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DEVELOPMENT OF THE PETROCHEMICAL INDUSTRY IN CEYLON 1/

by

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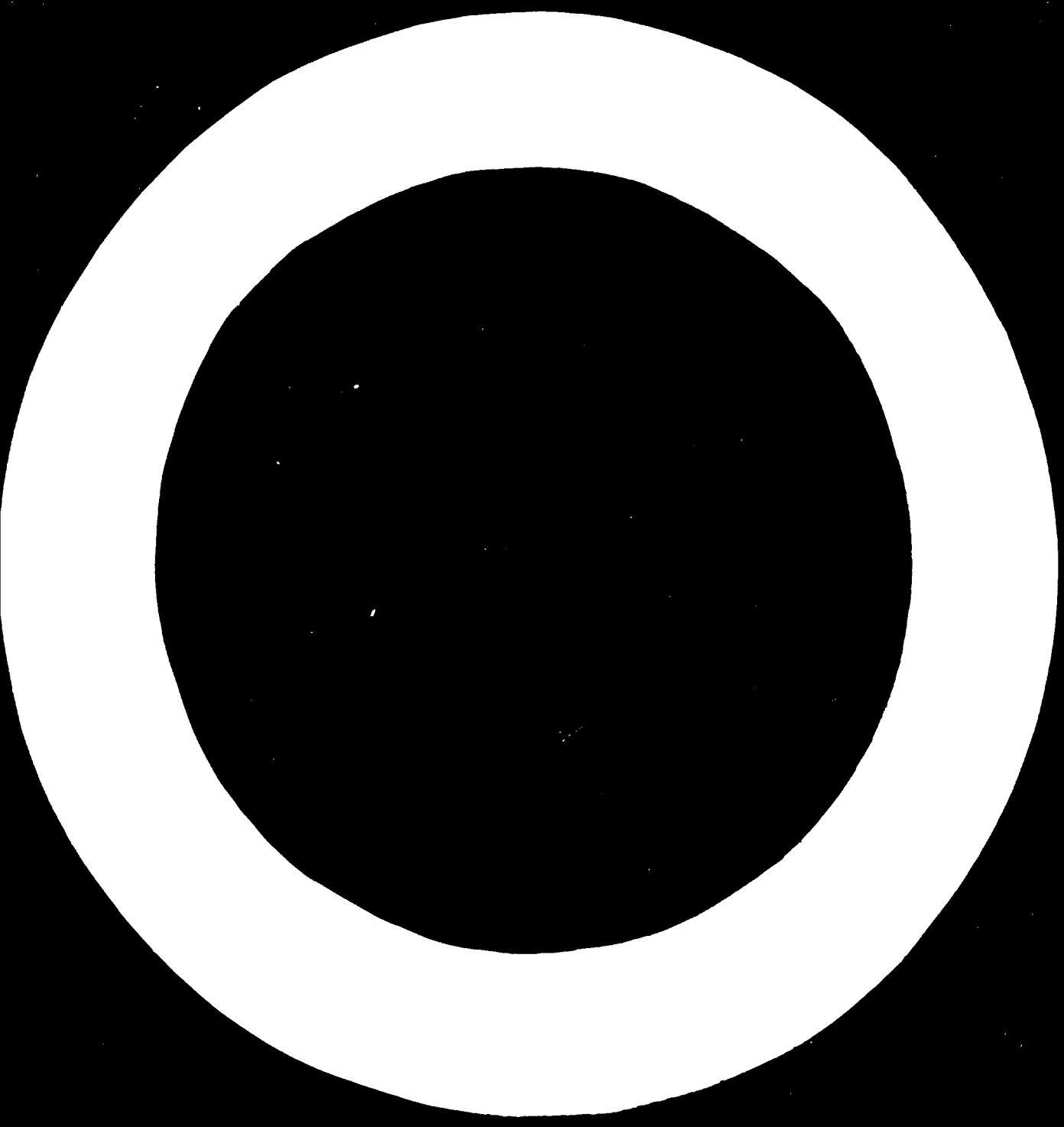

Introduction

Ceylon with a population of [illegible] ...oping country, with a [illegible] major crops, [illegible] tea, rubber and [illegible]. Diversification of the economy [illegible] phenomenon of [illegible] an improved rate of growth [illegible] in the volume of goods produced [illegible] agricultural and industrial sectors. The pattern of industrial production with its orientation towards import substitution in [illegible] consumer and capital [illegible] and imported raw materials, is typical of the first phase of industrialization in the majority of developing countries. However, there has been no progress made so far in the development of the petrochemical industry. This may be attributed to the limited market potential and the non-availability of raw materials locally.

Petroleum Industry

Two major steps [illegible] highlighted in the development of the petroleum industry:

1. The establishment by the Ceylon Petroleum Corporation of the country's first petroleum refinery [illegible] on stream in October 1969.
2. The proposed [illegible] Ceylon Fertilizer Corporation of an [illegible] naphtha due [illegible] production [illegible].

The refinery [illegible] country's entire domestic consumption [illegible] greases. It is a public sector project [illegible] of 1,[illegible] metric tons per day or 38,000 barrels [illegible]. The processing units include atmospheric and vacuum [illegible], a platformer, [illegible] etc. It is expected to be [illegible] full capacity in [illegible].

The refinery's [illegible], amounting to nearly 160,000 metric tons will [illegible] feedstock for the manufacture of approximately [illegible], which will meet the country's whole demand for [illegible]. Table I gives an indication of present imports of fertilizers.

Table I

Name of product	Year	Quantity cwts	Value Rupees
Sulphate of ammonia	1965	3,649,803	54,699,570.00
	1966	3,510,950	53,226,507.00
	1967	2,532,766	41,296,641.00
	1968	3,326,986	53,756,202.00
Ammonium nitrate fertilizer	1965	4,118	87,408.00
	1966	15,979	2,686,916.00
	1967	106,976	1,708,873.00
	1968	5,900	115,152.00
Nitrogenous fertilizer	1965	500	9,058.00
	1966	8,010	127,685.00
	1967	43,084	717,908.00
	1968	14,200	244,680.00

Prospects for a petrochemical industry

The prospects for a modest petrochemical industry in Ceylon are dependent on:

(i) The degree of industrialization achievable in the next few years, and

(ii) the size of the market that would be created, thereby, for petroleum-based industrial inputs.

Ceylon has at present no natural gas resources or crude oil and the feed-stock required for such an industry would have to be initially obtained from the by-products of the refinery, phased over two stages:

Stage 1 - utilization of as many by-products of the refinery.

Stage 2 - manufacture of specific feedstock by the refinery for any petro-chemical industries that are deemed necessary.

As regards stage 1, the gases produced by the refinery would provide a potential source from which LPG and sulphur might be economically recovered. A project to install a 10,000 tons LPG recovery plant in 1971 is being evaluated.

The LPG will be composed of approximately 15 per cent C_3s and 85 per cent C_4s. The project will include a sulphur extraction plant to meet the country's imports of approximately 4,000 tons of sulphur per year – the bulk of which is consumed in the agricultural sector. The plant will utilize the refinery waste gases as raw materials.

The present demand for basic petrochemical feeds in Ceylon is below the minimum requirements for economical operation of industrial plant. A great deal of preparatory study remains to be done to determine the prospects in the petrochemical field. As a rule, industrialization in this field commences with the setting up of finishing plant using intermediate products. This phase has now reached a considerable degree of maturity in Ceylon with the rapid increase in the current manufacture of finished items. Hence the setting up of a plant for substitute manufacture of the imported intermediate feeds may well prove to be an economically feasible proposition in the next few years. Sizeable local markets exist for carbon black and synthetic fibres and plastics with good prospects of expansion in the near future.

Carbon black

The figures for the current total import of carbon black are given in table II. Approximately 70 per cent is used in the manufacture of tyres and tube and the balance is used in the manufacture of rubber goods, ink and pigments. Ceylon's only tyre factory is in the public sector, commenced production in 1967 and is working to its rated capacity. It is expected to increase production substantially and will need an additional 4,000 tons of carbon black per year by 1971. With the proposed expansion of this plant by 1973, consumption of carbon black is estimated to rise to 7,000 tons per year.

The feasibility of installing a carbon black plant to cater to this demand using as raw material a high aromatic fraction from the refinery, is presently being examined.

Table II

Name of product	Year	Quantity cwts	Value-Rupees
Carbon Black	1965	,455	887,914.00
	1966	2,990	711,141.00
	1967	25,561	1,775,478.00
	1968	20,471	1,754,[illegible]1.00

Synthetic fibres

The textile industry in Ceylon has only recently grown beyond the basic stage of spinning and weaving of cellulose fibres. In recent times, not only has output expanded considerably but the industry has launched into spinning and weaving of non-cellulose, synthetic fibres which trend is expected to grow in the near future. Improvements in finishing techniques and modification of plant for production of better quality textiles, in particular those blended with synthetic fibres have gone far to encourage use of local textiles and curtail imports. The industry at present imports the bulk of its requirements of raw materials, including fibres. All the synthetic fibres consumed by the industry are imported. There are presently fifteen synthetic textile weaving and finishing mills, details of their consumption of fibres are provided in table III.

Table III

Name of products	Unit	Year	Quantity	Value-Rupees
Polyester fibres, nylon fibres, acrylic fibres, polyvinyl alcohol fibres	lbs	1965	1[illegible]3,[illegible]37	1,10[illegible],744.00
		1966	[illegible]1,[illegible]36	6,258,249.00
		1967	[illegible],241	1,715,5[illegible]1.00
		1968	1,320,000	7,100,000.00
Other synthetic fibres (rayons, acetate and viscose)	lbs	1965	1,[illegible]3[illegible],227	
		1966	1,1[illegible]0,134	3,8[illegible],408.00
		1967	1,716,17[illegible]	[illegible],97[illegible],[illegible]4.00
		1968	2,[illegible]00,000	13,900,[illegible]00.00
Cloth of synthetic fibres	yds	1965	13,[illegible]3[illegible],[illegible]8	13,571,2[illegible],00
		1966	17,1[illegible],[illegible]	16,[illegible]6,37[illegible].00
		1967	14,711,[illegible]	15,[illegible],[illegible].00
		1968	2,360	441,[illegible].00
Fishing nets and netting	cwts	1965	3,30[illegible]	2,32[illegible],[illegible]1.00
		1966	3,270	1,935,[illegible]5.00
		1967	7,553	2,713,[illegible]47.00
		1968	10,000	4,[illegible]5,000.00

Under the heading of other synthetic fibres fall rayon, acetate and viscose as consumed by the numerous handloom plants operated on a cottage basis.

Of the imported synthetic fibres, the first place is held by the polyamides and the polyesters with acrylic fibres take a poor second. The brightest outlook is for the polyamides in particular nylon-6 and nylon-66. These fibres are used widely in the weaving and finishing of shirts, bic ases, linen fabrics, socks, trousers and sewing threads, not to mention fishing nets. Approximately 70 per cent of the synthetic fibres imported consist of nylon-6. Nylon-66 is used chiefly for fishing nets.

As a first step, it would be advisable to undertake the polymerization of imported caprolactam to obtain nylon, as required by the existing textile mills. These mills have a total output of 30 million yards. Projected to 1975, demand is expected to rise to 55 million yards. Although further research is necessary into the required capacity of such a polymer plant, with emphasis on a market study, it cannot be gainsaid that the economic prospects of such a plant are quite sanguine considering that the importation of caprolactam in lieu of synthetic yarns would entail a saving of 60 to 70 per cent in terms of foreign exchange.

The second step, on the market aspects, would be the manufacture of caprolactam itself by extraction of benzene through refinery platforming. The questions of which process route to choose and what would be the economic capacity of such a unit have yet to be studied. It is hoped, however, that a start would be made in this matter in the next few years.

Plastics

Plastics are one of the petrochemical end products which have already found a large number of uses in Ceylon. The demand for thermoplastics, in particular, polyethylene, polyvinyl chloride and polystyrene, is expanding rapidly.

There are quite a good many plastics processing units operating in Ceylon, utilizing imported petroleum resins as raw materials. Table IV provides details of these imports. It is noteworthy that no finished plastic products are at present imported. On the other hand, some finished products are being exported to neighbouring countries.

Table IV

Name of product	Year	Quantity cwts	Value—Rupees
Polyethylene	1965	422	211,3[illegible].00
	1966	3,500	63[illegible].00
	1967	8,6[illegible]	1,[illegible]33.00
	1968	7,281	1,[illegible]00.00
PVC	1965	4,[illegible]48	1,[illegible]
	1966	5,[illegible]24	1,[illegible]
	1967	18,636	2,380,000.00
	1968	21,200	2,960,000.00
Phenol formaldehyde	1965	30,526	3,[illegible]57.00
	1966	48,957	5,[illegible]
	1967	60,483	5,687,482.00
	1968	33,000	4,216,000.00
Other resins	1965	6[illegible]3	60,436.00
	1966	[illegible]73	[illegible]
	1967	[illegible]6	13[illegible]
	1968	14,301	1,[illegible]

Considering the wide range of its applic[illegible] and the relatively low capital and operating costs involved, it would be true to say that PVC has the brightest future in Ceylon. PVC is used for making flexible products, i.e. film rolls, mis[illegible] extruded products, miscellaneous moulded products, and rigid products i.e. pipes, conduits and tubing. The present needs of the country in extruded PVC products for building purposes are met by three large reputed PVC finishing firms. The needs of the consumer goods and packaging industries are catered for by the other smaller firms.

Of the three recognized routes that are used for production of vinylchloride and thence to PVC, the direct chlorination of ethylene to give dichloroethane is the best suited to the country. The chlorine required can be readily obtained from the State caustic soda factory where disposal problems connected with chlorine as a by-product, has restricted expansion of the plant. A project has been launched for the expansion of this plant of produce 6,000 tons of caustic soda and 4,800 tons of liquid chlorine. Although the plastics industry is yet in its infancy, the demand for PVC can be safely expected to rise quite appreciably, and a study of the capital requirements and desired capacity of a plant for the

production of PVC in Ceylon can, therefore, be regarded as deserving of early consideration.

Main obstacles to the development of the petrochemical industry

In Ceylon, lack of capital, a confined local market, non-availability of raw materials, difficulty in breaking into foreign markets, low-priced competition from highly industrialized countries, and a dearth of technical "know-how" are among the many obstacles to contend with, in establishing a petrochemical industry. The setting up of even the smallest theoretically viable plant producing basic intermediates requires sizeable capital investment. Further such a minimum sized plant would still not necessarily be an economically viable unit considering that output would, at least in the initial stages, outstrip demand. In a developing country like Ceylon, this poses a major problem. It is not feasible to install petrochemical industry where the pre-condition for economic production i.e. an industrial complex to absorb output and an adequate level of consumer demand do not exist.

Another aspect of the problem is that in a country like Ceylon it is not so much question of catching up with industrialized countries in the development of new technology, as one of utilizing any available technology for building up the industry from inflares. No training of skills in the sphere of petrochemicals has so far been seriously attempted, and it is essential therefore, that intensive training courses be organized straight-away to turn out the skilled technicians required in the industry.

Conclusions

The critical feature of the economy of Ceylon is the rapid increase in population combined with a very limited utilization of natural resources. One of the most desired natural resources of developing countries is petroleum and where available, the utilization of such resources is inseparably connected with the production of petrochemicals. In this connexion, it may be useful to note that plans are presently afoot to test for the existence of petroleum or natural gas in the sedimentary basins of the north west region of Ceylon and its off-shore area.

This symposium should prove of a great value to Ceylon in view of its coincidence with the opening of the country's first petroleum refinery. It is hoped that the facts and opinions expressed at the symposium and the conclusions

reached will serve to promote and inspire the country's own efforts towards the development of a petrochemical industry, capable of contributing to the growth of the national economy.


25. 5. 72