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Consultations for Chemical Industries of
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ISSUES FACING CHEMICAL INDUSTRIES
IN DEVELOPING COUNTRIES^{1/}

DISCUSSION PAPER

prepared by
the Secretariat of UNIDO

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Introduction

1. The development of the chemical and petrochemical industry, through the co-operation between developing countries and industrially advanced countries, obviously will depend on the specific needs and industrial objectives of each country concerned. Social and economic benefits are the main objectives of many developing countries.
2. Geographical position apart, such needs fall within a wide range of cases according to the availability of natural as well as financial resources, and other factors prevailing in a developing country such as state of economy in general, and the methodology employed towards industrialisation.
3. For the development of the chemical industry, an analysis of the requirements of the inputs, such as raw materials, utilities, processing chemicals and catalysts, plants and equipment, technology and know-how, financial resources and requirement of market, man-power, infra-structure and regional development and research and development activities, reveals that the developing countries have one characteristic in common, that is, a few of these inputs are available within the country and some others have to be procured from outside through bi- or multi-lateral arrangements with other developing and/or with industrially advanced countries.
4. The first step towards the establishment of a chemical industry in a developing country will therefore, be the preparation of an inventory of the available inputs and the determination of ways and means to secure access to the missing ones.
5. The objectives of industrialisation and the criteria for their realisation generally provide the guidelines for action in each individual developing country.
6. For the developing countries in general, the objectives include: a) increase in GNP as well as social and economic benefits and social justice; b) improved balance of payment and public reserves; c) creation of employment; d) diversification of production and e) to create impact on other sectors of economy - agricultural and industrial - and on the overall economy through intra- and intersectoral linkages. The emphasis should however, be laid on agricultural development and food production where appropriate.
7. The guidelines for action in developing countries embrace situations ranging from overall-economic planning to market economy and are often decided by the respective Government.

8. The co-operation in the development of the chemical industries sector will have to take into account the complimentary inputs and objectives of the potential partners in developing and industrialized countries.

9. On the other hand, the objectives aimed at by the industrially advanced and also by some developing countries in establishing co-operation with other developing countries, may be summed up as follows:

- a) To ensure supply of raw materials and/or intermediates;
- b) To re-orient and overcome the tight labour situation;
- c) To export technological know-how;
- d) To solve the related social and urban problems, created by over concentration of industries;
- e) To develop new markets;
- f) To repatriate adequate profits resulting from their participation.

10. In view of the wide coverage of the chemical industry and its related activities it appears useful to focus attention on certain selected issues as follows:

A. Exploitation and utilization of indigenous natural resources and raw materials

11. The immediate concern of developing countries is to exploit their natural resources and to benefit from their processing. The establishment of modern chemical industries to process the indigenously available raw materials into chemical intermediates and finished products for domestic as well as export market will promote overall industrial and economic development.

12. Notwithstanding the fact that the development of petrochemicals was very dynamic during the last two decades, the output of chemicals on the basis of other materials has also recorded an increase. In the context of increased oil prices, the development of other sectors of chemicals, pharmaceuticals and pesticides industries, based on coal, materials from vegetable origin such as wood, agricultural wastes and products, molasses, alcohol, non-edible oils, jute-sticks, etc. should receive greater consideration.

B. Effect of increased oil prices on petrochemical production - and its impact on new areas of development

13. The present situation due to the increased oil prices and the consequent shortages of petrochemicals, calls for a new strategy in the development of chemical industries in the developing countries. A balanced approach for

the utilization of all resources of raw materials - over a time horizon - needs closer examination. Increasing efforts will be needed in the field of development and adaptation of technology in the direction of conservation of energy, hydrocarbon resources and also in the economic utilization of coal, materials of vegetative and mineral origin.

C. Fertilizers, Pesticides and Plastics as inputs in agriculture

14. The most important issue that can be singled out for special emphasis, is the role of the chemical industry in combating the situation of food shortages all over the world. Agricultural sector plays a predominant role in the economies of developing countries. The Chemical Industry as a key-sector makes a considerable contribution towards food production, plant protection and food preservation for which fertilizers, pesticides and petrochemicals, including plastics, have become the mainstay for agriculture.

D. Problems relating to the transfer of technology - adaptation of processes and patents

15. For the development of petrochemical and chemical industries in the developing countries, transfer of technology, know-how and adoption or acquisition of patents from advanced countries must necessarily follow. Restrictive provisions of various types, e.g. prohibition of export to third countries, tying-up of purchases of imported raw materials, catalysts and spare components of plants to the supplier of technology and tariff protections against import of competitive products, are generally incorporated in the know-how transfer agreements. Such conditions have some inhibitive effect on growth and calls for more equitable terms.

16. In certain cases, in deciding on the technologies, local conditions of labour situations are to be taken into consideration. Highly sophisticated, computerized plants and mechanical material handling equipment, often recommended by the multinational companies in the form of packaged and unaltered terms may not be necessary for the developing countries where there are cheap sources of labour.

17. Patent situations, particularly in the field of pharmaceuticals, pesticides, catalysts, etc. require liberal consideration in the matter of adaptation of foreign technologies.

E. Optimization of plant economy

18. The question of the most efficient plant size occupies a central place in the consideration of chemical development. However, optimization of plant economy and its utilization of capacity depend on many factors intricately related to the process, the size of the market and also the cost of other inputs. But particularly in the case of developing countries there may be considerations other than economic factors, such as social justifications and other circumstances which are different in developing countries from those of developed countries.

F. Indigenous Research and Development

19. Governments in many developing countries have realized the increasing importance of undertaking research and development programmes, for the development of petrochemical and chemical industries. A number of basic and industrial research institutes have also been set up. However, it is felt that the financial resources and the organizational measures are not often adequate to lay emphasis on application and commercialization of such research work. It may be considered to set up a "Technology Fund" to sponsor under UNIDO planned R & D effort in chemicals and petrochemicals technology in the developing countries for more fruitful results. In order to accelerate the process of commercialization, it is necessary to have better co-operation between research institutes, Governments and industry in the developing countries.

20. Co-operation between developed and developing countries is also possible by utilizing the local talents and resources of developing countries with the support of developed countries by way of meeting financial and foreign exchange requirements.

G. Design development activities - and local manufacture of plant and equipment

21. Side by side with the development of the chemical industry and research and development facilities, it is important that the design development capabilities should also be initiated, if necessary with the support of the Government. Plans for manufacture of plants and equipment - on a national or regional joint-venture level, may reduce the excessive dependence of the developing countries on imported machinery, equipment and spare parts. International co-operation by way of supply of design to support local fabrication and exchange of technical information to improve fabrication techniques should also receive consideration.

H. Problems of Maintenance

22. The maintenance of modern chemical and petrochemical plants, particularly the single train ones with few installed spares, is a major problem for developing countries because of shortage of skilled technicians and long delivery periods for spare parts by suppliers thousands of miles away.

I. Present energy crisis - and power shortages

23. In planning development of the chemical industry, development of infrastructure plays an important role. In the recent past shortage of power has been widespread in developing countries. In this context, while formulating the programme for the chemical industry the power requirements of the projects should be identified and properly assessed. The projects that appear feasible, particularly those with low power requirements may be included in the immediate short-term plans. In the case of large projects, particularly for the petrochemicals and other chemicals where electricity is an important input as a raw material, captive electricity generation plants are to be taken into account in order to optimise production on a continuous basis.

J. Over-concentration of industries - ecological and environmental aspects - and dispersal of industries

24. Public awareness of environmental and ecological problems is growing. In planning for petrochemical and chemical industries, protection of environment must be taken into account as a necessary pre-requisite for planning. In dealing with the environmental problems planned approach to "clean up" processes are to be adopted. Refineries must necessarily dispose of the many contaminants that are present in crude oil without creating an adverse effect on the local environment.

25. Air conservation, water conservation, waste water and effluent treatment, prevention of emission of sulphur and other particulates are some aspects for consideration in the early stages of planning for petro-chemical and chemical industries. Removal of sulphur from the waste gas or recovery of waste chemicals and engineered flaring system - may turn out to be profitable propositions in terms of economy and environmental protection.

K. Strategies and measures for co-operation among developing countries

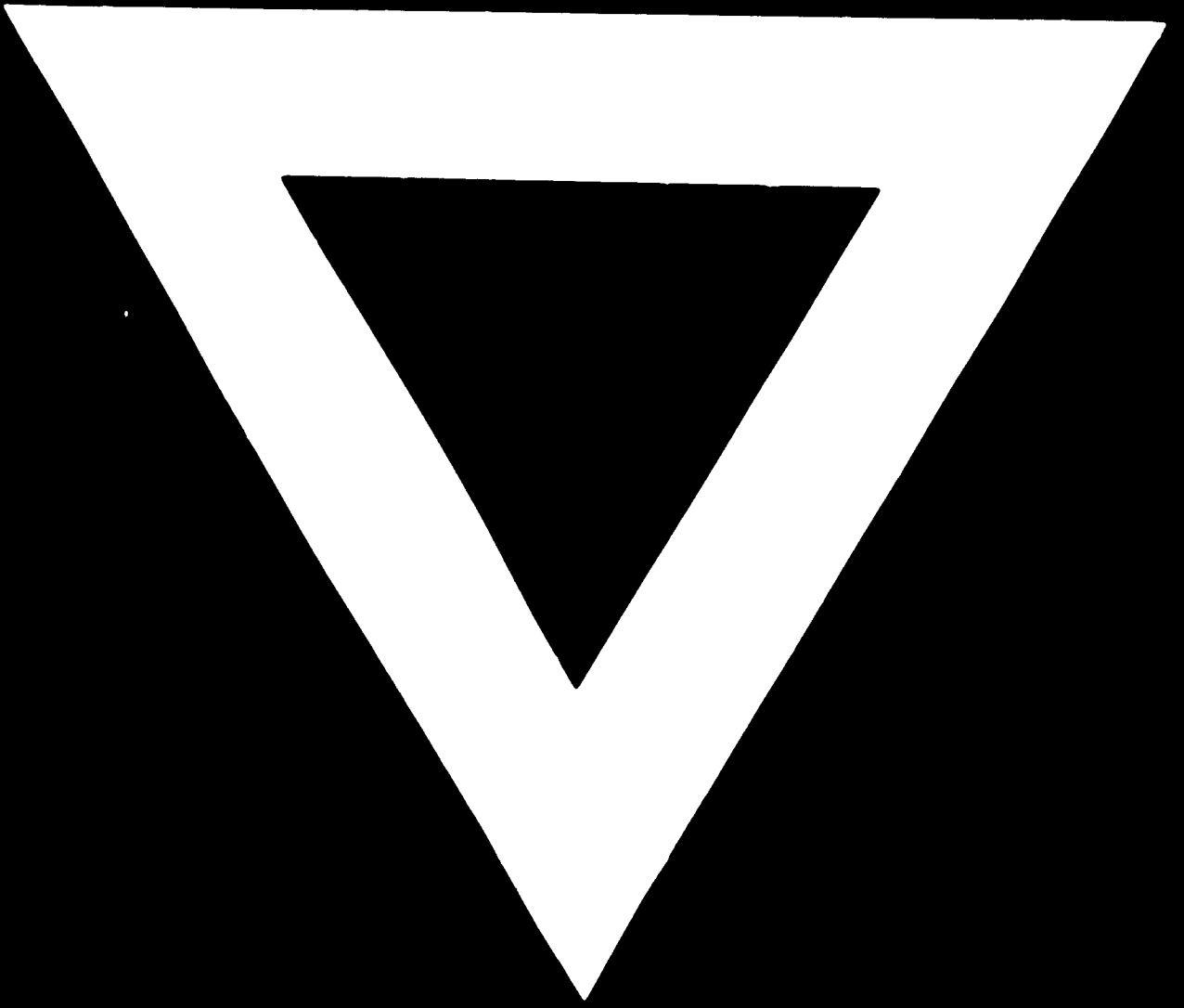
26. With established activities geared to the programme of industrialisation, every country may emerge out as a donor or a recipient in meeting the gaps in the input factors required for the development of the chemical industry.

Exchange, by way of trade of the basic, intermediate and finished products can be established between the developing countries having common economic goals. Such co-operation can be extended to the areas of production, science and engineering, research and development, infra-structure development, transport facilities and - payment and credit systems including export-guarantee credit systems. Some of the activities can be initiated and implemented by the developing countries themselves. UNIDO, can also assist, directly or indirectly, as a part of the work programme in fostering co-operation among developing countries.

L. UNIDO's role in assisting developing countries

27. Activities of UNIDO are well known in the direction of studies on the economic and technical feasibility of chemical projects, including market surveys, assisting on problems of production of existing industrial facilities like de-bottlenecking, maintenance, training and safety aspects. To these a number of specific activities are being added in order to cope with the problems of more recent nature such as abatement of pollution and protection of environments.
28. Above all the main endeavour for UNIDO would be to devote more attention to the investment follow-up as an integral part of the industrial development process and help mobilise the investment through external and domestic financing, government participation, investment banks, and other sources.





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