

## CHALLENGES OF TECHNICAL COOPERATION IN THE PETROLEUM INDUSTRY

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### INTRODUCTION

The petroleum industry is unique in combining several distinct characteristics:

- (a) It deals with an indispensable component of industrialization, namely petroleum, which is both a major source of energy and a basic industrial raw material.
- (b) A major proportion of the consumers of the products of this industry are remote from the sources of petroleum and deficient in it.
- (c) Most of the net exporters of petroleum are among the less developed countries, which are highly deficient in technologies relevant to the petroleum industry.
- (d) It is highly capital-intensive.

These characteristics make petroleum the centre of concern of almost every country in the world; be it concern about managing the necessary funds to pay for its import (oil-importing, particularly developing countries); or securing an equitable value for it and making the best use of it in their socio-economic development (oil-exporting countries); or guaranteeing a continuous, secure, conveniently-priced supply of it (oil-importing industrialized countries). It is imperative, therefore, for a stable international world economic order that the petroleum industry be the subject of constructive cooperation among all the parties concerned.

A careful review of the historical evolution of the inter-relationship among the various players of the petroleum game reveals that we are heading, albeit slowly, towards this kind of cooperation. Yet, it had appeared at times that the world was plunging into destructive chaos over petroleum issues. A quick review of such developments is necessary in order to put the issue of technical cooperation in the petroleum industry in perspective.

### EVOLUTION OF THE OIL-PRODUCERS-OIL-CONSUMERS RELATIONSHIP

The first 50 years of the life of the petroleum industry have been characterized by the dominance of the major oil companies (transnationals) over all aspects of exploration, production, transportation, refining and marketing. Even levels of production and prices were set by the transnationals based on the main criteria of maximizing profits and enhancing consumption. No regard was paid to the national interests of the producing countries, either in conservation of their depletable resources, or in providing them with an equitable share of the wealth arising from this industry, or in technically developing these countries. The common suffering shared by the oil producing countries of the Middle East and Latin America enhanced cooperation in petroleum issues among these countries. Such cooperation resulted in the formation of the Organization of the Petroleum Exporting Countries (OPEC) in 1960. So OPEC was created in direct response to the absolute dominance of the transnational oil companies and to protect the legitimate interests of its member countries.

The developing oil producing countries struggled to get a fair share of their petroleum. OPEC provided a strong fortress in that struggle. Some revisions of the concession contracts were indeed realized. New concession agreements provided better (though unsatisfactory) conditions to the oil producing countries. However, it was only through their historic decision of 1973 that the developing countries of OPEC have been able to acquire effective decision-making control over policies related to their respective petroleum resources. One of the most significant elements of OPEC members' strategy to achieve control over their petroleum resources and maximize their economic growth has been Participation. The Participation concept meant the trans-

ference of the ownership of the oil companies in the member countries to the national government, which pays a fair compensation to the foreign companies for their assets. The foreign companies would enter into a service and management agreement with the national government to cover the technical aspects of exploration, development and production against certain fees and the right for oil lifting. The companies thus got a fair compensation for their services and a guaranteed supply of crude oil to satisfy their downstream operations and markets all over the world.

The initiatives taken by OPEC (and OAPEC) in 1973 in raising oil prices and imposing a partial limited embargo of oil supplies in the wake of the Arab-Israel 1973 war resulted in the emergence of the International Energy Agency (IEA). This enhanced the oil-exporting-oil-consuming countries confrontation for some time. Yet some of the principles adopted by the IEA were at the heart of the aspirations of the OPEC and other developing countries. These included energy conservation, environmental protection and promotion of cooperative relations with the oil producing countries and with other oil consuming countries, particularly those of the developing world<sup>1</sup>.

The bottom line of the basic aims of the IEA as spelled out in the following items was to have a secure permanent supply of oil<sup>2</sup>.

- Cooperation among IEA participating countries to reduce excessive dependence on oil through energy conservation, development of alternative energy sources and energy research and development.
- An information system on the international market as well as consultation with oil companies.
- Cooperation with oil producing and other oil consuming countries with a view to developing a stable international energy trade as well as the rational management and use of the world energy resources in the interests of all countries.
- A plan to prepare Participating Countries against the risk of a major disruption of oil supplies and to share available oil in the event of an emergency.

As years went by, tension and mistrust gave way to understanding and cooperation. Neither OPEC nor the industrialized consuming countries could unilaterally determine the price of oil. Like other commodities, the price of oil came to be determined by the laws of supply and demand. All parties concerned have learnt some hard lessons that made them appreciate the destructive effects that sudden

fluctuations of oil prices would have on the world economy.

We believe that the oil producer-consumer relationship has matured to the extent that each party realizes that to secure his best interests, he has to take the interests of the other party into consideration. Achieving a stable oil market with oil prices which assure a reasonable return to the producer and predictability to the consumer has been the aim of concerned oil producers and consumers.

The responsible behaviour of the OPEC and other producers has contributed to the stability of the world oil market. Responsible members within OPEC have played a major role in this stabilization. Saudi Arabia, in particular, has been the main contributor in this respect, by virtue of its leading position in the world as a major producer, exporter and owner of the largest world reserves. Saudi Arabia has filled the gap in world petroleum deficit during the Iraq-Iran conflict and during the Gulf war. The most serious test to the role of Saudi Arabia in stabilizing the world petroleum market was the Gulf war. The preparedness of the oil industry in Saudi Arabia, both in production facilities and refining, has saved the world from a major oil crisis and at the same time made fueling the machinery of the Gulf war possible. OPEC producers declared in Vienna on 29 August 1991, that OPEC 'stands for market stability and regular supply of oil to consumers'<sup>3</sup>. They called upon consumers to 'actively participate in the stabilization process' through action by the IEA by drawing upon accumulated stocks in consumer countries.

We believe that the present amicable consumer-producer relationship opens the door for long term cooperation in the technical aspects of the petroleum industry in ways that would contribute to the welfare of all nations.

### **THE INEVITABILITY OF TECHNICAL COOPERATION**

Petroleum is global in many respects. It is an essential source of energy, it is thus the blood of industry. It is the raw material for thousands of chemical industries. Science tells us that there are many more breakthroughs yet to be achieved in making new value-added products from petroleum derivatives. Moreover, although petroleum is much less polluting than other sources of energy that industrialized countries plan to use increasingly (coal and oil shales), yet pollution by petroleum and its products is a challenge that we have to cope with in

a world striving for a clean environment. The harmful effects resulting from pollution by petroleum are, in many ways, not restricted to the point or country that consumes or produces it. The Gulf war is a living example of this.

In the early days of the petroleum industry, foreign companies from industrialized countries would explore for oil and produce it in developing countries and transport, refine, and market it in the world markets. The producing nations remained alien to the technologies of the petroleum industry for a long time. They had to wait until they could accumulate the necessary capital to start some activities that would involve their national resource. They could then appreciate the need to come to grips with these technologies.

Take Saudi Arabia as an example. From the historic moment when oil producing countries started getting a reasonably fair price for their oil, Saudi Arabia has used its oil revenues to launch major national development plans that included unprecedented development of its oil industry. The huge amounts of natural gas that had been flared by the oil producing companies (3.6 billion cubic feet per day in 1980) were utilized as of 1980. A major source of pollution was thus closed and the world market welcomed the largest exporter of NGLs. The diversification of the economy away from its dependence on the export of crude oil by the way of value-added industrialization has led the Saudi Government to implement major industrial projects in the refining and petrochemical industries. The refining capacity has thus increased to 1.5 million bbl. per day. The Saudi petrochemical industry today commands 5–7% of the world installed capacity in bulk petrochemicals. Downstream integration has been achieved to a good extent, including joint ventures with oil companies in the consuming countries.

International cooperation in the technologies of the petroleum industry is inevitable, especially for the developing oil producing countries.

### **WORLD ASPIRATIONS RELATIVE TO THE OIL INDUSTRY**

It is fair to assume that the price of oil will continue to be determined by the natural laws of supply and demand, and that the interests of consumers and producers, or what the Saudi Minister of Petroleum and Minerals termed 'reciprocal security'<sup>4</sup>, will entice consumers and producers to work together for the stability of the world oil market. One would then be justified in believing that working for the follow-

ing aims would serve the world community in the field of petroleum.

- Finding more oil, through more extensive and more efficient exploration.
- Recovering more oil from discovered reservoirs. This requires enhancement of research and development in the methods of oil recovery, particularly enhanced oil recovery.
- Conservation of energy by making more efficient engines and fuels and by innovation in the methods of energy transportation and storage. This also should include avoiding wasteful practices.
- Finding more uses for oil and its products both as a source of energy and as feedstocks for the petrochemical industries.
- Developing supplementary and alternative sources of energy in preparation for the post-petroleum era.
- Adopting more efficient measures to protect the environment.

These aims have been pursued to varying extents by almost every country in the world, independently or through regional and international frameworks of cooperation. Most of them are among the announced goals of OPEC, OAPEC or the IEA. The motives of each group may be different. OPEC member countries advocate energy conservation and the development of alternative sources of energy in order to extend the lifetime of their oil reserves and not to be caught in the cold when their reserves are exhausted at a time when their energy consumption would be at its peak (as expected from their development plans). The IEA countries, however, hope to develop alternative sources of energy immediately, if possible, in order to reduce or stop their dependence on imported oil. We believe that their motives and consequently their strategy will change if they are convinced of the security of world oil supplies and the long term stability of oil prices.

### **TECHNICAL COOPERATION IN ENVIRONMENTAL PROTECTION**

The environmental aspects of the oil industry, however, enjoy the unanimity of the concern of all countries of the world. It is probably this field that could enjoy maximum international technical cooperation, since it directly affects the survival of the inhabitants of this planet. International cooperation has already shown itself in the several international gatherings on environmental issues, the ozone

agreement, international agreements concerning oil spills, and most recently the intensive efforts by all qualified parties in the world to put out the fires that have been devastating the oil wells in Kuwait.

It should be pointed out that the environmental hazards of petroleum, particularly as a source of energy, have been unduly exaggerated. The global warming and other warnings are not well substantiated. Moreover, the same sources that blame petroleum for environmental hazards of global dimensions advocate the development of more hazardous and more polluting sources of energy, namely coal and oil shales. The search for alternative sources of energy should not confuse environmental with political issues.

The oil industry has created environmental hazards that we have so far been able to cope with, to varying degrees of success. However, there is a lot to be done in the field of research and development and international cooperation in this respect. These hazards include oil spills either at the source or during transportation, loading and unloading; product hazards which include petroleum products (fuels) and petrochemicals; waste hazards and associated methods of disposal; and oil field fire hazards.

### **Oil spills**

Oil spills are by far the most serious and recurring environmental hazard associated with the oil industry. The history of the oil industry is spotted with oil spills. Outstanding among these are the Amoco Cadiz incident opposite the French Brittany coast in March 1978 and the Exxon Valdez oil spill in Prince William Sound, Alaska, in March 1989. The Amoco Cadiz incident resulted in the development of an integrated infrastructure for oil spill response in France<sup>5</sup>. Exxon employed over 11 000 people and the entire world supply of booms and skimmers to face the Valdez spill<sup>6</sup>. The primary lesson of the Exxon Valdez spill was that oil spill prevention and response technologies need substantial research and development<sup>7</sup>. According to the Alaska Oil Spill Commission, oil discharges of the size of the Exxon Valdez spill occur somewhere in the world every year<sup>8</sup>. We have had our share of oil spills in the Arabian Gulf. To name some: the Saudi Hasbah 6 in 1980<sup>9</sup>, the Iranian Nuroz oil field spill during the Iraq-Iran war (1983)<sup>10</sup>, and the huge unprecedented spill during the Gulf war (1991) which involved the discharge of over 10 million bbls of oil to the Gulf waters. We believe that this area of the petroleum industry does not involve any political

constraints or economic rivalries that would hamper international cooperation. It should therefore be given utmost priority. Joint R&D programmes should be launched involving regional or international concerned parties with technologists from the industrialized countries playing a major role.

### **Product environmental hazards**

Environmental hazards related to petroleum and petrochemical products have attracted a lot of attention and concern in recent years. Environment protection authorities, particularly in the industrialized countries, continuously revise the toxicity of various products and enforce the proper safety regulations. A series of regulations have been enforced on gasoline, for example, starting with phasing out lead compounds and extending to controlling volatility and amounts of oxygenates, etc. Controlling petrochemical products is a more complicated issue because of the increasing number of new compounds that are added every year to the list of these products. A tremendous amount of research is required to determine the toxicity of these compounds and consequently impose the proper regulations regarding their production and manipulation. Technology transfer and exchange of information are essential in this respect. Petrochemical companies operating in developing countries should be urged to impose the same measures of safety as those adopted in their home countries. The citizens' Right-To-Know relevant to the toxicity of the products manufactured in their neighbourhood should be extended to overseas operations.

### **Waste minimization and disposal**

Hazards associated with wastes produced in the petroleum industry are yet another nuisance. These wastes include liquid and solid wastes as well as off gases from industrial plants and refineries. Tremendous efforts are being made to minimize the harmful impact of such wastes on the environment. A common, healthy practice has been followed recently whereby an environmental impact assessment is made before a certain plant is constructed. More recently waste minimization practices have been applied to existing industries not only to protect the environment but also to improve the economics of the industry. Clean, non-hazardous processes or feedstocks have been used in place of hazardous ones. Recycling or finding an economic use for the waste or processing hazardous wastes to produce less harmful products or wastes are other measures that

have been applied. I may mention here that the largest operation in the history of the petroleum industry whereby hazardous industrial waste was converted into useful products with great economic gains, was realized by the Government of Saudi Arabia in 1980. Associated natural gas that was flared at the rate of over 3 billion cubic feet per day (100 000 tons of gas) was gathered through a huge network of pipelines and used to produce LNG liquids and to feed the Saudi petrochemical industry. Many industrialized countries require that chemical industries recover hazardous gases and process them into useful or unharmed products. Tremendous amounts of money are being spent on repairing the damage that improper hazardous waste disposal has caused. The American Super Fund programme is just one example<sup>11</sup>. The concern of the world community about hazardous waste disposal has been reflected in the recent Global Convention (1989) governing the movement of such wastes across national borders<sup>12</sup>. This has been a modest step towards protecting some developed countries from becoming the dumping ground for industrial hazardous wastes produced outside their territories.

### **Oil field fires**

Oil field fires constitute another environmental hazard. This is another area that requires intensive R&D work. The frequent fires in the North Sea and the more recent devastating fires in the Kuwaiti oil fields in the wake of Gulf war testify to the great need for international cooperation in developing the technology of oil-fire fighting.

### **TECHNOLOGY TRANSFER IN THE PETROLEUM INDUSTRY**

Technical cooperation in other areas of the petroleum industry, namely exploration, production, oil field development, and downstream activities, particularly refining and petrochemicals, may involve some controversy. The technologies in these activities are almost completely controlled by the multinationals. We have seen some joint venture and service contract agreements between the multinationals and the producing governments covering exploration and production. Joint venture arrangements also govern some refining and petrochemical activities (e.g. in Saudi Arabia). Another type of arrangement involves the establishment, by the multinationals, of partly or wholly owned subsidiaries to run their overseas industrial activities. The interests of the multi-

nationals and the host developing countries do not overlap completely. The compromise that the two parties strike, unfortunately, has been at the expense of the technological development of the developing host countries. The obvious motivation of the multinationals is to continue their technological dominance; and the point of weakness of the developing countries being their drive for fast economic development. R&D activities practically do not exist in the host producing countries associated with the joint venture or service contract deals. Subsidiaries invariably depend for their R&D requirements on their parent companies which conduct the major part of their R&D in their home countries. The industrialization of some oil producing countries under the present arrangement does not promise true technology transfer. Some governments tend to apply pressure by requiring R&D activities to be established in their countries relevant to joint venture or subsidiary industrial activities. One may advocate that industrial joint ventures or other business arrangements involving technology transfer should be required to include the setting up of laboratories and pilot training facilities in the oil producing countries so that the imported technology can be assimilated and, henceforth, serve as seeds for growing indigenous technology.

### **EPILOGUE**

We believe that enough common interest has developed between multinationals and some developing countries, especially those with market or capital abundance, which merits better recognition of the interests of the developing countries in acquiring technological know-how in the petroleum industry. This should be accompanied by some initiative on the part of the host governments in providing the proper soil that will receive the seeds of this technology.

One would hope that the partnership between the oil companies and the producing countries in the petroleum industry will produce partnerships in technologies related to the various aspects of the industry; partnerships that will hopefully involve hand-in-hand efforts that lead to innovation.

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