2.4 Impact of the Chemical Industry on the Development of the Third World

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There is a mistaken belief that building up a chemical industry is not a priority for developing countries, particularly the smaller and poorer ones, because of its association with capital-intensive petrochemical complexes and the use of potentially dangerous and environmentally hostile processes. Access to chemicals is, however, essential to the operation of virtually all other industries as well as to agricultural efficiency, and more than 30% of UNIDO's technical assistance is directed towards the chemical and related industries.

The industrial revolution, which took place just over 200 years ago in Great Britain, was famous for the extremely rapid development of the textiles, iron and machine building industries; this would have been considerably hampered if the chemical processes for making acids, alkalis and bleaches had not been developed simultaneously. Chemical products such as soaps and disinfectants also played a major part in improving public hygiene and thus increasing life expectancy. Today, industry is even more dependent on chemicals, which are also needed for pharmaceuticals and medicines, housing and shelter, textiles and clothing, food production and food conservation, printing and communications, and for many other basic needs which are just as essential for developing as for industrialised countries.

Not having a chemical industry can severely hinder the economic development of a country. It will have to pay a much higher price for the chemicals it needs than does a rich country with a large efficient chemical industry, and access to the valuable technical assistance generally provided by chemical companies to their customers will be difficult. The cost of transporting basic chemicals such as acids and alkalis, chlorine for water purification, fertilisers, solvents for paint manufacture, formaldehyde for resin manufacture, lubricating oils and insulating materials is often far higher than the cost of making the product in its country of origin and may be twice as high as in industrialised countries. This can put an almost insurmountable hurdle in the way of the development of quite simple industries such as the paints industry or chipboard industry which, with the cheap labour available, could be quite profitable, while the high cost of fertilisers handicaps the development of agriculture and the production of food. The cost of importing and transporting chemicals can represent an unbearable drain on foreign exchange.

For considering the impact of the chemical industry on development, the developing countries can be divided into (a) those large enough and/or rich enough to have a market which would justify the indigenous production of most of the major chemicals required by their industries, agriculture and societies (eg. People's Republic of China, India, Mexico, Argentina, Brazil, Iran, Indonesia) and (b) those too small and/or too poor to have a market which would justify the economic local production of almost any of the chemicals they need (eg. countries with a population of less than ten million, and per capita GNP less than $500 per year). There are also a few lucky ones (eg. those with oil, natural gas or well developed export industries) whose consumption, though small, justifies the establishment of profitable chemical industries making products destined directly or indirectly for export.

Large Developing Countries

For countries large or fortunate enough to be able to have a profitable or potentially profitable chemical industry it is essential to ensure that this industry really does have a positive impact on the country's development. This means:

1. Promoting the growth of agriculture and of those industries which use the products of the chemical industry by encouraging and assisting the appropriate and efficient use of chemicals through, eg. promoting the use of plastics in agriculture, training farmers in the utilisation of appropriate and environmentally safe fertilisers and pesticides, and providing technical assistance and applications and development services to industries using chemical products such as plastics transformation, detergents, textile and paints industries.

2. Ensuring the efficient competitive operation of the chemical industry itself. Major technical improvements continue to be made even in the manufacturing of the so-called mature bulk chemicals such as commodity plastics and fertilisers, while speciality chemicals and special grades of plastics are under continual development in the industrialised world.

   Failure to operate plants efficiently, to increase output by introducing the latest technology, and to develop the use of speciality chemicals could result in stagnation of the industry and the transformation of a profit-making into a loss-making endeavour; this happens all too frequently in developing countries. To avoid this, in addition to needing capital and having the willingness to invest this capital in the modernisation of plant, the owners of chemical plant must ensure the ongoing training of their operators, engineers and managers. Access to information by the establishment of well run libraries with databases is very important. Also, it is essential to have the ability to do enough chemical process engineering design to carry out troubleshooting and at least revamp and modernise simple plants.

3. Ensuring that the chemical industry itself as well as those industries using its products have a positive environmental impact and are operated safely.

Small Developing Countries

The severe negative impact on the development of many small developing countries without an adequate chemical industry can be reduced in many ways. One is to investigate the possibilities of setting up chemical industry operations which are economical even if carried out on a small scale, eg. the formulation and packaging of pharmaceuticals and pesticides, even the production of some of the ingredients. In effect, the manufacture of drugs and medicines is the most important sector of the chemical industry in many countries with a per capita income of less than $1000 per year, contributing on average over 20% of the manufacturing value added by the chemical industry. The next most important chemical related industries are those making soap, cleaning preparations, cosmetics, and the plastics products industry.

An almost positive consequence of the high transport costs for many chemicals which are needed in smaller, developing countries is that it is possible to produce some chemicals locally at a price less than the cost of importing them. The major obstacle in the indigenous production of chemicals is often not the danger that the market might be too small to support a profitable business, but lack of knowledge and experience about the chemical industry.

There are likely to be few experienced chemists or chemical engineers residing in a small, developing country which has no chemical industry. To decide whether to set up a chemical industry or produce just one product, plan for its production, choose and purchase the technology, set up the plant and operate it, requires the assistance of unbiased and highly experienced professionals from the chemical industry. Even if outside experts are available, education and training of local staff, including on-the-job training by the experts, is of paramount importance.

When a type of product, say plastics, is not yet being made in a developing country, it is notoriously difficult to predict what the market will be once it is made there. As there are generally fewer industrial customers for a given product than in an industrialised country, the decision of just one or two entrepreneurs to set up a business which will use the product can mean a quantum jump in demand. The easy availability of a product within the country, without having to obtain import licences and without the delay involved in shipping it in from abroad, is a great spur to demand. The market can also be very positively affected if the producer is able to provide technical and application assistance to the customers. There are many cases in industrialised countries of over-capacity in the chemical industry resulting from too many producers investing in too many plants which are too large. In developing countries, when introducing a product not yet made in that country, there are hardly any examples of a new plant being oversized, provided the price of the product does not increase as a result of a government's desire to protect a fledgling industry.

Another way of helping small countries is to reduce the use of chemicals by improving the efficiency of their utilisation, eg. by encouraging recycling, efficient product design and efficient plant operation in the plastics transformation industry. If it is profitable to use a labour-intensive process for cleaning and recycling plastic waste in an industrialised country, it is far more worthwhile in a developing country; the plastic costs are the same or more, but the labour costs are much less. In many developing countries the potential for saving on the import of plastic resin can be as high as 30%; for a country with a population of 10 million inhabitants and a per capita consumption of plastics of only 1 kilo per annum, this can mean an annual saving in excess of 3 million dollars per year. Another approach is to develop products which do not require chemicals to be expensively transported or to use raw materials which are available locally, eg. using 'water-borne' rather than 'solvent-borne' paints and developing the use of locally available natural products, such as damar resin and rubber seed oil for paint manufacture in South East Asia. This can both reduce a country's dependence on imported chemicals and provide employment and income for those producing these natural products.

P.S. Though our headquarters staff at UNIDO includes a number of highly competent professionals who have both industrial experience and experience with developing countries, the Organisation is highly dependent on its roster of international experts and consultants, many of whom are world famous in their fields. Should anyone wish to help UNIDO to assist developing countries, they are cordially invited to offer their services.

[*Editorial note:* this is an abridged version, prepared by the Editor, of the longer original paper authorised by UNIDO].

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