CHAPTER V
CONCLUSION
The present study attempts to examine the several dimensions of technology transfer between developed and developing countries in the context of petrochemical industry in the GCC countries. These countries have some peculiar characteristics. They differ from other developing countries in terms of resource endowment, rentier character of their economy and newly started industrialization programme. Hence, they require to be analysed separately. The main focus of the study has been the examination of the several hypotheses which have been elaborated in the introduction of the study.

It has been hypothesised that the petrochemical industry being the leading sector is going to be the pace setter of the technological development process in the GCC countries. Indeed, the factor endowment of these countries is suitable to the development of petrochemical industry in the region. This is the conventional argument based on the Theory of Comparative Advantages. In addition to this, the beginning of manufacturing process in the region will generate the capacity to produce goods and machines, appropriate to the countries' requirements. This is applicable both to consumer and capital goods and further enhance the technological development process of the region. The region does not possess the minimum necessary requirements for the development of agriculture and has
embarked upon an industrialization programme in which petrochemical sector is predominant. So, it has a critical role to play in the technological development of the region.

The second hypothesis relates to the global structuring in the petrochemical industry and the emergence of the GCC countries as significant producers of base chemicals. The global restructuring in the industry has enabled these countries to increase their share in the world production of base chemicals. The falling oil prices and the oil revenues have reduced these countries' advantages in feedstocks and have raised the costs of petrochemical products. In spite of this, the production capacity has been continuously expanded in all these countries in recent years. Therefore, it is not surprising that presently more than 10 per cent of the world's basic chemicals are produced in South-East Asia and Saudi Arabia. The United States, Japan and the European community make up 13 per cent of world's total industrial capacity in basic chemicals and the Third World Newly Industrialising Countries (NICs) have established another 9 per cent of the global capacity.¹ Another estimate of the global production capacity of the chemicals shows that the production in the chemical industry is expected to increase by 25 per cent up to 1995 of which the share of developed and developing countries is 15 per cent and 70 per cent.

respectively. The structural problems faced by developed countries will foster this tendency in future. Consequently, the developed countries' share will fall and that of developing countries will rise sharply.

This restructuring process forms an integral part of the new international division of labour which introduced structural problems for Western Economies. The role of developing countries, as raw materials or agricultural products suppliers, has undergone a fundamental change in recent years. Similarly, the developed countries are no more the sole producers of industrial products. The new international division of labour is characterized by the Third World countries as manufacturers of more and more industrial products. These countries have emerged on the basis of mass production on low production costs, cheap labour and very low requirements for the qualification of labour. The most important among them are: Brazil, India, Korea, Singapore and Taiwan. During the same period, the rise in oil prices placed the oil producing countries in a favourable position to utilize the available raw material for the production of other products, the most important of which is petrochemicals. Consequently, the industrialized countries had to face the new and strong competitors in the international market. They also faced shortage of financial

2. Ibid.
resources because of the sharp rise in the raw material prices. The interrelatedness of markets emphasized the importance of national labour costs and so the low wage countries gained advantages. These changes resulted in a tremendous increase in demand for highly sophisticated products. The modernization and industrialization programme of oil exporting countries including GCC member states, is closely linked to this process. Modernization programmes in these countries raised the demand for these products. The developed countries, therefore, changed their industrial strategy to accommodate these changes and started concentrating on the production of high-tech goods and high value added products. The change is reflected in a move towards the production and research in speciality chemicals, assistance to developing countries in marketing their products by MNCs and the contracts signed to supply their technology by various MNCs. Therefore, the hypothesis that the region is going to emerge as a significant production site for base chemicals is valid.

The third hypothesis focusses on the issues in North-South technology transfer in the petrochemical industry in the GCC region. The various issues in North-South technology transfer and its several dimensions have been elaborated in the first chapter of the study. In general, the main three issues are related to the imperfect market for technology, appropriateness of the technology transferred and
technological dependence of the developing countries. Here it can be concluded that the peculiar characteristics of the GCC countries which differentiate them from other developing countries, have significantly influenced these issues in the GCC petrochemical projects. Secondly, there is variation among the GCC countries also.

Before going into the details of this, it is essential to mention that these issues have undergone a qualitative change over the years due to changes in international division of labour and the emergence of NICs. The changes in the strategies of MNCs have encouraged the production of certain goods, e.g. the production of base chemicals in GCC countries, electronics in S. Korea etc. Therefore, the oligopolistic nature of the market is dwindling in such cases. Hence, in the case of basic chemicals the technology market is less restricted and technology is available from a number of engineering firms and others on a license basis or otherwise. As a result, generally the developing countries are not facing much problems in the international market for technology due to the oligopolistic nature of the industry.

The GCC countries do not have sufficient number of scientists and technically skilled manpower to generate and sustain the level of technology desired. The MNCs involved in technology transfer in the base chemicals tends to take advantage of the situation because it necessarily weakens the
bargaining position of the GCC countries. This has found manifestation in the setting up of exorbitant prices by these companies for their equipment, machinery and other technical advices in the petrochemical projects in the region. Moreover, these projects need a large number of skilled technicians from outside because the MNCs deliberately utilize new and untested concepts for setting up these plants.

However, the oligopolistic nature of the market continues to exist in the production of intermediate and final petrochemicals. The developed countries maintain their monopoly over technology in the production of these products and they will make every effort to retain it. The GCC countries will face several disadvantages e.g. over pricing of inputs and machinery required, high costs of technology transfer etc.

Another issue, closely linked to this, is that of technological dependence. Infact, there are four key requirements for a developing country to attain advanced level of technology and technological independence. The first is an elite group or a class of people which is capable of identifying realistic technological goals and organizing the available human and material resources to achieve them. In addition, a country should possess an adequate number of scientists and technically skilled manpower to generate
indigenous technology and to absorb the borrowed technology. Third, sufficient amount of raw materials and capital is required to sustain the process of technological development. Fourth, the products of advanced technology should have a market. While the industrialized countries have a combination of all the four factors, it is missing in the GCC countries.

The GCC countries have included science and technology in their development plans and Saudi Arabia is leading among them. It has established various institutions and assigned them the role of formulating and implementing a technology policy. The other countries are also in the process of designing national science plan. However, all these countries have a shortage of scientists and technically qualified manpower to generate and absorb the technology. The problem is more acute in case of other GCC member countries as compared to Saudi Arabia. Saudi Arabian government has followed a policy of Saudization in all the petrochemical projects. They have also introduced several rules and regulations encouraging the participation of local people in the several industrial projects. However, the demographic patterns of these countries as well as the European countries show that the region is likely to face more problems in future due to shortage in the supply of people in technical and managerial fields. The local people are not interested in working at low levels due to the
rentier character of the economy. The massive oil revenues accruing to these people in the form of rent discourage them from working at lower levels where payments are comparatively less. Hence, these countries are dependent on expatriates not only at a high but also at lower levels.

Individually, the GCC countries have enough resources that positively contribute to the advanced technological development in these countries. Firstly, these countries possess natural resources that are marketable and can be processed into marketable commodities. Second kind of resource is capital, which can be invested in projects that expand the technological capacities of the country. Since these countries have appropriately decided to utilize the available raw material and develop the oil based industries e.g. petrochemicals, the technology required is highly sophisticated. They are well placed to bear the high cost of technology transfer. However, the petrochemical products will have to compete with other strong producers in the international market, so the GCC petrochemical producers will need to continue to depend on the most advanced technology in the field. Hence, technological autonomy is difficult to achieve.

The existence of a market for the products for which the new technology is being used, is also a prerequisite for the technological development of the region. The GCC
countries' local market is very small. Therefore, most of the petrochemical projects are export oriented. These countries have to confront the established producers in the petrochemical industry to carve out a share for their products in the international market. Hence, these countries have adapted a strategy of linking their exports to the collaborating multinational company. The company takes the responsibility of a sizable amount of production.

Therefore, the outlook for most of the GCC countries seems to be one of limited technological progress in the years to come, the major obstacle being the limited human resources. Thus, the GCC countries have a long way to go to gain technological autonomy.

The developing countries, in general, face the problem of inappropriate technology. The choice of the GCC countries' technology is distinct, shaped by the factor endowment of the region. Unlike the labour surplus economies, unable to draw extensively on the existing western technology because it is labour saving, the western technology is particularly suited to the factor endowment of GCC states. The petrochemical industry also enjoys one of the highest capital/labour ratios in the world. Investment per new job created is estimated at $20,000 to $100,000. Thus, apparently the capital intensive technology of the western world fits into the resource endowment of the region.
However, problems remain. As discussed earlier, the imported technology is accompanied by an ideology. Since the GCC countries are determined to preserve their Islamic values, ideals and ways of life, the imported technology is bound to create conflict. Certain changes are already visible. For instance, the women working in banks, schools etc. in Saudi Arabia, though these banks etc. are operated by these females and the customers are also females.

Leaving aside the socio-cultural aspect of the technology imported, there exists a relevance of autonomous technology in petrochemicals in the newly emerging countries. It is worthwhile here to give an example of Brazil. Brazil started an ambitious R&D programme in 1975 to utilize and produce technologies for alcohol, fuels and other alternative energy resources. The country produces a large amount of methanol. The national oil company of Brazil, namely Petrobra's developed a process at its research centre Cenpe's for the conversion of methanol to ethylene. This process has a high conversion rate of around 99 per cent. The Cenpe's process has also other advantages e.g. simplicity and flexibility of operation, infrequent catalyst regeneration etc. The Brazilian experience shows that the


developing countries can utilize their resources most efficiently through indigenous R&D efforts. The imported technology is not the final resort.

The petrochemical projects in GCC countries are intended to be vertically integrated with the global industry and this will influence the growth of indigenous technological base. It has been found that the GCC countries import intermediate and final petrochemical products from the industrialised countries and export them the primary petrochemicals. This will affect the development of indigenous technological capabilities in the long run. The profit margins are much higher in case of final products and it suits the resource endowment of the industrialised countries with high feedstock prices and high research expenditure. However, the newly emerging producers e.g. the GCC countries would prefer to expand their production capacities to the maximum and improve their economies of scale by moving into the production of specialty chemicals in the long run. This will be restricted by the dominance of MNCs due to their closely guarded technology in this sector of petrochemicals.

The trend in the demographic structure of these countries is likely to obstruct the process of technology transfer including its assimilation, adaptation, absorption and development. Therefore, the dependence on the industrialized countries is likely to exist in future.
However, the efforts made towards easing various obstacles in petrochemical industries development by individual GCC countries will have less force than coordinating these efforts. So a suitable technology policy, acquiring a regional profile, can enhance the competitive strength of the industry and the development process of the region. For instance, joint GCC efforts in marketing their petrochemicals would introduce greater international bargaining power in dealing with these problems. Regarding marketing, the joint GCC strategy can emphasize the following:

a. GCC countries should establish a joint marketing group that would assist in exchanging information on production and world prices, plus coordinate and plan for petrochemical sales. This joint financed group can also provide the industry with marketing research and similar services, to be offered by the producers of different petrochemical products. The group is to establish communications with traditional producers of world petrochemicals in cooperating and coordinating efforts that might result in future specialisation of market areas by the two parties.

b. These countries should consider investing in integrated marketing facilities such as building their own chemical tankers and establishing storage facilities in
different market regions. Saudi Arabia has attempted this strategy on its own. SABIC has commissioned a Japanese company, Mitsui O.S.K. Lines Ltd., to construct a 35,000 ton tanker to be used exclusively for imports. The establishment of transportation facilities and distribution centre is essential for integrating the industry, and eventually it will become a cost reduction factor increasing the degree of competitiveness of GCC petrochemicals in the world market.

c. GCC countries could increase their stake in western chemical companies. The Gulf Investment Corporation which was established in 1982 with $2.1 billion capital for regional and international investment, could consider this alternative in its investment plan. Some GCC countries have already engaged in buying equity shares in some of the well known chemical companies. Through purchasing equity shares in these and other international companies or by forming joint ventures abroad, GCC countries would make it possible to set a portion of their basic competitive petrochemicals to those companies as feedstock for their intermediate and final products.

d. The Arab world market provides a potential marketing area for GCC petrochemicals. As a unified group
within the Arab world, the GCC countries are to support cooperation within the Arab world. The reality of corresponding mutual interest among GCC countries and the rest of the Arab world is widely recognized. The benefit of GCC integration into a comprehensive Arab cooperative effort is not only from enlarging the market size for their petrochemical products, but also from cooperation with other Arab petrochemical producers, such as North African Arabian countries. These countries have been in the petrochemical markets long before the GCC entry, and have gained some marketing experience from which GCC countries could benefit.

e. GCC countries extend economic aid to the developing countries. GCC countries could alternatively provide aid to these countries by providing their needs for petrochemicals. However, the GCC governments should not involve their petrochemical producers in these aid agreements and should pay the value of the petrochemical aid to these producers as if they were sold internationally. This can increase the demand for GCC products.

PROBLEM OF EXPATRIATES:

The problem of expatriates can be eased by these countries jointly in two aspects. First, expatriates can be
better chosen to fit in with the host countries society. Second, the replacement of expatriates by GCC nationals can be intensified. The first effort takes a relatively shorter time to accomplish than the second one.

1. During the last decade, the GCC countries have encountered different types of expatriates and they have formed a better idea of those who have had minimum adaptation problem to their host countries and of those who have had more serious problems. Generally speaking, Muslim or Arab expatriates have tended to be more favoured socially because of the closeness and similarity of religions and cultural customs as compared with expatriates from other backgrounds.

2. Restrict the duration of stay for all expatriates to the period of their contract, which ought not to be more than five years. Extension of stay can be approved for those expatriates who have no recorded problems vis-a-vis their host country.

Development of GCC skilled manpower is the essential real solution to the problem of expatriate labour. This can be promoted by establishing large scale training programmes that would help build a base of GCC trainees needed for petrochemicals and other industries. Another consideration is women in most GCC countries are generally not employed in
the labour market except as teachers or physicians. The expansion of women's role in the GCC development process is unlikely to include petrochemical or the industrial sector in general. However, increasing the employment of women in government positions even if they are to work separately from men, would have a great effect on the total national labour force. The importance of women's involvement in the economic sectors is realised by all GCC countries, including the most conservative one, Saudi Arabia. Since the main religious and traditional concern is against males and females working in the same place, if such a mixed environment is avoided, the idea of women working will be less objectionable. In Saudi Arabia, for example, there are some commercial banks as well as some shops that are totally operated and dealt with by women and the customers are all women.

The Arab world, in toto, possess all the prerequisites for the growth of technological capabilities. Therefore the GCC countries should pool their available resources, harmonize their plans and establish joint projects and programmes for joint solutions to the common problems facing regional industrialisation.

Since the petrochemical industry in GCC countries is export oriented, it requires linkages with firms, well established in the international market. Therefore, co-operation with developed countries is a must. Prior to sharp
increase in feedstock and energy prices, the main motivation for co-operation between North and South was capturing the largest possible share in the markets of larger developing countries. The situation is different in case of NICs and specially, GCC countries. The expanding production capacity of their petrochemical plants shows that these countries are carving a bigger share for their products in the international market where the mutual cooperation between developed and developing countries is called for. Therefore, the new environment demands North-South co-operation in addition to the South-South co-operation which was considered to be the panacea of developing countries problems before.

Undoubtedly, the GCC countries have similarities in economic, social and political fields. However, differences remain. Saudi Arabia has certain advantages and capabilities to overcome the obstacles in their development programme, whereas the other countries of the region are in a comparatively weaker position.

Thus, issues in North-South technology transfer have changed qualitatively with the new international division of labour and emergence of NICs. Moreover, these have been shaped differently by the characteristics of the GCC economies in the GCC petrochemical projects.