.7	163.2	249.8	269.2	232.6	241.1	278.9	242.5	289.0	237.9
Italy	9.8	17.0	14.8	12.8	21.8	19.4	23.7	27.5	24.4	22.8	22.0	19.4
Netherlands	138.1	180.0	96.1	59.0	148.7	160.0	107.3	125.8	132.2	136.0	167.7	125.9
Eastern Europe and USSR		3.6	10.2	6.5	—	24.5	20.4	22.2	16.8	8.4	7.6	8.0
North America	314.6	307.6	277.9	320.1	353.8	349.6	324.2	236.3	248.3	278.9	243.3	276.6
Latin America	106.6	96.8	101.5	76.3	81.8	73.5	79.3	52.4	64.7	51.9	60.3	35.3
Oceania	37.7	46.3	36.6	35.5	35.7	36.3	37.1	39.7	35.7	31.6	37.2	32.9
Africa	4.7	3.6	4.2	4.1	4.0	4.4	3.7	1.8	4.1	4.0	6.1	4.2
World	1,709.9	1,960.0	1,565.1	1,298.8	1,698.9	1,783.1	1,528.7	1,444.9	1,416.9	1,357.7	1,451.2	1,256.3

Source: FAO, *Coconut Situation.*

Table A-II.11. The position of the Exporting Countries of Copra in ECAFE Region, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
						(ECAFE region)						
Ceylon	58.1	35.0	27.5	43.0	29.4	55.0	71.3	43.5	56.7	30.7	15.1	12.6
Federation of Malaya and Singapore	19.6	91.1	64.3	40.0	83.7	67.4	29.4	17.4	1.6	12.8	10.8	1.8
Indonesia	204.7	223.2	156.6	109.5	148.0	158.5	115.6	...	...	...	...	...
Philippines	26.8	39.8	42.1	32.9	43.4	33.9	16.0	30.0	35.0	45.3	...	...
Total	309.2	389.1	290.5	225.4	304.5	314.8	232.3	...	...	...	...	...
						(Outside ECAFE region)						
Ceylon	0.6	0.3	0.8	0.3	0.2	0.9	2.2	0.3	2.3	10.8	6.1	3.4
Federation of Malaya and Singapore	20.4	27.4	25.8	26.7	31.2	41.8	9.5	8.4	3.9	2.0	0.9	0.2
Indonesia	102.7	131.8	90.0	69.8	54.0	128.1	58.1	...	...	...	...	...
Philippines	966.3	981.0	819.3	623.1	955.6	913.0	812.8	925.9	817.5	813.9	...	...
Total	1,090.0	1,140.5	935.9	719.9	1,041.0	1,083.8	882.6	...	...	...	...	...

Source: FAO, *Coconut Situation.*

Table A-II.12. The Position of the Exporting Countries of Coconut Oil in ECAFE Region, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
						(ECAFE region)						
Ceylon	16.8	15.9	12.4	10.4	14.2	18.3	34.9	24.4	31.2	25.8	26.4	21.7
Federation of Malaya and Singapore	17.2	38.2	13.8	10.7	8.6	5.9	4.4	1.0	2.4	0.5	0.3	0.7
Philippines	—	—	—	0.2	0.2	0.2	—	—	—	—	—	—
Total	34.0	54.1	26.2	21.3	23.0	24.4	39.3	25.4	33.6	26.3	26.7	22.4
						(Outside ECAFE region)						
Ceylon	69.5	39.0	32.6	60.1	42.4	32.0	69.1	58.0	88.2	62.5	47.4	45.7
Federation of Malaya and Singapore	88.8	64.6	55.8	29.2	32.7	52.2	37.7	21.2	5.8	11.3	15.0	17.3
Philippines	108.9	95.9	94.8	69.9	55.3	73.9	151.3	212.6	233.2	241.4	313.1	234.9
Total	276.2	199.5	183.2	159.2	130.4	198.1	258.1	291.8	327.2	315.2	275.5	297.9

Source: FAO, *Coconut Situation.*

Table A-II.13. The Position of the Exporting Countries in ECAFE Region in the World Trade of Copra, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
1. Imports of copra into ECAFE countries	374.5	488.6	402.5	333.2	414.6	415.4	356.1	334.0	251.1	221.7	235.2	183.5
2. Supplied by ECAFE countries	309.2	389.1	290.5	225.4	304.5	314.8	232.3	...	...	...	...	...
3. (1 — 2)	65.3	99.5	112.0	107.8	110.1	100.6	123.6	...	...	...	...	...
4. Imports of copra into the rest of the world (excluding ECAFE countries)	1,335.4	1,471.4	1,162.6	965.6	1,284.3	1,367.7	1,172.6	1,110.9	1,165.8	1,136.0	1,216.0	1,072.8
5. Supplied by ECAFE countries	1,090.0	1,140.5	935.9	719.9	1,041.0	1,083.8	882.6	...	...	...	...	...
6. (4 — 5)	245.4	330.9	226.7	245.7	243.3	283.9	290.0	...	...	...	...	...
7. Total world imports of copra	1,709.9	1,960.0	1,565.1	1,298.8	1,698.9	1,783.1	1,528.7	1,444.9	1,416.9	1,357.7	1,451.2	1,256.3
8. Supplied by ECAFE countries	1,399.2	1,529.6	1,226.4	945.3	1,345.5	1,398.6	1,114.9	...	...	...	...	...
9. (7 — 8)	310.7	430.4	338.7	353.5	353.4	384.5	413.8	...	...	...	...	...

Source: FAO, *Coconut Situation.*

Table A-II.14. The Position of the Exporting Countries in ECAFE Region in the World Trade of Coconut Oil, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
1. Imports of coconut oil into ECAFE countries	38.2	55.9	29.3	24.2	25.1	38.8	38.3	45.0	52.0	42.0	38.8	42.1
2. Supplied by ECAFE countries	34.0	54.1	26.2	21.3	23.0	24.4	393.3	25.4	33.6	26.3	26.7	22.4
3. (1 — 2)	4.2	1.8	3.1	2.9	2.1	14.4	6.1	19.6	18.4	15.7	12.1	19.7
4. Imports of coconut oil into the rest of the world (excluding ECAFE countries)	345.2	329.5	285.7	238.5	239.4	269.9	338.8	381.8	418.9	439.2	368.9	369.4
5. Supplied by ECAFE countries	267.2	199.5	183.2	159.2	130.4	198.1	258.1	291.8	327.2	315.2	375.5	297.9
6. (4 — 5)	78.0	130.0	102.5	79.3	109.0	71.8	80.7	90.0	91.7	124.0		71.5
7. Total world import of coconut oil	383.4	385.4	315.0	262.7	264.5	308.7	377.1	426.8	470.9	481.2	407.7	411.5
8. Supplied by ECAFE countries	301.2	253.6	209.4	180.5	153.4	222.5	297.4	317.2	360.8	341.5	402.2	...
9. (7 — 8)	82.2	131.8	105.6	82.2	111.1	86.2	79.7	109.6	110.1	139.7	5.5	...

Source: FAO, *Coconut Situation.*

Table A-II.15. Production, Imports, Exports and Apparent Consumption of Copra and Coconut Oil of Exporting Countries in Developing ECAFE Region, 1956-1967

(1,000 metric tons)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Philippines												
1. Copra production	1,375.0	1,500.0	1,159.0	921.0	1,408.0	1,301.0	1,301.7	1,511.3	1,428.4	1,446.4	1,610.0	1,335.0
2. Copra exports	933.0	1,020.8	861.4	656.0	999.0	946.9	828.8	955.9	862.5	859.2	908.8	763.0
3. (1—2) Copra consumption	382.0	479.2	297.6	265.0	409.0	354.1	472.9	555.4	575.9	587.2	701.2	572.0
4. Coconut oil production	244.5	306.7	190.5	169.6	261.8	226.6	302.7	355.4	368.6	375.8	448.8	366.1
5. Coconut oil exports	108.9	95.9	94.8	71.1	55.5	74.1	151.3	212.6	233.2	241.4	313.1	234.9
6. (4—5) Coconut oil consumption	135.6	210.8	95.7	98.5	206.3	152.5	151.4	142.8	135.4	134.4	135.7	131.2
7. (6 : 4)	0.55	0.69	0.50	0.58	0.79	0.67	0.50	0.40	0.37	0.36	0.30	0.36
Malaysia and Singapore												
1. Copra production	156.6	132.1	110.0	127.5	178.0	165.0	136.0	139.0	116.7	126.0	130.0	138.0
2. Exports of copra	40.0	118.5	90.1	66.7	114.9	109.2	38.9	26.6	6.3	16.3	12.9	2.2
3. Imports of copra	123.8	191.4	146.9	94.1	120.4	127.3	83.8	65.3	23.7	27.9	28.8	18.8
4. Consumption of copra	240.4	205.0	166.8	154.9	183.5	183.1	180.9	177.7	133.4	137.6	145.9	154.6
5. Coconut oil production	153.9	131.2	106.8	99.1	117.4	117.2	115.8	113.7	85.4	88.1	93.4	98.9
6. Coconut oil exports	106.0	102.8	69.6	39.9	41.3	58.1	42.1	22.2	8.2	11.8	15.3	18.0
7. Coconut oil imports	1.2	1.2	1.0	1.9	2.9	3.0	1.8	11.9	9.6	11.4	14.1	15.9
8. Coconut oil consumption	49.1	29.6	38.2	61.1	79.0	62.1	75.5	103.4	86.8	87.7	92.2	96.8
9. (8 : 5)	0.32	0.23	0.36	0.61	0.67	0.53	0.65	0.91	0.65	1.00	0.99	0.98
Ceylon												
1. Copra production	259.3	187.7	167.1	224.0	187.3	269.6	303.2	240.4	322.1	265.8	235.0	220.0
2. Copra exports	58.7	35.3	28.3	43.3	29.6	55.9	73.5	43.8	59.0	41.5	21.2	16.0
3. Copra consumption	200.6	152.4	138.8	180.7	157.7	213.7	229.7	196.6	263.1	224.3	213.8	204.0
4. Coconut oil production	128.4	97.5	88.8	115.6	100.9	136.8	147.0	125.9	168.4	143.6	136.9	130.6
5. Coconut oil exports	86.3	54.9	45.0	70.5	56.6	93.3	104.0	82.4	119.4	88.3	73.8	67.4
6. Coconut oil consumption	42.1	42.6	43.8	45.1	44.3	43.5	43.0	43.5	49.0	55.3	63.1	63.2
7. (6 : 4)	0.33	0.44	0.49	0.39	0.44	0.32	0.29	0.35	0.29	0.39	0.46	0.48
Indonesia												
1. Copra production	752.0	755.0	570.0	530.0	630.6	647.5	368.1	403.5	467.4	482.6	528.3	...
2. Copra exports	307.4	355.0	246.6	179.3	202.0	286.6	173.7	136.5	186.1	126.6	175.0	130.0
3. Copra consumption	444.6	400.0	323.4	350.7	428.6	360.9	194.4	267.0	281.3	356.0	353.3	...
4. (3 : 1)	0.59	0.53	0.57	0.66	0.68	0.56	0.53	0.66	0.60	0.74	0.67	...

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