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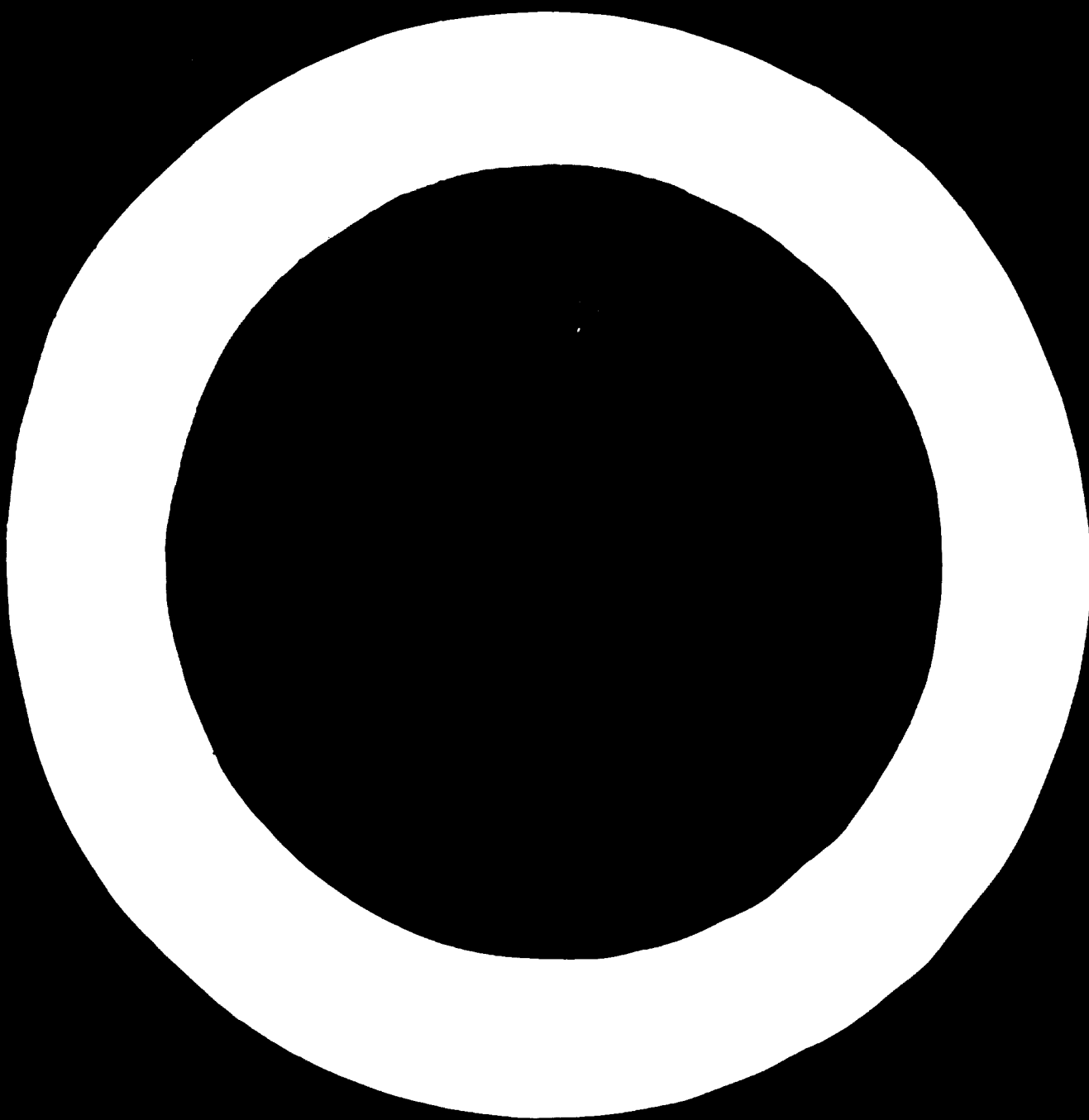
# Development of Metalworking Industries in Developing Countries

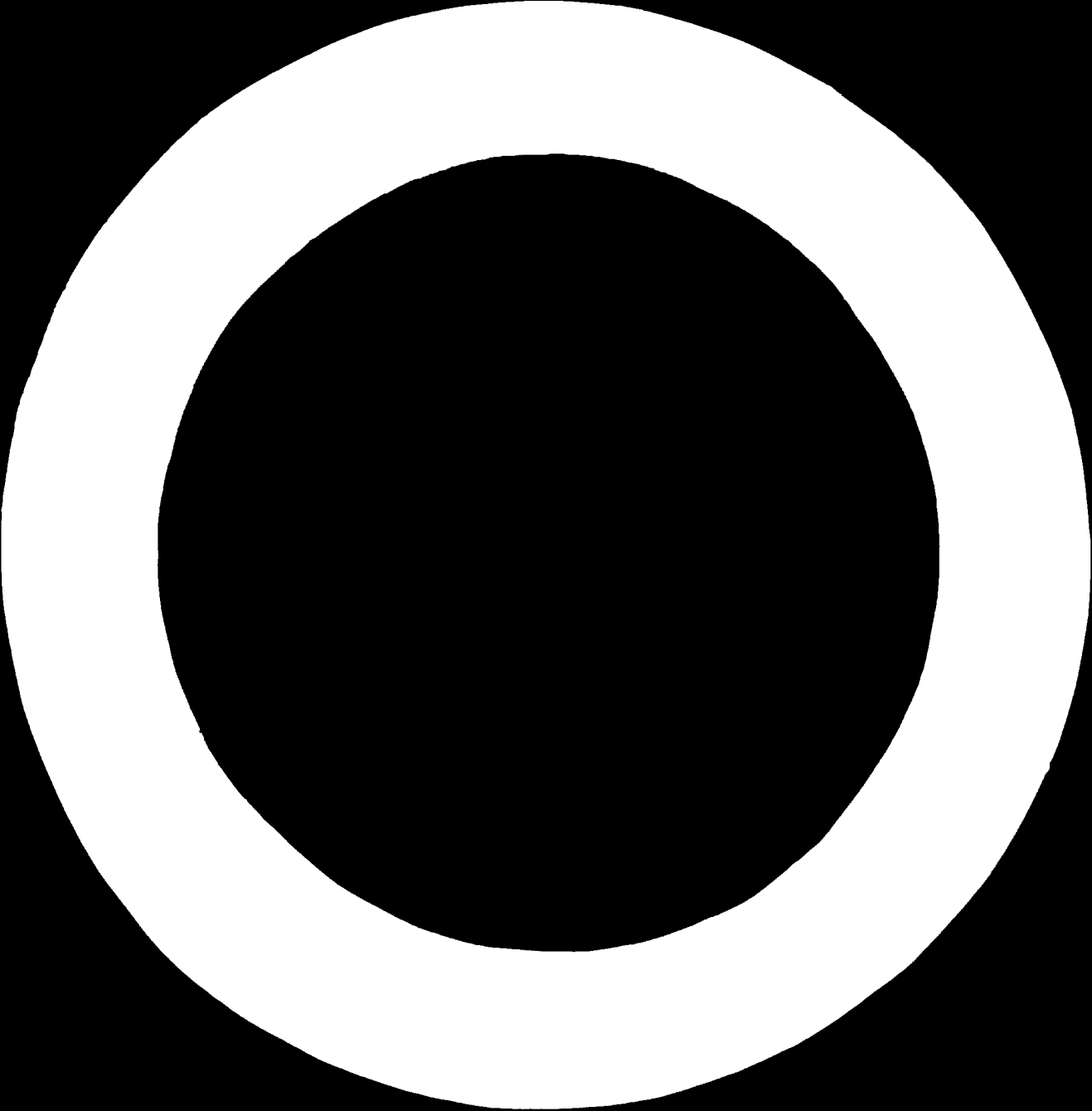
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## THE DEVELOPMENT AND PLANNING OF METALWORKING INDUSTRIES IN THE ECAFE COUNTRIES

*Secretariat of the United Nations Economic Commission for Asia and the Far East*

### INTRODUCTION

The ECAFE countries are at different stages of development in the metalworking industries and the general economies. The degree of development of the metalworking industries is similar to the relative degree of industrialization in these countries. By world standards, the manufacture of metal products and engineering goods in the region may be insignificant. Viewed, however, from the standpoint of the over-all industrial growth in the ECAFE region, significant progress has been made in manufacturing metal products during the past decade. This progress has raised industrial output and also increased employment.

Only a few countries have achieved a relatively high degree of industrial development and these are also the major producers of metal and engineering goods. Japan may be compared to the highly advanced countries in Europe and the United States. India has made an impressive advance in the capital intensive metalworking industries. Australia has, in recent years, made remarkable progress in the diversification and expansion of heavy and light engineering goods. New Zealand is almost self-sufficient in the production of agricultural machinery (except tractors) and also has made considerable progress in the production of miscellaneous engineering goods. Export capacities for metal and engineering products have developed rapidly in these countries.

Countries such as Burma, China (Taiwan), Hong Kong, Indonesia, South Korea, Pakistan, the Philippines, Malaysia and, to a lesser degree, Thailand and Iran have made some progress in developing metalworking industries. They have increased the production of durable consumer goods such as metal manufactures, appliances, utensils, building and hardware and accessories. The manufacture of small engines, complete units of simple agricultural machinery and food-processing machinery meet part of the domestic demand. The assembly of transport equipment such as motor cars and bicycles has increased considerably in some countries.

The other countries, namely Afghanistan, Brunei, Cambodia, Ceylon, Laos, Nepal and the Republic of Viet-Nam, have included in their development plans schemes for more rapid industrialization; but higher priorities have been given to power development, mineral resource exploitation, and increased production in agriculture and its related activities.

In some of the countries, small metalworking industries are also being established and/or are in the early stages of construction. Many of these countries have workshops

for miscellaneous repair services of machinery used in construction, mining and in agriculture. The trend is to expand these workshops and diversify production for greater utilization of the existing facilities. Also under active consideration are new metalworking industries for manufacturing farm implements and tools, assembling tractors for farm mechanization, establishing small foundries and shops for manufacturing pumps for irrigation purposes and for manufacturing household utensils, building hardware and common appliances in small establishments.

### POSITION OF THE METALWORKING INDUSTRIES<sup>1</sup>

The relative importance of the metalworking industries may be assessed by the percentage share of these industries in the total manufacturing output, by their contribution to employment and by added value in the process of manufacture. The percentage share, as of 1962, of the metalworking industries to the total manufacturing output in the countries of the region show wide variations, e.g. 16.4 per cent in Australia, 22.5 per cent in New Zealand, 7.1 per cent in China (Taiwan) and 14.4 per cent in India.

The percentage share in the total manufacturing employment shows similar variations, e.g. 24.9 per cent in Japan, 25.2 per cent in New Zealand, 12.4 per cent in China (Taiwan), 16.7 per cent in India and 24.4 per cent in Australia. In added value, the percentage share of the metalworking industries was: Philippines 8.8, Korea 8.1, New Zealand 22.5 and Australia 20.3.

Many of the countries in the ECAFE region have a low level of economic and industrial achievement, as there has been no large-scale application of scientific and technological advances to agriculture and industry. Now they are beginning to realize that their positions can be improved by modern techniques. An essential requisite for solving the basic economic problems of these countries is a planned change in the economy to bring about a high rate of growth which can be sustained in the years to come. This target, though difficult, is by no means unattainable. However, in implementing this plan it may not be necessary to follow the precise staging and techniques to which the highly advanced countries owe their success.

It is evident that a proper assessment of the existing social and economic conditions, the present industrial status and other inherent problems must be made in

<sup>1</sup> *Statistical Yearbooks 1962-63*, Australia, China (Taiwan), Japan and New Zealand.

order to achieve the best results. An exhaustive analysis of government policies and programmes and a host of techno-economic factors must be undertaken before deciding the kind of industry which will have growth opportunities in the coming decade.

The ECAFE region has more than half the population of the world in less than a sixth of the earth's land area<sup>2</sup> and also a tremendous rate of population increase. Consequently, the need for increasing the productivity of the people as well as improving the economy of the countries by industrialization is of utmost importance. The proper growth of metalworking industries is one of the key factors in achieving this end. This region is labour-abundant, but capital is scarce; hence, the development of labour-intensive metalworking industries is eminently desirable.

While the percentage shares of metalworking industries in the total manufacturing outputs of countries of the region have substantially increased during the past decade, they are still low compared to standards in other parts of the world. For example, the share ranges from 27 per cent to 30 per cent in Czechoslovakia and Belgium; and from about 35 to 40 per cent in the United States and the United Kingdom. The share in employment ranges from 22 to 25 per cent in the Netherlands and Poland; and from about 30 to 37 per cent in West Germany, the Soviet Union, Denmark and the United States. These high percentages reflect these countries' positions as major exporters of metal products.

#### TRENDS OF PRODUCTION, DEMAND AND DELIVERY OF METAL GOODS<sup>3</sup>

In the relatively more advanced countries such as Japan, the domestic production of metal goods in the mechanical and transport equipment groups is over 50 per cent of the total demand. In China (Taiwan), South Korea, Pakistan and the Philippines, a very high percentage of the demands for mechanical machinery is supplied by imports. The existing capacities of metalworking industries in the latter countries have been developed primarily to meet the domestic demands for durable consumer goods.

Progress has been achieved in the manufacture of household utensils and appliances such as metal containers, household furniture, office equipment and a host of other miscellaneous hardware and fittings. Manufacture of components and parts of oil and sugar mills, textile machinery (jute and cotton) and complete units of food-processing machinery has been developed in some of these countries. Manufacture of selected tractor parts (rollers and linkages) and assembly of tractors has been started in some countries. The manufacture of agricultural machinery and the assembly of automobiles have also reached moderate levels of production. Export markets have been developed for a few items of durable goods such as sewing machines, bicycles and pumps, utensils and appliances.

<sup>2</sup> ECAFE report of Asian Population Conference, December 1963.

<sup>3</sup> Country studies for Asian Conference on Industrialization, 1965.

In a few countries, the high increase in production of passenger cars, commercial vehicles and bicycles in the past few years has been one of the highlights of the metalworking industries. Japan has strengthened its position as one of the world's major exporters of passenger cars and commercial vehicles.

Australia recently began exporting passenger cars. In India, cars are being manufactured for the domestic demand and imports are banned. In the Philippines, Pakistan, Malaysia and Thailand, assembly units are turning out passenger cars in increasing quantities. The production of bicycles in India and China (Taiwan) is considerable and these countries can export part of their production. Manufacture of sophisticated and precision machinery is confined mainly to a few countries in the region, namely, Japan, China (mainland) and India and, to a growing extent, Australia and Pakistan. Complementary basic industries have been or are being developed in some countries.

#### FACTORS DETERMINING RATE OF GROWTH

The rate of growth of metalworking industries in the ECAFE region from 1953-1964 was relatively higher than that of the developed areas of the world. This growth has been reflected in corresponding changes in the economic structure of some of these countries. It is well known that in many of these countries, the limitations of the domestic market represent an inhibiting factor in their industrial growth. The creation of large markets through such means as economic integration and reciprocal trade agreements, therefore, presents opportunities for encouraging the growth of industrial output. Past experience has also demonstrated the importance of international technical co-operation in industrial growth. While shortage of capital has been singled out as one of the most important factors in hindering industrialization, attention has been focused in recent years on such factors as lack of trained manpower. International technical assistance thus has played and will continue to play an important role in alleviating these basic shortages.

#### DEGREE OF UTILIZATION OF EXISTING FACILITIES

While the outputs in the branches of the metalworking industries producing durable goods have increased progressively, there are certain sectors in some of the countries where the capacity of machinery and equipment has not been fully utilized. The lack of continuity and inadequacy of the supply of essential raw materials such as pig iron, steel sheets, special steel products, alloys and nonferrous metals have limited the output. This is attributable among other causes to the foreign exchange shortage for purchasing these materials from abroad. Indigenous production has not kept pace with the increasing demand. There is evidently a need for establishing new basic facilities for the production of these essential raw materials to meet the expanding demand and to utilize fully the productive capacity of the existing metalworking industries.

#### EXPORT PROMOTION

Most of the metal goods produced in the region are meant primarily to meet domestic demand with the exception of Japan, India and Australia. The promotion of exports is, however, being encouraged to generate foreign exchange to supplement the inadequate foreign exchange earnings of their primary export products. As an example of the effect of export incentive, the export of metal products in India has increased from Rs. 96.3 million in 1962 to Rs. 128.5 million in 1963. Similarly, Hong Kong and China (Taiwan) have developed new export markets for some metal goods. The opening of new markets in the more advanced countries for some of the metal products produced in the developing countries will also help the growth of the metalworking industries.

#### TRENDS OF INVESTMENT

Continued expansion in output can only be achieved with considerable investment both in the establishment of new industries and the improvement of existing facilities. Most of the important metalworking industries of the region are of recent origin. The trends and characteristics of investment vary from country to country. In the case of Japan and India, the great portion of the investment has been channelled to capital intensive metalworking industries. In Pakistan, the Philippines and China (Taiwan), investments have been concentrated on light metalworking industries. However, the present and future development plans of these countries include investment in heavy metalworking industries.

#### EMPLOYMENT

The employment trends in the metalworking industries in most countries of the region, particularly in the machinery and transport groups, indicated a rapid growth in the more advanced countries (Japan and Australia) and a steady growth in the other countries from 1956 to 1963 (1958 = 100).

The index of employment in Japan in machinery industry rose from 81.5 in 1956 to 187.5 for 1963. In transport equipment the indices rose from 86.4 to 156 and in metal products the increase was 72.6 to 206 for the same period. In Pakistan, the machinery branch index rose from 132.3 to 171.1. In Australia, the metal industries (machinery, etc.) increased from 96.6 in 1956 to 121 in 1963. In China (Taiwan), the machinery group increased from 94 to 105 and the transport increased from 99 to 169. In Indonesia, the index for machinery increased from 85.5 to 105.8 and for transport from 101.4 to 107. In the Philippines, the machinery index rose from 68 in 1956 to 70.3 in 1963.

#### PRICES

Available statistics do not permit a breakdown in absolute figures or percentages of the principal cost price factors and their trends in the metalworking industries as a whole or their main branches. Undoubtedly, raw materials and semi-finished products and salaries and wages are the most important factors. Transportation and distribution costs, investment and interest rates are

also important. Wages have increased in the metalworking sector in the less advanced countries by about 40 per cent since 1955. In Japan, there was an increase in wages of about 50 per cent from 1955 to 1962. The cost of raw material imports, particularly the cost of steel products, has had a great influence in the price structure of the finished metal goods in some ECAFE countries. Except in Japan, the costs of producing metal products in ECAFE countries are relatively higher than in the major producing countries in the world, particularly those which use mass-production methods.

There are, however, consumer goods and machinery items such as sewing machines, bicycles, simple agricultural implements and simple castings and metal furniture which can be produced competitively in the ECAFE countries. The relatively cheaper wages in ECAFE areas, coupled with the application of modern technology and the use of efficient machinery, has made it possible to manufacture some of these goods competitively. Improved methods of organization and know-how will further reduce production costs.

#### TRADE IN METAL PRODUCTS

Statistical data of world trade in metal goods show an increasing magnitude of trade among the highly developed countries and a continued increase in imports by the less developed areas. There has been, if at all, a very insignificant complementary export trade of metal products to the highly developed areas. The small value of exports from the ECAFE countries reflected the relatively unindustrialized state of their economies.

#### CONCLUDING OBSERVATIONS

The pattern of development of metalworking industries within each of the more advanced countries of the region is generally similar. Minimal facilities for manufacture of agricultural implements and hardware items gradually gave way to the establishment of more sophisticated workshops for the maintenance of imported machinery and equipment. Then followed a long period of development of skills in the use of imported tools and semiprocessed materials until a stage was reached when components and complete units could be manufactured for agriculture, food processing, transport and construction.

The next step was to set up facilities for processing imported steel ingots into bars, sections, sheets and wire, and ultimately to produce steel and other metals from indigenous raw materials. A tremendous impetus was given to this development by the growing use of motor vehicles. The maintenance of a wide variety of imported vehicles presented special problems and required specialized equipment and skills. Local production of replacement parts paved the way to the supply of original equipment components to vehicle assembly plants and hence to the complete local manufacture of cars, trucks and tractors. This whole process of development of metalworking industries in the more advanced countries of the region took place during a period of up to seventy years.

The urgent need to provide immediate employment for

a rapidly expanding population which has become aware of better standards of living does not permit any prolongation of the industrialization of the less developed countries.

Limitations in both natural and physical resources may not necessarily be a great handicap for developing metalworking industries. Hong Kong is a good example of a country which has developed an industrial economy with a minimum of natural resources. Most of the ECAFE countries are labour-abundant but short of capital resources and it is therefore of interest to note that these countries could develop satisfactorily by the establishment of labour-intensive and economically viable metalworking industries. These small-scale industries are naturally preferable because their needs for capital and markets are small. Successful development along these lines will be conducive to the establishment of larger scale enterprises. However, it is stressed that such industries should be properly co-ordinated and fitted into the over-all industrialization of the country and, moreover, of the region.

The establishment of common facility centres, comprising tool room, heat treatment, electroplating, inspection and testing of materials and components in relatively dense industrialized areas of developing countries, would go a long way in strengthening the industrial base of the country and also improving the quality of the products. Where this process is uneconomical, such as in rural areas, the use of mobile workshops is recommended. These would be useful also for training and demonstrations.

Several countries have already made arrangements for the exchange of study and observation teams in metalworking industries. The scope of such exchanges could be extended usefully. It would be particularly valuable if arrangements could be made for trainees from the less developed countries to receive in-plant training in

some of the newly established metalworking factories in other countries. This would provide them with varied experience in some of the practical problems encountered in the establishment and operation of new factories.

There is room for better co-ordination between the educational system and the specific needs of industries in the region. In addition, it is suggested that engineer tradesmen and managerial staff require periodic refresher courses or advanced training to keep pace with industrial progress.

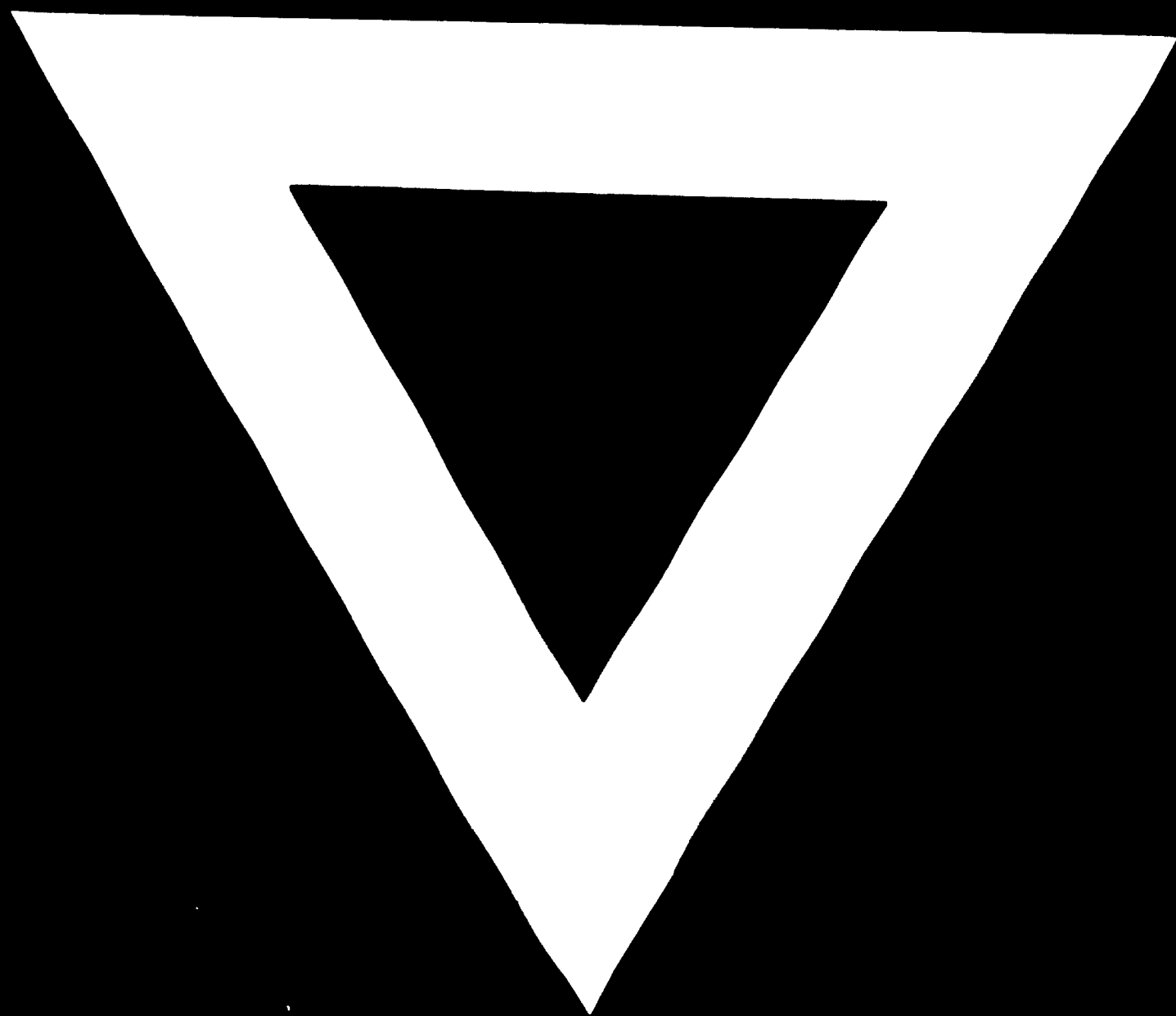
The problems facing the developing countries of the region are lack of adequate domestic capital, shortage of foreign exchange, insufficient technical know-how, raw materials, trained technical and managerial personnel and industrial research and development facilities.

Obviously these problems could be solved by international co-operation. Forms of such co-operation include financial equity participation, licensing agreements, technical assistance, consultant services and a re-examination of international trade and investment policies. An example of this would be the preferential duty treatment of goods exported from developing countries.

In addition to the above forms of assistance, advantage may be taken of offers from countries outside and within the region, in the form of consortiums, aid programmes and loans from governments and other financial institutions. Another feature of international co-operation in promoting industrialization in the region is in the establishment of large enterprises which will result in low unit-production costs.

The economies of scale should not be lost sight of when setting up plants, especially those which are capital-intensive and which require large markets. Such plants may require assistance from other countries inside and outside of the region. The recently established Asian Development Bank may be one of the main sources of financing for well-conceived projects of this type.





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