

UNITED NATIONS

A line drawing of four industrial smokestacks of varying heights, with wavy lines representing smoke or steam rising from them. The drawing is located on the left side of the cover.

asian
industrial
development
news

NO. 2

1967

NOTE TO CONTRIBUTORS

From 1968 onwards, it is proposed to publish the *Asian Industrial Development News* more frequently, providing information on industrial investment, progress on implementation of industrial programmes, industrial projects, and current information on industrial investigations and feasibility studies. Coverage will be given to technological aspects such as process and product research, research on raw material utilization, information on research studies and developments in the field of industrial standards.

The *News* will provide current information on market opportunities with data on imports and exports, particularly of manufactured and semi-manufactured products including evaluations of the development potential of such trade. Information pertaining to trade agreements, industrial aid schemes and bilateral agreements will also be provided.

It is intended that the *News* will be a source of up-to-date information on all techno-economic aspects of industry; and, while serving as a forum for the exchange of experience in the field of industrial development, research and studies, that it will provide economic information designed to assist the development and planning of industry on a mutually advantageous basis.

The *News* will also contain information on those activities of the United Nations and its specialized agencies that have specific relevance to industry.

In addition to the regular publication, special bulletins on the technical and economic aspects of industrial development will be published. These will be concerned with specific projects, sectors of related industry, industrial programming and management etc. The selection of special issues will be based on projects relevant to current trends in industrial development, including commercial or economic matters relevant to industry.

All persons, agencies and other bodies are welcome to contribute articles and industrial information to the *News*. Particularly, professional and technical personnel, research institutes, universities and other public or private institutions interested in industrial matters are invited to do so. Articles, research documents and studies and other information should be signed and sent in duplicate to the *Asian Industrial Development News*, c/o ECAFE secretariat, Industries Division, Sala Santitham, Bangkok, Thailand. Contributions to the December issue should reach this office by 31 October 1967 at the latest. The editorial staff of the *News*, while not taking responsibility for the opinions or views expressed in the articles, reserve the right to edit any contribution. Articles which are not published will not be returned.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of the frontiers of any country or territory.

ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST
Bangkok, Thailand

ASIAN INDUSTRIAL DEVELOPMENT COUNCIL

ASIAN INDUSTRIAL DEVELOPMENT NEWS

- **Brief survey of industry, 1966**
- **Regional news in brief**
- **Asian Industrial Development Council**
- **Articles — Prospects for industrial exports**
 - **Industrial integration among developing countries**
 - **Man-made fibre industry — ECAFE region**



UNITED NATIONS

New York, 1967

No. 2, 1967

E/CN.11/792

UNITED NATIONS PUBLICATION

Sales No.: 67.II.F.5

Price: US\$1.50 or equivalent in other currencies

FOREWORD

With this publication we make available to our readers the second issue of the *Asian Industrial Development News*¹. Preparations are now being made for the third issue. Starting with 1968, the *News* will be published more frequently. At the same time, special issues on techno-economic aspects mainly in the form of articles will be made available.

We are in communication with the Governments of the member countries for the purpose of obtaining current information on development trends. The benefits to be derived from a wider diffusion of information and exchange of experience cannot be over-emphasized. Particularly in the field of technology, manufacturing processes, and research on the utilization of indigenous raw materials, such exchanges and the knowledge of changes taking place would lead the policy-makers and technicians of the developing countries to a better and beneficial appreciation of the problems involved in the race to reduce the technological gap.

There is yet another aspect in which the *News* could prove to be of tremendous assistance. In the field of industrial economics, of plant sizes, economics of location, management and commercial data on both prices and trends of commodity markets and export prospects, there is a need for a wider exchange of information, which is particularly relevant in the context of regional co-operation and the drive towards increasing exports of manufactures and semi-manufactures.

This issue contains three articles dealing with (1) prospects for industrial exports, and measures for their increased production and trade, with special reference to ECAFE developing countries; (2) industrial integration among developing countries; and (3) development of the man-made fibre industry in the ECAFE region. All three articles are based on papers prepared by the ECAFE secretariat.

¹ The first issue was published in 1965 under the title, 'Industrial Development in Asia and the Far East'.

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Part I

NEWS IN BRIEF

BRIEF SURVEY OF INDUSTRY, 1966

A review of the progress and development in industry during 1966 was presented to the Economic Commission for Asia and the Far East in the *Economic Survey of Asia and the Far East* for 1966 by the secretariat of ECAFE, at the twenty-third session of the Commission held at Tokyo on 3-17 April 1967.

Trends in 1966

The *Survey* pointed out that there had been a drop in the rate of growth of industrial production for the region as a whole in 1966. The index of industrial production for the first three quarters of 1966 rose by 5.6% over the corresponding period in 1965, whereas the increase during the same period in 1965 was 10.2%.

This drop was mainly due to the slowing down of industrial growth in India, which accounted for about half the total output in the developing ECAFE region.

However, in those countries with a more developed industrial sector the following favourable developments were noted:—

- a) An increase in labour productivity,
- b) An increase in the share of exports in the form of manufactures, and
- c) Domestic processing of a larger volume of indigenous raw materials.

The general circumstances which contributed to the deceleration of growth were considered to have been:—

- a) Stagnation of agricultural production,
- b) Shortage of foreign exchange for imports of raw materials and service facilities, and
- c) Limited scope in the field of import substitution for expansion in view of the small domestic markets.

The *Survey* urged that, "...for greater industrial development of the developing ECAFE region, there should be, at least for the time being, a greater inflow of foreign capital to eliminate the most severe constraints of foreign exchange, and better harmonization of industrial plans within the region with a view to creating complimentary patterns of production and increasing intra-regional trade flows of manufactures.

Such industrial development would also make exports of manufactured goods to the rest of the world possible in the long run".¹

Country-Wise Evaluation

While substantial industrial growth rates were recorded in Afghanistan, China (Taiwan), the Republic of Korea, Singapore and Thailand, where rates of over 10% were reached over that of the previous year, in Ceylon, Pakistan, Philippines, and Hong Kong, the rates of growth achieved were more or less moderate for developing countries. The percentage rates in the latter countries ranged from over 4% to about 10%. The rates of growth in Burma, India, Indonesia, Laos and Nepal lagged behind considerably, ranging between 1% and 4%. Apart from the general decline in the rates of growth for the region as a whole, in comparison with the average rates achieved in the recent past, these facts also reveal an unhealthy feature of unevenness in growth rates among the different countries of the region.

The buoyancy of growth in both China (Taiwan) and the Republic of Korea has been attributed mainly to the war in Viet-Nam. In Singapore, industrial production in 1966 was expected to have reached \$M1,400 million, a 27% increase over the 1965 level of production, and this was largely due to improved relations with Indonesia. Afghanistan recorded a production level of 55 million metres of textiles, a 19% increase over that of 1965, and consequently also increased its production of vegetable oil from 3,000 tons in 1964/65, to 5,000 tons by 1965/66. Mining of coal and salt increased by 30%. Thailand's 20% increase in the manufacturing sector was mainly attributed to the construction boom which contributed to a phenomenal increase in the demand for cement and building materials, in contrast to the difficulties faced by the sugar industry and the drop in production in this sector by as much as 16%.

In the second group of countries in which there was a moderately satisfactory rate of growth, faster growth was hampered mainly by such factors as market limitations and inadequacy of foreign exchange. The Philippines recorded higher production both in mining and manufacturing than in the previous year, and this

¹ ECAFE, *Economic Survey of Asia and the Far East*, 1966, p. II-58.

was largely attributed to the relaxation of credit, control of smuggling and also to the higher prices fetched by copper. In Ceylon, the prospects of higher growth rates were curbed by the rationing of foreign exchange, the scarcity of which resulted in industries operating at an average of 70% of capacity. There was, however, a marked improvement in the production of cement, cotton textiles, paper and ceramics, besides the mining industries such as salt, ilmenite and graphite which have been in a state of depression during the recent past. Pakistan continued to maintain a steady growth of 4.5% as in the previous year. Apart from the improvements recorded in such items as chemicals, sugar, cigarettes and safety matches, the production of jute and iron ore showed increases of 42% and 24% respectively. Jute production reached 416,000 tons, while the mining of new iron deposits enabled production to go up from 23,000 tons in 1965 to 28,000 tons in 1966. Hong Kong, which depends to a large extent on exports suffered from restrictions imposed upon its exports of textiles. Despite this, exports increased by 7%. Increased production was recorded in electronics goods, plastic flowers, toys and utensils.

In the third group of countries, India showed an increase of only 1%. This was due mainly to the stagnation in the agricultural sector and to the foreign exchange crisis. Among the hardest hit were the

textile and the fertilizer industries. In Indonesia, the problems of hyper-inflation and balance of payments difficulties afflicted the entire economy and industry continued to operate at considerably reduced capacities. The textile industry operated at between 20 and 30% of capacity. The acute shortage of foreign exchange has been one of the contributory factors to this depressed state of the economy. Burma's industrial index showed an increase of 2.4%. The value of 1965/66 production increased to 4,350 million kyats, over half of which came from food processing. Nepal and Laos have somewhat small industrial bases and increases in production were not significant.

Development trends of important commodities

In evaluating the growth rates of important commodities, the *Survey* has taken into consideration ten items. Production of coal, tin in concentrates, iron ore, vegetable oils and cement had higher growth rates than the annual average increase for 1960/65. The rate of growth in respect of iron ore is more than double that of 1965. Whereas there was a negligible drop in the production of crude petroleum, a very substantial drop was recorded in cotton yarn; from a 3% annual average increase between 1960 and 1965, production in fact dropped by 6.0%. Slower rates of growth occurred in the production of crude steel, paper and to some extent in electricity.

Table 1

ECAFE COUNTRIES: COUNTRY PERCENTAGE SHARE OF PRODUCTION OF SELECTED INDUSTRIAL PRODUCTS, 1966

	Iron ore	Coal	Veg. oils	Paper ^c	Crude petroleum	Cotton yarn	Cement	Tin-in-concentrates	Crude steel	Electricity
Brunei					3.1					
Burma					0.4	0.2	0.2	0.6		0.1
Ceylon			4.8 ^b				0.1			0.1
China (Taiwan)		3.0	1.5	2.9		2.7	4.2		0.5	2.1
Hong Kong	0.4					6.5	0.4			0.9
India	46.6	40.3	23.5	7.0	2.4	46.5	18.0		12.0	10.5
Indonesia		0.3	12.1		18.9		0.7	14.4		0.5
Iran					73.9		1.3			0.5
Korea, Rep. of	2.0	6.2		1.0		3.3	2.7		0.4	1.1
Laos								0.5		
Malaysia (West)	19.4		11.8				1.3	62.0		0.7
Pakistan		0.7 ^a	5.6	1.6	0.4	11.4	2.9			1.4
Philippines	4.0		22.0			0.4	2.6			1.3
Singapore			1.2							0.3
Thailand	2.1			0.3			2.1	18.6		0.4
Viet-Nam, Rep. of						0.4				0.2
Australia	18.6	19.2		2.0	0.3	1.3	6.5	3.1	10.3	12.3
Japan	6.9	29.7	17.5	80.7	0.5	27.3	55.5	0.8	76.9	64.1
New Zealand		0.4		4.3			1.4			3.5

Source: United Nations, *Monthly Bulletin of Statistics*, and national publications.

^a Including lignite.

^b Export figures only.

^c Paper excluding paper board. For India, printing and writing; Rep. of Korea, Australia and New Zealand, newsprint; Pakistan, newsprint, printing other than newsprint and writing; Japan, foreign style.

Table 2

ECAFE REGION^a: SELECTED INDUSTRIAL OUTPUTS IN 1965 AND GROWTH RATES IN 1960-65 AND 1966 (1,000 TONS)

	Production 1965	Growth rate	
		Annual average 1960-65	1966 ^b over 1965
Coal	166,724	3.8	5.1
Crude petroleum	126,479	9.8	9.5
Tin in concentrates	104	2.4	3.7
Iron ore	36,024	7.3	15.3
Cotton yarn	2,017	3.0	-6.0
Vegetable oils	1,808	6.6	7.3
Crude steel	53,516	12.7	7.4
Cement	58,913	8.3	11.2
Paper	4,611	8.6	6.8
Electricity (million kWh)	300,094	10.9	10.1

Source: United Nations, *Monthly Bulletin of Statistics*, and national publications.

^a In general, the statistics cover all countries of the ECAFE region except mainland China, Mongolia and Nepal. In some cases, other small producing countries are also omitted because of lack of data.

^b Annual rates based on monthly figures available.

It will be observed that, apart from the exploitation of mineral resources, where production depends upon a country's exploitable resources, the production of such items as paper, cotton yarn, cement and crude steel, is concentrated in the developed countries of the region. In regard to paper, cement and crude steel, 80.7%, 55.5% and 76.9%, respectively of the region's total output is accounted for by Japan. Production of cotton yarn in India amounted to 46.5% of the total output of the region. Table 1 gives a general picture of the concentration of production in specific countries.

Some characteristics of development

In an examination of the basic characteristics of development, the *Survey* observes that:—

1. There has been a large expansion of the manufacturing sector;
2. The export of manufactured products has been increasing;
3. A greater degree of processing of indigenous raw materials has been achieved;
4. Labour productivity has risen;
5. Because of foreign exchange limitations, there has been idle production capacity in most of the developing ECAFE countries.

Table 3

SELECTED ECAFE COUNTRIES: CONTRIBUTION OF MINING AND MANUFACTURING TO THE NET DOMESTIC PRODUCT

Country	Year	Mining	Manu- facturing
<i>Developing ECAFE</i>			
Burma	1960	0.9	12.8
	1964	1.0	15.0
Cambodia	1960	← 8.2 →	
	1963	← 9.0 →	
Ceylon	1960	0.1	4.2
	1964	0.1	5.4
China (Taiwan)	1960	2.2	18.3
	1964	1.8	20.6
India	1960	1.1	15.4 ^a
	1964	1.1	15.7 ^a
Indonesia	1960	3.1	12.2
	1965	3.1	11.8
Iran	1959	0.2	25.1
	1963	0.2	29.4
Korea, Rep. of	1960	2.4	12.0
	1965	3.2	15.7
Malaysia (West)	1960	5.9	8.7
	1963	5.8	9.4
Pakistan	1960	0.2	9.6
	1965	0.3	11.6
Philippines	1960	1.6	15.8
	1965	1.5	16.9
Thailand	1960	0.4	11.5
	1965	0.3	11.4
Viet-Nam, Rep. of ...	1960	1.4	11.6
	1964	1.6	13.5
<i>Developed ECAFE</i>			
Australia	1960	1.8	28.5
	1963	1.6	27.8
Japan	1960	1.6	29.0
	1965	1.1	28.5

Source: United Nations, *Yearbook of National Accounts Statistics*, and national publications.

^a Including construction.

Note: The original estimates of production by industrial origin are gross domestic product at market prices for Burma, Cambodia and Thailand; gross domestic product at factor cost for Ceylon, China (Taiwan), Republic of Korea, Malaysia (West) and Australia; net domestic product at factor cost for India, Indonesia, Pakistan, Republic of Viet-Nam and Japan; national income for the Philippines; and gross national product at factor cost for Iran.

With the exception of Indonesia and the Republic of Viet-Nam, the other countries of the region experienced an increase in the contribution of the manufacturing sector to the net domestic product. In the Republic of Korea and Thailand, the growth rates of both mining and manufacture increased; mining increased at a higher rate than manufacturing and consequently its contribution to the net domestic product was much higher. This was particularly notable in the case of the Republic of Korea. Notable expansions in the manufacturing sectors were observed in the Republic of Korea, China (Taiwan) and Iran.

Idle capacity

Idle capacity can arise as a result of two factors. Under normal circumstances, it can result from changes in consumer preferences to competitive products or restriction of the total demand. On the other hand, idle capacity may exist as a result of the non-availability of foreign exchange for the purchase of essential components, spare parts and other *service facilities* and basically from the non-availability of foreign exchange for the purchase of raw materials. *The report* observes that in Australia, China (Taiwan) and the Philippines, the main reason for the existence of idle capacity lay in changes in consumer demand, but in the developing countries of the ECAFE region as a whole, capacity operation was inhibited considerably by the lack of foreign exchange.

It would therefore appear that the main factor hampering the attainment of higher rates of growth in industry has been the non-availability of foreign exchange. This situation not only contributes to a waste of existing capital resources but also creates considerable difficulties in connexion with domestic supplies, which in turn acts as a drag upon the other sectors of the economy. In order to achieve satisfactory rates of growth in industrial production, steps should therefore be taken not merely to ration foreign exchange by priority allocation of resources but to obtain the maximum foreign exchange resources necessary for the fullest utilization of capacity. This is particularly important in view of the fact that most of the developing countries within the region have, in the recent past, concentrated their investments on import-substituting industries.

Processing of indigenous raw materials

The report of the secretariat stresses the importance of processing indigenous raw materials particularly in view of its impact upon the share of manufactured exports in total exports. As demonstrated by the progress achieved by China (Taiwan), where in-

creasing exports of processed agricultural products earned US\$144 million in 1965 and US\$75 million during the first half of 1966, and in the Philippines, where exports of plywood and veneer in 1964/65 registered increases of 27% and 22% respectively, a significant impact in external markets can be made in this manner. Thailand began exporting tin metal in September 1965. The Government of Thailand has taken steps to encourage tin processing within the country and it is expected that all future exports of tin will be in the form of the metal.

Labour Productivity in industry

In an evaluation of productivity in relation to mining and manufacturing, *the review* comments upon the increases that have been taken place in some countries of the region. It observes that the highest increases in productivity have been recorded in the mining sector. In India, the average annual growth of labour productivity in mining has been more than twice that achieved in manufacturing. In China (Taiwan), the rate of increase of productivity in manufacturing in 1966, although less than the 1960-1965 average, was 4%, and in mining 5.8%. In the Philippines, the rate of increase was 4% in both mining and manufacturing. In Japan, labour productivity in the mining sector has almost doubled in five years while the increase in 1966 for manufacturing was 7%.

Export of manufactures

During the past decade, reasonable advances have been made by the countries of the ECAFE region in exports of manufactures and semi-manufactures, although the impact made by the total volume of such exports in comparison to total exports was negligible. As shown in table 4, the percentage of manufactured exports to total exports in many countries was less than 10%. In Hong Kong, the percentage was as much as 93%, almost equal to the total volume of manufactured exports of India.

It has become increasingly evident that the countries of the ECAFE region have reached a stage of industrialization when exports of manufactures and semi-manufactures need to be given high priority. External factors, such as the changing pattern of international trade, as well as internal factors, such as balance of payments problems, which are directly related to the adverse terms of trade, and technological considerations which determine economies of scale, indicate that without progress in exports of manufactures and semi-manufactures, further development of industry and in fact of individual economies would be greatly inhibited.

Table 4

SELECTED ECAFE COUNTRIES: EXPORTS OF MANUFACTURED PRODUCTS, 1964

Country	Percentage of manu- factured exports to total exports	Value of manufactured exports ^a	Value of total exports ^b
<i>Developing ECAFE</i>		(US\$1,000)	
Hong Kong (domestic product)	92.7	717,905	774,833
Korea, Rep. of	49.2	58,363	118,650
India	45.5	784,497	1,725,441
China (Taiwan)	39.5	171,404	433,806
Singapore	35.5	321,126	905,473
Pakistan	31.2	154,034	493,906
Malaysia	28.2	305,617	1,084,182
Malaysia (West)	(32.9)	(298,998)	(908,436)
Sabah	(5.7)	(4,798)	(84,866)
Sarawak	(2.0)	(1,821)	(90,880)
Afghanistan	12.9	9,103	70,685
Laos	6.2	55	889
Philippines	6.1	42,485	739,954
Iran	3.5	44,472	1,253,528
Thailand	2.7	15,622	574,924
Western Samoa	2.1	147	6,926
Ceylon	1.2	4,805	386,730
Viet-Nam, Rep. of	0.8	408	48,460
Cambodia	0.6	509	87,520
Brunei	0.1	25	59,414
Total developing ECAFE	30.0	2,633,577	8,765,321
<i>Developed ECAFE</i>			
Japan	91.6	6,112,164	6,673,728
Australia	16.5	500,234	3,036,041
New Zealand	4.5	47,700	1,065,172
Total developed ECAFE	61.8	6,660,098	10,774,941

Source: United Nations, *Foreign Trade Statistics of Asia and the Far East*, 1964.

^a Including SITC sections 5-9.

^b Including SITC sections 0-9.

REGIONAL NEWS IN BRIEF

Despite the setback in the pace of industrial growth in 1966, information now available indicates a renewed upsurge in 1967. Specific mention should be made of the developments taking place in heavy industries, particularly iron and steel and chemicals. In the field of chemicals, a chemical fertilizer industry is of considerable significance to the region and we discuss below some developments that are taking place in this field as well. These developments should, within the next few years, create a marked qualitative change in the structure of growth as well.

With the commissioning of several new iron and steel plants, particularly among the smaller non-traditional steel producers, and the projected starting up or expansion of several others, steel production within the ECAFE region enters a new phase.

In New Castle, *Australia*, a new 50-ton BOF and continuous casting plant is expected to start production this year, while the 100,000 T/Y blast furnace at Port Kembla Steel Works will be on stream in 1968. In *Ceylon*, the first stage (rolling mill) of the integrated iron and steel mill at Aturugiriya, 17 miles southwest of Colombo, with a 100,000 T/Y capacity was commissioned in March this year. The 12,000 T/Y wire products unit, a subsidiary of the integrated mill, also

started production simultaneously. In *China (Taiwan)*, the first stage of the projected 1 million T/Y iron and steel works (estimated to cost US\$300-350 million) is under serious consideration. The first stage production capacity is to be 400,000-500,000 T/Y. *India's* production of iron and steel, which increased from 1.5 million T/Y in 1955 to 9 million T/Y in 1965 will be further boosted and by the end of the Fourth Plan (1970/71) will have a capacity of 14.8 million T/Y. Production in 1970/71 is expected to reach 12 million tons. India is planning for diversification with increased production of plates, sheets and coils. The *Iranian* Government's contract with the USSR provides for a 1.2 million T/Y ingot iron rolling mill at a total cost of approximately US\$300 million. The first stage, 500,000 - 600,000 T/Y crude steel, is expected to be on stream by 1969, and the second by 1971. In the *Republic of Korea*, the Incheon Iron Works is to be expanded by a second stage production line, which when completed will increase crude steel output by 350,000 T/Y. The first stage (the rolling mill) of the *Malaysian* two-stage integrated mill commenced production in early September. This is a joint Malaysian-Japanese enterprise and the total capital cost is expected to reach about US\$82 million. First stage production is to be 63,000 T/Y of crude steel. The second stage is expected to be completed in early 1968, and production will increase to 120,000 T/Y. *Pakistan* is examin-

ing a proposal for a 1.5 million ton mill, blast furnace with oxygen converters, to be set up at Kalabogh. The first stage provides for 500,000 T/Y of crude steel. A decision is expected this year. In the meantime the 150,000 T/Y Chittagong mill was commissioned in May and expansion to 250,000 T/Y is to commence shortly. In the *Philippines*, the first stage of the first integrated iron and steel plant (the Iligin Integrated Steel Mills) is expected to be completed by 1968, with a capacity of 200,000 T/Y of crude steel. The second stage will be completed by 1970/71 when production is expected to increase to 250,000 T/Y. In *New Zealand* work has commenced on the first, £56 million, integrated iron and steel mill (New Zealand Steel Corp. Ltd.). The first stage provides for 190,000 T/Y of crude steel to be increased in four stages to 600,000 T/Y crude steel.

The completion of these schemes would result in a major breakthrough in the structural content of Asia's drive towards rapid industrialization. Recent data have shown that the ECAFE region's production of iron and steel was only 11 per cent of the world's production of iron and steel and that 90 per cent of this was accounted for by Japan, India and Australia. Yet, consumption of crude steel between 1958 and 1963 rose by as much as 70 per cent. The direct and indirect steel imports of the region stood in 1962 at \$4,514 million.

In the field of chemicals, nitrogenous fertilizers continue to occupy a predominant position in the Asian economic scene. Asia's production increased from 1,096,000 tons N in 1959/60 to 1,990,000 tons N in 1964/65, an increase of over 81%. Despite the increase in production however, imports into Asia continued to rise; 588,000 tons of nitrogenous fertilizers were imported in 1959/60, and 860,000 tons in 1964/65. The total world trade in nitrogenous fertilizers which stood at 3.5 million tons N in 1964/65 recorded a 6% increase in 1964/65 in contrast to the 12% increase in output, indicating that much of the production had been consumed domestically.¹

Along with the continuous increase in the world capacity, demand still maintains an edge over supply, with Asia being the second largest importer. Available estimates² indicate that there was a 14% increase in the world's nitrogenous fertilizer trade in 1965/66, total exports reaching 3.95 million tons N of which ammonium sulphate increased by 18% to 1.3 million tons N while exports of urea reached almost a million tons N. Exports during the first half of 1966/67 showed an increase of 9% over the first half of 1965/66, and present trade trends indicate that the world supply position will tend to become tighter during 1967.

¹ *Fertilizers, an Annual Review of World Production, Consumption and Trade*, 1965, FAO.

² *Nitrogen*, November/December 1966.

In the midst of these developments, however, an encouraging feature is the increased emphasis now being placed by several of the Asian countries on the production of chemical fertilizers. In *Australia* plans have been finalized for three new plants, two in Queensland, the Mount Morgan-Grace project and a joint project in Brisbane, and the other in Sydney, New South Wales. The Mount Morgan-Grace project is expected to cost about \$A15.6 million and the Brisbane project \$A40 million. In *Ceylon* a State Fertilizer Manufacturing Corporation has been set up to implement the Government's decision to set up a 300,000 ton per annum ammonium sulphate/urea fertilizer complex. The plant is to be set up close to the petroleum refinery about 10 miles from Colombo. In *India* plans have been finalized for establishing two new plants, one of which is an extension to the already existing fertilizer plant at Sindri by the addition of a new plant. This new naphtha reforming plant is estimated to cost US\$60 million, and will have a capacity of 200,000 tons per annum of NH₃ and 340,000 tons per annum of urea; it is expected to be on stream by 1970. The other, which is to be established in Maharashtra State and to be commissioned within three years, will have a capacity of 200 tons per day of ammonium chloride. In the *Republic of Korea*, the second five-year plan (1967-1971) gives considerable importance to the chemical fertilizer industry and the value of production is expected to increase by 431%. The 1965 production of nitrogenous fertilizer (urea) amounted to 75,000 tons N. During this year three other plants will be completed with a total of 144,000 tons N, apart from other chemical fertilizers. By 1971 the total output of nitrogen will increase to 374,000 tons per annum of nitrogen. The plan further anticipates that by the end of 1967, the entire domestic requirements of urea will be met from local production. In *Iran* plans have been finalized for a US\$170 million fertilizer complex (costs include construction of pipeline for gas and docks) intended to produce 1000 tons per day NH₃, 500 tons per day urea and 450 tons per day of diammonium phosphate and triple superphosphate. In *Pakistan*, apart from the two new schemes at Chittagong and Mari for 32,000 tons per annum of triple superphosphate and 170,000 tons per annum of urea respectively, and the extension of Daudkhel (40,000 tons ammonium sulphate per annum), nine new plants are to be set up during the third five-year plan (1965-1970). Six of these plants are to be completed during 1967/68, one in 1968/69 and the other two during 1969/70. During 1967/68 the production of urea alone is expected to increase by 513,000 tons per annum. The total production by the end of the plan period is estimated to reach 2,500,000 tons in terms of ammonium sulphate.

Country Notes

Afghanistan: Industry to receive greater attention in the Third Five-Year Plan. The Third Five-Year Plan of Afghanistan commencing 1967/68 lays

high priority on the development of the cotton textile industry. Although private investment in industry is beset with problems such as shortage of domestic savings, lack of technical skills and absence of suitable credit institutions, the plan envisages fulfilment of the expected targets of investment.

Among the new projects on which work has started are the fertilizer plant, an edible oils plant, a pre-fabricated housing unit and a bicycle assembly plant.

Ceylon: *Major schemes come into maturity.* Ceylon's integrated steel plant, and the hardware and rubber tyre and tube factories began commercial operations in March 1967. The steel rolling mill has a capacity of 100,000 T/Y and its associate wire drawing and production unit 12,000 T/Y. The hardware tools plant will produce agricultural tools, and engineers' and carpenters' tools. The tyre plant has a capacity of 350,000 tyres and tubes. Contracts were signed with ENI of Italy for the installation of a 1.76 million ton throughput petroleum refinery and with the German Democratic Republic for an integrated textile mill with 113,000 spindles. The former will come on stream in 1969 and the latter will start operations in early 1969.

China (Taiwan): *Priorities for mining and heavy industry.* Apart from the projected 1 million T/Y steel mill, China is to pay special attention to the development of the machinery industry. An extensive programme for increasing the mining of coal is to be undertaken and proposals for new mining centres will involve an expenditure of over US\$ 11 million. The country's potential coal production has been estimated at approximately 1.8 million T/Y. A new glass factory has come into operation.

Hong Kong: *Exports of manufactures to reach a new high.* Hong Kong, which is already one of the leading members of the ECFAE region in the export of manufactures, is expected to increase its exports by 10 per cent during 1967 to reach US\$2,000 million. Despite the difficulties experienced by the imposition of quotas, Hong Kong's cotton textile industry will receive a new boost when during this year the spindleage will be increased to 742,416. In 1967, there will be a marked increase in the production of garments and plastic goods, cotton weaving, wool knitting and transistor radio assembly.

Iran: *Industry to be diversified.* Although Iran's industrial growth rate averaged 11% during 1965 and 1966, the need to widen the industrial base has become imperative on account of an over-dependence upon oil resources, which have become the main support of the Iranian economy.

The new programme of investment including the large steel mill, an aluminium plant, whose capacity is now being expanded to 45,000 T/Y, a heavy duty pipe manufacturing plant, a tractor plant, a telecommunications equipment plant and petrochemical and fertilizer plants, now under construction, and the projected work on turbo-generators and electronic components will, it has been estimated, involve an investment of around US\$1,500 million during the next few years.

The programme of investment in the private sector includes under the major projects category a rolling mill of 250,000 T/Y capacity, diesel engines, glass and viscose rayon.

Republic of Korea: *Second Five-Year Plan emphasis on heavy industry.* The Republic of Korea is placing considerable emphasis upon heavy industries in its Second Five-Year Plan, which ends in 1971. The Plan provides for substantial investments in chemicals, machine building and the iron and steel industry. The country has made considerable progress recently in its exports of manufactures and semi-manufactures and by 1967 it is expected that exports of manufactures will reach a new high of US\$230 million. Serious steps are being taken to improve marketing techniques.

Malaysia: *Industrial estate for heavy industry.* Malaysia is to open a second industrial estate at Batu Tiga where The Government has set aside 300 acres for development. Batu Tiga, which is close to Port Swettenham, has already attracted considerable interest from motor assembly firms throughout the world. Proposals have also been received for manufacture of motor accessories and bicycles.

The Chemical Company of Malaysia, in partnership with ICI, have opened up a US\$ 17 million fertilizer/chlorine plant at Padang Jawa 17 miles from Kuala Lumpur. The capacity of the plant is 200,000 T/Y and is based on ammonia by-products. It has been estimated that there will be a US\$7 million saving in foreign exchange.

Considerable interest has been evoked by the discovery of commercially exportable copper deposits in the Mamut area (Sabah). The Government is at present considering the various applications that have been made and it is expected that investment in this mining would exceed US\$100 million.

Thailand: *Substantial increase in mining and manufacturing.* Assessments made at the end of the 1961-1966 National Economic Development Plan showed that manufacturing and mining had contributed 14.2 per cent to the gross domestic product.

Tin mining continued to receive greater attention particularly after the setting up of the smelting plant at Phuket in 1965 with a smelting capacity of 27,000 T/Y. A survey of iron ore undertaken jointly by the Department of Mineral Resources and Krupps of the Federal Republic of Germany has resulted in the discovery of approximately 6 million tons in Lopburi. These investigations are being continued.

THE ASIAN INDUSTRIAL DEVELOPMENT COUNCIL

Functions

The establishment of the Asian Industrial Development Council is a significant step towards achieving the objectives of industrial integration within the broad framework of regional co-operation. For several years, member countries of the ECAFE region have not only expressed the desire for such co-operation but some have in fact taken an initiative to set up facilities for sub-regional co-operation. The necessity for such co-operation, particularly in the field of industry has been adequately demonstrated by the inadequacy of industrial policies based on import substitution to meet the requirements of a faster rate of industrial growth and by the universality of technology, research and economies of scale of industrial enterprises.

A discussion of the various aspects of industrial integration among developing countries is contained in an article presented in this issue. We give below, in broad outline, the functions, composition and procedures as well as a summary of steps already taken by the Council during the two meetings which have been held.

The main function of the Council is to examine industrial development programmes of the member countries and to set out procedures for project integration. Perspectives of project integration involve not merely an examination of existing proposals but also a widening of the scope of individual enterprise towards a mutually beneficial process of harmonization. Through the Council's various specialized bodies, agreed industrial sectors will be subject to technical and economic evaluations against the background of regional markets. Such work will involve a continuous study of country programmes in order to identify projects for pooling of markets to achieve economies of scale.

Apart from this the Council will also take appropriate steps to assist member countries in the preparation of industrial feasibility studies, implementation of projects, selection and provision of expertise, co-ordination of assistance with other United Nations agencies in training and financing.

Composition

The Council consists of a nominee from each regional member and associate member country of the Commission. The chairman and the first and second vice-chairmen are elected by the Council to serve for a period of one year.

The Council is assisted by an advisory group consisting of nine members. The members of the advisory group consist of outstanding experts in industry provided by ECAFE member countries within and outside the region. While the advisory group is elected from nominations made by the Governments to serve for a period of one year, the Council will also be assisted by "action groups" established on an *ad hoc* basis from time to time to study and report to the Council on specific problems pertaining to industry.

The Council itself will remain the decision-making and implementing authority, while the work of the advisory group will be primarily that of preliminary economic analysis. It will advise on all matters within its competence referred to it by the Council, including the conducting of feasibility studies on projects on which there has been broad initial agreement among the Governments and also feasibility studies in respect of national schemes for which there are requests from individual governments. The advisory group may also, if requested by any member countries or a group of countries, examine national industrial development plans, and give advice with a view to:

- (i) isolating possible areas of conflict and promoting harmonization;
- (ii) avoiding such conflict or wastage of resources;
- (iii) providing the widest possible market for the products of the proposed undertakings, for the common benefit of all the countries concerned.

Apart from this the advisory group, if requested by the Council, will:

- (a) make specific recommendations to the Council on measures for the early achievement of sub-regional or regional co-operation in industrial development;
- (b) suggest measures for obtaining and utilizing financial and technical assistance for the planning and implementation of projects, including preparation of applications for such assistance from multilateral, regional and other resources;
- (c) bring to the attention of the Council or of its chairman such matters as it considers appropriate and related to its main functions.

The advisory group will meet twice a year. It will make its report to the Council and elect its own chairman and vice-chairmen.

The chairman of the Council has also the authority to set up *ad hoc* action groups at the request of Governments of member countries concerned and in consultation with the Executive Secretary to assist in the implementation of specific industrial projects. Experts for such action groups will be appointed with the concurrence of the participating countries and will be drawn from all regions of the world. When the Council is not in session the responsibilities of the chairman are:

- (a) To represent the Council in matters dealing with industrial development in the ECAFE region;
- (b) To consider and assist in obtaining any assistance requested by the action groups or the countries concerned for the planning and implementation of appropriate projects; and
- (c) To review periodically the work of the advisory group and give necessary directions regarding its programme of work.

Meetings — first meeting

The first meeting of the Asian Industrial Development Council was held from 2 to 7 September 1966. At this meeting the Council discussed the implications of the great diversity which prevailed among the member countries of the region in respect of size, population, resources, development, history, culture and political background. It noted that 87 per cent of the total population (1.7 billion) of the region was concentrated in five countries and the remaining 13 per cent in 19 countries. It was felt that in these circumstances economic co-operation and harmonization of industrial development plans was of considerable importance in particular to the smaller countries of the region.

The Council discussed the many fields in which regional collaboration could be established, for example, by the establishment of joint institutions for training and research, joint industrial enterprises and by the establishment of plans for the development of areas or groups of countries. It was also observed that certain important steps in this direction had already

been taken within the region by the establishment of the Asian Development Bank, the Mekong project, Association of Southeast Asia, the Regional Co-operation for Development, etc. It concluded that "... a practical approach would be to strive for and achieve co-ordination of as many individual projects in developing areas and industrial sectors as possible, while at the same time keeping full harmonization as the ultimate objective."

An important aspect of such collaboration was the need to establish a continuous exchange of information between the countries of the region. Such an exchange of information could best be set up on the basis of providing maximum publicity to individual industrial plans, research, market prospects, development of new processes and products etc. It was felt that the ECAFE secretariat should work out a system by which wide publicity could be given to these aspects, for the mutual benefit of all regional member countries.

At the meeting, member countries submitted suggestions pertaining to industrial projects which could be taken up for co-operative implementation. It was agreed that these projects be listed and steps taken to follow through by means of economic studies and technical feasibility surveys in order to establish correct procedures for the selection of projects on the basis of economic, commercial and technical considerations relating to the entire region as a whole. It was agreed that, on completion of these preliminary studies, detailed techno-economic studies should be undertaken. These studies should cover such aspects as siting, product mixes, processes, raw material resources and other aspects which were relevant for decision-making. Finally, steps should also be taken for the preparation of detailed engineering reports on the selected projects. On completion of these studies steps would be taken to finalize agreements on the form and method of financing the projects.

On the conclusion of its deliberations at the first meeting, the Council agreed that the following projects should be taken up for detailed examination. These projects were based on the information provided by the delegates present at the Council meeting.

<i>Projects</i>	<i>Countries principally interested</i>	<i>Remarks</i>
1. Forestry products industries, including pulp and paper	Laos, and Republic of Viet-Nam	Australia, New Zealand and Thailand have indicated willingness to co-operate.
2. — do —	Philippines	Particularly interested in utilization of residue and waste primarily for conversion into pulping materials to be exported to interested ECAFE countries.
3. Fertilizers based on natural gas: ammonia and urea	Brunei, Singapore	Australia has expressed interest in this project. The Republic of Viet-Nam and Thailand are interested in importing ammonia for fertilizer manufacture.

<i>Projects</i>	<i>Countries principally interested</i>	<i>Remarks</i>
4. — do —	Iran	Iran has indicated availability of surplus gas and willingness to consider proposals for joint ventures for their utilization.
5. Liquefied gas: LNG and LPG	Brunei, Singapore	Iran has also indicated availability of gas for liquefaction.
6. Alumina	Brunei, China (Taiwan) and Singapore	Based on Australian or Malaysian bauxite or Philippine aluminous laterite; Brunei gas and China (Taiwan) caustic soda. The Republic of Korea is interested in obtaining mineral raw materials from southeast Asia.
7. Silica industries, including ferro-silicon	Brunei, Singapore	
8. Integrated iron and steel plants	Laos, Philippines, Thailand and Republic of Viet-Nam	Thailand has requested further detailed feasibility study. The Republic of Korea is interested in obtaining coal and iron ore from southeast Asia.
9. Engineering industries, including manufacture of agricultural machinery (including dairy plants)	Laos, Philippines, Republic of Viet-Nam	Australia and New Zealand have expressed readiness to co-operate. The Philippines is considering offer of joint venture in farm tractors manufacture.
10. Mineral based industries viz. beneficiation of phosphate rocks, aluminous laterite, etc.	Philippines	China (Taiwan) has expressed interest in this project concerning both minerals. The Philippines is willing to consider proposals for the exploitation of newly discovered aluminous laterite.
11. Methanol	Brunei, Thailand	Based on Brunei or Iranian gas.

The Council also noted the following offers of assistance for training specialists:

— The Government of New Zealand offered expert services and training facilities in forestry and forest-based industries and dairy and milk treatment plants.

— The Government of India offered expert services and training facilities in iron and steel, fertilizer, food processing, leather and leather products, pulp and paper and engineering industries.

— The Government of the Republic of China offered ten fellowships during 1967 for training at the Taiwan Metal Industries Development Centre.

— The Government of Singapore offered to provide know-how in the building industry, industrial estate development, both operation and industrial research and training.

— The Government of the Philippines offered to serve as the host country for the establishment of regional plant for iron and steel making.

The Council agreed that offers should be examined so that they could be taken up for consideration at its next session.

Second meeting

The second meeting of the Council was held in February 1967. At this session the following new projects were included in the list of regional projects to be further investigated.

<i>Country</i>	<i>Projects</i>	<i>Remarks</i>
Brunei	Carbon black	Invites interested participants on a joint venture basis.
	Caprolactam/DMT	— do —
China (Taiwan)	Caprolactam/DMT	Willing to enter into market-sharing venture on reciprocal basis for these petrochemicals.
	Acrylonitrile	Willing to expand production capacity to share production with interested countries.
	Styrene	Willing to expand production capacity to share production with interested countries.
	Ethylene dichloride	— do —
	Carbon black	Willing to obtain supply of this chemical from those countries which are prepared to share production of the above chemicals.
	Ethyl acetate	— do —
Iran	Refinery	For establishment in interested countries.

<i>Country</i>	<i>Projects</i>	<i>Remarks</i>
	Sulphuric acid	This plant will have a production capacity of 500,000 tons/year and is expected to be in operation in mid-1969.
	Phosphoric acid	The production capacity of this plant is 150,000 tons/year. It is expected to be in operation in mid-1969. Establishment of conversion plants in interested countries will be considered.
	Super triple phosphate	The production capacity of this plant is 142,000 tons/year. Expected date of operation mid-1969.
	or	
	Di-ammonium phosphate	The production capacity of this plant is 100,000 tons/year. Expected date of operation mid-1969.
	LPG	A total of 45,000 barrels per day will be available by the end of 1969.
	Carbon Black	A plant with a capacity of 15,000 tons will be established to produce all types; 10,000 tons is earmarked for marketing in the ECAFE region. The expected production date is the end of 1969.
	Anti-knock compounds (TEL and TML)	Under study for early implementation.
	Ethylene	This plant will go into operation in 1970.
	Ethanol	-- do --
	Aluminium	This plant with a production capacity of 45,000 tons per year will go into operation in 1969. Willing to consider selling aluminium on a barter basis.
	Tractor manufacture	Available for equity participation.
Indonesia	Fertilizer	To undertake feasibility study.
	Forest-based industry	In support of New Zealand's proposal.
	Iron and steel industry	In support of the Philippines offer mentioned in paragraph 25 with special attention to research and development of laterite and iron sand.
Korea, Republic of	Ceramics project	Joint ventures invited.
Laos	Aluminium	Based on bauxite in south Laos and hydroelectric potential of Laos.
	Urea/cyanamide	Based on availability of hydroelectric power in the Mekong Basin.
Nepal	Karnali project	Joint development of cheap source of hydroelectric power.
	Forest industries	In support of the proposal of New Zealand.
	Fertilizers	Interested in feasibility study.
	Textiles (jute and cotton)	-- do --
	Agriculture-based industries	-- do --
Philippines	Forestry products Utilization of waste and residue	Feasibility study completed. Requested assistance in exploring ways and means of financing by the Asian Development Bank.
	Agricultural power tillers	-- do --
	Development of phosphate rocks for fertilizer manufacture	To undertake feasibility study. India has expressed interest in the scheme for development on beneficiation of phosphate rocks.
Viet-Nam, Republic of	Integrated iron and steel plant	Request for a feasibility study to be undertaken at an early date.
	Pulp and paper industry	-- do --
	Silica industry	-- do --

The Council decided to set up action groups in consultation with the countries concerned and to undertake comprehensive studies in respect of these projects. In the pursuit of these studies, the Council recommended that steps should be taken to explore the possibilities of obtaining support from other United Nations organizations such as UNIDO, the Asian Development Bank and the developed countries themselves.

The Council recommended that studies pertaining to forest-based industries should include industries based on fibre materials similar to wood, such as bamboo and bagasse; and, that in the preparation of the reports, the following considerations be taken into account:

- (i) Current developments and proposals in forestry and in forest-based industries;
- (ii) Present potential resources of raw materials, including afforestation programmes;
- (iii) Present and projected demand in the countries, sub-regions, regions and world;
- (iv) Choice of techniques for the exploitation or processing of forest-based industries;
- (v) Requirements of capital; labour (at various levels of skill); management; materials and other factors, including reference to the foreign exchange required;
- (vi) Infrastructural requirements and requirements from other sectors (including, for example, power, construction, transport, chemicals and research);
- (vii) Probable costs and prices, showing alternatives where there is a choice of techniques of exploitation or processing;
- (viii) Marketing arrangements within the region or sub-region and possibilities of export within and beyond the region;
- (ix) Availability of entrepreneur(s) to undertake the project(s).

In consideration of the proposal made by the Government of the Philippines, the Council recommended that the ECAFE secretariat and UNDP examine the measures that need be taken for strengthening the operation of the existing pilot plant centre for iron and steel making in that country.

In considering the offer made by the Government of the Republic of China, the ILO representative indicated that steps would be taken to increase the facilities available at this Centre so as to broaden the prospects of training facilities at the Centre.

ECAFE has taken the following steps in order to implement the recommendations of the Council. The members of the Advisory Group for 1967/68 have been contacted and governments have been informed of the decision taken to form the Advisory Group.

Action by ECAFE

The 1967/68 Advisory Group will consist of the following:

Dr. Antonio V. Arizabal (Philippines)
Dr. H. C. Bos (Netherlands)
Professor L. V. Castle (New Zealand)
Mr. Enayatollah Esmailian (Iran)
Dr. H. D. Fong (China)
Mr. Lim Ho Hup (Singapore)
Mr. K. B. Rao (India)
Dr. Porn Srichamara (Thailand)
Mr. Shintaro Tabata (Japan)

The first meeting of the Advisory Group will be held in September 1967.

Action groups are now being set up for iron and steel, pulp and paper and forest industries. Steps have also been taken to consider the feasibility of developing the Karnali hydroelectric scheme on a joint basis. Preliminary steps have also been taken to obtain more data on several other projects which were suggested for consideration during the last two meetings of the Council. These include:—

Fertilizers — LNG and LPG, alumina, silica industries, methanol, carbon black, caprolactam/DMT — projects submitted by the Government of Brunei.

Caprolactam/DMT, acrylonitrile, styrene, ethylene dichloride — proposals submitted by the Government of the Republic of China.

Establishment of refinery in interested countries — phosphoric acid, super triple phosphate or di-ammonium phosphate, LPG, carbon black, ammonia/urea, metallurgy, caprolactam and tractor manufacture — proposals specified by the Government of Iran.

Ceramics — proposals submitted by the Government of the Republic of Korea.

Aluminium, urea/cyanamide — proposals submitted by the Government of Laos.

Development of phosphate rocks, fertilizer products, engineering industries and agricultural power tillers — proposals submitted by the Government of the Philippines.

Pulp and paper industry and silica industry — proposals submitted by the Government of the Republic of Viet-Nam.

Calendar of ECAFE meetings on Industry and Natural Resources in 1967

The following are the meetings scheduled for the remainder of 1967 in the field of industry and natural resources at the time of going to press.

<i>Dates</i>	<i>Meeting</i>	<i>Venue</i>
26 June - 4 July	Committee for Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas, third session.	Seoul, Republic of Korea
4-11 September	Sub-Committee on Metals and Engineering, eleventh session.	Sydney, Australia
28 September - 4 October	Seminar on the Development of Building Materials.	Bangkok, Thailand
6-16 November	Committee for Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas, fourth session.	Taipei, China (Taiwan)
4-11 December	Seminar on Sources of Mineral Raw Materials for the Fertilizer Industry in Asia and the Far East.	Bangkok, Thailand
12-22 December	Workshop on Promotion of Industrial Research.	Bangkok, Thailand

Committee for Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas

At the third session of the Committee for Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas, the members of which are China (Taiwan), Japan, the Republic of Korea and the Philippines, the following items will be discussed:

1. Observations and recommendations of the twenty-third session of ECAFE on the reports and activities of the Committee;

2. Review of offshore prospecting undertaken by member countries of the Committee since its second Session;

3. Consideration of report of the Technical Advisory Group;

4. Consideration of amendments to be made to the co-ordinated offshore prospecting programme;

5. Consideration of measures to be taken for the investigation of mineral resources and *in situ* ores;

6. Review of the progress made towards the establishment of the regional training centre in Japan;

7. Review of the report of the secretariat's technical operations and consideration of further work that should be undertaken by the secretariat;

8. Review of operations of the Technical Advisory Group and its constitution for the fourth Session of the Committee;

9. Publication of report and data and exchange of information and setting of target date for the first Technical Bulletin of the Committee.

The agenda for the fourth session of the Committee will be decided at the third session.

Sub-Committee on Metals and Engineering

The eleventh session of the Sub-Committee on Metals and Engineering will review the progress of the iron and steel industry, the integration of steel production in some of the less developed countries of the ECAFE region, the development of the engineering industries, the progress of the machine tool industries, survey of non-ferrous metal industries, training for the development of metals and engineering industries and proposals for a future programme of work for the countries of the ECAFE region.

The meeting will be of particular importance to member countries in view of the steps that are now being taken for detailed studies in this field in connexion with the decisions of the Asian Industrial Development Council. Emphasis will be given to discussions on ways and means of expanding the development of the metal industries, in particular the engineering industries and the machine tool industries of the region. Detailed investigations are also being carried out on ways and means of assisting the non-traditional steel producer countries to embark upon an expanded programme on the basis of regional harmonization.

Seminar on the Development of Building Materials

In view of the importance of the building and building materials industries, the Working Party on Housing and Building Materials, at its eighth session, recommended that a seminar on the development of building materials and building components be included in the work programme.

The Seminar on the Development of Building Materials will provide an opportunity for an exchange of views and experience not only on the economic aspects of construction, such as cost of materials and speed of construction, but also on technical aspects such as the types of materials available for construction purposes. It will also ascertain the prospective growth rates and requirements of construction activities within

the region and will examine the methods used for producing building materials in various parts of the region.

Seminar on Sources of Mineral Raw Materials for the Fertilizer Industry in Asia and the Far East

Two of the important topics to be discussed at this seminar are:

1. Availability of primary fertilizer minerals in the region. These include natural gas, coal and lignite, sulphur, gypsum, phosphorite and apatite, and potash minerals;

2. Present state of utilization of local primary fertilizer minerals.

Apart from an examination of the availability and other aspects of the supply of mineral raw materials, the meeting will also consider the demand for the various types of marketed fertilizer products in the ECAFE region. It will take into view the future demand for various types of fertilizer and the possibilities of exploring available resources of fertilizer minerals. In this connexion, the technical aspects of exploration and technological developments that are currently taking place in the world will be discussed.

Workshop on Promotion of Industrial Research

At the workshop on Promotion of Industrial Research, all fifteen representatives from member countries will convene at the expense of BTAO, and a consultant will be engaged to prepare certain background papers. The importance of research in industry cannot be over-emphasized. Not only are problems of processing indigenous raw materials relevant to import saving but they also provide new opportunities for the expansion of exports. Research is also connected with the development of new processes and adaptation of existing processes to indigenous conditions. The meeting will provide an opportunity for an exchange of views and experience among regional research institutions particularly in relation to the various steps that need to be taken in order to co-ordinate research programmes within the region and in determining the various ways and means of shortening the period of research by exchanging information on facilities and work that is being done.

International Symposium on Industrial Development

The first world-wide meeting on industrial development is to be held at Athens in November-December 1967. The Secretary-General of the United Nations has stated that this meeting should afford an opportunity to countries at various stages of development and with different economic systems to exchange views not only on the problems that have to be faced but also on the broad strategy of industrialization.

The proposed agenda for this Symposium consists of four main items:—

1. General survey of the growth and characteristics of world industry;

2. Sectoral review of key industries, which will be dealt with by committees. The key industries to be taken up are iron and steel, non-ferrous metal, engineering products, fertilizer industry, basic chemicals and petro-chemicals, construction industry, building materials, wood-based industries, food products, and textile industries.

It is expected that the committees will discuss the following aspects:—

- i) The supply of raw materials and skilled manpower;
- ii) Technological considerations affecting industrial feasibility; the choice of technology and the relation of technology to optimum size of industrial plants;
- iii) Special factors affecting industrial efficiency;
- iv) Marketing, regional co-operation and integration;
- v) Export expansion.

The committees will have a summary paper on recent developments, the prospects for 1967-1975 and aspects of regional co-operation and integration, with conclusions and recommendations for future development.

3. Policies and measures in developing countries, with special emphasis upon the relation between industry and other sectors, problems of manpower, research and technology, and financing.

4. International co-operation. This discussion will basically be devoted to problems of establishing co-operation between the developed and developing countries, with a view to determining the ways in which the international flow of capital, skills, enterprise and technology could be promoted.

The meeting will provide a forum at which wide publicity can be given to problems that are now faced by the developing countries in their attempts to accelerate industrial growth. It will also provide for an exchange of views and reaching of conclusions which will be the beginning for international action towards the achievement of higher rates of industrial growth as envisaged in the Development Decade.

The meeting has been organized by the United Nations Centre for Industrial Development and final preparations will be made by the United Nations Industrial Development Organization. Representatives at high levels and experts of both governmental and non-governmental bodies from about 125 countries are expected to participate. The specialized agencies and the regional economic commissions of the United Nations will also be actively participating in the Symposium.

Part II

ARTICLES

PROSPECTS FOR INDUSTRIAL EXPORTS,¹ AND MEASURES FOR THEIR INCREASED PRODUCTION AND TRADE, WITH SPECIAL REFERENCE TO ECAFE DEVELOPING COUNTRIES²

I. Summary and conclusions

A significant postwar development has been the widening in the payments gap of all developing countries, arising from the growing import requirements vis-à-vis the declining capacity to pay for them. Import requirements have grown, mainly owing to capital requirements for the purpose of industrialization, but also on account of the rising demand for consumption goods, particularly food, to feed the rapidly expanding population in the developing countries. On the other hand, the capacity to import has declined, since the main component, primary exports, has suffered a continuous decline for a variety of causes—replacement by synthetic and other substitutes, economy in the use of raw materials, low income elasticity for food in developed countries, adverse terms of trade for primary exports, and the need of the developing countries them-

¹ The term "industrial exports" is used in this paper to cover exports of both manufactures and semi-manufactures. The UNCTAD secretariat has suggested, in a paper entitled "The definition of primary commodities, semi-manufactures and manufactures" (TD/B/C.2/3, 2 July 1965), that "a semi-manufactured article is a product of manufacturing which for most uses requires further processing or incorporation in other goods before becoming a capital or consumer good", and that "finished manufactured goods comprise manufactured goods for consumption by households plus capital goods for households and capital goods for industry." (para. 7) The procedure thus far followed by the United Nations Secretariat in compiling trade statistics is to include under "exports of manufactures" Standard International Trade Classification (SITC) items under four of the nine sections, namely, section 5 on chemicals, section 6 on manufactured goods classified chiefly by material, section 7 on machinery and transport equipment, and section 8 on miscellaneous manufactured articles. From this definition of manufactures are sometimes excluded "base metals" falling under division 67 on iron and steel and division 68 on non-ferrous metals. This procedure is not wholly satisfactory except for the purpose of facilitating computation. For under the other five sections,—section 0 on food and live animals, section 1 on beverages and tobacco, section 2 on crude materials, inedible, except fuels, section 3 on mineral fuels, lubricants and related materials, and section 4 on animal and vegetable oils and fats—both manufactures and semi-manufactures can be found. (See TD/B/C.2/3 quoted above) In the circumstances, attention has been given to manufactures (excluding or including base metals), to base metals, and to processed foods in this paper.

² Document E/CN.11/I&NR/L.66 prepared by the ECAFE secretariat for the 19th session of the Committee on Industry and Natural Resources.

selves to retain much of these primary exports to meet domestic demand. The primary exports have not grown, but are stagnant; the prospects for their growth are extremely limited. If the developing countries are to find a way out of their payments gap problem, it is through expansion and diversification in the production of industrial exports which, unlike the primary exports, are growing and can help to enhance the developing countries' capacity to import.

In 1961, three fourths of the industrial exports (excluding base metals) from the developing countries came from Asia, with the remaining quarter from Africa and Latin America in almost equal proportions. In Asia, seven developing countries—Hong Kong, India, Israel, Iran, Philippines, Pakistan, and China (Taiwan)—accounted for over three fifths of the total industrial exports (excluding base metals) from the developing countries to the developed market economies in 1962 or 1964.

In 1961, of the total industrial exports (including base metals) from the developing countries, worth almost four billion dollars, base metals contributed 34 per cent, light manufactures (especially veneer, plywood board, etc.) 29 per cent, textiles 23 per cent, chemicals 8 per cent, machinery and transport equipment 6 per cent. The rates of growth of these industrial exports during 1955-61, seemed in general to vary inversely with their relative importance, being highest for machinery and transport equipment (87 per cent) and lowest for base metals (11 per cent), with chemicals (34 per cent), textiles (41 per cent) and light manufactures other than textiles (44 per cent) in the intermediate group. After an examination of the world demand and supply situation, it appears that, in order to hasten the rate of growth of industrial exports from the developing countries, it would be advisable, in view of the developing countries' factor endowments in labour, natural resources, capital and technology, for them to concentrate on the production of industrial intermediates, which generally serve as inputs to a wide range of industries, lend themselves to mechanized production without much requirement of skilled labour now in short supply, are subject to economies of scale and dynamic in their technical progress, and are

likely to have considerable forward and backward linkage effects. This would include a number of resource-based industries such as wood, pulp and paper, glass, some ceramic goods, industrial chemicals, petrochemicals, synthetic fibres, etc., rolled metal products and a wide range of components, standard machine parts, tools and equipment parts. It would exclude, in most cases, the production of complex equipment, of consumers' durables and semi-durables, the demand for which mainly depends on differentiation of design, except where joint undertakings make these new designs accessible.

To promote the production and marketing of industrial exports from the developing countries, appropriate measures would have to be taken by the developed countries, by the developing countries, and among the developing countries themselves. The developed countries would have to reduce or eliminate tariff barriers, particularly the discriminatory rates against processed vs. raw materials, and dispense with non-tariff barriers, particularly quantitative import restrictions, and limitations on textile exports from developing countries. They would have to agree to make adjustments in the structure of industries affected by imports from the developing countries, for example textile mill products for which imports from the developing countries in the United States, for example, represented no more than 1.4 per cent of the total domestic supply in 1960. Finally, the developed countries would have to take measures to facilitate the marketing of industrial exports from the developing countries by means of: (1) establishment of an international trade information and trade promotion centre, as well as focal or contact points within the appropriate government agencies in the developed countries; (2) provision of financial and technical assistance to export organizations of the developing countries to market their industrial products; (3) promotion of joint ventures between developed and developing countries for producing goods, especially intermediates, for purchase and use by industries in developed countries; and (4) granting of favourable treatment to the industries and exporters of the developing countries with respect to the establishment of agencies, offices, consignment stocks, maintenance and repair services, etc., in the territory of the developed countries, within the framework of their national legislation.

In order to diversify and expand production of industrial exports, the developing countries would have to: (1) include in their development plans and policies the establishment and development of industries with an export potential and other measures and policies for the promotion of exports of manufactures and semi-manufactures; (2) undertake production efficiency and cost reduction programmes; (3) introduce standardization and quality control for strengthening the competitive strength of industries with an export potential; (4) provide financial, fiscal and other aids and incentives for industrial exports; (5) provide and/or

assist research institutes for improving the processing of products and quality of products, designing of products, new uses of products, etc.; (6) establish national market information and trade promotion centres to act as intermediaries between exporters and the international and regional market information and trade promotion centres and to help exporters promote exports of manufactures and semi-manufactures.

Finally, the developing countries themselves should get together and undertake co-operative ventures for the production of and trade in industrial exports. Joint ventures between two or more nations for the production of industrial exports, to take advantage of the economies of scale and specialization offered by modern technology, especially in the ECAFE region where 19 of the 24 countries have barely one eighth of the total population but only limited purchasing power, were recommended by the United Nations Conference on Trade and Development in 1964 and by the Asian Conference on Industrialization in 1965; the matter was taken up in its first session in September 1966 by the Asian Industrial Development Council whose functions are, *inter alia*, to "keep under continuous review industrial development plans, programmes and policies adopted in the regional member and associate member countries with a view to achieving progressive harmonization of industrial development plans" and "to identify, in collaboration with the countries concerned, projects where the co-operation of two or more countries would be of mutual benefit, as for instance in the pooling of markets to achieve economies of scale, international division of labour and fuller utilization of raw materials, and recommend ways of investigating and implementing such mutually beneficial projects."

The developing countries should also promote among themselves increased purchases of manufactures and semi-manufactures produced by them; they should, in other words, increase their intra-regional trade in industrial exports. In the ECAFE region, intra-regional trade in industrial exports (including base metals) during the past decade 1955-64 has shown an average annual rate of growth of 4.5 per cent, as compared with a rate of only 1.2 per cent for the intra-regional trade in all exports. The rates of growth are higher for capital goods such as base metals, chemicals, machinery and transport equipment, but have shown a decline for textiles in which almost every developing country is on the road to self-sufficiency.

II. Importance and advantages of industrial exports

For the developing countries, industrial exports, as compared with primary exports, are still small; the former, however, are growing, while the latter have become stagnant in postwar years. This transition from primary to industrial exports is under way in the developing countries today, just as it took place in the developed countries during the past.

Industrial exports from the developing countries claim only a very small share in the world total. In 1961, total exports of manufactures from the developing market economies were valued at \$2.6 billion, or about four per cent of the total value of \$62.3 billion for the world exports of manufactures in the same year. This share of the developing market economies in the 1961 world exports of manufactures has declined

somewhat from the five per cent attained in 1955, owing to a rise in the share of the centrally planned economies from ten to twelve per cent during the same period. Even so, the annual rate of growth in the developing market economies during 1955-61 was 6.5 per cent for exports of manufactures, as compared with only 2.2 per cent for primary exports.

Table 1
WORLD EXPORTS OF MANUFACTURES^a (EXCLUDING BASE METALS) BY ORIGIN, 1955 AND 1961

Exporting group	Amount (billions of dollars)		Index, 1961 (1955=100)	Percentage distribution	
	1955	1961		1955	1961
World ^b	37.8	62.3	165	100	100
Developed market economies	32.0	52.0	162	85	83
Developing market economies	1.8	2.6	146	5	4
Centrally planned economies	3.9	7.7	196	10	12

^a Data for exports of manufactures refer to f.o.b. values for the following items. Numbers of parentheses represent the code of the Standard International Trade Classification (SITC): Chemicals (5); Machinery and transport equipment (7); Other manufactures excluding base metals (6 and 8, excluding 67 and 68 but including 681).

^b Developed market economies: North America, western Europe, Australia, Japan, New Zealand and South Africa. Centrally planned economies: Union of Soviet Socialist Republics, eastern Europe, Yugoslavia, mainland China, Mongolia, North Korea and North Viet-Nam. Developing market economies: rest of the world.

Source: United Nations Conference on Trade and Development (hereafter abbreviated as UNCTAD), Proceedings, Volume IV on *Trade in Manufactures* (UN Publication Sales No.: 64.II.B.14), New York, 1964, p. 4.

Of the total export of manufactures valued at \$2,640 million from the developing market economies in 1961, \$1,945 million worth, or three fourths, came from those in Asia, with only \$325 million worth each from those in Africa and in Latin America. This total export of manufactures from Asian developing market economies in 1961 may be further broken down according to destination as follows:

	Amount (million dollars)
Developed market economies ...	905
Western Europe	412
EEC	122
EFTA	283
North America	369
Other	113
Developing market economies ...	928
Centrally planned economies ...	59
	1,945 ^a

Not only are the exports of manufactures from the developing market economies concentrated in Asia; they are also derived from a few of the more important countries, mostly in Asia. Thus, of a total export of manufactures valued at \$2,393 million from the developing market economies to the developed market economies in 1964, ten countries (including seven Asian countries) supplied as much as \$1,823 million worth or three fourths² (see table 1a).

^a This total includes a sum of \$53 million for "unallocated" trade.

² UNCTAD, Review of International Trade and Development 1966 (TD/B/82/Add.2, 20 July 1966) p. 72.

Table 1a
ORIGIN OF INDUSTRIAL EXPORTS (EXCLUDING
BASE METALS) FROM DEVELOPING COUNTRIES TO
DEVELOPED MARKET ECONOMIES,
1962 AND 1964

(in millions of dollars)

	Average annual rate of growth 1962-64 (%)		
	1962	1964	
Hong Kong	413	634	23.9
India	373	445	9.2
Israel	92	137	22.0
Yugoslavia	85	127	22.2
Mexico	98	126	13.4
Iran	62	77	11.4
Philippines	54	72	15.5
Pakistan	47	64	16.7
China (Taiwan)	39	68	32.0
Argentina	28	41	21.0
Brazil	25	32	13.1
Sub-total	1,316	1,823	17.7
Other	435	570	14.5
Total	1,751	2,393	16.9

Source: OECD, *Statistical Bulletin, Foreign Trade Series C*, trade by commodities; United Nations, *Statistical Papers, Series D, Commodity Trade Statistics*.

According to the average annual rate of growth of industrial exports (excluding base metals) during 1964-66, the seven Asian countries may be arranged in order as follows: China: Taiwan (32.0%), Hong Kong (23.9%), Israel (22.0%), Pakistan (16.7%), Philippines (15.5%), Iran (11.4%), and India (9.2%).

For the ECAFE developing countries³, the export of manufactures (including base metals) rose from \$1,316 million worth in 1955 to \$1,936 million in 1961 and \$2,714 million in 1964, representing an increase of 106 per cent in a period of ten years. Also, the proportion occupied by export of manufactures in total exports rose from 19 per cent in 1955 to 26 per cent in 1961 and 31 per cent in 1964. This is in striking contrast to the much slower rate of increase during the same period for the primary commodities, namely, 9 per cent. (from \$5,534 million worth in 1955 to \$6,026 million in 1964)⁴

The first Asian Conference on Industrialization, held under the auspices of ECAFE at Manila from 6 to 20 December 1965, expressed the view that a constantly increasing volume of exports of manufactures and semi-manufactures from the developing ECAFE region was particularly important for the following reasons:

³ Comprising Burma, Cambodia, Ceylon, China (Taiwan), Hong Kong, India, Indonesia, Republic of Korea, States of Malaya, Sarawak, Pakistan, Philippines, Singapore, Thailand and Republic of Viet-Nam. Because of non-availability of data, Afghanistan, Iran, Laos, Nepal and Western Samoa are not included.

⁴ United Nations, *Economic Survey of Asia and the Far East, 1965*, p. 189. See *infra*, tables 5 and 10.

(i) Increasing exports of manufactures and semi-manufactures should help the region to earn foreign exchange to permit the indispensable increase of investment goods and others required in the process of industrialization.

(ii) Increasing exports of manufactures and semi-manufactures should provide to the newly established industries in the region sufficiently large markets to realize economies of scale and reduce the unit cost of production.

(iii) Increasing exports of manufactures and semi-manufactures should help to reverse the present unfavourable trend in the terms of trade of the ECAFE region.

(iv) Increasing exports of manufactures and semi-manufactures should contribute to the economic independence of the countries of the ECAFE region and provide them with a greater capacity for adaptation to the rapidly changing conditions of the world economy.⁵

III. Present and future composition of industrial exports

A. Present composition

As shown in table 2, the exports of manufactures (including base metals) from the developing countries rose from \$3,030 million worth in 1955 to \$3,975 million in 1961, and their share in total exports from the developing countries rose from 12.8 per cent to 14.4 per cent during the same period.

⁵ ECAFE, *Proceedings of the Asian Conference on Industrialization, Manila, 6-20 December 1965 (E/CN.11/719, 10 January 1966)*, para. 175.

Table 2

EXPORTS FROM DEVELOPING COUNTRIES

(Value in millions of dollars)

SITC Code No.	Commodities		1955	1961
0 to 9	Total exports ^a	Value	23,670	27,600
0 and 1	Food, beverages, tobacco	Value	7,680	8,010
		Percentage ^b	32.4	29.0
2 and 4	Crude materials, except fuels, oils and fats	Value	6,960	7,360
		Percentage ^b	29.4	26.7
3	Mineral fuels	Value	5,900	8,100
		Percentage ^b	24.9	29.3
0 to 4	Primary commodities	Value	20,540	23,470
		Percentage ^b	86.8	85.0
5	Chemicals	Value	240	320
7	Machinery and transport equipment	Value	120	225
6 to 8	Textiles	Value	660	930
	Base metals	Value	1,220	1,360
	Other light manufactures	Value	790	1,140
5 to 8	Manufactures	Value	3,030	3,975
		Percentage ^b	12.8	14.4

^a Includes special category exports not shown by destination.

^b Percentage share in exports in each year.

Source: United Nations, *Monthly Bulletin of Statistics*, March 1961 and 1963, April 1961 and 1963.

As shown in table 3, of the total exports of manufactures worth \$3,975 million in 1961, base metals contributed 34.2 per cent, followed by light manufactures other than textiles (28.8 per cent), textiles (23.4 per cent), chemicals (8 per cent) and machinery and transport equipment (5.6 per cent). The rates of growth of these exports during 1955-61, however,

appeared in general to vary inversely with their relative importance, being highest (87 per cent) for machinery and transport equipment and lowest (11 per cent) for base metals. The intermediate groups in respect of rates of growth were chemicals (34 per cent), textiles (41 per cent), and other light manufactures (44 per cent).

Table 3

RATES OF GROWTH OF EXPORT OF MANUFACTURES (INCLUDING BASE METALS) FROM DEVELOPING COUNTRIES, 1955-61, BY COUNTRY GROUP (IN PERCENTAGES)

SITC Code No.	Commodities	Value in millions of dollars, 1961	Developed countries	Developing countries	Centrally planned economies	All countries
5	Chemicals	320 (8.0%)	35	60	-163	34
7	Machinery & transport equipment	225 (5.6%)	126	78	100	87
6 to 8	Textiles	930 (23.4%)	76	5	166	41
	Base metals	1,360 (34.2%)	7	50	—	11
	Other light manufactures	1,140 (28.8%)	53	33	433	44
5 to 8	Manufactures	3,975 (100.0%)	29	30	85	31
	Value in millions of dollars, 1961		2,596 (65.4%)	1,255 (31.6%)	89 (2.2%)	3,975 (100.0%) ^a

^a Includes "unallocated" trade which is not shown separately.

Source: United Nations, *Monthly Bulletin of Statistics*, March 1961 and 1963, April 1961 and 1963.

Of the total exports of manufactures from the developing countries in 1961, 65.4 per cent went to the developed countries, 31.6 per cent to other developing countries, and only 2.2 per cent to centrally planned economies. It is therefore important to compare the rates of growth of exports of manufactures from the developing countries to the developed countries. In this comparison, the highest rate of growth during 1955-61 (126 per cent) again occurred in machinery and transport equipment group, and the lowest rate (7 per cent) in base metals, with the other three groups in between—76 per cent for textiles, 53 per cent for other light manufactures, and 35 per cent for chemicals.

A further breakdown of the export of manufactures (excluding base metals) from the developing countries, in this case for 1964, is reflected in the official trade statistics of developed market economies, as shown in table 4 compiled by the UNCTAD secretariat. From an examination of this table it is readily evident that two-fifths of the manufactured goods imported by the developed market economies from the developing countries in 1964 consisted of only four items; three of these items were different types of textiles, and the fourth comprised pearls and precious stones which could be characterized only marginally as industrial products. Floor coverings—mostly carpets—and tapestries were the fifth largest item, accounting for 5 per cent of exports. The fifteen largest

items, whose individual values equalled or exceeded \$50 million, formed the content of nearly three-fourths of total exports. And if the list is enlarged to include items whose value amounted to \$20 million or more—altogether 24 items—nearly nine-tenths of the trade is accounted for. The dominance of various textile goods, wood products, leather and other equally traditional products is evident throughout this list. At the other end of the scale are as many as 48 items—or two thirds of the items covered—which contributed a little over one tenth of the total imports of manufactures of the developed market economies from the developing countries. Indeed, if the data were examined for the developing countries individually rather than as a group, the lack of diversification would appear even more forcefully. With the exception of Hong Kong and India, manufactured exports of the developing countries are confined to an extremely narrow range of products.

Table 4 also shows that while the slowly growing exports of textiles and other light manufactures, which accounted for the bulk of total exports of manufactures from the developing countries to the developed countries, constituted around 20 per cent or less of the total imports of developed countries from developing countries, the rapidly growing exports of machinery and transport equipment, which accounted for around five per cent of the total exports of manufactures from the developing countries to the developed countries,

occupied a very small proportion, also less than five per cent, of the total imports of developed countries from developing countries. Textile and other light manufactures are what may be considered as *traditional* exports developed either as handicrafts or in connexion

with programmes of import substitution for the developing countries, while machinery and transport equipment belong to the group of dynamic exports which, albeit insignificant in amount today, do give promise of considerable growth in the future.

Table 4

DEVELOPED MARKET ECONOMIES: IMPORTS OF MANUFACTURES (EXCLUDING BASE METALS)
FROM DEVELOPING COUNTRIES, 1964^a

<i>SITC</i> <i>code</i> <i>No.</i>	<i>Item</i>	<i>Value</i> <i>(millions</i> <i>of dollars)</i>	<i>Percentage</i> <i>of total</i>	<i>As % of</i> <i>total</i> <i>imports by</i> <i>developed</i> <i>countries</i> <i>in these</i> <i>products</i>
841	Clothing (except fur clothing)	374	15.6	21.1
653	Textile fabrics other than cotton	220	9.2	13.5
652	Cotton fabrics, woven	192	8.0	23.9
667	Pearls and precious and semi-precious stones ...	182	7.6	23.7
657	Floor coverings, tapestries, etc.	121	5.0	28.9
631	Veneers, plywood board, etc.	112	4.7	22.2
611	Leather	84	3.5	23.6
656	Miscellaneous textile articles	79	3.3	28.4
899	Miscellaneous manufactured articles	74	3.1	19.6
513	Inorganic chemicals	73	3.0	13.8
735	Ships and boats ^b	60	2.5	8.9
651	Textile yarn and thread	58	2.4	5.0
681	Silver, platinum	56	2.4	13.2
894	Perambulators, toys, games and sporting goods ...	52	2.2	10.3
512	Organic chemicals	51	2.1	3.3
551	Essential oils, perfumes and flavour materials ...	42	1.8	22.6
851	Footwear	40	1.7	8.3
655	Special textile fabrics and related products	36	1.5	9.9
724	Telecommunications apparatus	29	1.2	2.5
821	Furniture	28	1.2	8.2
599	Miscellaneous chemical materials and products ...	27	1.1	3.4
711	Power generating machinery other than electric ...	26	1.1	1.9
561	Fertilizers, manufactured products	23	1.0	4.8
541	Medicinal and pharmaceutical products	19	0.8	3.3
	Sub-total	2,058	86.0	11.7
	Other	335	14.0	1.1
	Total	2,393	100.0	4.9

Source: OECD, *Statistical Bulletin Foreign Trade Series C*, trade by commodities.

^a With the exception of those for the USA, Canada and Australia, all figures for developed countries are taken on a c.i.f. basis.

^b Most of this trade consists of re-exports.

As shown in tables 5 and 10, the export of manufactures (including base metals) from the ECAFE developing countries was more than doubled during the ten year period 1955-64, and its proportion in total exports rose from 19 per cent to 31 per cent.

Of the total export of manufactures (including base metals) worth \$2,714 million in 1964, textiles claimed 33.2 per cent, base metals 10.9 per cent, machinery and transport equipment 7.4 per cent, che-

micals 5.4 per cent, and other manufactures (leather, rubber, wood, paper, non-metallic minerals and other metals, and manufactures thereof) 43.1 per cent. However, during the ten year period 1955-64, the relatively unimportant groups appear to have had much higher rates of growth. These rates are 181 per cent for other manufactures (particularly veneers, plywood boards, etc.), 168 per cent for machinery and transport equipment, 90 per cent for base metals, 58 per cent for textiles, and 48 per cent for chemicals.

Table 5

EXPORT OF MANUFACTURES (INCLUDING BASE METALS)
FROM ECAFE DEVELOPING COUNTRIES.^a
1955, 1961 & 1964

(in millions of dollars)

SITC code no. in parenthesis	1955	1961	1964
A. Chemicals (5)			
World ^b	100	115	148
Developed countries	27	32	38
Developing countries	49	74	105
Centrally planned economies ...	22	8	3
B. Textiles (65)			
World ^b	570	770	900
Developed countries	230	390	490
Developing countries	330	345	335
Centrally planned economies ...	9	21	67
C. Base metals (67+68-681)			
World ^b	155	235	295
Developed countries	125	190	215
Developing countries	27	40	70
Centrally planned economies ...	—	3	12
D. Machinery and transport equipment (7)			
World ^b	75	146	201
Developed countries	3	20	40
Developing countries	70	122	160
Centrally planned economies ...	1	2	1
E. Other manufactures^c (61, 62, 63, 64, 66, 69)			
World ^b	416	670	1,170
Developed countries	152	333	750
Developing countries	271	327	390
Centrally planned economies ...	2	12	18
F. All manufactures (5+6+7+8-681)			
World ^b	1,316	1,936	2,714
Developed countries	537	965	1,533
Developing countries	747	908	1,060
Centrally planned economies ...	34	52	101

^a For country coverage, see footnote 3.^b Includes "other countries" not given in the table.^c Includes leather, leather manufactures, n.e.s. and dressed fur skins; rubber manufactures, n.e.s.; wood and cork manufactures (excluding furniture); paper, paperboard and manufactures thereof; non-metallic mineral manufactures, n.e.s.; manufactures of metal, n.e.s.

Source: Bureau of General Economic Research and Policies of the United Nations Secretariat, based on data from official sources.

Before leaving the subject of composition of industrial exports, a few words may be said in respect of processed foodstuffs. As shown in table 6 below, processed foodstuffs exported by developing countries to developed market economies rose from \$253 million worth in 1955 to \$329 million in 1961, an increase of 30 per cent. This compared poorly with a 60 per cent rise in the export of manufactures (excluding base metals), but quite well with a 7 per cent rise in the export of base metals, during the same period.

Table 6

PROCESSED FOODSTUFFS EXPORTED BY
DEVELOPING COUNTRIES TO DEVELOPED MARKET
ECONOMIES, 1955 AND 1961

(in millions of dollars)^a

SITC code	Item	1955	1961
013	Meat, canned or prepared	113	123
032	Fish, canned or prepared	32	38
048	Cereal preparations	5	3
053	Fruit, preserved or prepared	52	93
055	Vegetables, preserved or prepared	30	54
062	Sugar preparations, non-chocolate	1	1
073	Chocolate and products	12	8
099	Miscellaneous food preparations ...	1	2
122	Tobacco manufactures	8	8
Total		253	329

^a Data are derived from trade returns of developed market economies and therefore relate to imports valued on a c.i.f. basis.

Source: Bureau of General Economic Research and Policies of the United Nations Secretariat, based on data from official sources.

In this connexion, it may be noted that, in 1961, the industrial exports from the developing to the developed countries for different categories were of the following magnitude (in millions of dollars): manufactures (excluding base metals) 1,356; base metals 1,240; processed foodstuffs 329.⁶

B. Criteria for the development of export industries

As shown in table 1, during the period 1955-61, exports of manufactures (excluding base metals) from the developing market economies grew by only 46 per cent, as compared with a growth rate during the same period of 62 per cent for the developed market economies and a rate of 96 per cent for the centrally planned economies. This slow rate of growth reduced the share of developing market economies in the world export of manufactures from five per cent in 1955 to four per cent in 1961.

The slow rate of growth of exports of manufactures from the developing countries is, as shown in the preceding section, to be attributed to the composition of these exports, which is characterized by the predominance of traditional exports such as textiles and other light manufactures on the one hand, and on the other, by the emergence of dynamic exports such as machinery and transport equipment which are, however, still insignificant. For the exports of manufactures from the developing countries to grow at a higher rate than hitherto, it is imperative to develop export industries for which the products must command not only a high income elasticity of demand, but also be able to compete in respect of costs in the world market.

⁶ UNCTAD, *Trade in Manufactures*, op. cit., pp. 9, 47.

The requirements are therefore rigorous, and the task of export promotion is far more difficult than that of import substitution, for which there is a ready market at home that can be sheltered from foreign competition by means of tariff barriers, import controls, and many other measures. Indeed, a developing country may have to develop the two sectors — domestic and export — according to different criteria, resulting in a dual structure in which the export sector has to be highly advanced, while much of the domestic sector may remain somewhat backward.

The income elasticity of output (which corresponds roughly to the income elasticity of demand) as calculated from a sample of 53 countries, is shown in table 7. Exports from the developing countries are mainly concentrated in those commodity groups which have an income elasticity of output below the average for total manufacturing. In future, the developing countries should aim at promoting and expanding the export of those industrial products having an income elasticity of output above the average for total manufacturing, such as paper and paper products, basic metals, metal products, rubber products, chemicals and petroleum products.

Table 7

INCOME ELASTICITY OF OUTPUT IN MANUFACTURING

	All countries	High income countries	Low income countries
Paper and paper products	2.04	1.86	2.36
Basic metals	1.99	1.16	2.98
Metal products	1.98	1.87	2.23
Other manufacturing	1.85	1.85	2.05
Printing and publishing	1.72	1.64	1.24
Rubber products	1.58	1.46	1.94
Chemicals and petroleum products	1.55	1.12	1.80
Wood products	1.53	1.51	1.71
Clothing and footwear	1.36	1.25	1.95
Textiles	1.21	0.75	2.12
Non-metallic mineral products	1.16	1.14	2.37
Food, beverages, tobacco	0.98	0.97	1.72
Leather products	0.89	0.91	2.01
Total manufacturing	1.37	1.30	1.89

Source: United Nations, *A Study of Industrial Growth* (United Nations publication, Sales No.: 63.11.B.2), pp. 7 and 40.

On the supply side, the developing countries must promote export industries that can be fully competitive in the world market. This requires that the export sector should be more advanced than the rest of the economy and should build ahead of the existing structure and factor proportions. A change in the existing structure and factor proportions, which is the essence of development, means for the developing countries, in particular, an increase in the share of capital and in the application of new technologies.

In the developing countries, there is a highly unbalanced distribution of skills, with a sizable propor-

tion of the labour force having no industrial skills and no tradition of industrial work discipline, and a small minority of skilled personnel, mainly at the upper end of the range of skills. The greatest labour shortage is however in the middle levels of skill, where on-the-job training is an important and often the major part of the training process. In the circumstances, the export industries to be developed initially would have to rely on a small nucleus of very highly trained personnel, oftentimes supplemented by the import of foreign technicians and engineers, together with a main body of labour of which no high skills are required. This "points to mechanized, relatively capital-intensive, and/or resource-intensive industries, in which quality and rate of output are largely dictated by the process itself, and are but little subject to the vagaries of human skill *per se*. These industries may, in favourable conditions, themselves become centres of radiation for industrial skills and may facilitate further industrial development in general and growth of new export industries in particular."⁷

In respect of natural resources, it would be preferable for the developing countries to export food or raw materials in processed rather than raw form, in order to earn the foreign exchange derived from processing to increase the domestic added-value content of exports. The more highly processed products will generally be less subject to extreme fluctuations of price than the raw material; and, containing more domestically added value, will better be able to withstand such fluctuations when they occur. However, the addition of further processing stages to domestic raw materials can only be worthwhile to the extent that the advantages conferred upon the producing country by the saving of transportation costs are not offset by lower productivity in the processing stage, and provided that discriminatory tariffs in the importing countries on processed as against raw foods and materials are removed. Where the country possesses the natural resources for the production of the intermediates, and where transportation costs are an important element in the cost of alternative imports, industrialization may be speeded up by anticipating import substitutions, through orienting the production of the intermediates in the transitional stage towards the export market. This applies, for instance, to processed food, the internal demand for which is likely to grow only with further development and rising incomes. However, most intermediates, with the exception of some agricultural products, are bulky commodities, for which it is economical to produce only on a large scale, and large scale production carries with it also the advantage of product standardization. Large scale production requires, of course, heavy investments of capital.

⁷ United Nations Centre for Industrial Development, "General Study of Exports of Manufactures and Semi-manufactures from Developing Countries and Their Role in Development", in UNCTAD, *Trade in Manufactures*, *op. cit.*, pp. 61-62.

As regards capital and technology, it is not correct to argue that only comparatively simple technologies are within the capabilities of the developing countries; as, during the last war, many sophisticated industries were developed in developing countries such as India, owing to an interruption of imports and the presence of domestic demand. Instead, a developing country should ask what is the most advanced technology that it is capable of adopting for its industrial exports programmes. In this regard, "the developing countries should take the greatest possible advantage from the inverse relationship which exists between the degree of sophistication of equipment and processes and the complexity of their actual current operation."⁸ The more sophisticated the equipment and processes, the less the need for the intervention of human effort and skill and *vice versa*.

A chemical fertilizer plant, for example, is a highly complex assembly of equipment, but its current operation (not management and maintenance, which is in the hands of a small group of experts sometimes imported from abroad) requires operators of a relatively low level of skill. By contrast, the loom for weaving a Persian rug is a very simple instrument, but the skill of the weaver is of a very high order. Or, to take an example from a modern industrial process: the manual lathe is simpler than the automatic lathe, but the skill involved in the former is of the highest.

The developing countries, in adopting sophisticated equipment and processes, are reaping the advantages of being late-comers; they are achieving success as imitators. Whatever disadvantages they may have to encounter in other respects, the developing countries will thus have achieved a structural advantage over the developed countries, since innovations and changes which are marginal in the industrialized countries and affect the average only in the long run, can significantly affect the total structure in the less industrialized countries. Also, the price level of most manufactured goods in the markets of the developed countries is not often determined by the cost level achieved by the most advanced producers. The range of technologies still operating in these markets is fairly wide. The higher cost level of older technologies affects the price level and may create a protective price umbrella for new-comers; assuming that there are no artificial external trade barriers or that they can be removed.

The more sophisticated type of technology calls for a larger capital investment. However, it is also true that, in the case of sophisticated equipment and processes, the output from a given amount of capital is likely to be greatest. Sophisticated industries, in other words, are not only capital intensive, but also capital saving.

To sum up, it is clear that the development of export industries is among the most difficult and exacting tasks of a developing country, and that the effort should be commensurate with the difficulty of the task. Export industries, unlike import substituting industries which enjoy the availability of a domestic market as well as protection against competing imports, have to compete on the world market with similar industries in developed countries. The developing countries, which can enjoy the advantages of being late-comers, should choose the most advanced alternative technology within their horizon, mainly because such a choice can be capital-saving, and can prevent the increase of the technological gap between the developed and the developing countries.

The more sophisticated a manufactured commodity, the higher is the income elasticity of demand likely to be in both developing and developed countries. For any increment in income is likely to be spent on new goods, especially of a sophisticated variety. These goods will have an income elasticity of demand higher than one. However, some of the manufactured products with a very high income elasticity of demand are likely to be beyond the capacity of most developing countries to turn out; these include entirely novel commodities, the production of advanced capital goods, products dependent on original and novel design and some products protected by patents. However, since the income elasticity of the demand for all manufactured goods is considerably in excess of unity, the income elasticity of demand for industrial intermediate goods is not likely to be much lower than the average. These industrial intermediates "generally serve as inputs to a wide range of industries, lend themselves to mechanized production, are subject to economies of scale, and are dynamic in their technical progress. At the same time, they are likely to have considerable forward and backward linkage effects. This would include a number of resource-based industries, such as wood, pulp and paper, glass, some ceramic goods, industrial chemicals, petrochemicals, synthetic fibres, etc., rolled metal products and a wide range of components, standard machine parts, tools and equipment parts. It would exclude, in most cases, the production of complex equipment, of consumers' durables and semi-durables, the demand for which mainly depends on differentiation of design, except where joint undertakings make these new designs accessible. It would generally exclude complex assembly industries which depend on a highly developed industrial hinterland."⁹

IV. Measures for the expansion of markets in developed countries

A. Reduction or elimination of tariff and non-tariff barriers

Tariff barriers. Among most of the developed countries, two principal tariff scales are currently in

⁸ *Ibid.*, p. 68.

⁹ *Ibid.*, p. 69.

force. The member countries of both EEC and EFTA apply tariffs at a preferential rate to imports from other member countries and tariffs at the general or most-favoured-nation rate to imports from the rest of the world. What is of concern to most of the developing countries is the general tariffs applied by the developed countries, although some developing countries, for example, the Commonwealth countries in the ECAFE region, enjoy preferential arrangements in relation to their trade with the metropolitan country.

If we calculate a simple, unweighted average of tariffs on imports of manufactures for 1963, the average level of general tariffs of the major developed countries is found to be around 15 per cent *ad valorem* (see table 8). However, the level varies appreciably among the different countries. The highest rates are recorded by the United States and the United Kingdom, where the average tariff levels are around 20 per cent *ad valorem*. These two countries are followed closely by Japan. At the other end of the scale are the Federal Republic of Germany and the countries that are members of the Benelux Union, with average tariffs only about half as high as those of the United States and the United Kingdom.

Table 8

SELECTED DEVELOPED COUNTRIES:
AVERAGE AD VALOREM TARIFFS ON IMPORTS OF
MANUFACTURES, 1963^a
(Percentage rate)

Country	All manufactures	Chemicals	Manufactured goods classified by material	Machinery and transport equipment	Miscellaneous manufactures
United States	20	17	21	12	24
United Kingdom ...	20	16	19	19	23
Japan	18	11	17	17	27
Italy	15	12	15	16	17
Canada	15	8	16	12	21
France	14	11	14	14	18
Benelux	11	5	12	9	15
Germany (Federal Republic)	10	7	10	8	12
All above countries	15	11	16	13	20

^a Tariffs in this table refer to import duties at the general rate. Where duties are specific, they have been converted into their *ad valorem* equivalents.

Source: Bureau of General Economic Research and Policies of the United Nations Secretariat, based on data from official sources.

In the tariff systems of developed countries, tariffs on manufactures and semi-manufactures tend to be appreciably higher than tariffs on the raw materials used in their production; while those on the raw materials not produced in the importing country, have frequently been zero. The persistence of this pattern of discriminatory tariffs against manufactures and semi-manufactures adds to the difficulties confronting

the developing countries in their attempt to reduce the manufacturing costs relatively to the costs of primary production. Furthermore, there is also evidence that, with certain classes of product, the tariff tends to be higher on the finished than on the semi-manufactured product. The barrier to exports, in other words, may tend to increase as industrial development advances from the simple processing of materials to the production of final manufactures.

All these are clearly brought out in a recent study by the United Nations Conference on Trade and Development (hereafter abbreviated as UNCTAD) entitled "Tariff structures of selected developed countries and their effect on export of processed goods from developing countries" (TD/B/C.2/9, 7 February 1966). After an examination of the nominal and effective tariff rates¹⁰ of the EEC countries, the United Kingdom and the United States for 1963 imports of eight groups of articles classified according to the raw materials from which they are made — copper manufactures, iron and steel, wood manufactures, leather and leather manufactures, wool manufactures, rubber manufactures, cocoa manufactures and cotton manufactures — the conclusion is that "the main industrial countries generally maintain a clear progression in their tariff rates according to the degree of processing. In almost any given group, the tariff rates increase continuously with the degree of fabrication so that the raw materials bear no duties at all or low duties, whereas higher duties are levied on the finished products made from them. The effect of this escalation in tariff rates from raw materials through successive stages of processing indicates the extent to which the present tariff structures of developed countries tend to have an inhibiting effect on the establishment in the developing countries of capacity to process the raw materials which they produce."

Thus, in 1963 imports of iron ore from developing countries into the selected developed countries were worth \$402.5 million, but imports of iron and steel manufactures were worth only \$19.3 million. While tariff rates are zero on iron ore imports, the effective tariffs on ingots and other primary forms of iron and steel manufactures are as high as 100 per cent in the United States and the United Kingdom and are nearly 30 per cent in the EEC countries.

Another example is cotton manufactures. In 1963, imports of raw cotton from developing to developed countries amounted to a value of almost \$513 million, whereas imports of all cotton manufactures from developing to developed countries amounted to only \$137 million worth. While the tariffs on raw cotton in all developed countries are zero, their tariffs on cotton manufactures are generally substantial (except the

¹⁰ As distinguished from the nominal tariff rate, the effective tariff rate indicates the degree of protection accorded to the value added in the manufacturing process, not to the value of the product itself.

tariffs of EEC countries on cotton yarn) and rise rapidly with the degree of manufacture, with the effective tariff rates going up as high as 50 per cent.

Concurrently with the emergence of the regional groupings in the developed countries—EEC and EFTA—there has been a trend during the postwar years towards the liberalization of general tariffs. Since the end of the war, there have been six major rounds of negotiations under the General Agreement on Tariffs and Trade (GATT) for the reduction of tariffs—Geneva 1947, Annecy 1949, Torquay 1951-52, Geneva 1956, Geneva 1960-61 and the Kennedy round in progress since 1964. In view of the formation of regional groupings, such measures of liberalization assume particular importance for the developing countries since they not only reduce the absolute height of tariffs but also help to limit the size of the preferential margins.

The extent to which the developing countries have benefited from GATT tariff reductions is, however, limited by several factors. In the first place, many of the developing countries are not members of GATT. In the ECAFE region, only six developing countries—Burma, Ceylon, India, Indonesia, Malaysia and Pakistan—are members of GATT, along with three other ECAFE members among the developed countries—Australia, Japan and New Zealand. Secondly, many products exported by the developing countries have not been affected by tariff reductions; either they are subject to regulation by means other than tariffs—as with textiles or agricultural commodities—or, as with mineral raw materials, they are already exempt from import duties or attract duties only at very low rates. Finally, the negotiation of reciprocal tariff reductions among the developed countries has naturally tended to concentrate on items of special importance in trade among these countries.

However, GATT, keenly aware of the need for the expansion of trade of developing countries as a means of furthering their economic development, adopted in May 1963 a Programme of Action which, *inter alia*, stated that “industrialized countries should prepare urgently a schedule for the reduction and elimination of tariff barriers to exports of semi-processed and processed products from less developed countries, providing for a reduction of at least 50 per cent of the present duties over the next three years.”¹¹ In this connexion, the Ministers of the EEC and the States associated with it made the reservation that “as regards processed and semi-processed products, a study should be made to determine the selective measures, especially conceived to meet the needs of developing countries, which could assure these countries the necessary markets for the products in question.”¹²

¹¹ GATT, *Basic Instruments and Selected Documents*, Twelfth Supplement, Geneva, June 1964, p. 37.

¹² *Ibid.*, pp. 39-40.

A significant development of GATT, arising mainly from the strong representations made by the developing countries at the 1964 United Nations Conference on Trade and Development at Geneva, is the amendment of the General Agreement on Trade and Tariffs originally concluded in November 1947, by the addition of Part IV on Trade and Development, in February 1965. Recognizing the “need for increased access in the largest possible measure to markets under favourable conditions for processed and manufactured products currently or potentially of particular export interest to less developed contracting parties,” “the developed contracting parties *do not expect reciprocity* for commitments made by them in trade negotiations to reduce or remove tariffs and other barriers to the trade of less developed contracting parties.” (Article XXXVI) “The developed contracting parties shall to the fullest extent possible accord high priority to the reduction and elimination of barriers to products currently or potentially of particular export interest to less developed contracting parties, including customs duties and other restrictions which differentiate unreasonably between such products in their primary and in their processed forms.” (Article XXXVII)¹³

Part IV of GATT came into force *de jure* on 27 June 1966, the necessary two-thirds of the contracting parties having ratified it. The new section, which consists of three articles (XXXVI-XXXVIII), has been applied on a *de facto* basis by many developing countries since early in 1965; it is now legally binding on all countries that have accepted it. However, Article XXXVI, which lists the principles and objectives of Part IV, concludes rather tamely that the adoption of measures to give effect to them “shall be a matter of conscious and purposeful effort on the part of the contracting parties both individually and jointly.”¹⁴

In recognition of the new principle of non-reciprocity in trade negotiations, the GATT at the twenty-third session ending at Geneva on 6 April, 1966, granted to Australia the waiver which permits that country to give tariff preferences to developing countries. The developing countries, however, are somewhat lukewarm over the waiver, because it discriminates between them: only certain developing countries will benefit from it, and for a very limited number of products.¹⁵

Finally, the Kennedy round of trade negotiations, arising from the United States Trade Expansion Act of 11 October 1962, which proposes a tariff reduction of 50 per cent over the period of five years until the expiration of the Act on 30 June 1967 and went into

¹³ GATT, *Basic Instruments and Selected Documents*, Thirteenth Supplement, Geneva, 1965, pp. 2-4.

¹⁴ Malcolm Subhan, “Third world in”, in *Far Eastern Economic Review*, 21 July 1966, p. 102.

¹⁵ Malcolm Subhan, “Australian move”, in *Far Eastern Economic Review*, 5 May 1966, p. 246.

force on 4 May 1964, appears at first to promise significant benefits to the developing countries. In a resolution adopted on 6 May 1964 by the Meeting of the GATT Trade Negotiations Committee at ministerial level, the rate of 50 per cent has been agreed upon as a working hypothesis for the determination of the general rate of linear or across-the-board reduction of tariffs, with a bare minimum of exceptions which shall be subject to confrontation and justification, in place of the item-by-item negotiations in earlier years.¹⁶ Subsequently, the developed countries have, somewhat selfishly, drawn up long "exceptions lists" of goods considered to be of "over-riding interest" — to be excepted from the general reductions in tariffs. These exceptions lists include many of the semi-processed and manufactured goods produced and exported by the developing countries. With the withdrawal of France from the policy-making organs of EEC in June 1965, the Kennedy round negotiations have been confined to purely technical matters. Furthermore, the developed countries in the trade negotiations have recently tended to reduce the rate of 50 per cent *across-the-board tariff cut* to first 30 per cent, and then to between 20 per cent and 25 per cent. If this should prove to be the case, many EEC tariffs on products of export interest to developing countries will remain unchanged even if they are now removed from the Community's exceptions list.¹⁷

The United Nations Conference on Trade and Development, in the Final Act adopted in 1964, included among its recommendations A.III.4 on "Guidelines for tariff and non-tariff policies in respect of manufactures and semi-manufactures from developing countries." On the basis of this recommendation, the Trade and Development Board at its second session in September 1965 deferred to the third session consideration of a draft resolution (TD/B/L.53 and Corr. 1 and 2) which, *inter alia*, "recommends to Governments participating in the United Nations Conference on Trade and Development to take steps with a view to: (i) organizing a supplementary effort¹⁸ in the field of trade negotiations to fully achieve the objectives set by the Conference; (ii) undertaking readjustments in tariff nomenclatures and other measures to facilitate

taking of appropriate tariff and other action to promote the exports of manufactured and semi-manufactured products from the developing countries."¹⁹

At the third session of the Trade and Development Board in February 1966, a Working Party, consisting of representatives from both developing and developed countries, agreed on a new draft resolution. Under this draft, "the Trade and Promotion Board,..... noting that the trade negotiations under way among the Contracting Parties to the General Agreement on Tariffs and Trade can contribute to several objectives contained in the Final Act of the Conference, recommends.....(ii) that the countries participating in the GATT negotiations consider, at whatever stage of the negotiations they agree would be appropriate, what supplementary efforts can be made within the framework of recommendations A.III.4 to fully achieve the objectives of the Conference in the field of exports of manufactures and semi-manufactures from developing countries, (iii) that the Secretary-General of UNCTAD seek, on the basis of concrete proposals, the advice and assistance of the Director-General of GATT (and/or other appropriate international organizations in the event the concrete proposals do not involve the tariffs of Contracting Parties to GATT) concerning what revision or adjustments of tariff classifications can be made to promote the exports of manufactures and semi-manufactures from developing countries."²⁰ The Board at its third session, however, could not accept the draft resolution and deferred its consideration till the fourth session in August/September 1966.

The developing countries, in the meantime, have proposed a new system of "reverse preferences", by which the developed countries would allow the manufactures of developing countries to enter their markets duty-free, thus enabling them to compete freely against the domestic manufacturers within these markets, but protected from the competition of other supplies in the developed countries which would still have to pass the prevailing tariff wall. These tariff preferences for the developing countries would be non-reciprocal (i.e. the developed countries would not enjoy preferences for their own goods in the markets of developing countries in exchange) and non-discriminatory (i.e. they would apply to all developing countries and not merely to selected ones within the political sphere of influence of the developed country concerned.) It is likely that this proposal may come up for consideration during the second United Nations Conference on Trade and Development to be held in the fall of 1967 in New Delhi.^{20a}

¹⁶ GATT, *Basic Instruments and Selected Documents*, Twelfth Supplement, Geneva, June 1964, pp. 37, 47.

¹⁷ Simpson, Gwyn, "The Kennedy Roundabout", in *Far Eastern Economic Review*, 28 July 1966, pp. 154-159. In an AFP despatch from Geneva appearing in the *Bangkok Post*, 2 December 1966, it is stated that the main parties to the Kennedy round — except the six European Common Market countries but including the United States, Britain, Japan and the Scandinavian Countries Denmark, Finland, Norway and Sweden which had just decided to form one single bloc during the remaining, crucial part of the talks — tabled on 30 November 1966 lists improving or withdrawing offers already made for the final bargaining to begin from 15 January 1967. A member of the United States Delegation hoped it would be possible to achieve a general tariff reduction of more than 25 per cent — compared with the initial aim of 50 per cent.

¹⁸ Supplementary to the various rounds of trade negotiations under GATT.

¹⁹ Annual Report of the Trade and Development to the General Assembly (A/6023/Add. 1, 4 November 1965), Part II, Report of the Board on Its Second Session, August/October 1965, para. 74.

²⁰ Report of the Trade and Development on Its Third Session, February 1966 (TD/B/66, 23 February 1966), para. 74.

^{20a} Dick Wilson, "Strategy for the South", in *Far Eastern Economic Review*, 20 October 1966, p. 129.

Non-tariff barriers. Among the non-tariff barriers to imports of manufactures and semi-manufactures from the developing into developed countries, the most frequently used are quantitative import restrictions. These restrictions, in the form of quotas, permit a desired change in imports to be achieved swiftly and with considerable certainty, whereas the tariff structures are difficult to change unilaterally at short notice. If necessary, quotas can also be applied selectively.

The extent of existing licensing and quota restrictions in selected developed countries is outlined in table 9. The Benelux countries, the United Kingdom and the United States seem to have few quantitative restrictions on imports from any source. The Federal

Republic of Germany, Italy and Japan apply restrictions to a considerably wider range of imports; but, even in these countries, the restricted items are few by comparison with the number that can be freely imported. The restricted articles in the Federal Republic of Germany are concentrated within those categories which generally are of the greatest importance in the exports of manufactures from developing countries, namely, textiles, clothing and footwear, and processed foods all of which are consumer goods from "low-wage countries." In the case of Italy and Japan, most articles under restraint are those that are typically exported from developed countries, namely, producer goods such as chemicals and machinery.

Table 9

SELECTED DEVELOPED COUNTRIES:
NUMBER OF MANUFACTURED ARTICLES SUBJECT TO TOTAL RESTRICTIONS, JUNE 1963^a

<i>Commodity group</i>	<i>Benelux</i>	<i>Germany (Federal Republic)</i>	<i>Italy</i>	<i>Japan^b</i>	<i>United Kingdom</i>	<i>United States</i>
Processed foods	—	17	6	22	5	2
Beverages and tobacco	—	—	2	8	2	—
Chemicals	5	1	5	33	3	—
Leather and rubber products	—	1	—	5	—	—
Wood, cork and paper products ...	—	—	—	6	—	—
Textiles	— ^c	24	5	9	3 ^d	1 ^d
Iron and steel	—	—	—	4	—	—
Metal manufactures	—	—	—	4	—	—
Machinery, other than electric	—	1	4	22	—	—
Electric machinery	—	2	—	11	—	—
Transport equipment	—	—	11	8	1	—
Clothing and footwear	— ^c	8	3	4	— ^d	— ^d
Other manufactures	—	10	3	18	2	—

^a Number of articles refers to number of items distinguished in the sources used.

^b Articles subject to import licensing under the Foreign Exchange Fund Allocation System.

^c Imports of several items from Japan are subject to quota restrictions.

^d Exports of varying number of items are limited by exporting countries.

Source: Bureau of General Economic Research and Policies of the United Nations Secretariat, based on data from various GATT documents and from official national sources.

In the case of textiles, because of the reluctance of governments of developed countries to impose quantitative restrictions unilaterally in contradiction to pursuit of a liberal trade policy or for fear of damaging established political or economic interests in countries which would be affected by the restrictions, resort is had to limitations of exports from developing countries. The exporting countries' motive for acquiescing in such export limitations has presumably been the prospect of less favourable terms in case of refusal.

In order to slow down the growth of textile imports from the Commonwealth countries, the United Kingdom entered into bilateral agreements to limit cotton textiles exports with Hong Kong in 1958 and with India and Pakistan in 1959. These agreements have since been renewed and are still in force. Imports

from China (Taiwan) and the centrally planned economies (excluding Yugoslavia) are under licensing control. Imports of cotton yarn from Pakistan were also subjected to quota restrictions after negotiations to establish a voluntary export limit failed. Recently, the United Kingdom has been willing to accept a somewhat higher level of imports from Asian Commonwealth supplies, while the policy towards imports from new sources has, on the whole, become more restrictive.

A sudden increase in imports in the late 1950's prompted the United States Government to initiate consultations under GATT, which resulted in the international cotton textile arrangements of 1961 and 1962. A short-term arrangement was drawn up in July 1961 and remained in force for one year beginning 1 October 1961. The short-term arrangement was con-

verted into a five-year long-term arrangement, which became effective on 1 October 1962 and has been acceded to by the governments of 23 developed and developing countries.

B. Structural changes in industrial production

The import of manufactures from the developing to the developed countries is often accompanied by the fear that the increased imports will adversely affect domestic industries. This fear, though sometimes warranted in specific circumstances, is frequently very much exaggerated.

In the first place, the United Nations estimated in 1960 that imports of manufactured goods from the developing countries accounted for less than one per cent of the gross national product of the industrialized countries.²¹ Even if their value were multiplied several times over, these imports would be likely to absorb only a very small share of the additional demand for manufactured goods that can reasonably be expected to materialize in the years ahead. Secondly, the volume of manufactures (excluding base metals) imported by the developed countries from the developing countries in 1961 amounted to about \$1.4 billion worth. By comparison, the developed countries in the same year imported manufactures from each other to the value of \$33.8 billion. Thus, even if imports from the developing countries were to be instantaneously doubled, they would still amount to less than one-twelfth of current trade among developed countries in manufactures. Imports of manufactures from the developing countries are clearly a marginal element in the total trade of the developed countries.²² Thirdly, even for the major items of imports of manufactures from the developing countries into the developed countries, the proportion that such imports occupy in total domestic supply is extremely limited. Thus, in the case of the United States, the ratio of imports of selected manufactures from developing countries to domestic supply in 1960 was only 1.4 per cent for textile mill products, 1.4 per cent for veneer, plywood board, 0.7 per cent for leather and leather products, 0.4 per cent for chemicals and 0.1 per cent for footwear.²³

It is thus clear that, even for the specific industries affected, the problem of structural readjustment in production and employment that may arise on account of competition from imports coming from the developing countries is rather limited; the need for such readjustment would have been far greater in cases of technological progress or regional economic or industrial integration arising from the formation of the European Coal and Steel Community in 1952, the European Economic Community in 1958 and the European Free Trade Association in 1960. In the United States, for example, it has been estimated that

an increase of one billion dollars in the imports of commodities of a type produced by 72 major protected industries and distributed in proportion to their output in 1953 would displace between 51,000 and 224,000 workers. These workers would constitute only 0.1 to 0.3 per cent of total civilian employment in 1959. The estimate has to be taken along with the fact that any increase in imports which is induced by a general reduction in trade barriers is likely to be matched by a parallel increase in exports.²⁴

Measures for structural readjustment in developed countries were adopted after the formation of the Benelux, the European Economic Community, and the European Coal and Steel Community, or as national programmes arising from the application of the 1962 US Trade Expansion Act or the 1959 UK Cotton Industry Act. In Benelux, a joint readaptation fund was set up in 1953 to provide temporary financial help to enterprises experiencing difficulties as a result of the implementation of the Benelux treaty. The Social Fund of the European Economic Community was established under the Treaty of Rome to ensure the employment and guarantee the income of wage earners against the risks of the integration of national economies, and also to promote action against structural unemployment in general, through retraining and resettlement. The adjustment plan adopted by the High Authority of the European Coal and Steel Community for the high-cost Belgian coal mines provided for closing down marginal pits and renovating others, reducing the capacity of the industry by over 7 million tons, or more than a fourth of actual production in 1958. In order to enable the mines to clear the coal already accumulated at the pit-heads, a temporary subsidy was given to the operators.

The US Trade Expansion Act of 1962, which provides for a total reduction of 50 per cent in tariff rates within a period of five years, that is, prior to the expiration of the Act on 30 June 1967, to be achieved through negotiations with GATT, also provides for federal assistance to firms and workers suffering losses caused by import competition. It provides for three types of assistance, both to firms and to workers affected, namely (1) technical assistance — information, market and other economic research, managerial advice and counselling, training and assistance in research and development, (2) direct loans or guarantees of loans to provide financial assistance which otherwise might not be available, and (3) tax assistance through a special carryback of operating losses. Assistance to workers affected includes (1) readjustment allowances in the form of compensation for partial or complete unemployment, (2) retraining of workers so that they can shift into other types of employment, and (3) relocation allowances to assist a family in moving from an area where employment may be lacking to an area where employment is available.

²⁴ Walter S. Salant and Beatrice N. Vaccara, *Import Liberalization and Employment* (Washington, D.C., 1961), p. 215.

²¹ Cf. United Nations document E/CONF.46/PC/20, p. 52.

²² UNCTAD, *Trade in Manufactures*, *op. cit.*, p. 35, para. 156.

²³ *Ibid.*, p. 36, para. 159.

In view of the declining position of the cotton industry in the United Kingdom, partly because of the gradual loss of export markets but also because of increasing imports in recent years, and the consequent emergence of excess capacity, the Cotton Industry Act of 1959 empowered the Government to offer compensation to the industry if the latter agreed to scrap a sufficient amount of its old machinery and if it also undertook to compensate workers who might be displaced. Since introduction of the Act, about 50 per cent of the spindles in the industry, 36 per cent of the doubling spindles and 40 per cent of the looms have been scrapped.²⁵

In 1964, the United Nations Conference on Trade and Development adopted a Final Act, embodying Annex A.III.6, which recommended, *inter alia*, that the developed countries should make "arrangements for assisting the adaptation and adjustment of industries and workers in situations where particular industries and workers in those industries are adversely affected by increased imports of manufactures and semi-manufactures."²⁶

C. Measures to facilitate marketing of manufactured imports from developing countries

The first problem affecting the marketing of the industrial products of the developing countries in the developed countries is how to obtain full information about the requirements of the prospective buyers and about the laws and procedures in force in the important countries. This problem is summarized in paragraph 38 of the report of the Second Committee of the United Nations Conference on Trade and Development in 1964:²⁷ "The marketing of industrial goods in the developed countries requires the identification of prospective buyers, thorough and detailed knowledge of their demands in relation to technical standards, quality, design, packaging, prices, credit deliveries, etc., as well as comprehensive information on prevalent laws, rules, customs and procedures. An effective dissemination of relevant information and the organization of appropriate promotion services, both on a national and international scale, call for wide experience and substantial resources which are, at present, beyond the means of most developing countries. In addition, exports of manufactures and semi-manufactures by the developing countries have to contend with consumers' bias in favour of the technical standards and quality of the products of developed countries."

This problem can be met by the establishment of an international trade information and trade promotion centre, as well as focal or contact points within the appropriate government agencies in the developed countries. An international trade information and trade promotion centre, adequately staffed by com-

petent personnel, can render valuable assistance to the developing countries in promoting their exports of manufactures and semi-manufactures. The UNCTAD Second Committee recommended that "such a centre, to be effective, should be supplemented by national or regional trade information and trade promotion centres so that the latter can act in liaison between the former and the exporters of the developing countries. The international centre should be universal in character, i.e., should assist all the developing countries to sell their products in all, and especially developed countries, irrespective of their economic systems or mechanism of foreign trade. All developed countries should be prepared to co-operate fully with the international centre whose services should be made available on like terms to all developing countries."²⁸ The establishment of an international trade centre with regional or national trade information and trade promotion centres to cover the fields of trade information and of trade promotion would be a large-scale project and would require the co-operation not only of the governments but also of various non-official bodies as well as of experts, and would need to take into account the existing institutions in this field. So far, GATT has, since May 1964, established an International Trade Centre on a modest scale, adopting a step-by-step approach to expand its activities in assisting the less developed countries to increase their export earnings. The Group of Experts appointed by GATT to examine the activities of the Centre recommended in March 1965 that "for the moment trade information should be in the forefront of the Centre's *practical activities*, but the problems of training specialized commercial personnel for the developing countries should occupy a fundamental role in the analysis and study activities of the Centre. The same applies to problems of commercial administrative infrastructure."²⁹

The establishment of focal or contact points within the appropriate government agency or other appropriate institution for the co-ordination of activities intended to enlarge the opportunities for the importation of manufactures and semi-manufactures from the developing countries was recommended by the 1964 United Nations Conference on Trade and Development, in Annex A.III.6 to the Final Act. Such focal or contact points could guide and help the exporters from the developing countries in the marketing of manufactures and semi-manufactures, as the governments of developed countries possess or can obtain the type of comprehensive, reliable information about existing and future market needs and potentialities in their own countries which will give guidance to the developing countries regarding the export opportunities in a particular new market. They could be an efficient executive organ of the governments of the developed countries to aid actively the exporters and government

²⁵ UNCTAD, *Trade in Manufactures, op. cit.*, pp. 36-37.

²⁶ UNCTAD, Vol. I on *Final Act and Report* (United Nations publications Sales No. 64.II.B.11), Geneva, 1964, p. 40.

²⁷ *Ibid.*, p. 150.

²⁸ *Ibid.*, para. 39.

²⁹ GATT, *Basic Instruments and Selected Documents*, Thirteenth Supplement, p. 99.

agencies of developing countries. Moreover, they would be able to act as liaison agencies between the developing countries and their exporters and the government departments concerned as well as trading and industrial undertakings or firms in the developed countries.³⁰

A second measure to facilitate marketing of manufactured imports from the developing countries is the provision by developed countries of financial and technical assistance to export organizations of the developing countries to market their industrial products. The marketing of new products or of products from new sources involves the outlay of considerable preliminary expenditure on investigation of the market, including enquiries into the size of current and potential demand, the standards, specifications and requirements of the user, etc., and thereafter on the organizing of sales and publicity campaigns. The arrangements for marketing may also involve special terms between the exporter and the importer, industrial unit, or chain of department stores which agrees to buy the product in question from a new source. The exporting organization will in many cases need financial and technical assistance for all these purposes and for overcoming the initial difficulties of marketing the goods. Such financial and technical assistance which would help the developing countries to increase their exports of manufactures and semi-manufactures might be provided particularly where the imports of the goods in question will be acceptable in the long-term interest of the developed countries. Such imports may be said to be in the long-term interest of the developed countries in cases where, for instance, they gradually and increasingly take the form of processed raw materials, ores and tropical food products, including fruits and beverages, or chemical intermediates and engineering goods in the semi-finished stage like castings, forgings, billets and bars, or consumer or other goods made from raw materials available in the developing but not in the developed countries. The aid might be extended to the formulation of practical and technically feasible schemes of export promotion and marketing once the project had been approved in principle.³¹

A third measure is the promotion of joint ventures between developed and developing countries for producing goods, especially of intermediates, for purchase and use by industries in developed countries. The setting up of joint enterprises in developing countries is in fact already a feature of their industrial development. What is not so common is the setting up of such enterprises for producing goods required in developed countries. The promotion of such industrial co-operation involves "taking steps for bringing about adjustment in production patterns so that endowment

³⁰ UNCTAD, "Promotion of imports of manufactures and semi-manufactures from the developing to the developed countries" (TD/B/C.2/7, 7 January 1966), para. 9.

³¹ *Ibid.*, para. 12-13.

factors in both developed and developing economies are more efficiently used for common benefit."³² This involves a recognition of the principle of international division of labour as a basis for future industrialization in all countries. For the application of this principle, the states concerned would have to give up or modify the principle of self-sufficiency in national economic development, and joint studies would have to be made for determining the requirements of the developed countries in the various fields of industry, and the extent to which the existing or prospective industrial capacity in the developing countries can supply these requirements. Thus, the joint FAO/ECE study of the timber trends of Europe during the period 1950-75 points to the possibility of the developing countries supplying the requirements of plywood and veneer made from tropical hardwoods in the form of manufactured products. This joint study is a timely projection of the future trends of the demand for timber and forest products in Europe and emphasizes the need for long-term plans for satisfying the demand by increasing Europe's domestic resources and by imports. In this connexion, it is proposed that the Committee on Manufactures of the United Nations Trade and Development Board consider the constitution of a working group to suggest some specific steps which might be taken to give practical expression to these possibilities. The working group, assisted by representatives of the FAO and the ECE as well as of other regional Economic Commissions, might consider the questions of supply and demand more concretely in this sector and also questions of government policies which would be involved, the volume of the investment and financial assistance that would be required to set up the processing and manufacturing capacity, the terms and conditions of such investment and aid, and any other factors that would affect the success of industrial enterprises in developing countries as, for example, preliminary investigations and surveys of the likely areas of supply.³³

Sectors other than forest products could be studied on the basis of information available from governments, from other international bodies, and in publications, to be considered by the Committee on Manufactures at future sessions. On the basis of these studies, working groups similar to the one suggested on timber and forest products might then be set up to deal with various other sectors of industry, as for instance, (1) chemicals and petro-chemicals, including intermediates, (2) engineering and metallurgical products, (3) food-stuffs, namely, processed food and beverages, (4) textiles industry, including apparel industry, and the natural and man-made fibre industries, and (5) mineral and non-ferrous metal products and steel.

A fourth measure is the granting of favourable treatment to the industries and exporters of the deve-

³² UNCTAD, *Final Act and Report, op. cit.*, p. 40, Annex A.III.6, para. 7(ii).

³³ Document TD/B/C.2/7, para. 26.

loping countries with respect to the establishment of agencies, offices, consignment stocks, maintenance and repair services, etc., in the territory of the developed countries, within the framework of their national legislation. The latter are normal activities of businessmen from the developing countries, who have had little experience of the business world in the developed countries. The help they might receive in this field is normally of two types. In the first place, there are a number of laws and regulations which have to be satisfied before the exporter can establish successful business activities in the industrialized countries. Work permits are required by foreigners in some developed countries, and there are also regulations governing the setting up of offices by aliens. Income tax laws sometimes render them liable to the payment of tax both in their own country and in the country where they set up an office. The new exporters of the developing countries need assistance and favourable treatment for the purpose of satisfying these requirements and for conducting their export business. Secondly, not only governments but also chambers of commerce and similar institutions, national or international, can play an important part in facilitating the business activities of the exporters of the developing countries, such as by opening bureaux for assistance, and by considering other special measures to help them. The chambers of commerce and other associations of industries and business in the developed countries could convince the business and industrial communities in their countries that enlightened interest requires the liberalization of the terms of production and export rights under patents and licenses, in respect of export markets, for the industrial units set up in developing countries with their co-operation.³⁴

V. Measures for the diversification and expansion of production in developing countries

A. Integration of industrial exports in development plans and policies

The United Nations Conference on Trade and Development in 1964 recommended in Annex A.III.3 to the Final Act that "the establishment and development of industries with an export potential and other measures and policies for the promotion of exports of manufactures and semi-manufactures, should be included in the development plans and policies of the developing countries, by giving priority treatment to the export sector in allocation of domestic and foreign exchange measures, supplies of raw materials, spare parts, power, transport and skilled manpower, financial and technical assistance and providing for other types of aids and incentives, and at the same time without neglecting the development of industries based on the domestic market".

As noted earlier, the ECAFE developing countries accounted for three fourths of the total exports of

manufactures (excluding base metals) from the developing countries of the world in 1961. Among these, six major countries, namely, Hong Kong, India, Iran, Philippines, Pakistan and China (Taiwan), contributed four fifths of the total exports of manufactures from the ECAFE developing region. Aside from Hong Kong, other countries have provided targets for the export industries and proposed measures for their achievement, as part of their development plans.

In India's third five-year plan (1961/62-1965/66), a series of "export estimates", based partly on the projected output of the various industries and partly on an assessment of market conditions in foreign countries, have been formulated, with a view to estimating the foreign exchange earnings in the balance of payments. The plan envisages for the whole five-year period exports of manufactures worth nearly Rs 20 billion (\$4.2 billion) out of a total export of Rs 34.5 billion (\$7.25 billion), i.e., about 60 per cent of the total.³⁵ Of the total export of manufactures, jute manufactures and cotton textiles combined claim as much as 44 per cent. For the achievement of these targets, general policies and measures relating to specific commodities are to be applied. The primary object of the general policies envisaged in support of the export programme is to create the necessary climate in the country for the export effort, to restrain domestic demands and enlarge surpluses available for exports, and to reduce production costs.

In the *Outline of the Third Five-year Plan (1965-70)*, the Government of Pakistan proposes to raise the annual export earnings from Rs 2,950 million in 1964/65 (estimates) to the target total of Rs 4,250 million for 1969/70. For the same period, jute manufactures will rise from Rs 360 million to Rs 840 million, and cotton manufactures from Rs 150 million to Rs 300 million. In 1969/70, the major industrial exports — jute and cotton manufactures — are planned to contribute to almost 27 per cent of the country's total export earnings. Manufactured exports, which are expected to account for nearly 30 per cent of the total exports in 1964/65, are expected to increase to about 45 per cent of the total in 1969/70. For this rapid expansion of exports, the Government plans to pursue a vigorous policy for containment of domestic consumption of exportable products and a determined and imaginative policy for the development of market outlets abroad.³⁶

China (Taiwan), like Hong Kong, has achieved remarkable success as an export economy through a significant expansion in industrial exports. In the fourth four-year plan for economic development of the Province of Taiwan (1965-68), industrial exports, excluding processed agricultural products especially

³⁵ UNCTAD, "Export possibilities for Indian manufactures in the European markets" (E/CONF.46/P/9, 30 January 1964), pp. 5, 11.

³⁶ *Outline of the Third Five-Year Plan (1965-70)*, p. 72.

³⁴ *Ibid.*, para. 31-34.

sugar, are expected to rise from \$189.7 million worth in 1964, or 48 per cent of total exports, to \$293.4 million worth in 1968, or 52 per cent. While total export earnings are expected to rise by 42 per cent from \$463.1 million in 1964 to \$560.9 million in 1968, industrial exports will rise by 55 per cent from \$189.7 million to \$293.4 million during the same period. These industrial exports in 1968 are estimated to comprise, in order of importance, textile products (\$81.5 million), plywood and lumber products (\$58 million), chemicals (\$43 million), metal product and machinery (\$39.2 million), cement and building materials (\$19.5 million), paper and pulp (\$15 million), monosodium glutamate (\$7.7 million), and others (\$39.5 million). Since export expansion will be a major activity in the future economic development of Taiwan, whether from the viewpoint of stimulating economic growth or from that of balancing international payments, the Government plans to adopt a number of measures designed to reduce cost and improve quality, provide credit facilities and tax incentives to export industries, undertake export market research, restrict imports to protect new industries, encourage foreign investment and technical collaboration, etc.³⁷

In the Republic of Korea, which is making a heroic effort to increase its export earnings fourfold during the first five-year plan period (1962-66), from \$32.9 million in 1962 to \$137.5 million in 1966, the share of industrial exports is to rise from 15 per cent to 18.7 per cent. The total planned export of \$25.7 million for 1966 will consist of: manufactured goods classified by material, \$10 million (textiles 5.7, base metals 2.3, plywood 2.0); chemicals, \$3.7 million; and miscellaneous, \$12 million.³⁸

B. Productive efficiency and cost reduction programmes

The United Nations Conference on Trade and Development in 1964 recommended in Annex A.III.3 to the Final Act that "in order to raise output per worker and to formulate and execute programmes of cost reductions in industries with an export potential, the following steps, among others, may be taken:

(a) Modernization of, and addition of balancing, equipment to existing industries;

(b) Ensuring full utilization of the installed capacity;

(c) Introduction of progressive and scientific management which can employ techniques of modern industrial management such as incentives for workers, engineers, technicians and other cadres in the managerial and supervisory ranks, proper lay-out of equip-

³⁷ *The Republic of China's Fourth Four-Year Plan for Economic Development of The Province of Taiwan, 1965-1968*, Council for International Economic Co-operation and Development, November 1965, pp. 45-47.

³⁸ Republic of Korea, *Summary of the First Five-Year Plan, 1962-1966*, 1962, pp. 40, 70.

ment and machines, production and management accounting control, tooling facilities and systematic preventive maintenance procedures, product design, quality control, standardization, pre-shipment inspection, work performance standards, etc.;

(d) Provision of training facilities for imparting to and improving skills of workers and technical and managerial personnel".

It is well known that productivity of labour in most developing countries is low and quality of product inferior in comparison with advanced countries. However, the output per worker and the quality of product vary widely from unit to unit within the same industry. This wide range of outputs per worker reveals the potential for raising productivity. The study of cost structure of units within the range should enable the investigators to identify the elements responsible for low productivity and suggest specific measures for improving efficiency in units with low productivity. In India, the National Productivity Council has constituted productivity study groups to make intensive studies of the productivity and the cost structure in selected industries. A recommendation by an ILO productivity adviser was made much earlier to the effect that, in the third five-year plan, cost reduction in industry should receive the highest consideration and that plans for reduction of costs should be worked into the various plan projects.³⁹

Since the inception of the National Productivity Council in 1958, industry is being increasingly involved in the drive to raise productivity. Over the first three years of its establishment and under its auspices, 43 local productivity councils have come into existence and a large number of persons have participated in seminars and discussions on productivity and in the effort to make the techniques and problems in this field more widely understood. The National Productivity Council has organized 230 training courses in which about 4,000 managers, technicians and supervisors have taken part. Senior executives have also participated in advanced management programmes. In due course, the programmes of the National Productivity Council are expected to be linked up with the work of the proposed All-India Institutes of Management and the National Institute for Training in Industrial Engineering. In the third plan, it is proposed to extend the general training programmes for managers, technicians and supervisors to apply productivity techniques in plants on a larger scale and to train instructors in selected productivity techniques.⁴⁰

In India, which is a country where exports account for only a small fraction of total output in all industries except for the jute textile industry, the United

³⁹ "Reduction of costs", in *Indian Labour Journal*, June 1963, p. 527.

⁴⁰ Government of India, Planning Commission, *Third Five-Year Plan*, p. 650.

Nations Centre for Industrial Development has recommended the concentration of all export promotion measures and efforts in the export sector on selected units in each export industry rather than thinly spreading out the resources over all manufacturing units in an industry irrespective of their efficiency in exports, mainly in view of the country's scarcity of resources. The industrial units chosen to constitute the export sector should adopt productive efficiency and cost reduction programmes; they should not only be large enough to secure economies of scale, modern in equipment and progressive in management, but also give rise to a net foreign exchange earning position, that is, a positive balance between gross export earnings and foreign exchange expenditure on import requirements of machinery, spare parts and raw materials, payments of royalty for technical know-how, return on foreign capital, etc.⁴¹

C. Standardization and quality control

In 1964, the United Nations Conference on Trade and Development recommended in Annex A.III.3 to the Final Act that "measures should be taken to introduce standardization and quality control", for increasing the competitive strength of industries with an export potential in developing countries.

Standardization has grown and is today most effective in countries with a strong industrial base. However, standardization, as a regulatory instrument for the proper development of industry with the minimum wastage of resources both material and manpower, is most effective in developing countries which are aiming to achieve rapid development through development plans. For export industries in particular, standardization, including pre-shipment inspection and other measures for control of quality of export products, assumes special importance.

The Export Inspection Law of Japan, enacted in 1948 but amended in 1957, contains features which can be applicable to developing countries. Under this law, a number of agencies were established to conduct compulsory pre-shipment inspection of certain designated commodities. A total of 143 important items have been designated so far, constituting more than 40 per cent of Japan's total export. Export inspection is classified under this arrangement in three categories, viz.: (a) inspection of quality, (b) inspection of packing conditions, and (c) inspection of material and manufacturing processes.

Some other countries in the ECAFE region have either embarked on such schemes of pre-shipment inspection or are contemplating doing so. In India, quality control and pre-shipment inspection schemes for certain commodities are provided for by statutory

⁴¹ UNCTAD, "India-Policies and measures for promotion of exports of manufactures and semi-manufactures", (CONF.46/76, 9 March 1964), Part III on "The export sector in industries", pp. 53-62.

regulations. Many schemes are administered by export promotion councils for various industries set up to meet the increasingly urgent need to promote exports. The Ministry of Commerce ensures the proper planning and direction of all export effort. The Government a few years ago constituted an official committee, under the chairmanship of the Director of Indian Standards Institution, to review the existing mechanism for compulsory and voluntary quality control and pre-shipment inspection and make recommendations for further steps to be taken to increase export trade. Among these recommendations, one is that goods which are considered important for the export market and for which standards specifications have been or could be laid down should be required to be inspected and certified before export, through appropriate agencies at the time of manufacture or packaging. In 1963, the Export (Quality Control and Inspection) Act was passed by the Indian Parliament to empower the Government to impose compulsory quality control and pre-shipment inspection on commodities for export as and when it deems fit. The Export Inspection Advisory Council composed of official and non-official representatives has been formed to advise the Government on related matters. A Quality Control Directorate has also been established in the Ministry of Commerce to act as executive organ of the Council. Already many articles have come under compulsory control; others are being covered gradually as industry becomes more quality conscious and production comes up to standards.

This extension of the standardization movement which has enormously benefited Japan and is helping Indian export, will, if properly adapted, assist the economic development of other developing countries, and promote the expansion of export industries. Some countries, such as China (Taiwan), Pakistan and the Philippines, have also taken steps in the right direction and their efforts will soon gather momentum.⁴² In China (Taiwan), there are two government agencies in charge of maintaining standards for exports: the Central Bureau of Standards under the Ministry of Economic Affairs and the Bureau of Commodity Inspection and Quarantine under the Taiwan Provincial Government. No goods below standard are allowed to be exported and exporters who violate the regulations have their rights to import/export suspended.

D. Aids and incentives for industrial exports⁴³

The United Nations Conference on Trade and Development in 1964 recommended in Annex A.III.3 to the Final Act that "the Governments should assist investment in industries with an export potential and the promotion of exports of manufactures and semi-

⁴² Asian Conference on Industrialization, Sectoral Study on Standardization, Patents and Marketing (I&NR/Ind.Conf./S.6, 5 November 1965), pp. 86-89.

⁴³ Information on this section is derived mainly from United Nations, *Economic Survey of Asia and the Far East, 1963*, Part One on "Import substitution and export diversification", pp. 69-83.

manufactures by ensuring adequate provision of long- and short-term credit at reasonable or concessional rates of interest and equity capital through appropriate agencies such as the commercial banks, refinance corporations for industry, export risk insurance corporations and development banks and corporations, fiscal incentives, drawbacks of customs duties, sales or purchase taxes, concessional internal freight rates, supply of scarce raw material and other measures". The measures suggested may be considered under the following headings: financial aids, fiscal incentives, supply of certain materials, freight concessions, subsidies.

Financial aids. These comprise export credit, export credit refinance, and insurance of export credit risks.

Export industries usually enjoy credit facilities, sometimes on a preferential basis, in many ECAFE developing countries. In China (Taiwan), banks were especially asked to meet the credit requirements of export industries. Exporters of processing factories paid a specially low rate of interest to the Bank of Taiwan — 7.5 per cent per annum as against the commercial rate of 12.9 per cent to 15.4 per cent, in 1964. In India, the Reserve Bank extended in October 1958 the Bill Market Scheme to export bills, with a view to enabling banks to extend credit facilities to exporters on a more liberal basis. Under the extended scheme, all scheduled bank which were eligible to borrow under the Bill Market Scheme and which were authorized dealers in foreign exchange became eligible to borrow from the Reserve Bank at the bank rate against the security of usance promissory notes maturing within 90 days, executed by the scheduled bank and the exporter. The minimum amount to be advanced at a time by the Reserve Bank to a bank was fixed at Rs 200,000 and the minimum amount of an individual usance promissory note to be accepted as a security by the Reserve Bank was fixed at Rs 20,000 so that small exporters could also benefit from the scheme.

The official policy of most ECAFE developing countries is to establish or sponsor the establishment of both government development corporations and private development banks so as to provide finance for industries by means of long- or medium-term loans and of direct equity participation. To augment the resources of these institutions, governments have provided both share and loan capital, and have assisted them to raise loans and credits in foreign currencies, with or without a government guarantee. The policy of these institutions is generally to provide financial assistance to export as well as import-saving industries.

Some ECAFE developing countries, viz. India, China (Taiwan), the Republic of Korea, and the Philippines, export machinery and engineering goods. Export of these goods depends not only on relative prices and qualities of the products, but also on the extent to which the exporters can offer foreign buyers com-

petitive credit terms. With a view to enabling Indian exporters to compete effectively in this respect, the Refinance Corporation for Industries was established by the Government of India in June 1958 to extend, from 1963, the refinance facility to industries which export capital and engineering goods for pre-shipment credits and also for post-shipment credits if their duration does not exceed five years. The minimum amount for which refinance may be sought has been fixed at Rs 100,000 and the total amount of export credit refinancing to a single exporter is not to exceed Rs 5 million. Eighty financial institutions comprising 61 banks, 15 state financial corporations and four state co-operative banks are eligible for refinancing facilities in respect to the medium-term loans granted by them to industries.⁴⁴

The need to insure against export credit risks, of both commercial and political type, is great for export industries in developing countries, for not only are the risks of selling goods to overseas buyers generally greater than in the case of domestic sales, but then increase manifold when the country is engaged in vigorous export promotion efforts exploring new markets and selling goods to unknown foreign buyers and offering them, *inter alia*, credit facilities at least as good as those offered by their competitors. In India, the exporters had to bear these risks themselves until the establishment of the Export Risks Corporation in October 1957. This Corporation, modelled on the Export Credit Department of the United Kingdom, is wholly owned by the Government and is operated on a "no loss, no profit" basis. It has introduced four types of policy, viz. a Shipments (Comprehensive Risks) Policy, Shipments (Political Risks) Policy, Contracts (Comprehensive Risks) Policy and Contracts (Political Risks) Policy. The risks are insured from the date of shipment under the first two policies while the last two policies cover the risks from the date of the contract for the sale of goods. An exporter has the option to secure himself against political risks only or against commercial as well as political risks. The Corporation covers risks up to 85 per cent in the case of commercial risks and up to 95 per cent in the case of political risks. The remaining percentage of the risks is carried by the insured. Also, the exporters must ensure the "whole turnover". These two principles are followed so that the insurer should have a stake in the risk, and the broad spread of risks by countries, buyers and time is secured. The number of policies issued by the Corporation rose from 250 in 1959/60 to 623 in 1962/63, while the value of risks covered rose from Rs 75.6 million to Rs 231 million during the same period. The average rate of premium per Rs 100 of the insured value, which indicates the cost of insurance to the exporter, has been reduced twice since the inception of the Corporation and was Rs 0.27 in 1962/63.⁴⁵ In Pakistan, the Export Credits Guarantee

⁴⁴ "India — Policies and measures for promotion of exports of manufactures and semi-manufactures", *op. cit.*, p. 77.

⁴⁵ *Ibid.*, pp. 75-76.

Scheme was introduced in March 1962 with the objective of encouraging the export trade of Pakistan by undertaking such financial risks as are not covered by normal insurance guarantee. The scheme insures the total annual exports of exporter to the extent of 75 per cent for the commercial risks and 85 per cent for the political risks, the balance being borne by the exporter.

Fiscal incentives. These incentives include drawbacks, tax remissions, tax holidays, and import licenses or retention quotas.

To provide additional incentives to export industries, most governments of the ECAFE developing countries have introduced a system of drawbacks or refunds of import duties and other excise and sales taxes paid on materials going into the production of export goods. If such materials are subject to any duty (import duty on foreign material or excise duty on indigenous material), the duty element enters into the cost of export goods and thereby raises their prices relative to the price of competing foreign products made from materials not subject to similar duties. In China (Taiwan), the Government has agreed to grant rebates of taxes imposed on raw materials imported for processing upon the export of the finished products. In Malaysia, there is a 7/8 drawback on import duties levied on certain raw materials incorporated in exports. In India, there were about 200 items on the drawback schedule in 1963. Provision of drawback is made for any item for which a request is made. State governments do not charge sales tax on the ultimate transaction leading to the export. But sales tax paid on materials used in earlier stages for the manufacture of the products is not refundable. However, sales tax in respect of some commodities, e.g. textiles, sugar and tobacco, has been replaced in recent years by additional excise duties which are refunded on exports in a manner similar to the drawback of normal excise duty. In addition, there is a provision of Manufacture in Bond which obviates the necessity to make any actual payment of duties at any stage. The dutiable materials and components are kept under Central Excise or Customs supervision at approved places and the process of manufacture is conducted under the supervision of the Customs or Excise staff. In the Republic of Korea, a similar system—the bonded factory system—was introduced in 1961.

In regard to tax remissions, the Government of India has granted a rebate of one-tenth of the income tax and super tax attributable to income from exports since March 1962. A further rebate of income tax and super tax up to 2 per cent of the value of exports has been granted on exports affected after February 1963. While the former provision is applicable to all exports, the latter is not applicable to exports of a small number of commodities such as textiles, cement and sugar. In the Republic of Korea, income tax and corporation tax are reduced by 50 per cent for specified

businesses that earn foreign exchange. In Thailand, the Industrial Investment Act empowers the Board of Investment to grant export industries partial or full exemption from business taxes over such a period as may be determined in each individual case.

Most developing countries in the region provide newly established industries, including export industries, with specific incentives, among which the most important are tax holidays for specified periods and liberal depreciation allowances. The duration of the tax holiday varies from three years in Burma and four years in the Republic of Korea to five years in Ceylon, China (Taiwan), India and Thailand. For foreign investors, the tax holiday may be extended to a maximum period of eight years in the Republic of Korea. In Pakistan, the duration of the tax holiday depends on the areas in which the particular industries are located; the industries located in less developed areas enjoy a tax holiday for eight years, in developing areas, six years, and in more developed areas, four years. In the Philippines, the New and Necessary Industries Law, under which the tax holiday was granted expired in 1962. But, during the time the law was in force, out of the six years of tax holiday, full exemption from income tax was granted for three years and tax liability was progressively increased by a specified percentage every year thereafter. In the Republic of Korea a similar method of tax exemption is followed.

In many ECAFE developing countries, development rebates at rates ranging up to 20 per cent of the cost of plant and machinery are, in addition to the normal depreciation on plants and machinery installed, allowed as deductions from the taxable income in the year of installation, thus enabling the enterprise ultimately to charge up to 120 per cent of the original cost of the asset to revenue. If the profits of an enterprise in one year are not adequate to absorb the depreciation allowances due for that year, the unabsorbed depreciation is available for deduction from profits in succeeding years for an unlimited period. The unabsorbed development rebates and business losses can be carried forward for six years in Pakistan and for eight years in India.

The import entitlement schemes under which import licenses are granted for materials, etc., as a reward for export performance are the most important among the different types of inducement offered by the Government of India. The import entitlement may be used for imports of raw materials, components, consumable stores, tools or machine parts for replacement purposes (not involving expansion of the installed capacity) required in the industry concerned. The value of import licenses is fixed at a certain percentage of the value of goods exported or in accordance with a given multiple of imported raw materials used in the manufacture of the goods exported; it varies from commodity to commodity. In Pakistan, schemes, known as export bonus schemes, were evolved early in

1959; exporters of specified commodities are granted a stated percentage of their export proceeds in foreign exchange known as the export bonus; it is given in the form of bonus vouchers which are transferable and may be used for importing a stated range of goods either by the exporters who first earned the exchange or by any one who subsequently bought these vouchers. The premium thus earned enables the exporters to cover any shortfall in the foreign exchange allotment for the import of capital goods, essential spares and raw materials, due to the exigencies of the foreign exchange reserve position.

Supply of certain materials. In India, domestic pig iron, steel sections and tinplate are supplied to exporters against exports of engineering goods or exports of various products in containers of tinplate or steel, at prices which are lower than normal by Rs 20 to 150 per ton for various categories. Similar arrangements have been also evolved for the supply of raw materials for plastic goods and soda ash for glassware at reduced prices.

Freight concessions. Governments of the ECAFE developing countries have taken measures to provide adequate transport facilities for the expeditious dispatch of exports, sometimes at concessional rates. In India, freight rates have been reduced by some 50 per cent on the movement of large quantities of goods from places of manufacture to ports for export and, in some cases, also on the movement of raw material for the production of finished goods for exports. The Freight Investigation Bureau has been able to obtain concessions in ocean freight rates in a few cases. Exporting firms face peculiar difficulties in getting adequate shipping space at reasonable rates. Both the Government of India and the Government of Pakistan are taking suitable steps to assist them to secure shipping space at rates which are not excessive or discriminatory.

Subsidies. To promote exports, some developing countries grant subsidies to the export industries partly to offset the disparity between domestic and foreign prices. In the Republic of Korea, an export encouragement subsidy fund was established under a law passed in 1961 to grant subsidies to certain selected products. Subsidies range from 5 to 60 won per dollar's worth of exports, being equivalent to (according to the 1961 exchange rate) 4 to 46 per cent of the export value. Subsidies at the highest rate are paid to new exports, to goods exported to a new market, and to manufactured goods which show the largest rate of increase. In India, a cash subsidy is also granted through export promotion councils and development councils against exports of a small number of selected and specified commodities where studies have revealed the need for such assistance with reference to the competitive position in foreign markets. Sugar seems to have been a notable instance of this form of assistance. The subsidy in 1961 worked out to be a little less than

one-half of the export price of sugar and more than one third of the export price of groundnut oil.⁴⁶

E. Industrial research and development

The United Nations Conference on Trade and Development in 1964 recommended in Annex A.III.3 to the Final Act that "the Governments should provide, and/or effectively assist... research institutes for improving the processes of products and quality of products, designing of products, new uses of products, etc.". No one can deny the importance of industrial research and technology to industrialization in connexion with marketing studies and development, use of local materials, efficient use of equipment, utilization of waste and waste disposal, adaptation of foreign technology to local conditions, and development of indigenous know-how and technology. The close relationship between research and industrialization is clearly indicated by the fact that the *per capita* research expenditure is \$82 for the United States (1961/62), \$32 for the United Kingdom (1961/62), \$20 for the USSR (1958/59), and \$8.4 for Japan (1962/63), but only \$0.60 for mainland China, \$0.21 for India (1961/62) and \$0.10 for Pakistan (1964).⁴⁷

Out of the 24 ECAFE countries, including the three developed countries, Australia, Japan and New Zealand, only 15 have industrial research and development activity of any significance. These countries vary greatly in the stages of their growth and development. At one end are countries such as Japan and Australia which are sufficiently advanced to have a self-generating economy supported by a well-developed technological base. At the other end are Mongolia, Western Samoa and Afghanistan which have yet to set up institutes for industrial research. In the middle are countries such as China (Taiwan), India, Pakistan and the Philippines whose Governments have taken the initiative of building up research and development organizations to support their plans and programmes for industrialization. They have set up well-organized industrial research institutes which are making their contribution to the economy to enable the countries to achieve the take-off stage.

Of the 24 ECAFE countries, all except Australia, Hong Kong and New Zealand, have development plans of varying duration, generally four to five years, in most of which the need to set up research institutes to aid in their fulfilment has been recognized. In Japan and Australia, industrial firms contribute significantly to research expenditure and effort, while in China

⁴⁶ Although Article XVI, Section B 4 of GATT binds the contracting parties to cease to grant either directly or indirectly any form of subsidy on the export of any product other than a primary product if the resulting export price is lower than the domestic price, India, a member of the GATT, has reserved its position on this clause.

⁴⁷ Asian Conference on Industrialization, Sectoral Study on Industrial Research and Design (I&NR/Ind.Conf./S.13, 3 November 1965), p. 4.

(Taiwan), India, Pakistan, the Philippines, Indonesia and others, it is the government that has taken the major responsibility for initiative in the establishment and sustenance of the research institutes.

There are institutes set up by private industries essentially to meet their own immediate or long-term needs — the Iranian Oil Co., Hitachi Co. of Japan and other needs in fields related to their own. The governments of a number of countries have set up institutes dealing either with their major raw material resources or with specialized national requirements; these include the Wool Research Laboratory in Afghanistan, the Taiwan Sugar Experimentation Station, the Rubber and Tin Research Institutes in Malaysia, the Aeronautical and Metallurgical Laboratories in Japan and in India, and the Philippines Sugar Institute. In India there are a number of specialized research institutes for fuel, petroleum, metallurgy, glass, leather and food technology, in addition to laboratories dealing with the whole range of industries in the field of chemicals, physics and engineering. In most of the other countries, a start has been made by the setting up of multi-purpose institutes such as the Ceylon Institute of Scientific and Applied Research, the National Institute of Science and Technology in the Philippines, the Applied Scientific Research Corporation in Thailand, and the Union of Burma Applied Research Institute.⁴⁸

F. National market information and trade promotion centres⁴⁹

The United Nations Conference on Trade and Development in 1964 recommended in Annex A.III.3 to the Final Act that national market information and trade promotion centres "should be established to act as intermediary between exporters and the international and regional market information and trade promotion centres and to help exporters to promote exports of manufactures and semi-manufactures".

National market information and trade promotion centres in the ECAFE countries take various forms of organization; these may be located at home or abroad.

For the marketing of domestic products abroad, many countries in the region belonging to the Commonwealth usually designate trade commissioners and assistant trade commissioners in strategic foreign commercial centres. This applies to India, Pakistan, Australia and other countries. Australia, for example, had in 1964 100 trade commissioners and assistant trade commissioners in 43 posts. These posts are strategically placed to achieve maximum penetration, with emphasis on the centres of greatest activity. The work of a trade commissioner is aligned with the Department of Trade and Industry in Australia, and can be classified broadly into four fields, namely finding markets,

obtaining access, facilitating access, and penetrating. In Ceylon, commercial intelligence services are provided by officials of the Department of Commerce posted in places where Ceylon's trade is significant. Safeguards are provided in markets where competition from other countries is strong, and up-to-date information is furnished on markets for new products. In other countries, commercial counsellors are usually attached to the embassies and legations abroad. China (Taiwan) sends trade representatives or commercial attaches to most of the big cities in the world.

Besides trade commissioners, trade representatives and commercial attaches stationed in various foreign countries, many ECAFE countries despatch trade missions abroad to explore trade opportunities and conclude trade agreements, and participate in trade fairs and exhibitions organized from time to time in important trade centres of the world.

At home, national market information and trade promotion functions are usually performed by the relevant ministries — commerce, industry, economic affairs, etc. Special institutions are, however, established in some cases to handle these functions. In the Republic of Korea, the Korea Trade Promotion Corporation was established for wider research and survey of the international market and for building up commercial transactions with various countries in the world. The Corporation has been responsible for participation in international trade fairs; operation of trade centres in New York, Los Angeles, Hong Kong, Bangkok, Tokyo, Saigon, Singapore and Djakarta; publishing the results of surveys and research on Korean merchandise; arranging programmes for exchange of trade missions and information concerning business relations with the Republic of Korea. In the Philippines, the Bureau of Commerce, an agency under the Department of Commerce and Industry, helps in the promotion and development of foreign trade by establishing foreign trade connexions, undertaking research and special studies on foreign trade, preparing policy recommendations on foreign trade, conducting credit investigations, compiling, analyzing and interpreting statistics on foreign trade and preparing and publishing foreign trade directories, studying proposed trade agreements, conducting surveys of export potentials and foreign market possibilities for Philippine products and disseminating information on new trade opportunities. In Thailand, the Government established in 1960 the Board of Export Promotion, whose membership includes businessmen and professional men as well as government officials. The Board has various advisory committees, each dealing with a specialized field of trade. Some of the Board's active roles include trade arbitration, negotiating with foreign shipping conferences on matters of shipping and ocean freight rates, playing host to foreign trade missions, investigating major trade issues, disseminating literature and information, and promoting sales of Thai products abroad through various techniques.

⁴⁸ *Ibid.*

⁴⁹ Useful information on the subject may be found in the report of the Third Regional Seminar-cum-Training Centre for Trade Promotion (E/CN.11/TRADE/L.79, 29 December 1964).

In India and Pakistan, export promotion councils have been organized. In India up to 1964, 16 export promotion councils have been set up, covering groups of products such as engineering goods, cotton textiles and spices. These councils, which are non-official agencies of producers and exporters, advise the Government and other authorities on the policies to be followed and steps to be taken to expand exports of the products with which they are concerned; they also assist exporters in exporting their products. In Pakistan, the Export Promotion Council was established in March 1964 in consultation with the Federation of Pakistan Chambers of Commerce and Industry which nominated personnel for the 16 standing committees dealing with the various fiscal, industrial, commercial, transportation and marketing problems of exportable commodities. In Ceylon, measures were being taken in 1964 to organize export promotion councils similar to those of India and Pakistan.

The Indian Institute of Foreign Trade, which came into being in 1964, is an autonomous organization whose membership is extended to industry and trade, export houses, export promotion councils, commodity boards, government trading corporations, state governments, universities, educational and research institutions, and other organizations interested in foreign trade. During the past two years, the Institute has organized a number of activities with respect to commodity studies and the training of export management personnel; and it has started programmes of overseas market surveys, area surveys and general research into important problems of foreign trade.⁵⁰

Finally, the chambers of commerce have an important role to play in export promotion. In Commonwealth countries, the services rendered by the chambers of commerce to members can include some or all of the following, depending on the size and situation of the area covered:⁵¹

- a. Providing information on legislation affecting industry and trade, tax legislation, import and export control, customs procedure, customs tariff interpretations.
- b. Advising on economic and trade conditions at home and abroad, including the documentation requirements of other countries.
- c. Introducing members to businesses at home and abroad, institutions, government departments, etc.
- d. Helping members who wish to appoint agents in other countries.
- e. Receiving visiting trade missions from other countries and organizing trade missions to other countries.

⁵⁰ H. D. Shourie, "The Indian Institute of Foreign Trade", in *International Trade Forum*, Vol. II, no. 3, September 1966.

⁵¹ W. F. Nicholas, "The export promotion role of chambers of commerce in less developed countries", in *International Trade Forum*, Vol. II, no. 3, September 1960, pp. 14-15.

- f. Providing full commercial library services.
- g. Providing secretarial services for individual trade and export associations.
- h. Helping to employ staff and train staff in salesmanship, export procedures, etc.
- i. Issuing certificates of origin, certificates of analysis, certificates of weight and quality, authenticating export documents, and providing various weighing and measuring services.
- j. Providing arbitration services for settlement of commercial disputes.
- k. Circulating overseas trade enquiries to members so as to assist them either to import goods from abroad or to find external markets for their products.
- l. Providing various commercial education services, language training and examination facilities.

VI. Regional co-operation in the production of and trade in industrial exports

A. Multinational production of industrial exports

In the ECAFE region, the great diversity which prevailed among the 24 member countries in respect of size, population, resources, development, history, culture and political background taken with the fact that 87 per cent of the total population (1.7 billion) of the region was concentrated in five comparatively larger countries (China, India, Indonesia, Japan and Pakistan), the remaining 19 accounting for only 13 per cent, underscored the great need for co-operation endeavour in all aspects of industrial development, particularly for smaller countries.

Indeed, the United Nations Conference on Trade and Development in 1964, noting in Annex A.III.8 to the Final Act (a) the present relatively small size of the trade in manufactures and semi-manufactures among the developing countries, (b) the limited size in the developing countries of national markets, the limited resources of capital, skill and foreign exchange, (c) the diversity of natural resources among developing countries, and (d) the great advantages of: (i) economies of scale and specialization offered by modern technology, (ii) joint mobilization by developing countries of their resources in capital and skills, and (iii) developing countries exploiting their natural endowment factors in order to create complementarities of their industrial economies, recommended adoption by the developing countries of practical measures for promoting economic co-operation, both generally among themselves and within regional and sub-regional economic groupings, particularly in the fields of industrial development, and the growth and diversification of exports of manufactures and semi-manufactures. These measures include, above all, the harmonization of national industrial development plans "with a view

to creating integrated industries in economic regions or sub-regions, with due regard to the elimination of uneconomic competition within the region or sub-regions, and ensuring an equitable sharing of all member countries in the region or sub-region in the process of industrialization”.

At its twenty-second session early in 1966, the commission adopted resolution 68(XXII) establishing the Asian Development Council, whose functions are, *inter alia*, to “keep under continuous review industrial development plans, programmes and policies adopted in the regional member and associate member countries with a view to achieving progressive harmonization of industrial development plans” and to “identify, in collaboration with the countries concerned, projects where the co-operation of two or more countries would be of mutual benefit, as for instance in the pooling of markets to achieve economies of scale, international division of labour and fuller utilization of raw materials, and recommend ways of investigating and implementing such mutually beneficial projects”.

At its first session in September 1966, the Asian Industrial Development Council felt that, in selecting multinational industrial projects, what came first and foremost was the willingness and ability of the countries concerned to join together in a co-operative endeavour based on mutual advantage. That being assured, it appeared that projects which would have the greatest impact on the improvement in productivity of the agricultural sector and on the utilization of forestry products deserved the highest priority. From this point onward, many steps would have to be gone through before projects could be implemented; these would include preliminary economic studies to establish viability in the context of the economic and commercial situation in regard to the product vis-à-vis the region and the world, detailed techno-economic studies, detailed engineering reports, financing, etc. Another factor to be considered was that, whereas in certain industries, such as integrated iron and steel making plants, economies of scale and technological factors would not permit the slow building up of the different parts of the industry, in certain other industries, such as forest projects industries, implementation, stage by stage, namely, logging followed by timber production, followed by production of laminated products, pulp, etc., could be developed over a period of years.

On the basis of the above considerations, the Council selected a number of industrial projects for which the co-operation of two or more countries would be required in various fields, namely, forestry products, fertilizers based on natural gas, alumina, silica industries, integrated iron and steel plants, engineering industries including manufacture of agricultural machinery, mineral based industries, and methanol.⁵²

⁵² ECAFE, Report of the first session of the Asian Industrial Development Council (E/CN.11/747, 21 September 1966), Part III.

The implementation of multinational industrial projects, however, may give rise to a number of problems. In the first place, such projects, as noted above, should ensure “an equitable sharing of all member countries in the region or sub-region in the process of industrialization”. This principle of equity and reciprocity is difficult to determine, in respect to the location of plants, sharing of markets, distribution of gains, and other matters of common concern. Often, the principle of regional specialization and complementarity of development is lost under the influence of political considerations. A scheme for joint industrial ventures may thus be economically viable but politically unacceptable. This has been the experience of the Central American Integration Industries programme. Secondly, it is important for the success of any attempt at regional industrial integration that the participating countries be at more or less similar stages of development. The failure of the East African industrial integration experiment is attributed to the fact that industrial development is centred in the relatively more developed country of Kenya, at the expense of its less developed neighbours of Tanzania and Uganda. Thirdly, when several small countries join hands in implementing a joint scheme of industrialization, it is important to develop the regional infrastructure for industrial development, covering transport, power, technology, finance, marketing, etc. The slow progress of the Central American Integration Industries programme is partly attributed to the lack of progress in the establishment of regional infrastructure.⁵³

Joint industrial ventures for two or more countries, with a view to achieving economies of scale and sharing of markets, can be greatly facilitated if undertaken within the framework of a free trade regime or common market arrangements. Preferential arrangements for marketing the products of joint industrial ventures among participating countries are contrary to the GATT principle of universal application of the most-favoured-nation clause. However, if the participating countries agree to establish a free trade regime over a period of years for substantially all of the trade among the countries concerned, as has been the case with the Australia-New Zealand Free Trade Agreement over a period of ten years commencing 1 January 1966, an exception can be made to the GATT principle of universal application of the most-favoured-nation clause.⁵⁴ Failing the establishment of a free trade regime or common market, a waiver has to be obtained from GATT for preferential treatment, as was the case with the European Coal and Steel Community upon its establishment in 1952.

⁵³ Wionczek, M. S., The Experiences of the Central American Economic Integration Programme as applied to East Africa (CID/SUMP.B/12, December 1965), Centre for Industrial Development, United Nations, New York.

⁵⁴ GATT, *Basic Instruments and Selected Documents*, Volume III on “Text of the General Agreement 1958”, Geneva, 1958, Article I on General Most-Favoured-Nation Treatment and Article XXIV on “Territorial Application—Frontier Traffic—Customs Unions and Free-trade Areas”.

B. Intra-regional trade in industrial exports

Another aspect of regional co-operation in respect to industrial exports lies in the field of trade. In this connexion, the 1964 United Nations Conference on Trade and Development in Annex A.III.8 to the Final Act proposed "the promotion among developing countries of increased purchases of manufactures and semi-manufactures produced in other developing countries". In other words, there should be increasing intra-regional trade in industrial exports.

Intra-regional export in the ECAFE developing countries has during the past decade 1955-64 grown at an annual rate of only 1.2 per cent, as compared with one of 2.7 per cent for exports to all directions, mainly because of a higher rate of growth of exports to the developed countries (north America, western Europe, Australia, New Zealand, South Africa, and Japan) (see table 10). As a result, the share of intra-regional export in total export for the ECAFE developing countries during 1955-64 has fallen from 28.5 per cent to 24.9 per cent.

Table 10
DEVELOPING ECAFE REGION^a: INTRA-REGIONAL EXPORT

SITC code number in parenthesis	1955	1961	1964	Average annual rate of growth 1955-64 (%)	Percentage distribution (All exports to world =100)			Percentage distribution (Exports of manufactures to world) =100			Percentage distribution (Exports of manufactures to Intra-regional) =100		
	(millions of dollars)				1955	1961	1964	1955	1961	1964	1955	1961	1964
ALL EXPORTS													
World	6,850	7,480	8,740	2.7	100	100	100						
Intra-regional	1,955	2,070	2,180	1.2	28.5	27.7	24.9						
EXPORTS OF MANUFACTURES													
World	1,316	1,936	2,714	8.4	19.2	25.9	31.1	100	100	100			
Chemicals (5)	100	115	148	4.5	1.5	1.5	1.7	7.6	5.9	5.5			
Machinery & transport equipment (7) ...	75	146	201	11.6	1.1	2.0	2.3	5.7	7.5	7.4			
Other manufactured goods (6+8) ...	1,141	1,675	2,365	8.4	16.7	22.4	27.1	86.7	86.5	87.1			
Textiles (65) ...	570	770	900	5.2	8.3	10.3	10.3	43.3	39.8	33.2			
Base metals (67+68-68i)	155	235	295	7.4	2.3	3.1	3.4	11.8	12.1	10.9			
Others	416	670	1,170	12.2	6.1	9.0	13.4	31.6	34.6	43.1			
Intra-regional	505	631	749	4.5	7.4	8.4	8.6	38.4	32.6	27.6	100	100	100
Chemicals (5)	45	69	97	8.9	0.7	0.9	1.1	3.4	3.6	3.6	8.9	10.9	13.0
Machinery & transport equipment (7) ...	67	111	140	8.5	1.0	1.5	1.6	5.1	5.7	5.2	13.3	17.6	18.7
Other manufactured goods (6+8) ...	393	451	512	3.0	5.7	6.0	5.9	29.9	23.3	18.9	77.8	71.5	68.4
Textiles (65) ...	177	185	170	-0.5	2.6	2.5	2.0	13.5	9.6	6.3	35.1	29.3	22.7
Base metals (67+68-68i)	20	33	55	11.9	0.3	0.4	0.6	1.5	1.7	2.0	4.0	5.2	7.8
Others	196	233	287	4.3	2.9	3.1	3.3	14.9	12.0	10.6	38.8	36.9	38.3

Source: United Nations, *Monthly Bulletin of Statistics*.

^a Comprising: Burma, Cambodia, Ceylon, China (Taiwan), Hong Kong, India, Indonesia, Republic of Korea, States of Malaya, Sarawak, Pakistan, Philippines, Singapore, Thailand and Republic of Viet-Nam. Because of non-availability of data, Afghanistan, Iran, Laos, Nepal and Western Samoa are not included.

In contrast, the *intra-regional industrial export* in the ECAFE developing countries during the same period 1955-64 has grown at a much higher annual rate of 4.5 per cent; consequently, the share of intra-regional industrial export in total export has risen from 7.4 per cent to 8.6 per cent. This growth in intra-regional industrial export may be attributed to the progress of industrialization, mainly in the direction of import substituting and export promoting industries, in some developing countries in the region such as Hong Kong, India, Pakistan, the Philippines and China (Taiwan).

Among the different types of industrial exports, the greatest progress in intra-regional trade has been made in fast growing industries. The average annual rate of growth during the past decade 1955-64 was 11.9 per cent for base metals, 8.9 per cent for chemicals, and 8.5 per cent for machinery and transport equipment; it was, in other words, highest in capital goods industries in which the less developed countries of the region could satisfy their needs equally well with imports from other countries in the region that are relatively more developed. On the other hand, the intra-regional export of textiles from the ECAFE developing countries during the past decade has not grown, but has declined at an average annual rate of one half per cent; as, in almost every developing country, the production of textiles has been among the first industrializing activities to be undertaken, because of its nature as a light consumer goods industry which can be easily developed without much requirement of capital, technique and skill. Textiles, which constituted 35 per cent in the total intra-regional industrial export in 1955, has fallen to 22.7 per cent in 1964. In contrast, the share in total intra-regional industrial export has risen during the same period from 8.9 per cent to 13 per cent for chemicals, 13.3 per cent to 18.7 per cent for machinery and transport equipment, and 4 per cent to 7.8 per cent for base metals.

The Secretary-General of UNCTAD, in accordance with the programme of work for its secretariat, appointed an Expert Committee on Trade Expansion and Economic Co-operation among Developing Countries, which met from 16 February to 7 March 1966 and made a number of recommendations in its report (TD/B/68, 25 March 1966). According to the Expert Committee, expansion of trade among developing countries can be promoted through: (a) commercial policy measures not conditional upon commitments regarding the harmonization of other policies; (b) the co-ordination of investment or production programmes; and (c) the regional integration of national markets. These approaches are not mutually exclusive. The applicability and relative advantage of each will depend on various circumstances such as the size of the internal markets of these countries, their level of development, their economic and trading systems, the relative importance of their public sector, and geographical proximity.

With respect to trade expansion through commercial policy measures, the aim would be to secure a reduction of trade barriers on as wide a basis as possible so as to minimize discrimination among developing countries. Negotiations for trade liberalization with other developing countries would hold out better prospects of success if the more advanced developing countries did not insist on strict reciprocity. This approach to trade expansion would offer only limited prospects of success unless the governments of developing countries were prepared to modify their development policies so as to make room for a better division of labour among the developing countries concerned.

From an early stage, the ECAFE developing countries have recognized that trade liberalization, even if it were practicable, would not necessarily lead to significant increases in intra-regional trade, given the limitations of the present structure of intra-regional trade and the limited possibilities of complementarity. While trade liberalization, through removal of quantitative restrictions and tariffs, could facilitate the expansion of intra-regional trade, it would not necessarily create additional trade unless production plans and investment plans were, to some extent at least, harmonized and co-ordinated so as to bring about some measure of agreed specialization and avoidance of duplication and waste of resources. The ECAFE Working Group of Experts on Trade Liberalization,⁵⁵ which met in November 1964, felt that schemes for automatic and complete removal of quantitative restrictions and/or tariffs were not feasible on a region-wide basis; it therefore recommended three types of less far-reaching region-wise measures, namely, bilateral trade agreements, free lists for the imports of selected commodities, and regional quotas for selected commodities.⁵⁶

Co-ordination of investment and production programmes, as noted earlier, would contribute to a more rational division of labour among the countries concerned and would widen the scope for efficient investment. Such agreed specialization would, in the nature of things, require measures with respect to the exchange of goods. Agreements of this kind may cover one or more industries, involving vertical or horizontal specialization among the partners. Similarly, the supporting trade measures could take a variety of forms, e.g., free trade in specific products or long-term agreements.

The case for integration of national markets derives predominantly from the fact that the size of the domestic markets of many developing countries imposes severe limitations on their ability to exploit the economies of scale and specialization, and hence

⁵⁵ For the Working Group's Report, see United Nations, *The Asian Development Bank and Trade Liberalization*, New York, 1965 (UN Publications Sales No.: 65.II.F.15), pp. 83ff.

⁵⁶ UNCTAD, Document No. TD/B/68/Add.2, 2 June 1966, p. 4.

on the possibilities of industrial growth. To be successful, any integration scheme should give to each participating country a reasonable assurance that it will obtain a fair share of the ensuing benefits, and should safeguard in particular the position of the less developed countries.

Although the ECAFE developing countries have recognized the impracticability of embarking upon integration schemes on a region-wide basis, they have, from the outset, appreciated the need and justification for economic integration among limited groups of countries on a sub-regional basis, particularly among the smaller countries at similar stages of development. The progress even at the sub-regional level, however, has been slow.

VII. Postscript

As noted in footnote 1, statistics of industrial exports used in the present report embrace mainly those compiled for the First United Nations Conference on Trade and Development in 1964. They cover four of the nine commodity sections under SITC, namely, section 5 on chemicals, section 6 on manufactured goods classified chiefly by material, section 7 on machinery and transport equipment, and section 8 on miscellaneous manufactured articles. This is done for convenience of computation, but ignores two essential facts. First, three of the four sections (5, 6 and 8) contain both manufactures and semi-manufactures. Second, of the five sections not included — 0 on food and live animals, 1 on beverages and tobacco, 2 on crude materials, inedible, except fuels, 3 on mineral fuels, lubricants and related materials, and 4 on animal and vegetable oils and fats — manufactures can be found in sections 0, 1 and 3, and semi-manufactures in sections 0, 2 and 4.

The UNCTAD secretariat, after consultation with the United Nations Statistical Office, issued in July 1965 a working paper entitled "The definition of

primary commodities, semi-manufactures and manufactures" (TD/B/C.2/3, 2 July 1965), and reclassified the items in the nine SITC sections into primary commodities, semi-manufactures and manufactures. The reclassification for the years 1960-1964, which has just been issued, covers imports into selected developed countries from developing countries of semi-manufactures and manufactures, covering all the nine SITC sections, instead of just sections 5-8 as with earlier compilations undertaken by the United Nations (Bureau of General Economic Research and Policies of the Department of Economic and Social Affairs). In the new UNCTAD compilation, two significant facts emerge. First, the annual value of industrial exports, covering 9 instead of 4 SITC sections, is much larger. Second, in the four sections formerly considered to embrace manufactures, a larger proportion is found to be semi-manufactures rather than manufactures. These two facts are illustrated in table A, in which statistics compiled according to the new method evolved by UNCTAD are given for 1961, for which comparable data compiled according to the old method used by the United Nations are available. Thus, of the total import into the developed countries⁵⁷ of \$2.6 billion worth of items under SITC sections 5-8 excluding base metals (under divisions 67 and 68) from the developing countries in 1961, three fourths are semi-manufactures, and only one fourth are manufactures. Also, the total value of imports of both manufactures and semi-manufactures in 1961 reach \$4.8 billion for the nine SITC sections, instead of \$2.6 billion for the four SITC sections (5-8). The manufactures reached \$2,684 million, and the semi-manufactures \$2,141 million.

⁵⁷ In table 1 using the old method, developed market economies cover north America, western Europe, Australia, Japan, New Zealand and South Africa. In the present table A using the new method, the developed market economies cover the United States, Canada, EEC countries, EFTA countries (including Finland), Australia, New Zealand and Japan. Thus, the major difference in the two methods lies in the exclusion of South Africa, as Western Europe includes mainly the EEC countries and EFTA countries.

Table A
IMPORTS INTO SELECTED DEVELOPED COUNTRIES FROM DEVELOPING COUNTRIES^a OF
SEMI-MANUFACTURES AND MANUFACTURES,^b 1961
(Value in millions of dollars)

SITC code		Manufactures	Semi-manufactures	Total	Percentage distribution
0	FOOD AND LIVE ANIMALS	386	9	395	8.2
012-013	Meat	151		151	3.2
032	Fish	46		46	1.0
053	Fruit	99		99	2.1
055	Vegetables	55		55	1.2
	Other	35		35	0.7
1	BEVERAGES AND TOBACCO	279		279	5.8
112	Alcoholic beverages	271		271	5.6
	Other	8		8	0.2
2	CRUDE MATERIALS, INEDIBLE, EXCEPT FUELS		163	163	3.4
243	Wood, shaped or simply worked		152	152	3.2
	Other		11	11	0.2

Table A (Continued)

<i>SITC code</i>		<i>Manufactures</i>	<i>Semi-manufactures</i>	<i>Total</i>	<i>Percentage distribution</i>
3	<i>MINERAL FUELS, LUBRICANTS AND RELATED MATERIALS</i>	1,350		1,350	28.0
332	Petroleum products	1,350		1,350	28.0
4	<i>ANIMAL AND VEGETABLE OILS AND FATS</i>		22	22	0.4
5	<i>CHEMICALS</i>	20	202	222	4.6
512	Organic chemicals		30	30	0.6
513-514	Inorganic chemicals		54	54	1.1
551	Essential oils, perfume and other flavor materials		45	45	0.9
532	Dyeing and tanning extracts and synthetic tanning materials		17	17	0.4
561	Fertilizers, manufactured		12	12	0.3
	Other	20	44	64	1.3
6	<i>MANUFACTURED GOODS CLASSIFIED CHIEFLY BY MATERIAL</i>	261	1,745	2,006	41.6
611	Leather		70	70	1.5
631	Veneers, plywood boards, etc.		46	46	1.0
651-655	Textiles		360	360	7.5
656	Made-up articles, wholly or chiefly of textile materials				
		69		69	1.4
657	Floor coverings, tapestries, etc.	77		77	1.6
667	Pearls and precious and semi-precious stones	83		83	1.7
671-678	Iron and steel		54	54	1.1
681	Silver, platinum, etc.		39	39	0.8
682	Copper		815	815	16.9
685	Lead		61	61	1.3
687	Tin		179	179	3.7
	Other	32	121	153	3.1
7	<i>MACHINERY AND TRANSPORT EQUIPMENT</i>	63		63	1.3
8	<i>MISCELLANEOUS MANUFACTURED ARTICLES</i>	325		325	6.7
841	Clothing		177		3.6
	Other		148		3.1
0—4		2,015	194	2,209	45.8
5—8		669	1,947	2,616	54.2
TOTAL		2,684	2,141	4,825	100

^a The developed market economies include the United States, Canada, EEC countries, EFTA countries (including Finland), Australia, New Zealand and Japan. The developing countries include the remainder of the world, excluding Eastern Europe and the centrally planned economies, but including Yugoslavia.

^b Semi-manufactures and manufactures refer to those defined in the UNCTAD paper TD/B/C.2/3, 2 July 1965.

INDUSTRIAL INTEGRATION AMONG DEVELOPING COUNTRIES¹

I. Summary and conclusions

Industrial integration is sectoral integration; it is integration of industrial development across national frontiers, so as to achieve the economies of scale made possible by the integration of national markets which if left alone, would be too small to permit the economic operation of a single plant or enterprise in a given industry.

Among the developing countries, industrialization usually started with import substitution, because of reliance on a captive domestic markets, for the production of goods of final demand. However, as industrialization progresses, and enters into the field of intermediates or "process industries" characterized by economies of scale, the domestic market, especially for a small country, is found to be inadequate and has to be supplemented by export markets in foreign countries. In the circumstances, the need for industrial integration among several countries arises.

Industrial integration, which in postwar years started with the establishment of the European Coal and Steel Community in 1952 among the developed countries in western Europe of West Germany, France, Italy and the Benelux nations (Belgium, Netherlands, and Luxemburg), has spread, albeit slowly, to the countries in the developing regions of the world. The limited achievements to date include the industrial licensing system in the three East African countries of Kenya, Tanzania and Uganda, the regime of integrated industries in the five central American republics of Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua, and the five countries of Argentina, Brazil, Chile, Mexico and Uruguay which are members of the Latin American Free Trade Association (ALALC). In the ECAFE region, a beginning in similar directions has been made by the Asian Industrial Development Council, which met for the first time in September 1966 to identify several industrial projects which promise possibilities of co-operation between two or more nations.

For industrial integration among the developing countries to be successful, there appear to be at least three prerequisites, namely, (1) an integrated market under a free trade regime or common market arrangements as in the case of East Africa, Central America

and Latin America, (2) similarity in the stages of development as in the case of Central America, and (3) availability of infrastructural facilities for regional or sub-regional industrialization, which has to be enhanced in order to hasten further progress in Central America.

In industrial integration between nations, several problems usually emerge to affect the course of progress and determine its speed. The first is the choice of industries for integration, for which it is important to keep in mind the objectives of integration, including the gradual adaptation of existing industries to the conditions and dimensions of a regional market, progressive specialization on a national and regional scale, and creation of favourable conditions for existing and new firms to compete in the world market. In view of the scarcity of investment resources and of the pressing need to accelerate their rates of growth, the developing countries should, in attempting to achieve these objectives, also stress the need of channelling the resources towards those sectors which have a key importance for the development process, such as iron and steel, chemicals (including petro-chemicals, fertilizers, and other heavy chemicals), pulp and paper, heavy equipment, fuels, energy and infrastructure in general.

A second problem is the equitable distribution of benefits among participating countries, especially if they are at different stages of development, so that the elimination of trade barriers among these countries will not lead to the concentration of investment in the more advanced developing country, because of the presence of economic and social infrastructure and higher returns on capital. Hence it is important to adopt a number of measures in the field of fiscal incentives, improvement of infrastructure, and establishment of a regional development or financing agency.

A third problem is the formulation and adoption of a regional investment policy. For this purpose it is essential for the participating nations to establish a planning co-ordination committee or a regional development board, which can meet to exchange views on the industries to be established under the national plans, and agree on an allocation of industries which could be best undertaken by individual countries from a regional viewpoint. It would also be highly desirable, for the purpose of minimizing the difficulties of agreeing on a regional investment policy, to delimit the scope of the regional industries to (1) new industries

¹ Document I&NR/AIDC.2/1 prepared by the ECAFE secretariat for the second session of the Asian Industrial Development Council.

suited for efficient operation in a regional market, (2) industries having great strategic importance for the development process, (3) industries requiring state instead of private investment so as to facilitate decision making by a single governmental body instead of many private investors, and (4) a "package" of industrial projects covering either various projects or various sectors within which there would be possibilities for giving satisfaction to each participating country.

A fourth problem is the establishment of appropriate regional institutions to conclude and implement agreements on industrial integration projects. In Central America, the establishment of each regional industry requires signature by the five member countries concerned of a protocol to the Agreement on the Regime for Integration Industries, which necessarily takes time and involves delay. In the case of the Latin American Free Trade Association, the organs include (1) the Conference of the Contracting Parties, which is the supreme body meeting regularly once a year to adopt all decisions in matters requiring joint action, and (2) the Standing Executive Committee, which is the permanent organ of the Association responsible for supervising the implementation of the Provisions of the Montevideo Treaty, with a secretariat headed by an Executive Secretary and comprising technical and administrative personnel. This regional structure has not been found satisfactory for the implementation of industrial integration projects in the ALAIC countries. The ECLA secretariat, in a recent study, declared that "what is proposed is not a political integration but the establishment of community institutions that are more independent, and have more freedom and scope for action, than the existing ALALC organs, without prejudice to any co-operation that might be received from inter-American or international institutions".¹

A fifth and final problem is the nature and scope of the agreements to be concluded for the purpose of industrial integration and the need for an agency to formulate and supervise the implementation of these agreements. In Latin America, the industrial complementarity agreements provided in articles 15-17 of the Montevideo Treaty of 1960 have been concluded only twice, owing to the length of time required for complicated negotiations of this kind, the lack of multi-national projects in particular sectors, the want of an agency to study and promote such agreements, the lack of promotional provisions and necessary machinery to implement specific provisions for the promotion of a given industry, particularly in regard to supervision of the fulfilment of commitments and to the execution of investment and technical assistance programmes designed to promote new production activities or to facilitate the adaptation of those already existing. Both the ALALC Conference and the Standing Executive Committee have adopted certain resolu-

tions to remedy the existing shortcomings, and it is hoped that, arising from the decisions taken (1) to undertake joint programming of industrial development on a region-wide basis, and (2) to permit exceptions to the most-favoured-nation clause and thus facilitate conclusion of sub-regional agreements which appear to offer the likeliest possibilities of complementarity in smaller groups of countries, the pace of industrial integration may be accelerated.

Among the developing regions of the world, the ECAFE region, because of its great diversity in respect of size, population, resources, development, history, culture, and political background, is the outstanding exception where industrial integration has not yet taken place. A beginning, however, has already been made by the establishment of the Asian Industrial Development Council in 1966, whose functions are, however, limited; the most important one is "to identify projects where the co-operation of two or more countries is required for the pooling of markets to achieve economies of scale, international division of labour and for the better utilization of raw materials; and to recommend ways and means for the investigation and implementation of such projects". The developing countries of the region have not as yet entered into any free trade arrangements, even on a sub-regional basis, although several regionwise institutions of an infrastructural character, notably the Asian Development Bank, the Asian Institute for Economic Development and Planning, the Asian Institute of Technology, and the Asian Highway, have recently been or are in the process of being established, mainly under the auspices of the United Nations Economic Commission for Asia and the Far East. It is hoped that in the not too distant future, sub-regional economic and industrial integration, for which preparatory steps are being taken by the Association of Southeast Asia (ASA)² and the Regional Co-operation for Development (RCM),³ may also come into being and help to hasten the pace of economic growth among the developing nations of Asia.^{3a}

II. The need for industrial integration

During the postwar years many developing countries have embarked on the course of industrialization

² Member states are Malaysia, the Philippines, and Thailand.

³ Member states are Iran, Pakistan, and Turkey.

^{3a} At the meeting held from 29 November to 6 December 1966, the First Working Group of Planning Experts on Regional Harmonization of Development Plans, organized by the ECAFE in co-operation with the United Nations Department of Economic and Social Affairs, recommended that the strategy of plan harmonization at a sub-regional grouping level involving a limited number of countries be adopted. It also advocated a commodity-by-commodity or sectoral approach at the initial stages of sub-regional plan harmonization, and proposed an organization structure of sub-regional association for plan harmonization and economic co-operation along the lines being pursued by the Regional Co-operation for Development (RCD). (See *Report* submitted on 6 December 1966 by the Working Group to the Executive Secretary of ECAFE).

¹ ECLA, "A Contribution to Economic Integration Policy in Latin America" (E/CN.12/728, 20 April 1965), p. 172.

to accelerate their rate of economic growth, thereby helping to raise their standards of living. At the early stage of industrialization they generally embark on import substitution, chiefly because of reliance on a captive domestic market. Import substitution enjoys the natural protection of distance and transport costs, makes fewer demands on standards of efficiency, service, and quality; moreover, it is facilitated by familiarity with the formerly imported product. It will generally cover goods of final demand. However, as industrialization progresses among the developing countries, the chain of industrial production is lengthened by then entering into the field of intermediates which generally belong to the category of so-called "process industries" where economies of scale play a major role. For small countries with limited domestic markets, and in cases where the need to achieve economies of scale demands large production units, the establishment of a new industry to replace imports can become economical only when export possibilities are also taken into consideration. In the circumstances, the need arises for industrial integration among several countries which are too small to start out individually with the establishment of an industry which requires a minimum optimum scale for economical operation.

In this connexion, the question arises as to the distinction of nations in respect to size. The criteria to be employed may vary from area, population, productivity or national income, to total home market of the country (the product of numbers and of average income). Sometimes, it is relevant to have in mind the size not only of a nation with its home market, but also with its normal export markets. Indeed, as pointed out by Professor E.A.G. Robinson, "what is more important in practice is that a nation that is

rich, for reasons of rich natural resources and high individual productivity, can afford to be smaller in terms of population than a less richly endowed country without suffering from the penalties of markets inadequate to sustain efficient production".⁴

In the ECAFE region, most developing countries may be considered as small nations having limited home markets. Aside from the large populous and somewhat self-contained countries of India, Indonesia and Pakistan, the other 17 developing countries⁵ may be considered small. In terms of population, only 222 million, or one quarter of the total population of 884 million for the 20 ECAFE developing countries, are to be found in these 17 countries. In terms of area, 5.06 million square kilometres or 48 per cent of the total area of 10.55 million square kilometres, belong to these 17 countries. All these countries enjoy a rather low level of national income. With the exception of the oil producing countries, Brunei and Iran; the entreport cities, Hong Kong and Singapore; and the relatively more developed countries, China (Taiwan), Malaysia and the Philippines, the rest of the developing countries in Asia, large or small, enjoyed in 1964 a *per capita* income of less than \$150, but generally around the regional average of \$100 (see table 1).

⁴ Robinson, E. A. G. (ed.), *Economic Consequences of the Size of Nations*, MacMillan, London, 1960, p. xv.

⁵ These include: Afghanistan, Brunei, Burma, Cambodia, Ceylon, China (Taiwan), Hong Kong, Iran, South Korea, Laos, Malaysia, Nepal, Philippines, Singapore, Thailand, South Viet-Nam, and Western Samoa. The centrally planned economies of mainland China, Mongolia, North Korea and North Viet-Nam are excluded, so also the developed countries of Australia, Japan and New Zealand.

Table 1

AREA, POPULATION AND NATIONAL INCOME OF ECAFE DEVELOPING COUNTRIES, 1964

Country	Population (thousand)	Area (1,000 sq. km)	Density (Population per sq. km)	Gross National Product (GNP) (million US dollars)	Per Capita GNP (US dollars)
Afghanistan	15,227	647	24	...	...
Brunei	84 ^{x,a,al}	6	17	99 ^{a,b}	1,177 ^{a,c}
Burma	24,229	678	36	1,613	67
Cambodia	5,866 ^d	181	34	729 ^{b,d}	124 ^{c,d}
Ceylon	10,965	66	167	1,497	142 ^l
China (Taiwan)	12,070 ^e	36	336	2,556 ^b	212 ^c
Hong Kong	3,692	1 ^f	3,578	1,126	305
India	471,624 ^g	3,046	155	42,000 ^h	89 ⁱ
Indonesia	93,506 ^{a,j}	1,492	69	7,534 ^a	81 ^a
Iran	22,184 ^d	1,648	14	4,879 ^d	220 ^d
Korea, Rep. of	27,633 ^k	98	281	3,091 ^b	112 ^c
Laos	1,960	237	8	...	...
Malaysia	9,398 ^l	332	27	2,861 ^l	305 ^l
Malaya, States of	8,039 ^{l,al}	131	59	2,514 ^l	313 ^l
Sabah	521 ^l	76	7	146 ^l	280 ^l
Sarawak	838 ^l	125	7	201 ^l	240 ^l

Table 1 (Continued)

Country	Population (thousand)	Area (1,000 sq. km)	Density (Population per sq. km)	Gross National Product (GNP) (million US dollars)	Per Capita GNP (US dollars)
Nepal	9,920	141	70	665	67
Pakistan	96,683 ^d	947	106	8,525 ^d	88 ^d
Philippines	31,270	300	104	4,841 ^b	155 ^c
Singapore	1,820	0.581	3,133	966	531
Thailand	29,700	514	58	3,789 ^b	128 ^c
Viet-Nam, Rep. of	15,715	171	92	1,891	120
Western Samoa	122	3	43	...	...
Developing ECAFE Countries	883,668	10,545	84	88,660	102

Sources: (1) UN, *Statistical Yearbook, 1965*. (2) UN, *Monthly Bulletin of Statistics* (Oct. 1966).
(3) *Economic Survey of Asia and the Far East, 1965*.

* Census.

^a 1960.

^{a1} Excluding transients afloat.

^b Gross domestic product.

^c *Per capita* GDP.

^d 1963.

^e Comprising the Island of Taiwan and the Pescadores.

^f Land area only. Total, including ocean area within administrative boundaries, is 2,916 km².

^g Excluding Kashmir-Jammu, the final status of which has not yet been determined; also excluding Sikkim.

^h National income.

ⁱ *Per capita* national income.

^j Excluding West Iran.

^k Excluding alien armed forces, civilians, aliens employed by armed forces and foreign diplomatic personnel and their dependents.

^l 1965.

Significant differences exist between the patterns of industrial activity and structure of larger and smaller countries.⁶ In the first place, certain industries or groups of industries are ordinarily found in larger countries and not in smaller countries. Larger countries normally possess an automobile industry, an aircraft industry, locomotive building, heavy machinery building, both mechanical and electrical. Smaller countries rarely possess any of these industries. Secondly, there tend to be differences in the degree of diversification of industries. In small markets, firms tend to be less specialized and more diversified. Many products are produced within each plant and the firm tends to be more concerned with the problems of shifting production from one product to another as circumstances dictate than with making an outstanding success of any single product. Thirdly, there appear to be differences in the character of competition. In small markets it is easier to develop a monopoly, since the number of firms of minimum efficient size which the market could keep employed is smaller. Fourthly, in almost all the larger economies, the general specialization of firms extends to the specialization of service industries, with additional opportunities for producers to narrow, so far as they may wish, the range of processes for which they make themselves responsible and to extend, with advantages to them-

selves, their dependence on the services of these specialist firms to the greatest possible extent. These differences, applicable more to the developed than developing countries, point to the conclusion that "most of the major industrial economies of scale could be achieved by a relatively *high-income* nation of 50 million; that nations of 10-15 million were probably too small to get all the technical economies available; that the industrial economies of scale beyond a size of 50 million were mainly those that derive from a change in the character of competition and specialization — a change which may, if one relies on the contrasts between American and other experience, be explained partly by scale, but may also be attributed to differences of national outlook and to differences in the legal handling of the problems of monopoly, as well as to differences consequent on income and expenditure per head, and due, in part at least, to a richer endowment of natural resources."⁷

Industrial integration, as a means of accelerating development, gives rise to a number of advantages — economies of scale, favorable location and specialization, enhanced efficiency, and reduction in external vulnerability.⁸

⁷ *Ibid.*, pp. xviii-xix.

⁸ UNCTAD, *Trade expansion and economic integration among developing countries* (TD/B/85, 2 August 1966), Chapter II.

⁶ Robinson, *op. cit.*, pp. xvii-xviii.

The extent to which economies of scale can be realized depends on the nature of productive activity. Thus, the production of non-durable consumer goods which involves little technology and capital, and the production of which is typical for the very early stage of industrialization, often finds adequate outlets within a national market. Particularly large markets, however, are necessary for the production of basic semi-manufactures (iron and steel, non-ferrous metals, heavy chemicals, etc.), fertilizers, pulp and paper, capital goods (industrial machinery, farm machinery, electrical equipment, transport equipment) and durable consumer goods. The products of these sectors are characterized by the highest income elasticities of demand within the consumption pattern of developing countries. To be precluded by the size of the market from going into these lines of production, or to produce these goods under clearly uneconomic conditions, means to lose some of the most dynamic opportunities for economic growth.

Even for products characteristic of the earlier stages of the import substitution process and involving less technology, such as cement or consumer goods like textiles and footwear, access to larger markets tends to reduce costs greatly. That in developing countries a very large number of industries are working far below capacity is another indication that the limitation of the size of the market is an important element in their high cost level.

A region, covering the individual countries that comprise it, has a greater scope for specialization. The advantages of specialization in particular locations of a large area will be particularly evident in the case of products in the production of which raw materials or energy have a large share, for example, certain chemicals, alumina, paper and cellulose. For sophisticated products such as automobiles and machines, experience likewise shows the value of specialization among producers in a region. The producer of the final product often does not himself produce the various parts, components and accessories but buys them from separate firms which can achieve important economies by supplying various producers of finished products.

Industrial integration also enhances industrial efficiency. As the markets of many developing countries are too small to justify economically the establishment of more than one plant in many industries, the plant that is established in the country usually enjoys a monopoly and has no incentive to increase its efficiency, because of absence of competition under government protection against similar imports. This situation tends to perpetuate itself beyond what would normally be regarded as the infant stage. On the other hand, a wider, regional market would sustain a larger number of efficient production units, and would provide a spur to higher efficiency even in those industries where a larger than national market would be necessary

for reaching the optimum economies of scale. The possibility of making comparisons with other producers would then exist, and this would provide an incentive for improving productivity. This abandonment of protection among developing countries forming the region in no way implies that the protection against the producers of the developed countries is also to be given up. Rather, protection should be organized within a wider, regional framework that does not require sacrificing the opportunities of achieving economies of scale, specialization and incentives for operational efficiency.

Industrial integration also reduces the external vulnerability of the developing countries. Stagnation and fluctuations in the purchasing power of the traditional primary exports from the developing countries make it necessary for these countries to diversify their exports both in kind and with respect to destination. Industrialization for export to other developing countries is an important element of this diversification. Inasmuch as this diversification would speed up the industrialization process, the demand for raw materials and foodstuffs would increase and imports of such products from other developing countries would thus also be stimulated. Exports of industrial products to other developing countries would lessen their dependence upon the developed countries and enhance their capacity to resist the outside shocks occasioned by the characteristics of primary goods trade; their imports of capital goods and basic materials would become independent of the consequences of the fluctuations in the traditional commodity exports.

III. The experiences of industrial integration

Industrial integration has been tried out in both developed and developing countries. Among the developed countries the most outstanding example is the European Coal and Steel Community. The treaty setting up the Coal and Steel Community for fifty years was signed in Paris on 18 April 1951. France, Italy, West Germany, Holland, Belgium and Luxemburg established a common market in coal and steel by abolishing tariffs, quotas, subsidies, restrictive practices and price discrimination. On 10 August 1952, the High Authority of the Community was established in the city of Luxemburg and, on 10 February 1953, a five-year period began during which the provisions of the Treaty of Paris were gradually brought into effect. The common market was immediately opened for coal, iron ore and scrap. The provisions of the Treaty were extended to common steel in May 1953 and to special steels in August 1954. At the end of the transition period (February 1958) a considerable measure of success had been achieved in breaking down tariff and other barriers which had formerly restricted trade in coal and steel products between the members of the Community. But a single external tariff on coal had not yet been introduced. Those responsible for setting up the Coal and Steel Community were in-

fluenced by two basic ideas. The first was the doctrine of free competition. The founders of the Community considered that the efficiency of the coal and steel industries depended upon the existence of mines, plants and wholesale distributors competing with one another. The second idea was the doctrine of supra-nationality. The governments which signed the treaty handed over to the High Authority certain powers formerly exercised by them separately. The High Authority was given the right to fix maximum and minimum prices and quotas; to inspect mines and plants; and to demand confidential information from firms.⁹

Both in Africa and Latin and Central America, the developing countries have resorted to industrial integration in varying degrees. The East African Common Market, comprising three countries (Kenya, Uganda, Tanzania) with a total population of 25 million, was established in the 1920's. When these countries became independent in the early 1960's,¹⁰ internal trade was free with certain minor exceptions and identical tariffs prevailed in each. They had a common currency, freedom of capital movements and financially self-supporting services (railways, harbours, posts, telecommunications, airways) administered on an East African basis. From 1959 to 1964, intra-regional trade grew from £20 million to £34 million, expanding more than twice as fast as external trade. In 1962, 43 per cent of intra-trade consisted of industrial products, three fourths of which being exported by Kenya. Industry thus tended to concentrate heavily in Kenya, and Kenya's exports to Tanzania, for instance, in 1964 were 3.5 times larger than its imports from Tanzania.

This lop-side concentration of industry in Kenya, the relatively most developed member of the East African Common Market, originated from the Industrial Licensing Ordinance introduced in 1948 for the purpose of encouraging "the orderly establishment and setting up of new industries to the best advantage of East Africa as a whole while providing protection to consumers and workers" (Part II, Section 3(2)). According to one source, "the industrial licensing system rapidly became a means for preventing competition (from Uganda and Tanganyika) with plants already established in Kenya" and "not unnaturally,

the latter two countries became unwilling to agree to the addition of any new industries to the licensing schedule under such conditions."¹¹

The Raisman Commission's¹² proposal to distribute the net gains and losses from the customs proceeds from the foreign trade of the area under conditions of intra-trade liberalization did not succeed. The three countries, immediately after attaining independence, entered into negotiations between April 1964 and January 1965 for the still-born Kampala-Mbale Agreement, which provided for dealing with the inequitable distribution of gains from the common market — as reflected in intra-territorial trade imbalances — through an early implementation of five measures:¹³

- (a) immediate action with respect to certain inter-territorially connected enterprises aimed at their shifting productive activities in such a way as to increase production in a deficit country and thereby reduce imports from a surplus country;
- (b) agreement as to the immediate allocation of certain major industrial projects;
- (c) application of a system of quotas and suspended quotas whereby exports from surplus countries would be progressively reduced, and local production increased in the deficit countries according to the building up of the productive capacity of the deficit country;
- (d) increased sales from a country in deficit to a country in surplus; and
- (e) early agreement within the East African Common Market on a system of incentives and equitable allocation of future industrial activities among the three countries.

Although the Kampala-Mbale Agreement established an immediate link between regulation of regional trade flows and distribution of new industrial enterprises throughout the region, it gave first priority to the problem of allocation under the territorial Industrial Licensing Ordinance on the basis of an exclusive license to a firm operating in the agreed territory. Tanzania was allocated the manufacture of aluminium sheets and foil, tires and tubes, and radio assembly and parts production. Uganda received the sole rights for the production of bicycles and fertilizers and Kenya was left with the manufacture of electric light bulbs and possibly neon and fluorescent tubes. It was also agreed that the problem of future allocation of industry and differential incentives for new industrial activi-

⁹Henderson, W. O., *The Genesis of the Common Market*, Frank Cas & Co. Ltd., London, 1962, pp. 144-146. In regard to the establishment of a single external tariff, the High Authority at the beginning of 1964 adopted Recommendation No. 1/64, requiring peripheral duties on steel to be adjusted to the Italian level of 9 per cent. This recommendation remained in force in 1965, and is considered by the High Authority to "represent for the community a step towards the unification of its tariffs at somewhere near the same level as those of the other major steel producing and exporting areas." (European Coal and Steel Community, *General Report on the Activities of the Community* (February 1, 1965—January 31, 1966), para. 43.)

¹⁰Tanganyika became independent in 1961, Uganda in 1962, Zanzibar and Kenya in 1963. In 1964 Tanganyika and Zanzibar united to form the Republic of Tanzania.

¹¹Sidney Dell, *Trade Blocs and Common Markets*, New York, Alfred A. Knopf, 1963, p. 238.

¹²Officially known as the UK Colonial Office Economic and Fiscal Commission of East Africa.

¹³Wionczek, M. S., The experiences of the Central American economic integration programme as applied to East Africa (CID/SYMP.B/12, December 1965), p. 19.

ties would be studied by a regional committee of industrial experts. This committee would draw up lists of "East African industries" according to one of two alternative definitions of their economic feasibility: (a) only if a given industry had access to the entire regional market or (b) only if it needed access to a market larger than that of any one country in East Africa. When examining a possible distribution of these regional industries, particular regard was expected to be given also to the need for an equitable distribution within the region and the concrete industrial location of new projects.

The Kampala Agreement, however, failed and became a dead letter in the Autumn of 1965, through the interplay of many internal and external factors. The East African Currency Board, supposed to be converted into a single central bank for the three countries at an early date, actually disappeared from the scene in the spring of 1965 as a result of a unilateral step of Tanzania to establish its own state bank in charge of currency issue and a separate monetary policy, which led, in turn, to a decision of the two remaining countries to end the common currency arrangements in the area in 1966. Kenya's relationship with Tanzania further deteriorated when, shortly after the Kampala scheme had been set up and before its ratification (which never took place), Kenya unilaterally withdrew its original approval to allocate to Tanzania an auto-mobile assembly plant as a consequence of an offer from a group of local and foreign investors to build such a plant in its own territory. This incident forced prolonged multilateral negotiations of a revised list of allocated industries, injected a large measure of bitterness into Kenyan-Tanzanian relations and was largely responsible for Tanzania's putting into motion in mid-1965 the second part of the Kampala agreement providing for the imposition of quota restrictions in case of a persistent trade imbalance with other member countries of the East Africa Common Market. Also, the absence of any progress in respect to a regional uniform treatment of foreign investment, in a region short of financial resources for development, led to a race among the three countries to attract foreign industrial investment under almost any conditions.

In Central America, industrial integration has taken place within the broader framework of a common market among five countries (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua) with a total population of 12 million. On 10 June 1958, representatives of the Governments of these five countries gathered at Tegucigalpa, Honduras, to sign the "Multilateral Treaty on the Free Trade and Central American Economic Integration". This Treaty established a free trade regime to be perfected within a period of ten years from the date of its enforcement, and called upon the member states to "adopt, by mutual agreement, measures designed to further the establishment or expansion of regional industries

directed towards a Central American common market and of particular interest to the economic integration of Central America." In the Agreement of the Regime for Central American Integration Industries, signed on the same date by the representatives of the Governments of the five countries, it is stated that "the Contracting States undertake to encourage and promote the establishment of new industries and the specialization and expansion of existing industries within the framework of Central American economic integration, and agree that the development of the various activities which are or may be included in such a programme shall be effected on a reciprocal and equitable basis in order that each and every Central American state may progressively derive economic advantage." (Art. I)¹⁴

On 13 December 1960, the four Contracting States of Guatemala, El Salvador, Honduras and Nicaragua signed the General Treaty on Central American Economic Integration,¹⁵ which incorporates the Regime for Central American Integration Industries, and reduces the transitional period for the establishment of a free trade regime to five years. According to this Treaty, article XVII, "the contracting parties hereby endorse all the provisions of the agreement on the Regime for Central American Integration Industries, and, in order to ensure implementation among themselves as soon as possible, undertake to sign, within a period of not more than six months from the date of entry into force of the present Treaty, additional protocols specifying the industrial plants initially to be covered by the Agreement, the free trade regime applicable to their products and the other conditions provided for in Article II of the Agreement."¹⁶

According to the provisions of the 1958 agreement on the Regime for Central American Integration Industries, the additional protocol for each industry to be signed by the Contracting States shall stipulate:

- (a) The country or countries in which the industrial plants covered by this Regime are to be situated, the minimum capacity of the said plants and the conditions under which additional plants are to be subsequently admitted into the same or other countries;
- (b) The quality standards for the products of the said industries and any other requirements that may be deemed convenient for the protection of the consumer;
- (c) The regulations that may be advisable as regards the participation of Central American capital in the enterprises owning the plants;

¹⁴ United Nations, *Multilateral Economic Co-operation in Latin America*, Vol. I, New York, 1962 (UN Publications Sales No.: 62.11.G.3), p. 23.

¹⁵ Costa Rica acceded to the Treaty with its signature in July 1962. However, the Treaty came into effect on 4 June 1961, upon ratification by the three Governments of Guatemala, El Salvador and Nicaragua.

¹⁶ *Multilateral Economic Co-operation in Latin America*, *op. cit.*, p. 8.

- (d) The common Central American tariffs which shall be applied to the products of Central American integration industries; and
- (e) Any other provisions designed to ensure the attainment of the objective of this Agreement.

The first protocol to the Agreement on the Regime for Integration Industries entered into force in February 1965 for Costa Rica, El Salvador and Guatemala and in August of the same year for Nicaragua. The first two activities to be integrated were the tyre and inner tube plant set up in Guatemala and the caustic soda and chlorinated insecticides plants established in Nicaragua. In November 1965, the five governments signed a second protocol extending the benefits of the Regime to a sheet glass plant to be opened in Honduras.

Also, beginning in 1963, the five Central American republics have established a special system for the promotion of new productive activities, providing for periodical joint elaboration of the list of Central American manufactures to be granted special tariff protection in the area from the moment they supply at least 50 per cent of the regional demand. The two lists approved between 1963 and 1965 include certain glass products, electric bulbs, sanitary paper and sulphuric acid.

Intra-regional trade in the five Central American republics has increased greatly since 1960, although progress in industrial integration could have gone further but for the fact that the area integrated is a relatively small one, having a total population of a little over 12 million and an average population density of 27 persons per square kilometre; moreover, it has still to build up a common basic economic infrastructure with respect to roads, harbour facilities and energy.

In Latin America, the Treaty Establishing a Free-Trade Area and Instituting the Latin American Free-Trade Association, or briefly the Treaty of Montevideo, was signed on 18 February 1960, by government representatives from seven countries — Argentina, Brazil, Chile, Mexico, Paraguay, Peru and Uruguay. Subsequently, before the end of 1961, Columbia and Equador also ratified the agreement. The Latin American Free Trade Association had thus nine members with a total population of about 180 million and a total area of 18.3 million square kilometres, giving an average population density of 10 per square kilometre in 1963.¹⁷

The Treaty of Montevideo, which became effective on 2 June 1961, established the Latin American Free Trade Association (LAFTA or ALALC) with headquarters in Montevideo. In the course of a period of 12 years, the participating countries agreed to eliminate all duties and other restriction on "substantially all

their reciprocal trade". In Chapter III of the Treaty on "Expansion of Trade and Economic Complementarity", Article 16, it is stated that "with a view to expediting the process of integration and complementarity . . . , the Contracting Parties: (a) shall endeavour to promote progressively closer co-ordination of the corresponding industrialization policies, and shall sponsor for this purpose agreements among representatives of the economic sectors concerned; and (b) may negotiate mutual agreements on complementarity by industrial sectors."¹⁸ Little attempt, however, has been made to conclude industrial complementarity agreements. Up to early in 1965, only two had been signed. One, in force since July 1962, deals with calculating and other punch-card machines and has been acceded to by Argentina, Brazil, Chile and Uruguay. The second, concerning electronic valves, came into force in April 1964, and has been signed by the same four countries and Mexico. The first agreement has already begun to have an effect on trade in the goods in question. Argentina has exported 354,000 dollars' worth of calculating machines to Brazil and Uruguay. In addition, more investment has been made to develop new market opportunities.

The reasons for the slow progress in the conclusion of industrial complementarity agreements are not far to seek. According to a recent study by the ECLA secretariat,¹⁹ "a number of explanations are forthcoming for the scant use made of these agreements, including the unlimited application of the most-favoured-nation clause; the difficulties and inevitably slow tempo of any negotiations of this kind; the lack of specific multi-national projects in particular sectors; the want of an agency to study and promote such agreements; the incompatibility of industrialists' interests and those of their respective Governments; and lastly, the preference of those concerned for Common Schedules²⁰ as a means of liberalizing trade in certain products." In regard to the first and most important difficulty — the unlimited application of the most-favoured-nation clause — an attempt has been made to remedy this situation in resolution 99(IV) adopted by the ALALC Conference, which stipulates that the benefits of a complementarity agreement shall not be extended to countries that have not adhered to it unless they have previously granted satisfactory compensation.

¹⁸ *Multilateral Economic Co-operation in Latin America*, *op. cit.*, p. 58.

¹⁹ A contribution to the economic integration policy in Latin America (E/CN.12/728, 20 April 1965), p. 46.

²⁰ In addition to the National Lists of tariff reductions to be achieved through annual negotiations by each country on imports from the rest of the group, equivalent to not less than eight per cent of the weighted average duties applicable to third countries, a Common List is to be drawn up which will itemize the products on which all countries agree ultimately to eliminate duties. The Common List is to cover products accounting for 25 per cent of trade among the participants by the end of the first three year period, 50 per cent by the end of the second, 75 per cent by the end of the third, and "substantially all of such trade" by the end of the fourth.

¹⁷ The four most populous countries have 151 million people or 84 per cent of the total, namely, Brazil (76 million), Mexico (38 million), Argentina (22 million) and Columbia (15 million).

In the ECAFE region, industrial integration among developing nations has not yet begun, but has entered the stage of preliminary deliberation at several meetings of government representatives convened under the auspices of ECAFE. At the second session of the Conference of Asian Economic Planners in October 1964, it was felt that "the time had come to attempt the first steps towards regional harmonization of production plans in countries of the region. . . . Such plan harmonization was regarded as necessary for accelerating the economic development of the region, because the expansion of intra-regional trade would call for the creation of new patterns of complementarity in the production structure of the national economies. It was not sufficient to seek a significant increase in trade flow along the traditional lines; economic co-operation to serve as an effective tool for the region's economic growth, should be extended to the field of production and investment planning. The guiding principle should therefore be intra-regional and international specialization in production on the basis of mutual agreement, of a kind that would assure mutual benefits and equity to all participating countries."²¹

In the following year, in December 1965, the Asian Conference on Industrialization resolved to set up an Asian Industrial Development Council, whose functions would be, *inter alia*, "(1) to keep in continuous review industrial development plans, programmes and policies adopted in the regional member and associate member countries with a view to achieving progressive harmonization of industrial development plans, and (2) to identify projects where the co-operation of two or more countries is required for the pooling of markets to achieve economies of scale, international division of labour and for the better utilization of raw materials; and to recommend ways and means for the investigation and implementation of such projects."²²

ECAFE at its twenty-second session in March/April 1966 adopted resolution 68(XXII), on the Asian Conference on Industrialization and Asian Industrial Development Council, whereby the Conference was made a permanent organ of the Commission, to meet with the joint participation of ECAFE and UNIDO and, at three-year intervals, to review and advise upon progress made with all the problems involved in industrialization in the ECAFE region; and the Asian Industrial Development Council was required to meet at least once a year, to perform the functions mentioned above.²³

At its first session in September 1966, the Asian Industrial Development Council felt that, in selecting

multi-national industrial projects, first and foremost was the willingness and ability of the countries concerned to join together in a co-operative endeavour. That being assured, it appeared that projects which would have the greatest impact on the improvement in productivity of the agricultural sector and in the utilization of forest products deserved the highest priority. From this point onward, many steps would have to be gone through before projects could be implemented; these included preliminary economic studies to establish viability in the context of the economic and commercial situation in regard to the product vis-à-vis the region and the world, detailed techno-economic studies, detailed engineering reports, financing, etc. Another factor to be considered was that, whereas in certain industries, such as integrated iron and steel making plants, economies of scale and technological factors would not permit the slow building up of the different parts of the industry, in certain other industries, such as forest products industries, implementation, stage by stage, namely, logging followed by timber production, followed by production of laminated products, pulp, etc., would be developed over a period of years.

On the basis of the above considerations, the Council selected a number of industrial projects for which the co-operation of two or more countries would be required, in various fields, namely, forest products, fertilizers based on natural gas, alumina, silica industries, integrated iron and steel plants, engineering industries including manufacture of agricultural machinery, mineral based industries, and methanol.²⁴

It may also be noted that the RCD, established by Iran, Pakistan and Turkey in July 1964, has worked out three large industrial projects, for aluminium, carbon black and bank-note paper, which have been approved in principle for implementation on a joint equity participation and production sharing basis. Studies on a number of industries such as locomotives and pulp and paper, which have been identified as suitable for development on a joint basis, have been completed and are being examined by expert groups. Detailed studies are nearing completion on other groups of heavy industries, including diesel engines, ship building, electrical goods, textile machinery, tractor components, machinery and equipment for the tea industry, plant and equipment for chemical, sugar and cement factories.^{24a}

IV. The prerequisites for industrial integration

Any experiment for industrial integration between two or more nations, to be successful, appears to call for the presence of at least three preconditions or

²¹ Annual Report of ECAFE, 1964/65 (E/CN.11/705), para. 344.

²² Proceedings of the Asian Conference on Industrialization (E/CN.11/719, 10 January 1966), p. 115.

²³ Annual Report of ECAFE, 1965/66 (E/CN.11/739/Rev.1), pp. 184-188.

²⁴ ECAFE, report of the first session of the Asian Industrial Development Council (E/CN.11/747, 21 September 1966), Part III

^{24a} ECAFE, Sub-regional plan harmonization: A case study of the Regional Co-operation for Development (RP/WPH.1/ B.3, 11 November 1966), p. 20.

prerequisites, namely, an integrated market under a free trade regime or common market arrangements, similarity in stages of development, and availability of infrastructural facilities for regional or sub-regional industrialization.

An integrated market for two or more participating countries, which can absorb the products of an industrial plant operating profitably with a minimum capacity, is essential to any scheme for industrial integration. This has been the case with the industrial integration schemes already reviewed, whether in western Europe, East Africa, Central America or Latin America. Asia lags behind in this regard, but a promising beginning in the direction of establishing a free trade regime appears to have been made by the Association of Southeast Asia (ASA). In October 1966, a communique issued after the final session in Kuala Lumpur of a joint ASA committee on trade liberalization stated that the committee "discussed the possibility of establishing a Free Trade Area among the ASA countries", which include Malaysia, Philippines and Thailand.²⁵

A second prerequisite is similarity in the stages of development reached by countries participating in the industrial integration scheme. The failure of the industrial integration experiment in East Africa is to be attributed largely to the more advanced stage of development in Kenya than in the two other states; as a result, economic development—industry, trade, finance, and economic growth—is concentrated in Kenya. Thus, for example, the Raisman Commission estimated that, from 1952-54 to 1957-59, real income *per capita* rose perhaps as much as 40 per cent in Kenya, and by rather less than half this amount in Tanganyika;²⁶ while in Uganda average incomes were just about maintained in real terms over the period. Thus inequality in income distribution between the three countries has been growing rapidly largely because new manufacturing, construction, public utilities, and other service industries have tended to gravitate to the more developed and urbanized areas of Kenya, notably around Nairobi and Mombasa. Also, it must be recognized that Tanganyika and Uganda, by paying higher prices for imports of manufactures from Kenya than they would have paid had they bought them from western Europe, have in effect been subsidizing Kenya's industries. In return, of course, Kenya pays protected

²⁵ *Bangkok Post*, 21 October 1966. See item on "ASA moves toward free trade area".

²⁶ In the United Republic of Tanzania (Tanganyika and Zanzibar) with a total population in 1964 of 10.3 million in a total area of 940,000 square kilometres, Tanganyika has a population of 9,990,000 or 97 per cent, and an area of 937,000 square kilometres or over 99 per cent. In contrast, Kenya has a population in 1964 of 9,104,000 with an area of 583,000 square kilometres, and Uganda a population of 7,367,000 and an area of 236,000 square kilometres. The average density of population per square kilometre is 11 in Tanganyika, 16 in Kenya, 31 in Uganda, and 127 in Zanzibar. The *per capita* national income in 1964 is \$85 in Kenya, \$77 in Uganda, and \$72 in Tanganyika.

prices for industrial products from the other two countries, but the balance of advantage is heavily in Kenya's favour because of the much larger share of manufactures in its exports. Furthermore, in these circumstances, there has been a large net outflow of capital from Uganda, which is equivalent to 5 per cent or more of domestic money incomes, for investment in both Kenya and elsewhere.²⁷ Finally, this lop-sided development has had an unfavourable impact on the financial resources available to the governments for development expenditure. The effect of industrial growth in Kenya has been that all three countries have lost customs revenue from the displaced imports. Against this must be placed the effect of rising incomes in increasing the yield from income tax and excise duties as well as from customs duties on products continuing to be imported. But since the higher incomes have been generated primarily in Kenya, the result on balance has been a seriously adverse effect on government revenue in Tanganyika and Uganda.²⁸

A third prerequisite is the provision of regional infrastructure for industrial development and integration. It is true that, in Central America, efforts were made in the beginning to provide certain essential facilities on a regional basis, including the establishment of the Advanced School of Public Administration (ESAPAC 1954-), the Central American Research Institute for Industry (ICAITI 1956-), and the Central American Bank for Economic Integration (1961-). This, however, is not adequate in view of the wide disparities in basic capital resources and the fund of technical knowledge and savings, as well as in roads and electric power plants, and the lack of links between these facilities at the regional level. The slow progress made in industrial integration is evidenced by the fact, already cited, that by 1965 only a few integration industries had emerged since the signing in 1958 of the Agreement on the Regime for Central American Integration Industries, these being the tyre and inner tube plant in Guatemala, the caustic soda and chlorinated insecticide plants in Nicaragua, and the sheet glass plant in Honduras. The ECLA secretariat, in a review of the "General situation and future outlook of the Central American Integration Programme" in January 1963, drew attention to the importance of establishing adequate regional infrastructure by stating that "the progress made towards the common market will tend to liberate forces that must increasingly lead, not merely to a customs union, but, in the longer run, to the economic union of the member countries. This union will have been fully achieved when, in addition to the features that already exist, there is a common basic economic structure with respect to roads, harbour facilities and energy, and when mobility of the factors of production has been achieved."²⁹

²⁷ Dell, *op. cit.*, pp. 235-37.

²⁸ *Ibid.*, p. 238.

²⁹ ECLA, Report of the Central American Economic Co-operation Committee, 13 December—29 January 1963 (E/CN.12/672) Annex C, p. 31.

V. The problems of industrial integration

Industrial integration among developing nations has taken different forms in various parts of the world— industrial licensing in East Africa, designation of integration industries for the region in Central America, and inter-governmental industrial complementarity agreements in Latin America. Whatever be the forms or methods chosen for the purpose of achieving the objective of industrial integration, there are certain common problems which have arisen in the course of industrial integration. These include the choice of industries for integration, equitable distribution of benefits, regional investment policy, regional institutional structure, and industrial complementarity agreements.

Choice of industries for integration. In the selection of industries for integration among developing nations, it is important to keep in view the objectives for regional industrial integration schemes. These have been eloquently formulated, for instance, by Placido Carcia Reynoso, Mexico's Deputy Minister of Industry and Commerce and Chairman of the Governing Board of the Latin American Economic and Social Planning Institute in the following terms:³⁰

1. To facilitate the gradual adaptation of existing industries to the conditions and dimensions of a regional market, without exposing them to the excessive risks of competition from other firms, already in operation or new, that may be attracted to the region by the changed circumstances of production and distribution and by the appeal of a market enhanced by a preferential customs regime.

2. Through progressive specialization on a national and regional scale, and also within each industrial branch, to extend the import-substitution process to sectors that are technologically more complex, require a higher initial investment, and are more advantageous from the standpoint of productivity and efficiency than those presently operating in the individual domestic markets.

3. To create favorable conditions so that existing firms, as well as those expressly established for exporting manufactured goods to third countries, will be equipped to compete with those operating in world industrial centres.

However, in view of the scarcity of investment resources and of the pressing need to accelerate the rate of growth, the developing countries should, in attempting to achieve the above objectives, also stress the need of channelling the resources towards those sectors which have a key importance for the development process. Among these sectors may be mentioned iron and steel, chemicals (including petro-chemicals, fertilizers and other heavy chemicals), pulp and paper, heavy equipment, fuels, energy and infrastructure in

³⁰ "Problems of regional industrialization", in Wionczek, Miguel S. (ed.), *Latin American Economic Integration: Experiences and Prospects*, Frederick A. Praeger, London, 1966, pp. 159-60.

general. The demand for the products of strategic industries expands very rapidly, and as long as they are not produced in the country, they are imported in large quantities and contribute to the tightening of the external bottleneck. In other words, their usually high income elasticity of demand contrasts with the usually low income elasticity of the traditional export commodities of the developing countries. The establishment of these activities in developing countries would make a particularly important contribution toward redressing the external imbalance. These activities, moreover, usually powerfully induce growth. It is therefore clearly in the public interest that investment resources should be directed to these branches.³¹

In Central America, article II of the Agreement on the Regime for Central American Integration Industries stipulates that "the Contracting States shall regard as Central American integration industries those industries which, in the judgment of the Central American Industrial Integration Commission, comprise one or more plants which require access to the Central American market in order to operate under reasonably economic and competitive conditions even at minimum capacity".³² The products of plants which form part of a Central American integration industry and which are covered by the present Regime enjoy the benefits of free trade between the territories of the Contracting States, while the products of plants which form part of the same industry but which are not covered by the Regime, enjoy in the Contracting States successive annual reductions of ten per cent in the applicable uniform Central American tariff. Also, the enterprises owning industrial plants covered by the present Regime enjoy, in the territory of the countries where such plants are or may be established, in the way of fiscal incentives, the benefits and exemptions prescribed by the national legislation of the country concerned. Finally, except in cases of emergency, the Governments of the Contracting States shall not grant customs duty exemptions or reductions below the Central American common tariff on any imports from countries outside Central America of goods which are equal or similar to or substitutes for goods manufactured in any of the Central American countries by plants of industrial integration industries, nor shall they apply to such imports preferential exchange rates equivalent to such exemptions or reductions.

*Equitable distribution of benefits.*³³ In the course of industrial integration, the most difficult problem is the equitable distribution of gains among countries that are at different stages of development, with some developing countries being more or less developed

³¹ UNCTAD, Trade expansion and economic integration among developing countries (TD/B/85, 2 August 1966), para. 72.

³² United Nations, *Multilateral Economic Co-operation in Latin America*, Vol. I on "Text and documents" (UN Publications Sales No.: 62.II.G.3), 1962, p. 23.

³³ For a fuller discussion of this subject, see UNCTAD, Trade expansion and economic integration among developing countries, *op. cit.*, pp. 36-64.

than others. The elimination of trade barriers among these countries will often lead to the concentration of investment in the more advanced developing country, because of the presence in the latter of economic and social infrastructure and higher returns on capital. The less advanced developing country, because of trade liberalization, will not only lose customs revenue on imports from the more advanced developing country, but may sometimes have to pay a higher price for these imports than for those from a third country. Under these circumstances, further polarization of development in an area where countries are at a disparate stage of development may result, as has happened with the East African Common Market referred to above.

In order to achieve equitable distribution of benefits among a group of nations at disparate stages of development in any scheme for industrial integration, it is necessary to narrow the gap between the more advanced and the less advanced developing country. Otherwise, the less advanced developing country may fear a flight of capital as well as an exodus of qualified labor to the more advanced country. It must be assured of a fair sharing of the gains from a regional market, as well as of the advantages which accrue to regional industrial integration arising from the economies of scale.

In Central America, the Transitional Article in the Agreement on the Regime for Central American Integration Industries, signed on 10 June 1958, stipulates that "in order to promote an equitable distribution of the Central American industrial integration plants, the Contracting States shall not award a second plant to any one country until all of the five Central American countries have each been assigned a plant". However, in actual practice, this principle has not proved to be workable. When, late in 1961, informal negotiations on the implementation of the Regime started at the first meeting of the *ad hoc* Working Group on Industrial Development, held in Managua, Nicaragua, the politics of the distribution of the integration industries and not its economics became the main issue. Virtually no use was made of the existing ECLA industrial studies to relate individual projects to the needs of the region, except in a sense that each project obviously needed access to the whole regional market. Little attention was given to the economics of location. Also, the least developed countries would insist on the principle of negotiations by "rounds", whereby each country would receive a similar number of projects. Indeed, "for any one cognizant of these first discussions of the implementation of the Regime of Integration Industries it became quite obvious that the economics of industrial integration were closely intertwined with the politics of economic co-operation and that any attempt to divorce them might put heavy strain on the orderly functioning of the Central American common market scheme".³⁴

³⁴ Wionczek, *op. cit.*, pp. 8-9.

A number of measures in the field of fiscal incentives, improvement of infrastructure, and establishment of a regional financing agency have been suggested to achieve an equitable distribution of benefits among the participating countries in an industrial integration scheme.

A useful illustration of fiscal incentives is provided by the Central American Agreement on Fiscal Incentives to Industrial Development, signed on 31 July 1962 by the five republics. In the first place, the enterprises qualified to avail themselves of these incentives are defined as those "having industrial plants which, by the use of modern and efficient manufacturing methods for the processing of raw materials and semi-finished goods, produce articles that are necessary for the development of other productive activities or for meeting the basic needs of the population, that replace articles imported on a substantial scale or that increase the volume of exports". These enterprises are classified into three groups, A, B, or C, according to their importance to the national economy, the extent of local materials consumed, and their contribution to the improvement of the payments position. An industrial enterprise in Group A or B shall be classified as a new or existing industry. The benefits to be granted cover: (1) total or partial exemption from customs duties and related charges, (2) exemption, for the enterprise and its members, from income and profits taxes on earnings from the qualifying activities, and (3) exemption from taxes payable on assets and net worth by the enterprise or by its owners or shareholders in respect of the qualifying activities. These benefits vary according to whether the enterprise falls into group A, B, or C, or whether it is a new or existing industry; also, the extent of exemption is greater for machinery and equipment, less for raw materials, semi-manufactured goods and containers; and least for fuels.³⁵

Fiscal exemption or tax incentive could attract investors if they are granted automatically and not subject to involved negotiations. Also, while it is easy for a well-to-do country to grant these incentives, it would be difficult for a poorer country to deprive itself of necessary revenue.

However, the inconveniences which result for enterprises from serious infrastructural insufficiencies in certain areas cannot be compensated by fiscal incentives; and, if an enterprise sees no chance of making a profit, fiscal incentives must evidently remain ineffectual. Nor are long periods of fiscal exemption likely to sway an investor's decision in cases where there are possibilities of basic political changes in the countries concerned. In general, it would therefore appear that more immediately tangible measures, such as the availability of free or low-rent industrial estates

³⁵ Report of the Central American Economic and Co-operation Committee, 13 December 1960-29 January 1963 (E/CN.12/672) Annex D, pp. 56-62.

or premises and the granting of substantial financial starting aids — in the form of low-interest loans of long maturity, of equipment bonuses equivalent to a certain percentage of the investment, or of straight subsidies — would be more likely to influence investment decisions.

Another type of measure is the improvement in the less advanced developing countries of their infrastructure, including transport, telecommunication, energy supply and human investments such as education, health and even housing. These infrastructural investments require large financial resources which are clearly beyond the possibilities of a less advanced developing country. They can, however, be constructed with less cost if undertaken on a regional basis. It is therefore desirable to entrust an important responsibility in this respect to a regional financing agency, such as the Inter-American Bank for Latin American, the Central American Bank for Economic Integration, the African Development Bank, or the Asian Development Bank. Indeed, as provided for in the Agreement Establishing the Asian Development Bank, one of its functions is "to utilize the resources at its disposal for financing development of the developing member countries in the region, giving priority to those regional, sub-regional as well as national projects and programmes which will contribute most effectively to the harmonious economic growth of the region as a whole, and having special regard to the needs of the smaller or less developed member countries in the region". (Article 2)

*Regional investment policy.*³⁶ When two or more nations join hands in the establishment of an industry or industries sensitive to the economies of scale, and share an integrated market, the question arises as to the most advantageous or rational allocation of industries among the participating countries after careful consideration of a variety of relevant factors. In thus trying to establish a regional investment policy, the motives prompting it would be equitable distribution of benefits, establishment of priorities through concentration on key industries for development purpose, avoidance of duplications to eliminate excess capacity giving rise to wasteful competition, and strengthening of domestic enterprises through participation of both domestic and foreign capital. The difficulties in the establishment of such a policy are, however, enormous. In agreeing upon the location of industries, one must be aware of the fact that, even in a co-operative or joint industrial venture among several nations, each country is sovereign; that a certain industry may be suitably located in more than one country; that each country has a bias in favour of producing goods at home since external factors often escape control; and that, in joint planning for a regional investment policy, each country will have to be ready to make certain sacrifice in order to achieve common ends.

³⁶ For a fuller discussion on the subject, see document TD/B/85, *op. cit.*, pp. 65-93.

In order to facilitate inter-governmental agreements on a regional investment policy, it is important to plan jointly through the establishment of a planning co-ordination committee or a regional development board, which can meet to exchange views on the industries to be established under the national plans, and agree on an allocation of industries which could be best undertaken by individual countries from a regional viewpoint. It would be more flexible if such an exchange of views were to take place before the national plan is finalized, so that any adjustment required from a regional viewpoint could still be made.

In view of the difficulties in agreeing upon a regional investment policy, it would be highly desirable to delimit the scope of regional industrial planning from the start. Thus, regional industries may preferably be limited to: (1) those specific industrial projects representing new investment in the regional market, (2) industries requiring access to the regional market for efficient operation, (3) industries requiring large capital which can be provided by the state instead of by a large number of private investors, thus facilitating decision-taking by confining it to one single body, (4) sectors having great strategic importance for the development process, and (5) a "package" of industrial projects covering either various projects or various sectors within which there would be possibilities for giving satisfaction to each participating country.

In channelling investments into the desired locations and for avoiding duplications of investment, there should be no national licensing of the plants that have not been agreed upon by the governments concerned. Instead, the regional group should issue a common license covering the branches in question. While a unanimous decision on this question might encounter the danger of a veto by a partner country, and a majority decision might give rise to fears of inequity, it seems that the decision on a common license would require considerable confidence among the partners. Secondly, if only agreed plants have free access to the whole regional market, there would be a strong incentive for investments to go to the desired location. Thirdly, the governments might agree that each country would grant incentives (such as fiscal incentives, state aid, credits, or technical assistance) only to projects which have been agreed upon or which are consistent with the criteria established in a regional investment policy. Fourthly, the effectiveness of any of the means so far discussed could be enhanced if a regional financing institution were to declare that it would actively promote those projects that are consistent with an agreed policy, say by means of a guarantee for private loans granted to these projects. Fifthly, the attitude of international financing institutions, such as the World Bank, the International Finance Corporation, and the International Development Association, could be very influential in helping regional investment policies, including agreements on the allocation of specific industries. These institutions could commit themselves

to giving priority to the financing of projects provided for in such agreements; they might even take a policy decision to seek out such opportunities systematically in the future, not only in the field of infrastructure, but also of industry. Finally, in order to avoid duplicating investments in the countries of an existing or potential regional group, countries might agree to consult in advance before any of them authorizes an investment in a production line that exists already in another country of the group or is contemplated in that country's development plan.

To take advantage of the economies of scale and to avoid duplication, a regional investment policy may aim at the establishment, in a particular regional market, of only one plant engaged in a particular line of production. The smaller the area to be integrated, the more numerous would be the cases of industries for which only one plant would be justified. In such a situation, the approved plant might in fact or in law be regarded as having the benefit of a monopoly. As a precaution against abuse of this situation, provision may be made for the supervision of the firm concerned or for fixed norms as to the prices, quantity and quality of the goods it is to produce. A number of other means may also be employed. First, the period during which the approved firm is to have access to the regional market during which no other firm may be licensed may be limited to a few years. Secondly, where import substitution aims only at supplying a high percentage, not the whole, of total demand, the deficit might be filled by imports from third countries by a lowering of the external tariff, thus exerting some pressure upon the privileged producer. Thirdly, before temporary exclusive privileges are to be granted to a particular enterprise, public solicitation of investment offers might help to ensure fair play in the decision making process.

Foreign capital would be needed for regional investment projects for several reasons. First, such capital is necessary for closing the trade gap which is largely related to the import demand for capital goods in the course of development. Secondly, owing to population growth and demonstration effects, domestic savings are limited and insufficient for carrying out a high rate of investment. Thirdly, foreign capital can ensure a stream of modern industrial technology into the developing countries. Foreign capital, however, will not flow to countries whose policies towards foreign investment are changing and uncertain, and do not guarantee either profitable or secure returns. To favour positive contribution by foreign capital, various instruments can be envisaged. First, the countries wishing to integrate should harmonize their approach to foreign investments or establish a regional investment code. Criteria regarding a minimum of local capital participation or the exclusion of foreigners from ownership in certain sectors, the rules regarding the transfers of profits, interests, royalties and technical assistance fees, the privileges with respect to taxes

and duty-free imports, the valuation of assets of enterprises for fiscal purposes, the guarantees for the security of investments, local participation in management, etc., would then be defined at the regional level. A regional convention on commercial arbitration would usefully supplement such rules. Secondly, partnerships between foreign and domestic investors should be systematically promoted. From the viewpoint of the foreign investor, a number of advantages will accrue to such partnerships, such as the knowledge of the domestic market which nationals possess, the easing of the relations with the government or the desire to reduce the risks of political discrimination. On the other hand, the domestic investor will benefit from the inflow of technology and skill, and enjoy the training opportunities, the credit facilities and the technical assistance which the foreign investors could provide in a joint partnership.

Regional institutional set-up. For the purpose of implementing regional industrial integration, within the framework of a free trade regime (as in the case of the Latin American Free Trade Association) or a common market (the Central American Integration Industries Regime), regional institutions to implement decisions already reached or to initiate the conclusion of new agreements are essential. Such institutions are the more important in developing countries where market forces do not operate automatically or with as much effect as in developed countries.

In Central America, a supreme body having the power to conclude agreements for the establishment of a regional integration industry does not exist, for "the application of the present Regime to the Central American integration industries is subject to signature by the Contracting States, in respect of each of the said industries, of an additional protocol."¹⁷ The absence of such a body having the power to conclude agreements necessarily delays the whole process of setting in motion an integration industry. The Agreement Establishing the Regime for Integration Industries provides, however, for the establishment of a Central American Industrial Integration Commission, in order to ensure due application of this Agreement and of the additional protocols. In 1960, when the General Treaty on Central American Economic Integration was concluded, it incorporated the Agreement on the Regime for Central American Integration Industries. Under this agreement has been established the Central American Economic Council, composed of the Ministers of Economic Affairs of the several Contracting Parties, for the purpose of integrating the Central American economies and co-ordinating the economic policy of the Contracting States. This is the policy-making body, under which is set up an Executive

¹⁷ Article III of the Agreement on the Regime for Central American Integration Industries (Tegucigalpa, 10 June 1958), in United Nations, *Multilateral Economic Co-operation in Latin America* (UN Publications Sales No.: 62.II.C.3), 1962, pp. 23-24.

Council, consisting of one titular official and one alternate appointed by each Contracting Party, for the purpose of applying and administering the present Treaty and of undertaking all the negotiations and work designed to give practical effect to the Central American economic union. The Executive Council assumes, on behalf of the Contracting Parties, the functions assigned to the Central American Industrial Integration Commission, as well as many other powers. In addition, a Permanent Secretariat has been instituted to act as such for both the Central American Economic Council and the Executive Council, and to see that this Treaty and all other agreements relating to Central American economic integration already signed or that may be signed hereafter are properly executed among the Contracting Parties.

In case of the Latin American Free Trade Association (ALALC) established since 1960, the organs are the Conference of the Contracting Parties and the Standing Executive Committee. The Conference is the supreme organ which adopts all decisions in matters requiring joint action on the part of the Contracting Parties. It is composed of duly accredited representatives of the Contracting Parties, and holds a regular session once a year and special sessions when convened by the Committee. The Committee is the permanent organ of the Association responsible for supervising the implementation of the provisions of the Treaty Establishing a Free-Trade Area and Instituting the Latin American Free-Trade Association. It consists of a permanent representative of each Contracting Party, who shall have an alternate. The Committee shall have a Secretariat headed by an Executive Secretary and comprising technical and administrative personnel.

The ECLA secretariat, in a recent study,³⁸ declares that "what is proposed is not a political integration but the establishment of community institutions that are more independent, and have more freedom and scope for action, than the existing ALALC organs, but would at the same time have the same Latin American character as those organs, without prejudice to any co-operation that might be received from inter-American or international institutions."³⁹ At the first stage of integration, the community institutions should fulfil practical purposes including: (1) objective evaluation before establishing the mode for the application of new agreements, (2) formulation and study of new agreements from the standpoint of the interests of the community for consideration by the governments concerned, (3) establishment of agencies to promote and encourage actively, and on a continuing basis, the full and prompt exploitation of the new trade and development opportunities provided by the agreements signed, and (4) a high level organ to adopt decisions

relating to the execution of the agreements concluded and propose amendments to the governments. To fulfil these functions, the ECLA secretariat proposes the following community organs: The Council, the Board, an agency to promote investment, a committee of entrepreneurs and workers, the parliamentary assembly, and *ad hoc* arbitration tribunals.

The Latin American community should have a high-level political organ, the Council, which would be responsible for taking the decisions required for the progress of integration. It would be a ministerial organ, consisting of the Ministers for Foreign Affairs of all member countries, who could be accompanied, and in some cases replaced, by other Ministers with jurisdiction over any special questions that might come up. It would meet at least twice a year, to exercise the basic powers in relation to the integration process, particularly in regard to tariff reduction, regional investment policy and other matters requiring generally a unanimous decision.

The Board, which is to be the prime mover of integration, should have powers to make studies and propose action with complete freedom from any kind of limitation. The Board, whose members are to be elected by the Council, would essentially represent the interests of the community. Though it would not be a supranational authority, since it would not impose any new obligations on the Contracting Parties, it would adopt a supranational approach in expressing the interests of the community. The members of the Board would be elected from persons of high reputation in Latin America, for specific periods, but could be re-elected for one or more additional periods. The Board would have (1) a supervisory function of watching over the faithful and strict fulfilment of the agreements concluded and of decisions adopted by the Council and the tribunal, (2) a dynamic function of proposing projects, programmes or provisions to the Council, and formulating any recommendations it deemed desirable for the better fulfilment of the agreements and for the conclusion of new agreements, particularly in relation to a regional investment policy, trade and tariff policies, etc., (3) a promotional function of furthering economic development within the framework of the regional investment policy, including the encouragement of sectoral complementarity agreements and projects for the establishment of new industries as a joint operation by several countries, (4) a co-ordinating function, by virtue of which the Board would act as a link between national agencies for the planning and promotion of development, and would facilitate and encourage the consideration, and promote the complementarity, of projects of common interest to several countries, (5) an evaluating function, in determining and considering the facts on which were based requests for exemption from the general rules in force, and in making recommendations on how such requests should be dealt with, and (6) a conciliatory function, in relation to disputes that might arise from the applica-

³⁸ ECLA, A contribution to economic integration policy in Latin America (E/CN.12/728, 20 April 1965), Chapter X on "The Institutional Structure".

³⁹ *Ibid.*, p. 172.

tion of the agreements, through the recommendation of solutions.

The investment promotion agency, to be established by an agreement between the Board and the Inter-American Development Bank (IDB), would be directed and administered by a governing council on which the Board and the IDB would be represented, and to which only nationals of member countries of the Latin American economic community would be appointed. The agency would carry out the regional investment policy by translating it into specific projects, with the assistance of technical advisers and the co-operation of other institutions such as ECLA, the Latin American Institute for Economic and Social Planning, etc. The agency would act specifically in relation to the following:

- (a) The preparation of draft projects of sectoral agreements;
- (b) The advising of countries and of the Board in the negotiation of such agreements;
- (c) The execution of particular aspects of sectoral agreements, when the Board so requests, in particular those relating to technical assistance;
- (d) Advice to the Board to ensure the correct functioning of the sectoral agreements and the fulfilment of the obligations they involve.

The committee of entrepreneurs and workers, an advisory body to meet twice a year, would, in co-operation with the Board, assist in clarifying and defining the region's problems and interests. It would consist of a given number of representatives of the entrepreneurs and workers of each of the Contracting Parties, and its members would be appointed by the various Governments for a given period, and could be re-elected.

The parliamentary assembly would consist of representatives of the Congresses of each of the member countries; it would permit the establishment of a group of persons who would act in their respective national parliaments on the basis of a direct and detailed knowledge of integration problems.

The *ad hoc* arbitration tribunal would be established whenever there was a complaint relating to non-compliance by one of the Parties with agreements or obligations entered into under the Treaty, or other instruments arising from the Treaty. In each case the tribunal would consist of members of different nations appointed by lot from a five-member panel submitted by each country. The tribunal could also serve as the legal advisory body to the other community institutions.

Industrial complementarity agreements. In Latin America, these agreements are provided for in articles 15-17 of the 1960 Montevideo Treaty establishing the

Latin American Free Trade Association. Each agreement should include a specific liberalization programme and rules for maintaining the preference margins agreed on vis-à-vis third countries, as well as provisions designed to reconcile the treatments accorded to imports from third countries, to co-ordinate government programmes and incentives (including those relating to the treatment accorded to capital and services from inside and outside the Area) and to establish regulations for the prevention of unfair trade practices. To date, only two complementarity agreements have been negotiated and ratified, in connexion with certain types of calculating-machines and with electronic valves. The limited use made of these agreements is, as noted earlier, due to the length of time required for complicated negotiations of this kind, the lack of multinational projects in particular sectors, the want of an agency to study and promote such agreements, the incompatibility of industrialists' interests and those of their respective governments, and the preference of those concerned for Common Schedules as a means of liberalizing trade in certain products. The ECLA secretariat has also pointed out as further explanations the failure of the Montevideo Treaty to include promotional provisions and necessary machinery to implement specific provisions for the promotion of a given industry, particularly in regard to supervision of the fulfilment of commitments and to the execution of investment and technical assistance programmes designed to promote new production activities or to facilitate the adaptation of those already existing.⁴⁰ In order to get out of these difficulties, ALALC, by virtue of resolution 31 of the Standing Executive Committee, established the Advisory Committee on Industrial Development (Comision Asesora de Desarrollo Industrial—CADI), to make a study of the Contracting Parties' industrial policies and to define the problems affecting the integration of industry. CADI's first meeting, held in May 1964, had two particularly important results: it approved a number of bases for the formulation of the Area's industrial development policy, and recommended to the Standing Executive Committee that four study groups be set up, three of which would be concerned with the elucidation of integration problems in specific branches of industry.

The bases for the formulation of an industrial development policy applicable in the Area, including (1) the concept of "the programmed location of industries of importance for the Area" "in view of the different structures and levels of development in the ALALC countries", (2) the aim of "an equitable distribution of the benefits deriving from integration" for such a programming, and (3) the inclusion not only of trade policy but also of "all others capable of influencing a process of industrial integration by sectors" among the devices and incentives to be used in the programming of integration, represent a conceptual advance with respect to those on which complementarity agree-

⁴⁰ *Ibid.*, pp. 123-24.

ments have thus far been established, and constitute the first enunciation of an integration policy. However, like the complementarity agreements, the bases formulated by CADI for a region-wide form of sectoral programming, ambitious as they are in many respects, will also be subject to the limitation that they are conceived for new production lines and as a means of reconciling the advance of integration with protection of the position reached by each country's existing industries.

The study groups were to be composed of technical experts from the ALALC secretariat and from inter-American economic co-operation agencies (ECLA, Inter-American Economic and Social Council, and Inter-American Development Bank), in addition to experts designated by the governments of ALALC member countries by way of technical co-operation rather than official participation. Three of these groups were to be concerned with problems affecting steel-making, the petro-chemical industries, and the pulp and paper industry, respectively. As pointed out by the ALALC secretariat in a report presented at the second meeting of CADI in 1965, the experience of the international agencies engaged in making descriptive studies of sectors of industry in ALALC countries shows that, given several experts working exclusively on one sector, and the funds required for visits to the countries concerned, the work takes about three years.

Since the first meeting of CADI, the Conference of the Contracting Parties of ALALC had adopted two important resolutions. The first, resolution 99(IV), opened up fresh possibilities for sub-regional arrangements, by admitting exceptions to the application of the most-favoured-nation clause. The Montevideo Treaty, it may be noted, did not afford scope for sub-regional agreements, and precisely the likeliest possibilities of complementarity, in a restricted sense, seemed to exist in smaller groups of countries, often being of interest to a single concern established in the countries in question. Under the terms of article XXI of resolution 99(IV), the Contracting Parties expressly agree that those of them which are not parties to a complementarity agreement shall only benefit by the reciprocal concessions agreed on between its signatories, subject to the granting of fair compensation.⁴¹ The second resolution, resolution 100(IV), is to formulate, in broad terms and in the light of past experience, the basic guide-lines for economic policy in relation to customs, monetary, agricultural and industrial development questions, as well as to draw up a programme of action for the implementation of such policies. The guide-lines for industrial development policy, which embody all the criteria proposed by CADI, place strong emphasis on industrial integration through the joint programming of sectors of industry and the use of instru-

⁴¹ It is up to the Standing Executive Committee of ALALC to settle any differences of opinion likely to arise in the course of negotiation as to what is meant by "fair compensation."

ments other than complementarity agreements; but, at the same time, a distinction is still drawn between new and existing activities, joint programming being regarded as acceptable only for the new branches of industry. The ECLA secretariat questions the advisability of reserving the sectoral programming approach on a region-wide basis to the new and dynamic sectors. "Such a step", it feels, "might result in a tendency to sanction the unprogressiveness and virtual technological stagnation now prevalent in many of Latin America's traditional industries. Instead of respecting and even accentuating the disparities in productivity and operational efficiency between the new and the traditional sectors, industrial integration ought to aim expressly at eliminating them little by little, extending to the whole of the manufacturing sector the benefits of competition as an instrument for promoting efficiency and technological progress, and using sectoral programming as an effective means of gradually and systematically modernizing the traditional industries, as well as of promoting substitution of the new sectors' production for imports from outside the region."⁴² The ECLA secretariat also raises the question as to "whether an agreement relating to a sector of industry and representing a genuine sectoral and regional development programme, in which recourse would be had to the whole range of indispensable non-tariff instruments, could be implemented and supervised through the existing institutional machinery." It is precisely on account of this institutional deficiency in ALALC that ECLA secretariat advances the proposals regarding institutional reorganization of ALALC noted earlier, including the establishment of a regional investment promotion agency.

The main feature of a sectoral agreement would be its adaptation to the specific conditions and difficulties of a particular branch of industry and, in this respect, there could not be two identical sectoral agreements. None the less, they must all have the same structure. According to the ECLA secretariat, the principal characteristics of a model sectoral agreement would be:⁴³

(i) A development programme for the sector throughout the region, designed to indicate the framework for the evaluation of trade development and industry location trends, investment needs, etc., in successive years, and to constitute a diagnosis of the outstandingly weak points of the industry considered;

(ii) An investment programme, i.e., an estimate of the investment needs if the branch of industry is to grow in line with the assumption of the proposed

⁴² Document E/CN.12/728, *op. cit.*, p. 129.

⁴³ *Ibid.*, pp. 138-140.

sample programme,⁴⁴ and also of that required to eradicate or correct the weaknesses of certain countries or enterprises as regards intra-regional competition, according to the diagnosis of the industry prepared and included in the development programme:

(iii) A technical assistance programme parallel with the investment programme, aimed at helping the competitors that are likely to suffer most when intra-regional competition is intensified, and describing the procedures, areas of application and manpower and financial resources needed;

(iv) A programme for the reduction of internal customs duties over and above the targets established in the general formula, as consistent with the specific conditions obtaining in the industry itself; and procedures for applying the safeguard clause in case of maladjustments in existing concerns, adapted to the particular conditions of the industry in question (for example, liberalization by means of quotas as applied to a growing proportion of the market);

(v) A programme aimed pragmatically at standardizing the external tariff in so far as it is strictly necessary to prevent distortions in competitive conditions ruling in the branch of industry concerned;

⁴⁴The assumption is for the ALALC member states to conclude integration agreements for the ensuing five years relating to a minimal list of industries consisting of steel, aluminium, copper, pulp and paper, fertilizers, alkalis, petrochemicals, heavy industrial equipment (for the afore-mentioned sectors and other basic industries), transport material (for road, railway and water-borne transport), machine-tools, textile machinery, energy generating equipment, mining equipment, tractors and agricultural machinery, road-making equipment, and textiles. Sub-regional agreements, or agreements relating to products or limited groups of products, could be concluded over and above a general sectoral agreement, even if the parties had not undertaken to prepare a sectoral agreement within the initial five-year period of the new phase of integration.

(vi) A set of commitments for the reconciliation of certain aspects of economic policy which carry most weight in the branch of industry considered (systems of incentives to industry or regulations governing foreign capital and enterprises, tax provisions, etc.), representing the indispensable minimum to avoid obvious distortions; and consultation machinery to mitigate the difficulties that might arise in this connexion in future, since it is deemed very difficult to establish rulings, *a priori*, for all the action called for without the risk of carrying the arduous task of reconciliation beyond the limits of future practical requirements;

(vii) A set of provisions concerning the use of exceptions to the most-favoured-nation clause admitted in the general formula, favouring the aims with respect to a well-balanced regional development set forth in the sample plan prepared for the sector; that is, provisions relating specifically to countries at a relatively less advanced (and medium) stage of economic development;

(viii) Measures for the practical implementation of the provisions and programmes included in the sectoral agreement, use being made of the institutional mechanisms of the common market (the Board and the Investment Promotion Agency) and other instruments which might be created especially for the sector concerned (producers' councils or advisory boards for consultation regarding the harmonization of conditions for inflows of foreign capital, etc.); as a matter of general policy, it might be as well in the early stages to have recourse exclusively to the general organs of the Treaty in the way of permanent bodies, and to accept new sectoral agencies or mechanisms only on a consultation or advisory basis.

DEVELOPMENT OF THE MAN-MADE FIBRE INDUSTRY IN THE ECAFE REGION¹

I. Introduction

Research on the possibility of producing man-made fibres dates back to the nineteenth century or even earlier. The work of Chardonnet, Audemars, Hughes, Gerard, du Vivier and others during the mid-nineteenth century and later, formed the starting point of the tremendous cellulosic man-made fibre industry that exists to-day. Commercial exploitation of the principal cellulosic man-made fibres in the present use, such as viscose rayon, cuprammonium rayon and cellulose acetate started around the end of the nineteenth century and the beginning of the twentieth century.

The discovery and later commercial production of the non-cellulosic synthetic fibres originated from the fundamental research of organic polymers embarked upon by Carothers of E.I. du Pont de Nemours in the United States in 1928. His research was not directed specifically at the formation of fibres and it was a surprising and important discovery that some of the newly synthesized polymers were fibre-forming. His work led to the first synthetic fibre pilot plant for the production of nylon in 1938. The introduction of nylon (polyamide) fibre was followed by a host of other synthetic fibres, such as polyesters, acrylics, polyvinyl alcohol, polypropylene, polyurethane, polyvinylidene chloride and others, and work on the modification of existing polymer fibres and the introduction of new types continues.

The development and expansion of the man-made fibre industry is illustrated in table 1, showing the world production of man-made fibres since 1921.

Table 1

WORLD PRODUCTION OF MAN-MADE FIBRES

Year	Cellulosic		Non-Cellulosic		Total
	MT	Per cent	MT	Per cent	
1921	22,000	100	—	—	22,000
1931	228,000	100	—	—	228,000
1941	1,278,000	99	9,000	1	1,278,000
1951	1,820,000	95	103,000	5	1,923,000
1955	2,278,000	90	267,000	10	2,545,000
1960	2,600,000	79	702,000	21	3,302,000
1965	3,331,000	62	2,029,000	38	5,360,000

¹ Prepared by the ECAFE secretariat on the basis of documents prepared for the Seminar on the Development of the Man-made Fibre Industry in Asia and the Far East, held from 28 October to 7 November 1966 in Tokyo/Osaka, Japan.

The production of all textile fibres in the world, excluding hard fibres such as flax, ramie, hemp and jute, amounted to 18,267,000 metric tons in 1965, of which 11,390,000 metric tons were cotton, 1,485,000 metric tons were wool, 32,000 metric tons were silk, and 5,360,000 metric tons were man-made fibres. Thus cotton, wool and man-made fibres represented approximately 63 per cent, 8 per cent and 29 per cent of the total textile fibre production respectively. The average rate of growth of total world textile fibre production during the last fifteen years was 4.2 per cent. The average rate of growth for man-made fibres alone was 7.5 per cent.

In 1965 the ECAFE region contributed 976,000 metric tons or 18 per cent to the world production of man-made fibres. The production in the region was confined to seven countries, namely, Australia, China (Taiwan), India, Japan, Republic of Korea, New Zealand and Pakistan. By far the largest share of the production, 88.6 per cent, was in Japan, which was the second largest producer of man-made fibres in the world. An average annual rate of growth of 7.7 per cent appears to have been maintained in the region from 1957 to 1965. The production of man-made fibres in countries of the ECAFE region in 1965 is shown in table 2.

Table 2

MAN-MADE FIBRE PRODUCTION IN THE ECAFE REGION IN 1965

Country	Cellulosic		Non-cellulosic		Total	Per cent
	MT	MT	MT	MT		
Australia	6,800	9,400	16,200	1.7		
China (Taiwan) ...	4,900	1,600	6,500	0.7		
India	81,800	2,900	84,700	8.7		
Japan	485,900	379,600	865,500	88.6		
Korea, Rep. of ...	—	1,900	1,900	0.2		
New Zealand	—	1,300	1,300	0.1		
Total	579,400	396,700	976,100	100.0		
Percentage ...	59.4%	40.6%	100%			

The output of man-made fibre in the region increased from 467,000 metric tons in 1956 to 976,000 metric tons in 1965, an increase of 109 per cent or 7.7 per cent per year on average. A large proportion of this increase was in the non-cellulosic fibre group, which increased from 29,000 metric tons in 1956 to 396,700 metric tons in 1965.

The domestic consumption of textile fibres from 1953 to 1962 in the ECAFE region and in the world is shown in table 3.

Table 3

DOMESTIC CONSUMPTION OF TEXTILE FIBRES

(Unit=1,000 metric tons)

Fibre	ECAFE region				World total			
	1953	1957	1962	annual increase, %	1953	1957	1962	annual increase, %
Cotton	1,428	1,856	2,094	3.9	8,188	9,459	10,116	2.1
Man-made	278	431	613	6.2	2,033	2,884	3,936	6.8
Wool	109	138	197	6.1	1,197	1,333	1,488	2.2
Total	1,815	2,425	2,904		11,418	13,676	15,540	

It can be seen from table 3 that the growth in domestic consumption of man-made fibres in the region has exceeded that of both cotton and wool, although the latter have also shown a high level of growth. However, the usage of man-made fibres as a proportion of all textile fibres used is still relatively small, especially in the developing countries of the region. Domestic consumption of man-made fibres in the ECAFE region represented for 21.1 per cent of total textile fibre usage in 1962, the most recent year for which comparable data are available. In the same

year, the proportion for the whole world was 25.3 per cent.

With the exception of Japan, all countries of the region, no matter whether they are producing man-made fibres or not, have to import certain quantities of cellulosic and non-cellulosic fibres to meet their demand. The domestic production of man-made fibres as a percentage of net domestic availability in the six producing countries in the years 1964 and 1965 is shown in table 4.

Table 4

DOMESTIC PRODUCTION OF MAN-MADE FIBRES AS A PERCENTAGE OF NET DOMESTIC AVAILABILITY

Country	Cellulosic fibres		Non-cellulosic fibres		Total Man-made fibres	
	1964	1965	1964	1965	1964	1965
Australia	41	36	53	54	46	45
China (Taiwan)	24	27	30	28	7	24
India	94	98	16	29	85	91
Japan	127	128	110	123	120	126
Korea (Republic of)	—	—	15	17	8	10
New Zealand	—	—	—	43	—	26

Table 4 shows that only the domestic production of man-made fibre in Japan gives percentages in excess of 100, which indicates that substantial quantities of domestically produced man-made fibres have been exported.

Forecasts for domestic demand of fibres by 1975 in countries of the region have been made by experts on the hypothesis that a certain degree of self-sufficiency is to be attained and the effect of import restrictions is taken to be less than at present. Table 5 shows the estimated demands in countries of the region by 1975.

Table 5

DOMESTIC DEMANDS FOR FIBRES IN COUNTRIES OF THE REGION BY 1975

(Unit=1,000 metric tons)

Country	All fibres	Man-made fibres %	Cellulosics	Non-cellulosics	
Burma	74.2	15	11.1	8.3	2.8
Ceylon	32.8	30	9.8	6.3	3.5
China (Taiwan)	95.5	30	28.6	19.1	9.5
India	1,674.8	20	335.0	223.0	112.0
Indonesia	146.9	15	22.1	14.7	7.4
Iran	173.0	25	43.3	32.6	10.7
Korea, Rep. of	167.1	25	41.8	16.7	25.1
Malaysia ¹	74.2	15	11.1	5.6	5.5
Pakistan	328.3	20	65.7	32.9	32.8
Philippines	109.2	20	21.8	14.5	7.3
Thailand	95.9	20	19.2	9.6	9.6
Japan	1,699.2	50	850.0	450.0	400.0
Australia	170.2	35	60.4	20.1	40.3
New Zealand	38.8	25	9.7	4.8	4.9
Other countries ²	184.3	15	27.6	18.4	9.2
Total	5,064.6		1,557.2	876.6	680.6

¹ Includes Sabah, Sarawah and Singapore.² Includes Afghanistan, Bhutan, Brunei, Cambodia, Hong Kong, Laos, Nepal, Republic of Viet-Nam, West Samoa.

The production capacity operating and under construction in the different countries of the region is given in table 6.

Table 6

MAN-MADE FIBRE ANNUAL PRODUCTION CAPACITY
OPERATING AND UNDER CONSTRUCTION IN THE
ECAFE REGION

(Unit=metric tons)

Country	Cellulosics	Non-cellulosics
Australia	8,600	20,400
China (Taiwan)	26,900	9,900
India	77,000	8,200
Japan	661,000	426,000
Korea, Rep. of	5,000	3,200
New Zealand	—	1,500
Pakistan	6,600	1,100
Thailand	—	1,000
Total	785,100	501,000

A comparison of table 5 with table 6 shows that, with the exception of Japan, current capacity and capacity under construction are very substantially below the estimated requirements by 1975. It indicates that the annual domestic demands for man-made fibres in the region by 1975 will be 876,600 metric tons of cellulosics and 680,600 metric tons of non-cellulosics, whereas the annual production capacity operating and under construction is 785,100 metric tons cellulosics and 501,000 metric tons of non-cellulosics. The net annual deficit in the region is therefore 91,500 metric tons of cellulosics and 179,600 metric tons of non-cellulosics. It is evident that there is ample scope for the development of the man-made fibre industry in many countries of the region.

II. The Man-made Fibre Industry in Countries of the
ECAFE Region: Present State, Future Plans and
Development Prospects

1. Australia

High tenacity viscose filament yarn was first produced in 1952 and was followed by regular tenacity acetate filament in 1953. The raw material for viscose filament yarn, high grade alpha cellulose, is imported while other necessary chemicals such as caustic soda and carbon disulphide are obtained from local manufacture. Alpha cellulose is imported from the United States for the local manufacture of acetate flake which is used for the production of acetate yarn. Solvent is also produced locally. There is no production of cellulosic staple or tow in Australia.

The production of nylon 66 filament yarn for textile purposes was started in 1958. The factory was enlarged in 1962, when production of high tenacity nylon 66 yarn for industrial applications was introduced. In 1964 nylon staple was produced, and in a new section "Terylene" polyester filament yarn, staple and tow were made. Local manufacture of nylon 6 monofilament and multifilament was also undertaken, principally for use in tyre cord fabric. Since 1965 textured nylon 6 carpet has been produced and it is planned to extend output to include normal tenacity filament nylon 6 for apparel uses. There is also small-scale production of Saran, polyolefin and other heavy monofilaments, for use in flyscreens, fishing lines and webbing. At present the intermediates for all local manufacture of non-cellulosic fibres are imported

from overseas. No plans have been announced of intentions to manufacture intermediates locally.

Table 7 shows the production and production capacity of man-made fibres in Australia.

Table 7
PRODUCTION AND PRODUCTION CAPACITY OF
MAN-MADE FIBRES IN AUSTRALIA

(Unit=metric tons)

Year	Filament		Non-cellulosic	Staple Non-cellulosic	Total
	Viscose	Acetate			
<i>Production</i>					
1961	4,100	900	2,300	—	7,300
1962	5,000	1,800	2,700	—	9,500
1963	5,000	1,800	5,400	—	12,200
1964	5,400	1,800	7,300	450	15,000
1965	4,500	2,300	8,600	900	16,300
<i>Capacity</i>					
1966 (March)	5,900	2,300	10,900	2,300	21,400
1967 (Dec.)	5,900	2,700	17,200	3,200	29,000

Australia also imports considerable quantities of man-made fibres. 12,200 metric tons of cellulose and 10,200 metric tons of non-cellulose were imported from July 1964 to June 1965.

Exports of man-made fibres in 1964/65 amounted to 1,600 metric tons compared with 1,100 and 900 metric tons in the preceding two years.

There are no special government policies aimed at assisting the production and use of man-made fibres, although the industry shares with other Australian industries the right to seek protection from imports through the imposition of tariffs, or in some instances, the payment of bounties.

2. Burma

Man-made fibres are not produced in Burma and the current economic development plan does not envisage production being undertaken. Imports of man-made fibres and manufactures in 1962 are unofficially estimated at 3,100 metric tons.

With the large resources of bamboo, the man-made fibre industry in Burma should favour the production of cellulose. In view of the lack of cotton in Burma, the production of viscose staple fibre would be of substantial interest. The manufacture of dissolving pulp may be attached to a paper plant at Sittang, lower Burma. The required production of 27 tons per day of cellulose could be divided into 20 tons per day staple, and 7 tons per day filament, which would be an economic unit.

The small quantity of synthetic fibre requirements could be easily met by the establishment of a three tons per day polyester plant, and a similar size nylon plant, based on imported intermediates.

3. Ceylon

Man-made fibres are not at present manufactured in Ceylon, although plans for the local production of fibres are under serious consideration. Detailed investigations have been completed for the establishment of a chemical complex comprising the manufacture of viscose rayon, nylon 6 and polyester filaments, soda ash, caustic soda and carbon disulphide.

A recent survey of Ceylon demands indicated that over 7,000 tons of man-made fibres will be required in 1970, and it will be increased to about 10,000 tons per year by 1975. At present, demand continues to be largely for cellulose.

This demand in Ceylon would be too small to justify pulp manufacture or the manufacture of synthetic fibre intermediates. The main demand would be for filaments and it may be estimated at 6,300 tons of rayon filament, 2,000 tons of polyamide filament and 1,500 tons of polyester. These fibres could easily be produced from imported intermediates.

4. Republic of China

Production of man-made fibres in China (Taiwan) was first undertaken in 1957 with the manufacture of viscose filament yarn (normal tenacity) and Saran monofilament. By 1959 viscose staple was also being produced. Since then, this plant has gradually expanded into the present capacity of 6.5 metric tons per day of filament and 20 metric tons per day of staple fibre.

The production of polyamide and polyester fibres was started at the end of 1964 with a capacity of 2 and 2.5 metric tons per day respectively. Two new polyamide plants were completed in 1966 with a capacity of 2.5 and 3 metric tons per day respectively.

The production of man-made fibres since 1961 is shown in table 8.

Table 8

PRODUCTION OF MAN-MADE FIBRES IN CHINA (TAIWAN)

(Unit=metric tons)

	1961	1962	1963	1964	1965
Rayon filament	1,886	1,888	1,857	1,740	1,989
Rayon staple	2,130	2,427	2,881	2,889	2,805
Nylon 6 filament ...	—	—	—	53	668
Polyester staple	—	—	—	12	595

Expansion projects are being undertaken to increase polyester fibre and polyamide fibre production in the plants that were first put into operation in 1964 both up to 7.5 metric tons per day. A 10 metric ton per day acrylic fibre plant is being constructed with completion time scheduled at mid-1967.

At present, the raw materials for rayon filament and staple and those for polyesters and polyamide fibres are imported. There is no indigenous production of either rayon grade pulp or synthetic fibre intermediates. However, a 100 metric ton per day pulp plant and a 45 metric ton per day rayon staple fibre plant are under construction and are expected to be operable in 1967 using the abundant local supplies of hardwood. In addition, a 50 metric ton per day acry-

lonitrile plant is to be built utilizing propylene from the naphtha cracking plant currently under construction. A caprolactam plant of 6,600 tons per year and a DMT plant of 4,500 tons per year are also planned.

The existing and planned capacity of man-made fibre production in China (Taiwan) is summarized in table 9.

Table 9

SUMMARY OF EXISTING AND PLANNED CAPACITY OF MAN-MADE FIBRES PRODUCTION IN CHINA (TAIWAN)

Fibre	Status	Capacity MT/day	Year of operation	Process	Raw material	Investment Million US\$
Viscose fil.	Existing	6.5	1957	Viscose	Pulp	7.0
Viscose staple	Existing	20.0	1959	Viscose	Pulp	3.5
Viscose staple	Under construction	45.0	1967	Maurer	Pulp	10.0
H.T. Viscose staple	Under construction	10.0	1967	Polynosic	Pulp	3.5
Nylon 6 fil.	Existing	2.0	1964	Chemtex	Caprolactam	3.0
Nylon 6 fil.	Under construction ¹	5.0	1968	Chemtex	Caprolactam	4.0
Nylon 6 fil.	Existing	2.5	1966	Boulogny	Chips	3.0
Nylon 6 fil.	Existing	3.0	1966	Zimmer	Chips	2.75
Polyester staple	Existing	2.5	1964	.....	DMT	1.67
Polyester staple	Under construction ¹	5.0	1967	.....	and ethylene glycol	2.87
Acrylic staple	Under construction	10.0	1967	Lodering	Acrylonitrile	....
Saran monofil.	Existing	1.0	1957	Dow	Saran powder	4.0

¹ Expansion of existing facilities.

Thus by 1968, the local production of man-made fibres will have a total capacity of 112.5 metric tons per day (37,130 metric tons per year) consisting of 81.5 metric tons of cellulose and 31 metric tons of non-cellulose.

Imports of man-made fibres amounted to 17,908 metric tons in 1965, of which 12,731 metric tons were cellulose and 5,179 metric tons of non-cellulose.

The estimated demand for all fibres up to 1975 is given in table 10.

Table 10

ESTIMATED DEMAND FOR FIBRES IN CHINA (TAIWAN)

(Unit=metric tons)

	1966	1970	1975
Cotton	60,000	60,000	50,000
Wool	3,300	4,000	4,500
Rayon filament	2,100	4,500	6,000
Rayon staple	17,900	21,000	37,000
Nylon filament	3,500	5,400	9,000
Polyester filament	900	2,100	4,500
Polyester staple	1,900	3,500	6,500
Acrylic staple	1,700	4,000	8,000
Cellulose acetate	130	250	700

By 1975 the estimated demand, including exports is expected to be 43,000 metric tons for cellulose and 28,700 metric tons of non-cellulose. These targets

could easily be met by a logical expansion of the existing industry, including the production of intermediates.

With regard to the textile industry, there are 79,000 man-made fibre spindles currently in operation with an annual capacity of 56,000 bales of yarn. The production of rayon spun yarn and blended yarn at present cannot keep pace with demand. Domestic and export sales of blended textiles of rayon and synthetic fibres are rising. Mills have undertaken expansion programmes to increase blended spindles so as to meet the demand.

5. Hong Kong

There is no existing or planned production of man-made fibres in Hong Kong, though significant imports are known to occur for the local production of spun yarns and fabrics for domestic consumption and exports. In 1962 imports of man-made fibres, fabrics and manufactures totalled 15,380 metric tons while exports amounted to 9,970 metric tons.

6. India

Viscose filament yarn was first produced in India in 1951, and was followed by viscose staple and acetate filament in 1953. Production of high tenacity viscose filament yarn was later commenced in 1962, and during the same year spinning of the first non-cellulosic fibre, nylon 6 filament, was started. Production of man-made fibres during recent years is shown in table 11.

Table 11

PRODUCTION OF MAN-MADE FIBRES IN INDIA

(Unit=metric tons)

Fibre	1961	1962	1963	1964	1965
Viscose filament	21,436	26,237	31,221	35,294	35,170
Viscose staple	26,061	32,381	32,146	36,819	37,056
H.T. Viscose filament		695	2,721	4,830	7,512
Acetate filament	2,032	1,388	1,953	1,836	2,036
Nylon 6 filament		176	742	1,175	1,430
Total	49,529	60,877	68,783	79,954	83,204

Production during this five-year period increased in total by 68 per cent or 10.9 per cent per year on average.

The increasing volume of domestic production of cellulosic fibres has been accompanied by a decline in the level of imports. However, imports of non-cellulosic fibres have been increasing, although this trend was reversed in 1965. Details of imports appear in table 12.

Table 12

IMPORTS OF MAN-MADE FIBRES IN INDIA

(Unit=metric tons)

Fibre	1961	1962	1963	1964	1965
Viscose acetate filaments	18,282	13,641	7,333	4,737	1,447
Non-cellulosic filament and staple	1,951	3,628	4,606	6,763	4,937
Total	20,233	17,269	11,939	11,500	6,384

The growth in demand for man-made fibres in India has led to plans for the expansion of the industry and during the next five years it is planned to produce locally nylon 6 staple, polyester staple and acrylic staple in addition to the present production of cellulosic fibres and nylon 6 filament. Details of existing plants, those under construction and also those in the planning stage are summarized in table 13.

Table 13

SUMMARY OF MAN-MADE FIBRE PRODUCTION CAPACITY IN INDIA

Fibre	Status	Capacity MT	Year of operation	Raw material	Investment (Million Rs)
Viscose filament	Existing	34,000	1951	Pulp	500
	Under Const.	500	1966	Pulp	5.3
	Planned	6,000	1968	Pulp	70
Viscose staple	Existing	26,000	1953	Pulp	160
H.T. Viscose filament	Existing	11,000	1962	Pulp	150
	Under Const.	3,500	1967	Pulp	60
	Planned	5,500	1969	Pulp	90
Acetate filament	Existing	2,000	1953	Cellulose	40
	Planned	10,000	1969		170
Nylon 6 filament	Existing	1,600	1962	Caprolactam	50
	Under Const.	2,500	1968	Caprolactam	72
	Planned	18,500	1971	Caprolactam	610
Nylon 6 staple	Planned	2,100	1971	Caprolactam	18
Polyester staple	Existing	2,000	1966	DMT and	...
	Planned	9,500	1968	Glycol	60
Acrylic staple	Planned	6,500	1970	Acrylonitrile	65

The existing capacity for the production of cellulosic pulp is 54,000 metric tons per year, and the capacity under construction is 21,600 metric tons per year. Production of pulp made from bamboo, eucalyptus and hard woods was 40,175 metric tons in 1965.

Caprolactam for nylon 6 filament yarn production has so far been imported. However, a plant has been licensed for the production of 15,000 tons per year of caprolactam.

A petrochemical complex based on a naphtha cracker has been planned near the refinery at Koyali

(Gujarat) and this will be producing 10,000 tons of DMT per year by 1970. Another petrochemical complex in Bombay is expected to go on stream by mid-1967, producing among other products 10,000 tons per annum of ethylene glycol and 8,000 tons of vinyl acetate.

Presently there are about 68,000 looms and 180,000 hand looms capable of producing 815 million metres per annum of rayon and synthetic yarn fabrics on a two-shift basis. It is planned to instal an additional 40,000 power looms in the next five years.

7. Indonesia

Man-made fibres are not produced in Indonesia. FAO estimates of man-made fibre consumption during 1962 totalled 24,000 metric tons, which consisted of imports of fibres, yarns, fabrics and other manufactures. The demand for cellulosic fibres amounts to about 40 tons per day of pulp. This amount would not be economical to produce, but it would be economic if the pulp is produced by integration with a paper mill.

The anticipated demand of about 7,000 tons per year of synthetic fibres would not justify the establishment of intermediate facilities. However, if a petrochemical centre were to be developed for other purposes, the production of intermediate could be considered as a possibility.

8. Iran

The use of man-made fibres in Iran is currently confined to imported products, since there is no domestic fibre producing industry. It is estimated that imports of man-made fibres, yarns, fabrics and other manufactures amounted to 22,500 metric tons in 1962. These are mostly imported as viscose staple for blending with cotton.

Iran is establishing a viscose plant, which by 1975 will have a production capacity of about 30,000 tons, equal to the projected demand. Initially the plant will be based on imported pulp and capital costs of the plant are estimated at US\$50 million, of which foreign exchange of \$36 million will be required.

By 1975, Iran should have enough raw materials available from the Caspian beach forests to establish a 110-ton per day dissolving pulp plant to feed the staple and filament plant.

Iran has the best petrochemical resources of the region and can consider the establishment of intermediate plants of economic size. It is already planning to establish plants for ethylene glycol and caprolactam, which could easily feed polyester plants both in Iran and Pakistan. The small quantity of acrylic requirements in Iran would be met by imports from Pakistan under the agreed RCD arrangements in exchange for these intermediates.

The spinning facilities for nylon, polyester and acrylics would have to be developed and so would the necessary textile facilities.

9. Japan

Japan is the second largest producer of man-made fibres in the world, exceeded only by the United States. At present, it has 92 man-made fibre plants with a total capacity of 3,294 metric tons per day, or 1,087,000 metric tons per year. Table 14 shows the man-made fibre production capacity in Japan.

Table 14

MAN-MADE FIBRE PRODUCTION CAPACITY IN JAPAN

Fibre Cellulosics	No. of companies	No. of plants	Capacity	
			MT per day	MT per year
Viscose staple	15	15	1,421	468,900
Viscose filament	5	8	281	92,700
H.T. viscose filament	3	3	83	27,400
Acetate filament	4	4	70	23,100
Acetate staple	3	3	79	26,100
Cuprammonium filament	1	1	60.7	20,000
Cuprammonium staple Sub-total	1	1	8.5	2,800
	32	35	2,003.2	661,000
<i>Non-cellulosics</i>				
Nylon filament	7	10	375	123,800
Nylon staple	2	3	34	11,200
Polyester filament	3	3	97	32,000
Polyester staple	5	6	218	71,900
Acrylic staple	6	7	256	84,500
Polyvinyl alcohol ...	3	4	174	57,400
Polyvinylidene	2	3	14	4,600
Polyvinyl chloride ...	5	5	31	10,200
Polyethylene	9	9	35	11,600
Polypropylene	7	7	57	18,800
Sub-total	49	57	1,291	426,000
Total	81	92	3,294.2	1,087,000

The production of man-made fibres in Japan from 1961 to 1965 is shown in table 15.

Table 15

PRODUCTION OF MAN-MADE FIBRES IN JAPAN

(Unit=metric tons)

Fibre	1961	1962	1963	1964	1965
<i>Cellulosics</i>					
Viscose filament .	98,668	88,951	89,561	89,555	86,059
Viscose staple ...	297,841	286,614	321,940	343,294	347,934
H.T. viscose filament	26,232	29,129	24,283	24,069	24,497
Acetate filament .	16,301	18,486	19,310	21,449	23,685
Acetate staple ...	6,344	5,004	7,295	11,544	16,780
Sub-total ...	445,386	428,184	462,389	489,911	498,955
<i>Non-cellulosics</i>					
Nylon filament and staple ...	49,546	57,717	80,052	119,121	117,995
Polyester filament and staple ...	37,330	46,821	62,295	85,568	97,391
Acrylic staple ...	23,033	27,392	36,015	61,624	84,070
Others	43,215	50,814	60,831	75,968	80,148
Sub-total ...	153,124	182,744	239,193	342,281	379,604
Total	598,510	610,928	701,582	832,192	878,559

It can be seen from table 15 that the production increased from 598,510 metric tons in 1961 to 878,559 metric tons in 1965 with an average rate of increase of 8.0 per cent per year.

Present capacity for the production of man-made fibre intermediates in Japan is shown in table 16.

Table 16

PRODUCTION CAPACITY OF INTERMEDIATES IN JAPAN

Intermediate	No. of companies	No. of plants	Capacity	
			MT per day	MT per year
Viscose and acetate Pulp (dissolving sulphite pulp)	5	7	1,137.8	375,500
Viscose and acetate pulp (dissolving kraft pulp)	1	2	184.9	61,000
Ethylene glycol	4	4	210	69,300
Caprolactam	5	5	570	188,100
Dimethyl terephthalate	5	6	155	51,200
Terephthalic acid ...	6	6	320	105,600
Polyvinyl alcohol ...	4	6	250	82,500
Acrylonitrile	6	7	470	155,100
Total	36	43	3,297.7	1,088,300

During the initial period of cellulosic fibre production, wood pulp and caustic soda were imported, while sulphuric acid and carbon disulphide were obtained from local production. During later years the cellulosic fibre industry was able to rely almost entirely on domestic production of raw materials. However, since 1958, with the change in use from coniferous to broad-leaved wood, pulp has again been imported in large quantities.

The development of the non-cellulosic fibre industry since 1950 has been accompanied by a similar build-up of domestic production of intermediates, principally based on calcium carbide and petrochemical industries.

Details of domestic production, imports and exports of man-made fibre intermediates appear in tables 17, 18 and 19.

Table 17

PRODUCTION OF MAN-MADE FIBRE INTERMEDIATES IN JAPAN

(Unit=1,000 metric tons)

Intermediate	1961	1962	1963	1964	1965
Viscose and acetate pulp ...	401.2	387.8	412.9	455.3	465.3
Caprolactam	55.4	65.5	87.4	124.6	167.2
Ethylene glycol...	20.4	23.1	27.1	41.2	64.8
Dimethyl terephthalate...	....	....	....	....	....
Terephthalic acid	37.6	46.7	55.6	69.7	77.8
Acrylonitrile ...	21.3	29.0	37.9	78.1	153.3
Polyvinyl alcohol	42.2	55.5	61.2	69.4	81.5

Table 18

IMPORTS OF MAN-MADE FIBRE INTERMEDIATES IN JAPAN

(Unit=metric tons)

Intermediate	1961	1962	1963	1964	1965
Rayon grade pulp	159,459	164,312	190,020	197,542	202,926
Caprolactam ...	—	—	6,160	10,574	2,585
Polyester resins ¹ ..	1,060	534	833	1,431	1,463
Dimethyl terephthalate ...	—	72	2,972	6,605	481
Ethylene glycol ..	8,304	13,903	23,505	18,720	3,142
Acrylonitrile	—	107	5,056	11,519	—
Acrylic resins ¹ ...	—	304	430	—	214

Table 19

EXPORTS OF MAN-MADE FIBRE INTERMEDIATES FROM JAPAN

(Unit=metric tons)

Intermediate	1961	1962	1963	1964	1965
Caprolactam ...	—	—	281	2,662	12,924
Polyester resins ¹ ..	2,858	872	962	1,252	—
Acrylonitrile	—	—	—	—	44,443

¹ Includes resins for non-fibre products.

Exports of man-made fibres from Japan are shown in table 20.

Table 20

EXPORTS OF MAN-MADE FIBRES FROM JAPAN

(Unit=metric tons)

Fibre	1961	1962	1963	1964	1965
<i>Cellulosics</i>					
Viscose filament ..	21,582	19,521	14,254	16,890	17,099
Viscose staple ...	27,527	46,977	69,526	86,577	89,017
H.T. viscose filament	180	425	97	167	54
Acetate filament ..	386	987	174	462	795
Acetate staple ...	39	207	28	444	1,528
Sub-total ...	49,714	68,117	84,079	104,540	109,393
<i>Non-cellulosics</i>					
Nylon and polyester filament	4,936	5,183	6,905	12,171	24,515
Nylon, polyester and acrylic staple...	2,279	4,580	7,942	18,502	45,547
Others	621	1,020	329	899	1,100
Sub-total ...	7,836	10,783	15,176	31,572	71,162
Total	57,550	78,900	99,255	136,112	180,555

Imports of man-made fibres into Japan are negligible, being only 330 metric tons in 1965. The highly developed domestic industry has led to a low level of imports. On the other hand, exports have been encouraged and an appreciable proportion of the domestic output of man-made fibres is directed to export markets, amounting to almost 21 per cent in 1965 compared with 10 per cent in 1961.

The man-made industry in Japan will continue to expand in the future. Plant expansions now under way for non-cellulosic fibres are expected to increase to a total capacity of 1,510 metric tons per day by mid-1967.

The estimated man-made fibre requirements in 1975 including exports are shown in table 21.

Table 21

ESTIMATED MAN-MADE FIBRE REQUIREMENTS IN JAPAN
(Unit=1,000 metric tons)

Fibre	1965	1975	Increase, %
<i>Cellulosics</i>			
Filament	134	148	10
Staple	365	349	-4
Sub-total	499	497	0
<i>Non-cellulosics</i>			
Filament	166	460	177
Staple	214	517	142
Sub-total	380	977	157
Total	879	1,474	68

It can be seen from table 21 that there will be no increase in the production of cellulosic fibres, while synthetic fibres will continue to grow at a high rate.

10. Republic of Korea

The production of man-made fibres is at present limited to non-cellulosics. The first plant producing polyvinyl alcohol fibre commenced operation in 1959. Nylon 6 filament yarn was initially produced in 1963 and a second plant began normal operation in 1964. Production of these fibres is shown in table 22.

Table 22

PRODUCTION OF MAN-MADE FIBRES IN THE
REPUBLIC OF KOREA
(Unit=metric tons)

Fibre	1961	1962	1963	1964	1965
Polyvinyl alcohol staple ...	200	300	400	300	400
Nylon 6 filament	—	—	100	900	1,500
Total	200	300	500	1,200	1,900

Domestic production of these non-cellulosic fibres has been supplemented by imports of nylon, acrylic, polyester and Saran fibres and also substantial quantities of cellulosic fibres. Imports of man-made fibres amounted to 17,700 metric tons in 1965 consisting of 8,500 metric tons of cellulosic fibres and 9,200 metric tons of non-cellulosic fibres.

The rapid increase in demand for man-made fibres that has occurred during recent years has led the Government to promote local production under the first and second five-year economic development plans.

Under the second five-year plan, production capacity is scheduled to be raised from the present 5.8 metric tons per day (1,914 metric tons per year) to 175 metric tons per day in 1971 (57,750 metric tons per

year), consisting of 65 metric tons of cellulosic fibres and 110 metric tons per day of non-cellulosic fibres. A 15 ton per day viscose plant is at present being erected. The range of fibres then produced will include viscose, acetate, polyamide, polyester, acrylic, polyvinyl alcohol and polypropylene. The estimated capital investments required are \$170 million, of which \$120 million will be in foreign exchange.

It is not proposed to manufacture pulp for cellulosic fibres. All the necessary chemical pulp will be imported. However, most of the intermediates for non-cellulosic fibres will be produced locally. These intermediates are scheduled to be provided by 1971 from a combined petrochemical complex now contemplated under the second five-year plan.

On the basis of a projected production of 30 tons per day of polyamide, 10 tons per day of polyvinyl alcohol and 40 tons per day of acrylic fibres, the requirement of caprolactam will be 11,000 tons per year; of polyvinyl acetate, 6,000 tons per year; and of acrylonitrile, 13,200 tons per year.

11. Malaysia and Singapore

There are no plans to establish man-made fibre plants in Malaysia and Singapore. The small domestic demands do not justify the manufacture of dissolving pulp for cellulosic fibres and intermediates for synthetic fibres. However, with large resources of old rubber trees and other hardwoods, the production of dissolving pulp may be integrated with a large pulp and paper industry. In view of the lack of cotton, the man-made fibre industry should favour the production of cellulosics in Malaysia and Singapore.

12. New Zealand

The production of man-made fibres in New Zealand commenced in 1965 with the operation of two units, the first producing nylon 66 filament and staple and the second nylon 6 filament. There is no production of cellulosic fibre.

The production and imports of man-made fibres during 1965 are shown in table 23.

Table 23

PRODUCTION AND IMPORTS OF MAN-MADE FIBRES IN
NEW ZEALAND
(Unit=metric tons)

Fibre	Production	Imports
<i>Cellulosics</i>		
Filament	—	400
Staple	—	1,700
Sub-total	—	2,100
<i>Non-cellulosics</i>		
Filament	800	1,200
Staple	500	500
Sub-total	1,300	1,700
Total	1,300	3,800

Future non-cellulosic fibre capacity is estimated at 2,500 metric tons by the end of 1967, comprising 1,800 metric tons of filament and 700 metric tons of staple. All intermediates have to be imported.

13. Pakistan

Until 1966 man-made fibres were not produced in Pakistan. However, under the third five-year plan (1965-1970) the development of the petrochemical and synthetic fibre industries is considered essential to the economic future of the country. The establishment of a cellulosic fibre and pulp industry has also been planned.

The plants under construction for the production of man-made fibre will be completed in 1968, with a total capacity of 7,700 tons which consists of 6,600 tons of cellulose and 1,100 tons of synthetics.

In order to meet part of the pulp demands, the Government of Pakistan has approved the establishment of a central linter plant, which will initially have a capacity of 10,000 tons per year. It will be expanded to 20,000 tons per year when supply arrangements with Iran and Turkey are completed.

In addition, the Government is planning the construction of two petrochemical complexes; one at Karachi in West Pakistan, and the other at Chittagong in East Pakistan. The former will produce 17,500 tons of synthetics (7,500 tons of polyester, 5,000 tons of acrylics, 5,000 tons of polypropylene) and the latter will produce about 10,000 tons of synthetics (5,000 tons of polyvinyl alcohol and others).

The manufacture of 6,000 tons per year of polyamide fibre based upon caprolactam from Iran is also contemplated.

The total capacity for the production of synthetics would meet Pakistan's requirement and also permit small exports to Turkey and Iran.

In the case of cellulose, the total contemplated production of 13,200 tons would not meet demands. The establishment of additional capacity for 20 ton per day staple and 20 ton day filament by 1975 would be necessary. The present production capacity capacity of 11,500 tons of dissolving pulp would also have to be expanded.

14. Philippines

Man-made fibres are not currently produced in the Philippines. Estimates of man-made fibre imports in fibres, yarns, fabrics and other forms amounted to 9,950 metric tons in 1962.

The production of cellulosic fibres to meet local demand could be met by spinning operations based on imported wood pulp. The demand for about 40 tons per day would not justify the construction of a pulp plant.

The production of synthetic fibres could be accomplished by importing intermediates. The demand for about 7,000 tons of intermediates per year by 1970 would not justify the local production of intermediates.

15. Thailand

Domestic consumption of man-made fibres may be estimated from the import data shown in table 24, which are reported to represent mainly viscose and polyester staple.

Table 24

IMPORTS OF MAN-MADE FIBRES TO THAILAND

Year	Quantity in MT
1961	510
1962	1,186
1963	1,217
1964	1,140
1965	1,200

A nylon 6 filament yarn plant is reported to be under construction, with an annual capacity of 1,000 metric tons. Production is scheduled for early 1967. Caprolactam for the plant is to be imported from Japan.

The demand for synthetics in Thailand is high when compared with cellulose. By 1975 it is anticipated that demands will reach 10,000 tons each for cellulose and synthetics.

16. Republic of Viet-Nam

With richly endowed forest resources in the Republic of Viet-Nam, the production of dissolving pulp for cellulosic fibres combined with a pulp and paper industry would be very economical. However, in view of the present situation, industrial development in man-made fibres is difficult to predict at this stage.

III. Technical and Economic Aspects of Manufacturing Man-made Fibres

1. Cellulosic fibres

Dissolving pulp is the major raw material for the manufacture of cellulosic fibres. For many years, cellulosic fibres were made from cotton linters as the only raw material until it was proved that it is both technically and economically possible to obtain a suitable pulp from wood. After 1930, dissolving pulp was produced in large quantities from soft wood by the sulphite process. In recent years, the development of new techniques has made possible the manufacture of dissolving pulp from hard-woods which are cheap in prices and rich in natural resources. High-grade dissolving pulp made from hardwoods and bamboo by the pre-hydrolysis sulphate process have also gained wide acceptance throughout the world.

The recent development of techniques for the manufacture of viscose has also made it possible to use dissolving pulp of lower alpha-cellulose content. Particularly, the low alpha-cellulose pulp derived from low cost hardwoods is increasingly used for the production of rayon staple fibre. A pulp containing 88 per cent of alpha-cellulose is generally acceptable for this purpose.

Cotton linter cellulose has excellent physical properties. It has been widely used for tyre cord which requires higher strength and fatigue resistance. It is also used for the manufacture of cuprammonium and acetate fibres. The prices of linter pulp are generally higher than those of wood pulp and the fluctuation of prices is also remarkable.

The manufacture of dissolving pulp is a capital-intensive industry and needs large-scale operation in order to reduce the cost of production. Especially, a dissolving pulp mill using hardwoods or bamboo as raw materials based on the pre-hydrolysis sulphate process requires the digesters to be lined with stainless steel and involves elaborate bleaching and purification processes and more instrumentation. However, for the developing countries of the ECAFE region, there are good possibilities for establishing 100 to 200 tons per day pulp mills capable of producing chemical pulp for paper as well as dissolving pulp for viscose rayon, because the differences in the type and requirements of process equipment are comparatively small.

Table 25 shows the estimated investment costs of dissolving pulp mills utilizing tropical hardwoods or bamboo as raw materials. The estimates for the mills are based on plants capable of producing both

dissolving pulp and chemical pulp (bleached kraft pulp) for high strength papers. When the mills are operating for chemical pulp, the output would be higher by 30 per cent. The costs for the installation of power plants are included in the estimates. Duties and taxes are not included as conditions are different in each country.

Table 25

ESTIMATED INVESTMENTS REQUIRED FOR DISSOLVING PULP MILLS

(Unit=1,000 US dollars)

Item	Capacity (MT per day)		
	100	150	200
Equipment, including installation ...	13,500	17,100	20,500
Building	2,440	3,100	3,750
Direct plant investment	15,940	20,200	24,250
Price escalation 3%	440	510	620
Freight and handling 5%	680	860	1,030
Purchasing and expediting 2%	250	320	400
Construction overheads 3%	480	600	730
Capital start-up expenses 4%	640	810	970
Engineering 7%	1,120	1,410	1,700
Contingencies 7%	1,120	1,410	1,700
Total plant investment	20,670	26,210	31,400
Financing, including interest during construction period, 13%	2,680	3,400	4,070
Fixed investment	23,350	29,520	35,470

The estimates for the cost of production using hardwoods or bamboo as raw materials are shown in table 26. The raw materials are based on supply from organized plantations.

Table 26

ESTIMATED COST OF PRODUCTION OF DISSOLVING PULP

(Unit=US dollars)

Item	From hardwoods (200 MT/day)			From bamboo (200 MT/day)		
	Quantity	Unit price	Cost/MT	Quantity	Unit price	Cost/MT
<i>Fibrous raw material (MT) ...</i>	3.0	11.0	33.00	3.60	10.0	36.0
<i>Chemicals (kg)</i>						
Caustic soda	40	0.08	3.20	61	0.08	4.88
Sodium sulphate	100	0.03	3.00	140	0.03	7.20
Limestone	550	0.006	3.30	393	0.006	2.36
Chlorine	70	0.08	5.60	47	0.08	3.76
Sodium chlorate	10	1.00	10.00	12	1.00	12.00
Sulphuric acid	10	0.04	0.40	11	0.04	0.44
Other chemicals			4.00			3.00
Sub-total			29.50			33.64
<i>Utilities</i>						
Power (kWh)	1,680	0.01	16.80	13.00	0.01	13.00
Steam (MT)	11	2.00	22.00	12.80	2.00	25.60
Cooling water (m ³)	800	0.004	3.20	880	0.004	3.52
Treated water (m ³)	90	0.04	3.60	80	0.04	3.20
Fuel oil (kg)	250	0.03	7.50	183	0.03	5.49
Sub-total			53.10			50.81

Table 26 (Continued)

Item	From hardwoods (200 MT/day)		From bamboo (200 MT/day)			
	Quantity	Unit price	Cost/MT	Quantity	Unit price	Cost/MT
Labour and supervision			15.00			15.00
Other direct costs						
Maintenance, 3%			9.10			11.80
Plant general expense			12.00			12.00
Sub-total			21.10			23.80
Total direct costs			151.70			159.25
Fixed charges						
Insurance and taxes, 2%			9.40			9.40
Depreciation, 10%			48.50			48.50
Interest, including for working capital, 6%			32.70			32.70
Sub-total			90.60			90.60
Total cost of production			242.30			249.85

The most suitable process for utilizing tropical fibrous raw materials is the pre-hydrolysis sulphate process. One plant, established recently in India, is successfully producing dissolving pulp at a rate of over 100 tons per day from bamboo as raw material. The vast fibrous raw material potential of the region holds out the possibility of regional self-sufficiency in dissolving pulp for the viscose rayon industry.

There are three basic commercial processes for the production of cellulosic yarn and staple fibres: the viscose process, the cuprammonium process and the

cellulose acetate process. About 90 per cent of the world production of these fibres is by the viscose process. The initial capital outlay is lowest in the case of the viscose process and the cost of production is also the lowest. For plants with a capacity of 10 tons per day of filament yarn, the capital investment for the viscose process is about US\$4 per kg capacity for the acetate process about US\$6 per kg capacity and for the cuprammonium process about US\$10 per kg capacity. Table 27 shows the details of investment costs.

Table 27
ESTIMATED INVESTMENTS FOR CONTINUOUS RAYON FILAMENT PLANTS
(Unit=1,000 US dollars)

	Viscose Process		Cuprammonium process	Acetate process
Capacity, kg year	1.8 million	3.6 million	3.6 million	3.6 million
Denier	120	120	100	120
Equipment, including installation	4,740	7,750 ¹	23,400	13,300
Buildings	750	1,250	1,250	1,670
Direct plant investment	5,450	9,000	24,650	14,970
Price escalation, 3%	140	230	700	400
Freight and handling, 5%	240	390	1,170	660
Purchasing and expediting, 2%	100	150	470	260
Construction overheads, 3%	160	270	740	450
Capitalized start-up expenses, 4%	220	360	980	600
Engineering, 7%	380	630	1,730	1,050
Contingencies, 7%	380	630	1,730	1,050
Total plant investment	7,070	11,660	32,170	19,440
Financing, including interest during construction period, 13%	920	1,520	4,180	2,510
Fixed investment	7,990	13,180	36,350	21,950
Fixed investment per kg capacity	\$4.44	\$3.66	\$10.09	\$5.4

¹ Includes recovery of sodium sulphate.

It can be seen from table 27 that the reduction in investment per kg capacity for plants producing viscose rayon filament yarn of different capacities is not so significant as in other cases. It is because the spinning and textile machines which constitute the major part of the investment in such plants have to be multiplied *pro rata*.

It may therefore be concluded that in developing countries entering the field of production of cellulosic fibres, a filament rayon plant of 1.8 million kg capacity per year would be economically feasible and as soon as the technical staff and operators are trained and sales established it can rapidly be expanded. It would be a practical approach to install the viscose preparation and service sections of larger capacity so that in the long run the investment will be lower.

Table 28 shows the estimated investment cost for a regular viscose staple fibre plant with a capacity of 20 tons per day as compared to a high wet modulus (HWM) viscose staple fibre plant of the same capacity.

Table 28

ESTIMATED INVESTMENTS FOR STAPLE FIBRE PLANTS

(Unit=1,000 US dollars)

	Regular viscose	HWM viscose ¹
Capacity, kg year	7.0 million	7.0 million
Equipment, including installation ...	5,800 ²	7,500
Buildings	1,200	1,600
Direct plant investment	7,000	9,100
Price escalation, 3%	170	230
Freight and handling, 5%	240	380
Purchasing and expediting, 2%	120	150
Construction overheads, 3%	210	270
Capitalized start-up expenses, 4% ...	280	370
Engineering, 7%	490	640
Contingencies, 7%	490	640
Total plant investment	9,000	11,780
Financing, including interest during construction period, 13%	1,170	1,400
Fixed investment	10,170	13,180
Fixed investment per kg capacity ...	\$1.45	\$1.88

¹ Excluding know-how or royalty payments.

² Including sodium sulphate recovery.

It should be pointed out that one staple fibre spinning machine for regular viscose in modern installations produces over 20 tons per day and therefore, coupled with a single line of equipment for the production of viscose by the continuous slurry alkalization process, constitutes the minimum practical size. The slurry alkalization process has certain advantages in that it is a more uniform reaction, compact, labour saving, and capable of processing a wide range of pulps. However, for more specialized products the conventional batch process is still selected.

Table 29 gives the estimated cost of production of viscose rayon filament at a capacity of 3.6 million kg per year. The production cost estimate is based on conservation process conditions which are advisable for adoption in a new plant. With experience, however, the margins in the process can be cut down resulting in savings in raw material and services and a consequent reduction in the cost of production. No credit has been shown for by-product sodium sulphate, the price of which will naturally be determined by the demand from paper and other industries in the country.

Table 29

ESTIMATED PRODUCTION COST PER KG OF VISCOSE RAYON FILAMENT

(Unit=US dollars)

	Quantity	Unit price	Cost per kg	Total
<i>Raw materials</i>				
Wood pulp	1.10	0.22	0.24	0.24
<i>Chemicals</i>				
Caustic soda	0.96	0.08	0.08	
Sulphuric acid	1.50	0.04	0.06	
Carbon disulphide	0.35	0.10	0.04	
Zinc oxide	0.02	0.39	0.08	
Other chemicals			0.03	0.29
Other materials, filter, packing, etc.			0.08	0.08
<i>Utilities</i>				
Power (kWh)	7	0.01	0.07	
Steam (kg)	40	0.002	0.08	
Cooling water (m ³)	0.3	0.004	0.01	0.16
Treated water (m ³)	0.11	0.04		
Labour and supervision			0.15	0.15
<i>Other direct costs</i>				
Maintenance, 3%			0.07	
Plant general expense			0.12	0.19
Total direct costs				1.11
<i>Fixed charges</i>				
Insurance and taxes, 2% ...			0.07	
Depreciation, 10%			0.32	
Interest, including interest on working capital, 6%			0.24	0.63
Total cost of production per kg				1.74

The cost of production for viscose staple fibre is much lower than that of filament as can be seen from the lower capital investment per kg capacity. This will also depend on the efficiency of carbon disulphide recovery.

For comparison, the costs of production of cuprammonium rayon filament and acetate rayon filament are \$3.15 and \$2.17 per kg respectively.

The acetate process would be worth exploiting in countries where cotton linters are available. Otherwise the choice is always in favour of the viscose process. However, the acetate has found an excellent market in the production of filters for cigarettes. 90 per cent of the acetate staple and tow production in Japan is for this use. Acetate has also proved successful in certain textile end-uses.

High wet modulus and polynosic fibres are now in commercial production. The HWM fibre process is based on the use of modifiers while the polynosic fibre process is based on the "toramomen" type process. The former have more elongation and are suitable as blends, while the latter have a better wet strength and the stress-strain curves are more similar to cotton. They can be spun by themselves and are ideal where one is looking for a substitute for superior cotton.

Polynosic fibres will continue to have a good market. The investment costs required for the production of polynosic fibres are somewhat higher than for the regular viscose staple. However, it will not be difficult to introduce the process for polynosic fibre in the plant producing conventional staple fibre. The ageing or depolymerization process could be by-passed as a higher viscose viscosity is required. There is no change required in the spin bath station.

Modified types of rayons have been developed such as incorporated staple fibre containing protein. These have interesting properties, similar to woolly fibres and are winning new markets for rayon in the field of knitwear.

In conclusion, developing countries in the tropical zone should consider the development of cellulosic fibres, particularly where imports of cotton have to be substituted. Cellulosic fibres are more economic to produce, more suitable for the tropical climate and the investments required are lower than those for producing synthetic fibres.

2. Synthetic fibres

Basic raw materials for synthetic fibres

Natural gas and petroleum are the basic raw materials for the production of synthetic fibre intermediates. Among their derivatives, acetylene, ethylene, propylene, ammonia, methanol, benzene, toluene and xylenes are the main intermediates for the manufacture of various synthetic fibres.

The proved reserves of crude oil in countries of the ECAFE region were estimated in 1963 at 41,722,285,000 barrels, which accounted for 12.5 per cent of the total world reserves. During the same year, the production of petroleum in the region was 2,078,368 barrels per day, which represented 8 per cent of the total output of the world.

Substantial natural gas reserves are known to occur in some countries of the region. According to a very approximate estimate, the natural gas reserves of the region are about 2,772,158 million m³, or 97,867,000 million scf. The total production of natural gas in the ECAFE region, partly based on estimates, was about 18,564 million m³ in 1963, or an average of 1,795 million scf per day.

Countries which have inadequate resources of petroleum or natural gas can nevertheless develop their petrochemical industry if they have refineries with large refining capacity. Naphtha, reformed gasoline, refinery off-gases and heavy oils can be used as feedstocks for the production of various first generation intermediates.

For the production of the basic intermediates of synthetic fibre industry, the main first generation raw materials are acetylene, ethylene, propylene and the aromatics. Ammonia is also an important intermediate but its production is tied up with the requirement of the fertilizer industry. Similarly, methanol obtained from natural gas is primarily for making synthetic resins and is consumed in small quantities for synthetic fibre industry.

Acetylene is a first generation intermediate used for the manufacture of polyvinyl alcohol, polyvinyl chloride and acrylic fibres. About ten years ago, all acetylene was made by the reaction of calcium carbide with water. Now more than 30 per cent of the acetylene produced in the United States is made from natural gas or liquid hydrocarbons, and it appears likely that the carbide process will gradually be replaced for all large-scale uses of acetylene.

The commercial processes for converting hydrocarbons into acetylene may be classified into three types based upon the methods used to supply the thermal energy:

- (1) Partial oxidation or flame process
- (2) Thermal cracking or regenerative furnace process (Wulff process)
- (3) Electric arc process

Acetylene produced by the above processes needs a very large scale of operation in order to reduce the production cost. The investment costs for the three processes with a capacity of 45,000 tons per year or 150 tons per day of acetylene on battery limits are as follows:

- | | |
|--|----------------|
| (1) Partial oxidation or flame process | US\$ 9,750,000 |
| (2) Thermal cracking or Wulff process | US\$13,000,000 |
| (3) Electric arc process | US\$16,000,000 |

The costs of production of acetylene by the above processes based on natural gas at a relatively low price of US\$0.20 per million BTU, of ethane at US\$0.07 per lb, and power rate at 0.6 cent per kWh at a capacity of 150 tons per day are estimated approximately as follows:

- (1) Partial oxidation or flame process
US\$130 per ton (5.9 ct/lb)
- (2) Thermal cracking or Wulff process
US\$116 per ton (5.3 ct/lb)
- (3) Electric arc process
US\$175 per ton (8 ct/lb)

The production cost of acetylene should be below 5 cents per lb in order to compete with the new processes using ethylene or propylene as a raw material for making synthetic fibres such as polyvinyl alcohol and acrylic fibres. However, the production cost of acetylene within the region would probably be over 6.5 cents per lb as, with the exception of Iran, the gas and power prices are generally higher than estimated above.

In general, acetylene processes are giving way to processes based on ethylene and propylene. However, the Wulff process is economic when both acetylene and ethylene produced can be utilized, such as for the manufacture of vinyl chloride.

Newer acetylene processes in the research stage of development, such as the Plasma process, give promise of reducing the cost of acetylene produced from natural gas to the level of 3 to 4 cents per lb. When these processes become economical, acetylene may well return to the petrochemical field in a big way.

Ethylene and propylene are the main raw materials for the production of intermediates in the petrochemical industry. Ethylene is required for the production of ethylene glycol for polyester manufacture and for the production of vinyl acetate for polyvinyl alcohol manufacture. Propylene is required for the manufacture of acrylonitrile for acrylic fibre manufacture and for polypropylene fibre manufacture.

Ethylene and propylene are generally prepared by the thermal cracking of petroleum products, of which the most important is naphtha. They can also be produced economically from ethane and propane contained in refinery gases or in wet natural gas.

The pyrolysis of naphtha to produce ethylene and propylene is a major commercial process and crackers are being built from 40,000 tons of ethylene per year to as much as 350,000 tons per year of ethylene.

The percentage conversion to ethylene is not only based upon the type of naphtha used, but also upon the severity of cracking. In general, ethylene propylene ratios are about 2:1 but can be anywhere from 1:1 in low severity operations to as much as 3:1 in the new high severity cracking operations.

The costs of manufacture of ethylene in Japan based upon a naphtha cost of \$16.7 per kilolitre are shown in table 30. By-products are assumed at a price

of 7 cents per kg for propylene and 5.54 cents per kg for the C-4 fraction.

Table 30

ETHYLENE COSTS AT DIFFERENT CAPACITIES

(Unit=Cents per kg)

Size of cracker	Tons of ethylene per year			
	20,000	40,000	80,000	100,000
50% utilization	—	20.6	17.4	16.3
75% utilization	18.4	15.0	12.6	11.6
100% utilization	14.7	12.6	10.1	9.5

As shown in table 30, the cost of ethylene diminishes with the size of the cracker, but this is only true if the cracker operates at 100 per cent capacity. For example, the cost of ethylene from a 80,000 ton per year plant running at 75 per cent capacity is equal to that from 40,000 ton per year plant running at 100 per cent capacity.

The investment cost of a naphtha cracker with a capacity of 80,000 tons of ethylene per year is about \$16 million on battery limits basis for a grass roots plant in a new location.

Aromatics are the main raw materials for the two most important synthetic fibres, nylon and polyester. Before the Second World War, coal tar was the main source of benzene and other aromatics. The quantity of aromatics from coal tar is limited as it is tied to coke production. Since 1950, petroleum has become the main source of aromatics. Some kinds of crude oil have a high aromatic content, but the main raw materials in petroleum capable of conversion to aromatics are the naphthenes. In general, the conversion of naphthenes to aromatics takes place in the following commercial petroleum operations:

(1) Catalytic reforming of naphtha for the production of high octane reformates which contain substantial quantities of aromatics.

(2) The production of aromatics in the gasoline fraction obtained during the cracking of naphtha to produce ethylene and propylene.

In the production of aromatics from naphtha feedstocks, the relative percentages of benzene, toluene and xylenes are dependant largely on the type of crude oil used.

Since benzene has a large market and toluene has a limited market, the conversion of toluene to benzene is an important economic consideration and, since 1960, this has been accomplished by hydro-dealkylation.

The minimum economic size of units depends largely on the type of operations being conducted and the relative demands for various products. Where the catalytic reformates are available from existing operations, the recovery of benzene and toluene at costs competitive with imports is possible even at a capacity of 8,000 tons of aromatics per year. The recovery of aromatics from naphtha crackers is economical at 80,000 tons per year of ethylene production, but hydrodealkylation is only economical with still larger crackers.

Polyamide fibre

The production of polyamide fibres in the world exceeded one million tons in 1965 which shows a six fold increase for the last decade. There are 42 producing countries, but 80 per cent of the production is from the six major producing countries: the United States, Japan, the United Kingdom, the Federal Republic of Germany, Italy, and France. Polyamide fibres are expected to continue occupying the first place among synthetic fibres for many years to come in terms of volume of production.

The end-use pattern of polyamide fibre is different in the different countries. In the United States, the biggest item is industrial use which consumes 42 per cent of total nylon production; 27 per cent is utilized for apparel use and 23 per cent for household furnishings. In Japan the biggest item is apparel use which consumes 47 per cent. Of the remaining, 12 per cent is for tyre cord, 12 per cent for fishing net and 19 per cent for export.

Polyamide fibre may be regarded as suitable for development in the developing countries of the region for it provides growth opportunities in many end-uses. It is produced by very well established processes and has an established market. For apparel, it has a good feel, dyes well and its resistance to discoloration by sunlight has been markedly improved. Polyamides are cheaper to produce than polyesters.

The most commercialized nylons are the nylon 6 and nylon 66, and these constitute the bulk of the world production of this group of fibres. The actual differences between these two main types with regard to their applicability are so small that they are known only by experts. In Japan, nylon 6 has been commercialized from the standpoint of availability of raw materials, conciseness of the process, product cost and dye ability.

The development of nylon 6 or nylon 66 in a particular country has been influenced also by the preferences of the textile industry. A textile mill which has standardized on the use of one type of nylon will resist the change to the use of the other. Economics of scale of operation is also an important factor in-

fluencing the decision. If the establishment of small capacity plant is being considered, nylon 6 may be the more suitable choice. Since the capacities of plants envisaged to be set up in the developing countries are of the order of 2 tons to 5 tons per day, the development of nylon 6 might be considered in preference to nylon 66. Examples of nylon fibre spinning plants with such sizes using imported caprolactam as starting raw material operating successfully are those in China (Taiwan), India, Pakistan, etc.

Investment cost data on small polyamide fibre plants producing nylon 6 from caprolactam are given in table 31. These costs are estimated in developing countries for a grass roots location including all services. For countries with a well-developed economy and available facilities, these costs could be lowered by about 20 per cent.

Table 31

INVESTMENT COSTS OF POLYAMIDE FIBRE PLANTS

<i>Capacity tons per day</i>	<i>Average denier</i>	<i>Investment cost \$ per annual kg</i>
2	20	12
5	30—40	10
15	40—50	6.5

At the other extreme, the capital costs of a plant producing 10,000 tons per year of nylon 6 fibre (average 40-50 denier) are \$4 per annual kg capacity on the same basis.

Caprolactam, the intermediate for making nylon 6, is now commonly made from the air-oxidation of cyclohexane which can be obtained by the hydrogenation of benzene. Recently new processes, such as photonitrosation of cyclohexane (PNC), the nitration process, and the SNIA process, have been developed. The PNC process for the manufacture of caprolactam starting with cyclohexane is established successfully in Japan. Mercury lamps of more efficient design have been developed and this is expected to further the use of the process based on photosynthesis.

World prices of caprolactam have been declining and are now 23 cents per lb. As shown in table 32, the estimated cost of production of caprolactam from benzene at a production level of 12,000 tons per year is about 25 cents per lb. This would therefore represent a minimum unit in countries of the ECAFE region, and is equivalent to a production of about 11,000 tons of nylon 6 fibre. The investment cost for a 12,000 MT per cent caprolactam plant in battery limits is US\$18,360,000. Royalty is 3 per cent of annual sales value for 10 years.

Table 32

ESTIMATED PRODUCTION COSTS OF CAPROLACTAM

<i>Raw & Auxiliary</i>	<i>Unit</i>	<i>Consumption per 1 lb caprolactam</i>	<i>Unit price (US\$)</i>	<i>Cost (US\$/lb)</i>
<i>Material</i>				
Benzene	lb	1.14	0.0338 (\$0.25/gal)	0.0386
Ammonia	lb	1.62	0.0273 (\$60/MT)	0.441
Hydrogen	m ³	0.48	0.02 sulphur at	0.0096
Sulphur dioxide	lb	1.55	0.0114 (\$45/MT)	0.0177
Oleum	lb	1.20	0.0159 (\$35/MT)	0.0191
Carbon dioxide	lb	0.45	0.0136	0.0061
Caustic soda	lb	0.14	0.0273	0.00382
Nitrogen	m ³	0.0027	0.0056	0.0015
Solvent	lb	0.016	0.055	0.00083
Catalyst	lb	0.005	2.40	0.0120
		Total		0.1520
<i>Utilities</i>				
Steam	lb	15	0.85/Mlb	0.01275
Electric power	kWh	1.18	0.009/kWh	0.01060
Cooling water	gal	180	0.025/M gal	0.00450
Demineralized water	gal	2.4	0.07/M gal	0.00017
Fuel oil	lb	0.35	0.009	0.00032
		Total		0.002834
<i>Labour & supervision</i>				
Skilled labour		53/d	4.0/man-day	0.00610
Helpers		47/d	2.5/man-day	0.00322
Supervision		10/d	150/man-month	0.00133
		Total		0.01065
<i>Maintenance % of investment/yr ...</i>			3	0.0279
<i>Royalty</i>				0.0078
<i>Tax and insurance % of investment/yr ...</i>			1	0.00595
<i>Depreciation % of investment /yr ...</i>			10	0.0695
<i>Interest % of 2/3 investment/yr</i>			8	0.0371
		Total production cost \$/lb		0.3402
By-product credit, ammonium sulphate 4.3 lb @ \$45/MT ...				0.08800
Net production cost of caprolactam, US\$/lb				0.2522
		or approximately		US\$0.25/lb
				(US\$0.55/kg)

Polyester fibres

Polyester fibre was first produced in the United Kingdom during 1948 on a pilot scale. There are now 96 polyester plants in the world, located in some 30 countries. During the last five years world production has been increasing at about 25 per cent per year, and in 1965 production amounted to 460,000 metric tons. It is expected to increase to around 1,100,000 metric tons by 1970.

The rapid growth of polyester fibres was largely attributed to the unique properties of the fibres including its high Young's modulus, superior heat-setting properties, and high resistance to heat, light, abrasion and chemicals. Polyester, both in filament and staple form, is therefore extremely versatile and is widely used in many apparel, household and industrial applications.

Polyester staple is commonly blended with cotton, rayon and wool and it may be spun on the cotton, rayon, woollen and worsted systems. In respect of polyester-cotton blends, a 65:35 blend is generally preferable to provide acceptable wash and wear properties and for use in the "permanent-press" clothing.

In establishing a polyester fibre industry in a developing country, it is important to ensure that the complementary textile industry is able to absorb and satisfactorily handle the fibre. Hence it is necessary for the fibre producing industry to work in close co-operation with the textile industry to avoid market disruption during the initial stage of manufacture. Developing countries should at the initial stage, limit their activities to fibre spinning using imported dimethyl terephthalate (DMT) and ethylene glycol. After this has been accomplished, planning of intermediates production should be undertaken at the most suitable time.

Investment costs for various sizes of polyester staple plants using DMT and ethylene glycol as raw materials are shown in table 33.

Table 33

INVESTMENT COSTS OF POLYESTER STAPLE PLANTS

Capacity tons per day	Investment cost \$ per annual kg
3	5.6
15	3.6
30	2.9

It is generally considered that the plant capacity of 15 tons per day of polyester staple is the economic size to be established in the region.

Polyesters now in commercial production for fibre manufacture consist almost exclusively of polyethylene glycol terephthalate. This polymer is formed from the reaction of terephthalic acid and ethylene glycol or from dimethyl terephthalate and ethylene glycol.

p-Xylene is the major raw material for the manufacture of terephthalic acid. It is separated from mixed xylenes. The production cost of p-xylene can vary within the range of 5 to 10 cents per lb, the variation depending mainly on plant size, raw material cost and by-product credits.

The oxidation of p-xylene to terephthalic acid can be carried out in two ways: by nitric acid and by air. The nitric acid process is the oldest one used, but it involves a large consumption of nitric acid, about 2 lb per lb of terephthalic acid. The more economic methods of air oxidation are now used in new commercial plants. The two major commercial methods are the Witten process and the Mid-Century process. The Witten process utilizes a four-stage oxidation process to obtain terephthalic acid from p-xylene. In the Mid-Century process, a mixed xylene stream is oxidized in the presence of a catalyst composed of a heavy metal and bromine. The resulting solid acids — isophthalic, phthalic, terephthalic and benzoic—are then separated.

It has been claimed that the yields and cost of manufacture for the production of DMT from p-xylene are approximately the same for the Witten process as for the Mid-Century process. However, the capital investment for the Mid-Century process is about 20 per cent lower for similar plants. In general, it takes about one lb of p-xylene to produce 1.4 lb of DMT. Assuming the price of p-xylene to be 9-12 cents per lb, the costs of production of DMT by the Witten process should be about 15-20 cents per lb, depending on plant size.

Recent developments have resulted in the production of a highly purified terephthalic acid which is acceptable as a raw material for polyesters without prior conversion to DMT. Pure terephthalic acid can be made at a cost of production in the same general area.

The Henkel process is based on the discovery that the potassium salt of an unsubstituted carboxylic aromatic acid will rearrange to form dipotassium terephthalate. Experience has indicated that the Henkel method may be less economical than the above two oxidation methods for producing either DMT or pure terephthalic acid.

Considerable information available in the literature regarding the oxidation of p-diisopropyl benzene to terephthalic acid. An obvious disadvantage to this route is the large amount of carbon and hydrogen that must be oxidized to carbon dioxide and water. However, this route should not be ignored by countries with an ample supply of benzene and propylene and with an inadequate supply of xylenes.

The production of DMT involves a fairly large scale of operation if the costs are to be competitive with world prices of 19-20 cents per lb. Even with the normal duty protection of 30 per cent the scale would have to be in the range of 10,000 tons per year of DMT. Since 1.10 tons of DMT are required for the production of one ton of polyester fibre, this is equivalent to a demand of 9,000 tons of polyester fibre per year.

The other component of the polymer is derived from ethylene glycol which is obtained from ethylene oxide by hydrolysis. Two methods of manufacture are known, namely chlorohydrination of ethylene and direct oxidation of ethylene by air or oxygen. The former is now out-moded for economic reasons and all the new plants are now based on the oxidation method. It is manufactured on a very large scale. Current prices are about 13 cents per lb. Even with normal duty protection, competitive prices would not be possible with a plant of 5,000 tons per year capacity.

The investment cost for DMT from p-xylene is estimated at \$1 per kg capacity with a production capacity of 30 tons per day. The investment cost for ethylene glycol from ethylene is \$0.6 per kg capacity with the same capacity.

Acrylic fibres

Acrylic fibres were developed commercially only in 1950 in the United States. They have now become one of the most important man-made fibres. World production has risen from only 16,600 tons in 1954 to 397,500 tons in 1965. Even during the last five years, the growth rate has been 26.5 per cent per year. Currently 60 plants are operating in 22 countries.

Production of acrylics in the ECAFE region is confined to Japan at present, which has 17.1 per cent of the world's capacity. Plants are scheduled for construction in China (Taiwan), India, the Republic of Korea and Pakistan in the near future.

Basically there are two types of acrylic fibres, pure acrylics and modified acrylics (modacrylics). They are both made from acrylonitrile, but the former contains over 85 per cent of acrylonitrile and the latter 35 to 85 per cent. Copolymers used in modacrylics are vinyl chloride and vinylidene chloride.

The important properties of acrylic fibres which have made it of importance are its wool-like appearance and its stress-strain relationship which approaches that of wool. Acrylic fibres have a great resistance to weathering, including both moisture and sunlight. The finished product also launders easily (dripdry). Acrylic fibres have a good abrasion resistance, which is of special interest to the carpet and rug industry.

The end-use pattern in the United States in 1964 for acrylic fibres was 30 per cent for carpets and rugs, 24 per cent for sweaters and swim wear, 14 per cent for jerseys, 10 per cent for blankets and 24 per cent for other uses such as pile, broadcloth, etc. In Japan, underwear accounts for 35 per cent and outer garments 55 per cent.

Modacrylics have high resistance to inflammability. In general, 20 per cent of modacrylics are mixed with acrylics in carpets for this reason. While acrylics still represent the major man-made fibre used in carpets, strong competition is being encountered from polyamides, particularly in tufted carpets.

Acrylic fibres differ from other synthetic fibres in that they can be produced in a variety of ways, using different co-polymers and solvents and varying technique of spinning. The spinning processes differ considerably from one producer to another. Generally dry spinning uses dimethyl-formamide (DMF) as a solvent, but wet spinning processes use organic solvents such as DMF, dimethylacetamide, acetone, dimethylsulphide, etc., as well as inorganic solvents such as nitric acid, zinc chloride aqueous solution, etc.

The wet-spinning method is more suitable for the production of staple fibre, and both capital costs and cost of production are lower than dry spinning. All Japanese acrylic plants use the wet spinning method, and Japan has developed its own technology in the use of inorganic and organic solutions for wet spinning. The corrosive effects of inorganic solutions can be minimized by the use of appropriate materials of construction and processing conditions.

In contrast to other synthetic fibre plant, small acrylic fibre plants are not economical. The investment costs for larger acrylic fibre plants using imported

acrylonitrile are given in table 34. They include low to top facilities for conversion of 50 per cent of the production.

Table 34

INVESTMENT COSTS OF ACRYLIC FIBRE PLANTS

<i>Capacity tons per day</i>	<i>Investment cost \$ per annual kg</i>
15	3.5
60	1.9

These investment costs are for developing countries with less availability of facilities and they will be much lower for developed countries.

The main raw materials for the manufacture of acrylonitrile are petrochemical intermediates. Either ethylene, acetylene or propylene can be used, in conjunction with ammonia. In commercial practice, propylene is used instead of acetylene or ethylene. Even in Japan, where acetylene prices are low, it is estimated that the cost of manufacture of acrylonitrile by the propylene route is cheaper by about 5 cents per kg. In other countries the difference is reported to be 15 cents per kg. While the world prices of acrylonitrile have fallen recently to about 14 cents per lb, the development of the new propylene route gives encouragement to production within the region.

The economics of propylene usage are partly dependant upon the marketability and prices for by-products. Of these by-products, there are difficulties in marketing acetonitrile. In Japan this is used for the manufacture of vitamin B and for the extraction of butadiene, but the supply is greater than demand. In the case of hydrocyanic acid, the other by-product, it is mainly used for methyl methacrylate manufacture.

The cost of manufacture of acrylonitrile in China (Taiwan) for instance has been estimated at 13 cents per lb at a production level of 10,000 tons per year. It appears therefore that, with a nominal duty protection, permitting sales at 17 cents per lb, a 10,000 tons per year acrylonitrile plant would be economical and would have a five-year pay-out time. A 5,000 tons per year plant on the same basis would have a production cost of about 16 cents per lb, and this would be practicable in a protective market as it would permit sales at 21 cents per lb.

The investment cost for erecting an acrylonitrile plant of 10,000 tons per year including financing is \$7,325,000. The estimated cost of production of acrylonitrile is shown in table 35.

Table 35

ESTIMATED COST OF PRODUCTION OF ACRYLONITRILE

	Unit	Consumption per M ton	Cost per unit	\$ per ton ACN
<i>Raw materials</i>				
Propylene	tons	1.61	70	112.70
Ammonia	tons	0.72	85	61.20
Sulphuric acid	tons	0.827	35	28.95
Catalyst & chemicals				1.50
<i>Utilities</i>				
Power	kWh	1,400	0.01	14.00
Steam	tons	7.21	2.2	15.86
Water	m ³	545	0.005	2.73
Operating labour				2.64
Supervision @ 20% labour				0.53
Maintenance @ 4% capital invested				29.30
Taxes & insurance @ 1%				7.32
Depreciation @ 10%				73.25
Interest @ 8%				58.60
Cost for metric ton				408.58
<i>Less: Credit for by-products:</i>				
Ammonium sulphate	tons	1.03	50	51.50
Hydrogen cyanide	tons	0.15	250	37.50
Acrolein	tons	0.04	500	20.00
Acetonitrile	tons	0.03	500	15.00
				124.00
Net cost per metric ton =				284.58
per kg =				28.5 cents
per lb =				13 cents

Polyvinyl alcohol fibres

Polyvinyl alcohol (PVA) fibre made by a combined process of heat treatment and partial acetalisation was discovered by Japanese chemists in 1939. Commercial production of the fibre called Vinylon started in Japan in 1950. The production was 49,000 tons in 1965 with a growth rate of about 13 per cent per annum in the past four years. The production in 1966 is estimated to be about 60,000 tons in Japan.

PVA fibre has properties somewhat similar to that of cotton. It has the highest moisture absorbency value among all synthetic fibres. It has good dyeing properties. The fatigue, abrasion resistance, tensile strength, bending strength and impact strength of PVA fibre are superior to those of cotton. As compared with other synthetic fibres, the generation of static electricity on PVA fibre is small. PVA fibre also has good resistance to weathering, micro-organism and insect attack. It also provides warmth.

PVA fibre is suitable for apparel use, especially working wear, uniforms and sportswear. For apparel use, PVA fibre in staple form is usually blended with cotton or rayon to form blended yarns. 100 per cent PVA spun yarn is generally used for industrial purposes. The main industrial uses are for making fishing

nets, ropes, tents, canvas, filters, belting, hose, bags, etc. The coarse denier filament yarns are used for making nets, ropes, conveyor belts and tyre cords for small car and bicycles. The fine denier filament yarns are especially being used for the replacement of silk.

Vynlon staple can be spun into yarns having various characteristics in 100 per cent form or in blends with natural or man-made fibres. In either case, spinning can be carried out with relative ease by conventional machines since the properties of PVA fibre more resemble to natural fibres than other synthetic fibres.

Acetylene and acetic acid are the main raw materials for the manufacture of vinyl acetate which is the intermediate for the production of polyvinyl alcohol. Acetic acid is recovered for reuse at the saponification stage in the PVA manufacturing process. A new process has been recently developed by using ethylene as a raw material which reacts with sodium acetate in a palladium chloride-acetic acid solution to form vinyl acetate. However, this process has not been commercialized in Japan and the details of the process are not available, except the information that the process is advantageous only when ethylene is obtained at low cost, vinyl acetate is produced on a large scale and the by-product, acetaldehyde is effectively utilized.

Polyvinyl acetate is produced by the polymerization of pure vinyl acetate in methanol solution at a degree of polymerization of about 1,700. The continuous method was reported to be preferable. Polyvinyl alcohol is produced by the saponification of polyvinyl acetate with methanol and caustic soda. PVA is precipitated as a white powder, which is dried and used for making PVA fibre.

Generally speaking the wet spinning system is used for the manufacture of PVA staple and tow, while dry spinning system is used for making filaments. In the wet spinning system, an aqueous solution of PVA is extruded through a nozzle and coagulated in a coagulating bath containing glauber's salt. In the dry spinning system, PVA aqueous solution of higher concentration is extruded into hot air to form a filament. The PVA fibre thus formed is stretched and heat-treated to improve its mechanical properties. The fibre is then acetalised with formalin or benzaldehyde. Benzaldehyde gives higher resiliency to the fibre.

The minimum economic size of a PVA plant using calcium carbide as a starting raw material was 20 to 30 tons per day. The investment cost for a PVA plant within battery limits in Japan is about \$350,000 per ton of PVA per day. The investment cost for a vinylon fibre plant is approximately \$300,000 per ton of fibre per day. If natural gas is used as a starting raw material, the investment cost for an acetylene plant of 30 tons per day would be about \$250,000 per ton of acetylene per day.

Countries of the ECAFE region may import PVA from the producing countries to make vinylon fibre. In so doing, the minimum economic size for a vinylon fibre plant is much smaller, being about 5 to 10 tons per day. A vinylon plant was established in the Republic of Korea seven years ago with a capacity of 2 tons per day, using PVA imported from Japan as a starting material. The capital investment was approximately \$670,000, of which 70 per cent was for procuring equipment. The plant was fairly successful and it is planned to increase the capacity to 10 tons per day.

The current price of PVA staple fibre in Japan is approximately \$1.00 per kg for export, which makes it the cheapest fibre among all synthetic fibres. It is estimated that in the future the price may be reduced to around 0.80 per kg. The current average price in Japan for PVA is \$0.64 per kg. For export in large quantities, it may be possible to reduce it to about \$0.56 per kg for fibre production. The replacement of cotton by PVA fibre would be possible when its price could be reduced to the level of high grade cotton.

Other synthetic fibres

Both *polyethylene* and *polypropylene* are relative newcomers to the fibre field. However, polypropylene fibres are finding increasing use in textile applications

whereas polyethylene fibres are being used in industrial applications. Of the low density and high density polyethylenes, only the high density polyethylene has physical properties satisfactory for use as fibres. In Japan, polyethylene fibres were introduced before polypropylene fibres, and probably for this reason more polyethylene is used for ropes and fishing nets than polypropylene.

The inherent disadvantages of propylene, such as poor oxidative resistance and dye ability, have been partially overcome by suitable choice of stabiliser-antioxidant combinations and by discovering new dyeing techniques, respectively. On account of their properties such as strength, abrasion resistance, zero water absorption, etc. both polyethylene and polypropylene have found application as fishing nets.

Japan first developed the conjugated polypropylene fibre and yarn in 1965. The manufacturing process and the characteristics of the new fibre and yarn are more or less similar to those of other conjugated fibres and yarns. Examples of the application of conjugated polypropylene yarns are knitted wear, socks, bed-quilts, carpets and outwear.

The replacement of jute by polyplefin (polyethylene and polypropylene) fibres in some applications, e.g. corn bags and ropes is considered to be possible in the future. However, it is rather premature to draw any conclusion at present on account of the still considerable price difference and also field trial results being not yet available.

Both *polyvinylidene chloride fibre (Saran)* and *polyvinyl chloride fibre* are characterized by their excellent resistance to chemicals and to weathering, and by their non-inflammability. They are mostly used in applications which require these special properties.

Polyurethane fibre (Spandex) is being produced in Japan and its demand is increasing yearly. Initially this new fibre will replace conventional rubber yarn in many applications. The prices of Spandex are high. In Japan, the list prices per kg for Spandex yarn are:

- \$27.70 for 70 denier.
- \$19.40 for 140 denier.
- \$16.60 for 280 denier.
- \$13.70 for 420 denier.

The price range in the United States is \$15 per lb for 40 denier to \$3.10 per lb for 2,240 denier.

The high cost disadvantage is partly overcome by the need in many cases to include only a small quantity of Spandex (6 to 10 per cent by weight) in the fabric. The main uses at present are foundation garments, swim wear, sports wear, skirts, slacks and blouses.

IV. International and Regional Co-operation in the Development of the Man-made Fibre Industry

Generally the factors inhibiting the growth of industries in developing countries have been identified as:

1. Limited markets,
2. Lack of technical know-how,
3. Lack of trained manpower,
4. Lack of capital.

In the case of the man-made fibre industry, there are certain difficulties in addition to these general factors, such as:

1. The lack of knowledge on the part of the developing countries of the comparative advantages and disadvantages of various processes which are in the hands of a limited number of producers in a relatively small number of developed countries.

2. Due to the fact that owners of patents generally demand a minimum fee, without reference to the quantity to be produced, patent fees become an unbearable burden to developing countries, in cases where only small quantities are proposed to be produced to cater to small markets.

The first point at which a developing country experiences difficulty in establishing a man-made fibre industry is in the selection of a process that would offer the optimum advantage to it. An impartial institution which could give technical advice in this matter and help to sort out the rival claims made by the owners of different processes would be greatly advantageous to the developing country. No doubt many impartial institutions for conducting feasibility studies exist, but detailed information about their capabilities is not widely known. Again, in many developing countries personnel with sufficient experience to formulate even the preliminary ideas on the basis of which such institutions may be approached, do not exist.

International and regional co-operation is of particular importance to solve the difficult problems in the development of the man-made fibre industry. It was recommended in the Seminar on the Development of the Man-Made Fibre Industry in Asia and the Far East that developed countries accept trainees from developing countries for training in planning and programming and general methodology for the development of man-made fibre industries.

The experiences of those developing countries which have succeeded in establishing man-made fibre industries, the difficulties they faced and how they were overcome, the factors to which particular attention had to be paid in the matter of awarding contracts, etc., would also be helpful to newcomers, and facilities for studying all the steps that were taken before the industry was established may be offered by developing countries also.

The Seminar recommended that the ECAFE secretariat compile and maintain up-to-date lists of institutions available for feasibility studies and also use their good offices to arrange training of personnel in developed countries as well as developing countries where the man-made fibre industry had been established.

In most developing countries, domestic markets are not sufficiently large to justify the minimum economic volume of production. The only recourse would have to be either exports or pooling of markets between two or more developing countries. In a highly competitive industry such as the man-made fibre industry, it would be extremely risky for developing countries to establish an industry based on exports. Therefore, the only alternative is to pool markets.

Two or more countries could with advantage set up joint-venture enterprises for the production of intermediates and/or fibres, based on raw materials available in one country. The intermediates and/or fibres could be distributed for further processing among the partner countries to cater to their individual markets. This would enable the establishment of optimum size units at each stage.

It was suggested in the Seminar that the manufacture of the following three intermediates for man-made fibres would be most suitable for regional co-operation in the southeast Asian countries:

1. The establishment of a dissolving pulp plant based on hardwoods or bamboo, with a capacity of 100-200 tons per day.
2. The manufacture of caprolactam for polyamide fibre production with a capacity of 12,000 tons per year.
3. The manufacture of dimethyl terephthalate for polyester fibre production with a capacity of at least 10,000 tons per year.

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