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## German Chemicals in the World's Markets

by Dr Rolf Sammet, Chairman of the Board of Management of the Farbwerke Hoechst AG, Frankfurt

**T**he importance of individual countries within overall world output of chemicals has shifted greatly. Among the factors responsible for this, not only the two world wars and the political, economic, and social changes, which have taken place after 1900, must be named but also the vastly altered importance of chemicals for the entire economic process. During the last decades of the nineteenth century, chemicals were of importance for other branches of industry only in individual cases, through supplying to them—especially to the makers of textiles—chemical manufacturing and processing aids. In addition, chemical concerns sold pharmaceuticals to individual users. Today, there is not a single branch of industry in which chemicals do not play a major part.

### Shifting Balance

Before the First World War, most German-produced chemicals were either dyestuffs, fertilizers, or medical drugs, whilst today, the combined output of these three types of chemicals represents only about 30 p.c. of overall production of German chemical industry. Chemical products which now form the mainstay of chemical manufacture are being supplied to the most varied branches of industry and of the economy, so that chemicals have come to be fully integrated in the entire economic process. Any attempt to

analyse the international importance of chemicals will therefore result in the finding that, in the industrially developed countries, including the Federal Republic of Germany, the United States, Japan, and the United Kingdom, chemical production represents in all of them just under 10 p.c. of total industrial turnover. On the other hand, chemical turnovers per head of population are very different from one country to another, depending on overall efficiency of their respective economies. In 1968, the United States were far out in front with DM 1,050, followed by West Germany with DM 744, the UK with DM 723, and Japan with DM 475 chemical turnover per head.

### Liberal Trade Policies as a Counterweight

To make chemical manufacture internationally competitive, the economies of scale in producing on a vast scale impose themselves as essential for success. Countries whose home markets are narrow are thus forced to find outlets for their production abroad, without which their production units will not be able to grow to acceptable size. German chemical industry, in 1968, exported 34 p.c. of its total output, the US only 7 p.c., Japan 10 p.c. and the UK 18 p.c. Switzerland is clearly a special case, because its chemical industry exports no less than about 70 p.c. of its production.

As against earlier periods, trade among the industrialised nations of the West has been greatly liberalised. It has also become possible to set up manufacturing plants outside the borders of each chemical group's country of domicile, and this acts as a counterweight to the potential harm which a trend towards forming monopolies might do. Chemical industry and all the other industries have become highly interdependent, and this, not surprisingly, has the effect that the exchange of products and investment activities in the field of chemicals mainly takes place between industrially highly developed countries. In 1968, of total foreign investments in chemicals by US concerns, more than one half went to Europe — \$ 670 mn of \$ 1,230 mn. It has been estimated that more than two thirds of this were invested in the area of the European Common Market. There are no comparable figures available for German chemical industry, but it might be a good guess that the proportions are at least the same as those for overall investments of all German industries. German private industry has invested abroad in the period from 1952 to the middle of 1969 altogether DM 15,700 mn, of which the lion's share of almost DM 11,100 mn was absorbed by other industrialised countries. The main attraction was clearly provided by other European countries. Chemicals represented about 25 p.c. of all

foreign industrial investments over the whole period, but as much as 43 p.c. in the first half of 1969.

### **Government's Energy Policy**

The original base material of industry chemistry was coal tar, a product of another industry. To this day, chemical manufacture is dependent for its raw materials which other industries supply. Modern petrochemicals, both organical and anorganical, could not be produced without the oil industry processing crude for making motor fuels and fuel oil for other industries and for individual consumers. Projects of building oil refineries or atomic power stations exclusively for supplying chemical manufacturers with their requirements, thus separating them from the development of the entire economy, are still in their infancy.

Compared with its international competitors, German chemical industry is up against great difficulties. Crude oil, petroleum products, and natural gas are today indispensable basestocks for chemical processing, but at the same time, they are the most important sources of energy for the entire economy of most nations. The well-known problems of German energy policy have led to much higher energy prices than in other comparable industrialised countries. Since energy constitutes a major cost factor in composing chemical gross output value, the expansion of German oil industry in its function as producer of petrochemical basestocks is also being hindered. That is one of the reasons why German chemical concerns have been toying with the idea of setting up some of their production units which use much energy or are heavily dependent on oil outside Germany but within the EEC.

As the structure of primary energy supplies is vastly dif-

ferent in the United States, European petrochemicals had to be built up on completely novel technological developments. However, it seems now that the trends might be reversed both in the US and in Europe, for natural gas now gains more and more importance in Europe as a high energy fuel, whilst fears have been expressed in the US that natural gas might become scarce there.

### **The Need for International Patent Protection**

The results of research and development work are exported both in the form of finished products and through the construction of production plants abroad. Recently, exchanges and the sale of production licences as well as the sale of complete chemical plants have assumed added importance. Companies thus sell, in package deals, a combination of the knowhow which has been accumulated through hard work over decades, the results of engineering skill, design and planning work, and frequently also the equipment, and even finance. This trade in which the commodities sold are technological knowledge and experience is possible only with those countries which afford protection to intellectual achievement. It implies adequate patent laws and the willingness to pay royalties and to permit their transfer. Western industrialised countries have been treating these requirements—with very few exceptions—as a matter of course for many years past. Even the Soviet Union and the other countries of Eastern Europe have gradually come to acknowledge that this is the only practicable way of utilising themselves the knowledge and experiences built up by other countries for developing their own economies.

Italy does not grant patent protection to pharmaceutical

products and manufacturing processes. It is intriguing to find that this has not led to cheaper prices for medicine in Italy than in other industrialised countries. It appears that the industrial "shysters", who believe that they can circumvent the spending of money and efforts on research and development work, have not been able to acquire sufficient trust with the Italian public, which plays an especially important part in the field of pharmaceutical products. On the other hand, trusted Italian pharmaceutical manufacturers seem to have seen the light by acknowledging the need for an effective patent law which would protect the use of research results in order to enable new research and development work to continue. Many developing countries, on the other hand, refer to the Italian example in discussions on patent and licensing problems. Actual Italian developments prove, however, that such a shortsighted kind of "social care" will, in the long run, bring harm and not benefits to the masses of the people.

### **Chemical Developments in Developing Countries**

Creating an efficient chemical industry is of particular importance for developing countries. The close interdependence between chemicals and all the other sectors of industry poses essentially the same problems here as arise in developing overall industrialisation. Added difficulties are resulting from the characteristic structure of chemical manufacture. Developing countries have not yet made much progress in forming free trade areas or common markets, such as industrialised nations have built. Plants for making bulk chemicals whose design size is at or near the economically acceptable lower margin may still be too big for the home market, because unit investment

costs in these countries are much higher than in industrialised regions. Developing countries normally also levy import duty on investment goods, or their weak currency position imposes sharp import restrictions. In most cases, such countries have no investment goods production of their own. This causes uncompetitive production costs of manufacturing in developing countries, which can be overcome only by high export subsidies. But the financial limits of such a policy are naturally narrow there.

Success in developing a chemical industry is therefore possible only behind a shield of crass protectionism, but in the long run, this impedes further progress in its evolution. Alternatively, it will be advisable to make a start with a type of production which is less closely tied to the growth of industry as a whole. This will be generally possible in the cases of products which need not go through a multitude of subsequent processing stages, or which can be sold immediately to individual consumers.

#### **Import of Knowhow Indispensable**

Developing countries will not be able to develop a chemical industry without importing processes and knowhow. Chemicals in Germany are responsible for about 30 p.c. of the total outlay on industrial research, whilst its share in overall industrial output is only 10 p.c., and between 3 and 5 p.c. of this turnover are represented by research and development costs, so that processes and knowhow are of high financial value for them. Total costs of intellectual effort and experiences cannot be precisely identified. They consist not only of the specific and effective costs of research and development for one given process or product but of the entire spend-

ing of a nation for achieving a high level of education and technological skill. Passing on technological knowledge and skills therefore forms part of development aid which must never be underrated.

#### **Direct Investments Essential**

German chemical industry is naturally keen on opening up new foreign sales outlets. Building up production plants in the rising countries of Latin America, Africa and Asia contributes to the expansion of their markets and their entire economies. Investing capital in these countries bears higher risks, for both political and economic reasons, than in industrialised nations. German industry cannot operate there without being granted the same protection as is customary in industrialised countries. Admittedly, fiscal treatment of losses incurred by foreign associate companies has been much improved during 1969, but there is still a long way towards Germany acquiring equal rights with other countries. Protecting German investments in foreign countries with politically unsettled conditions is a problem that still awaits its solution.

Compared with the chemical industries of the United States and of Switzerland, German chemical companies, because of the need to rebuild their plants after the Second World War, suffer from lack of funds of their own. There seems to be no chance for a change in this situation. Investment by German chemical industry will therefore continue to be at a greater risk than elsewhere. A vital need for the growth of German chemicals is expansion of work beyond the frontiers of Germany. Chemical enterprise must strain all its fibres to help the younger industrial nations in developing their own industries, in order to gain them as trading partners. But this will only be possible by

further strengthening our research and technological potential and by training people capable of spreading technological skills in other lands, thus engaging actively in co-operation for building up new industries there.

#### **Research: the Gateway to Success**

German chemical industry was born from research efforts and management initiative combining for a common aim. Its growth will always be based on the availability of sufficient numbers of well-trained scientists and engineers. The German educational and training system has proved its value in the past. Unlike other countries, Germany had trained large numbers of capable chemists who had shown during their university years that they were able to engage in serious research. After 1945, chemical research in Germany has generally been able to return to its high level, which is recognised worldwide and can hold its own among other nations. This achievement is of particular importance, as Germany lost all its patent rights and registered trade marks 25 years ago, and during the difficult period of reconstruction the upward slog was much harder than in comparable foreign countries. At present, we have reached a stage when our system of education and training is being thought over afresh and reorganised. The Government and the institutions of higher learning are facing the task to use past achievements for creating a new training system which will be geared to the requirements of future decades. Whether they will travel in the right direction can only be seen in the future, when German chemical industry displays its achievements in the days of tomorrow and after to-morrow as an integral part of the whole economy.