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**Global Preparatory Meeting for the Regional
Consultation on the Petrochemical Industry
in the Arab Countries**

Karachi, Pakistan, 10-13 December 1991

**REPORT OF THE ASIAN-ARAB PREPARATORY MEETING
FOR THE REGIONAL CONSULTATION ON THE PETROCHEMICAL
INDUSTRY IN THE ARAB COUNTRIES***

**Karachi, Pakistan
27-30 November 1989**

Prepared by

the UNIDO Secretariat

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PREFACE

The Second General Conference of the United Nations Industrial Development Organization (UNIDO), held at Lima, Peru, in March 1975, and subsequently endorsed by the United Nations General Assembly, recommended that UNIDO should include among its activities a system of continuing consultations between developed and developing countries with the object of raising the developing countries' share in world industrial output through increased international co-operation.

In May 1980, the Industrial Development Board decided to establish the System of Consultations on a permanent basis, and in May 1982 it adopted its rules of procedure (The System of Consultations, PI/84) setting out its principles, objectives and characteristics, notably:

- The System of Consultations shall be an instrument through which the United Nations Industrial Development Organization (UNIDO) is to serve as a forum for developed and developing countries in their contacts and consultations directed towards the industrialization of developing countries;
- Consultations would also permit negotiations among interested parties at their request, at the same time as or after consultations;
- Participants of each member country should include officials of governments as well as representatives of industry, labour, consumer groups and others, as deemed appropriate by each government;
- Final reports of consultations should include such conclusions and recommendations agreed upon by consensus among the participants; the report should also include other views expressed during the discussion.

Thirty-eight consultation meetings were convened since 1977 covering petrochemical, fertilizer, pharmaceutical, capital goods, iron and steel, agricultural machinery, leather and leather products, vegetable oil and fats, food-processing, industrial financing, training of industrial manpower, wood and wood products, building material, etc. In regard to the petrochemical industry, three consultation meetings were held in Mexico City 1979, Istanbul 1981, and in Vienna 1985.

During the second session of the General Conference of UNIDO, which was held in Bangkok, Thailand, 9-13 November 1987, a number of Arab delegates expressed the desire to hold a petrochemical regional consultation in the Arab countries. Both the Arab Industrial Development Organization (AIDO) and the Organization of Arab Petroleum Exporting Countries (OAPEC) expressed the desire to co-operate with UNIDO in organizing such a consultation. This desire was also expressed by the Gulf Organization for Industrial Consulting (GOIC), an intergovernmental Arab Organization.

In the framework of UNIDO's co-operation programme both UNIDO and AIDO have agreed in their communiqué of 18 February 1988 to jointly implement, in co-operation with OAPEC, a regional consultation on the development of the petrochemical industry in the Arab countries.

A preliminary meeting to this consultation was held in Baghdad, 19-20 February 1989 and the first preparatory meeting was held in Vienna, 26-29 September 1989 where a set of conclusions and recommendations were reached including the commitments of co-operating organizations to undertake a number of studies for the consultation. The meeting also agreed to accept the generous offer of the Pakistani authorities through PERAC to host the Asian-Arab preparatory meeting in Karachi, Pakistan 27-30 November 1989.

I. Opening

The meeting was inaugurated by the chief guest, Begum Nusrat Bhutto, Senior federal Minister, Government of Pakistan. While welcoming the delegates from Asian-Arab countries, Begum Bhutto appreciated the thoughtfulness of countries blessed with the wealth of oil for using this wealth for the development of their industrial base and their contributions in the overall industrial development in the region.

She said petrochemical products have become a necessity of every day life both in the developed and the third world countries because of their ready acceptability by the consumers. Up to recently, western countries have supplied most of the petrochemicals to the world markets, but with the coming on stream of new complexes in the Middle East, the position is now fast changing. It is an encouraging development. She further said that by the beginning of the next century, Arab countries would have a population of some

250 million. If the basic needs for food, clothing and housing were translated into terms of intermediate and consumer commodities manufactured from petrochemical products it would be clear that the Arab regional market offers ample opportunities.

The need therefore for better industrial planning and a common market strategy is a must to reduce dependence on the western market. The regional consultation on the petrochemical industry in the Arab countries and the deliberation which would take place in Karachi, she stressed, would closely look into these aspects.

She indicated that in Pakistan development of the petrochemical industries has been slow, but with its sizeable market, raw material such as natural gas and by-products of oil refining, availability of skilled manpower and other infrastructure, the future of this industry is very encouraging.

She said that the present peoples government of her country attaches high priority to the industrial development of the country; and an industrial policy package has been formulated with a view to overcome and remove the bottlenecks faced in the implementation of industrial projects. The environment, therefore is very conducive for private investment in Pakistan and on behalf of her government she assured all the reasonable help and assistance to investors both foreign and local, who would like to come and invest in the industrial sector of Pakistan.

In the end she appreciated the efforts of UNIDO and State Petroleum Refining and Petrochemical Corporation (PVT) Ltd. (PERAC) for organizing this important meeting and expressed her confidence in the successful outcome of the meeting.

At the opening of the meeting, Mr. M. Chaudhry, the chairman of the State Petroleum Refining and Petrochemical Corporation (PVT) Ltd. (PERAC) welcomed the chief guest and delegates, and remarked that this meeting is not only of wider Asian-Arab regional importance but also bears great significance to the economic development of Pakistan. He applauded UNIDO's services to bring developing and developed countries together to discuss problems, promote closer understanding and explore means of co-operation, co-ordination and integration of the petrochemical industry in the Asian-Arab regions.

He further said that although Pakistan lacks financial resources, it has vast resources in the form of raw materials, skilled manpower, suitable infrastructure and market. He added that the State Petroleum Refining and Petrochemical Corporation (PVT) Limited which has the mandate to promote and develop chemical industry in Pakistan has carried out a number of studies; and that the bulk of this information can be beneficially utilized by foreign and local investors for setting up the industry in Pakistan, and PERAC would be pleased to discuss joint ventures in this connection.

Mr Naseer Ahmed, Acting Secretary, Ministry of Production, Government of Pakistan in his address said that this meeting is indeed a very important one and vital to the industrial growth of each one of our countries.

He said that the Asian-Arab region possesses enormous potentials and therefore an interregional integrated approach for the development of petrochemical industry in the region is required for the benefit of all. In Pakistan he said we are actively pursuing our development plans for the petrochemical sector.

The present democratic Government of Pakistan has taken the industrial growth as an item on its priority list and therefore liberal policies of investment have been adopted by our government towards securing the trust of private investors.

And finally, the representative of UNIDO, System of Consultations Division, in his inaugural address said that the petrochemical industry has played a vital role in the development of world economy and the wide range of its products has enriched economic welfare of humanity at large. He said so far UNIDO has organized three petrochemical consultations on a global level but at this stage it is preparing for the first regional consultation in this industrial field. The Arab region has been chosen for this consultation because of the particular advantage it has compared to the other regions such as the availability of large quantities of natural gas and crude oil, relatively easy access to investment capital, and still untapped potential markets for consumption.

He stressed the need at the policy level for the Arab petrochemical industry: firstly to integrate this industry in the national economy for its

effective contribution to the total accelerated economic growth of the countries concerned; and secondly for effective co-operation, co-ordination and integration within the Asian-Arab region.

He said although a considerable degree of economic and technical co-operation exists at present between the Arab region and other countries in the continent of Asia and the Pacific, there is still ample scope for further co-operation.

He pointed out that representation at the Karachi meeting is very wide in scope and represents varying interests of the Arab region and Asia as a whole and therefore it is expected to lead to meaningful suggestions/recommendations which would form a good basis of discussions in the forthcoming regional consultations.

II. Election of Chairman and Vice Chairman

Dr. M. Chaudhry, Chairman of the State Petroleum Refining and Petrochemical Corporation (PVT) Ltd of Pakistan was elected Chairman of the meeting.

Mr. Abdullah Y. Al-Abdullah, Director of Planning, Kuwait Petrochemical Industries Company and Mr. Khaled Boukhelifa, Deputy Director of Petrochemical Industries, Algerian Ministry of Mines, were elected as Vice-Chairmen.

III. Adoption of the Agenda

The agenda of the meeting was adopted. (Annex I)

IV. Presentation by UNIDO's representative

At the first working session the representative of UNIDO, System of Consultations Division, highlighted the objectives of the Asian-Arab preparatory meeting and briefly reviewed the background of the System of Consultations Division. He then presented the summary of the outcome of the first preparatory meeting held in Vienna, 26-29 September 1989 bringing into focus the main issues and topics selected for the Regional Consultation on the petrochemical industry in the Arab countries, namely:

- Co-operation, Co-ordination and integration in the field of petrochemicals;
- Marketing of petrochemicals;
- Impact of technology
- Development of infrastructure;

He also pointed out the importance of the Asian-Arab interregional preparatory meeting to discuss/exchange views on and explore possible means and modalities of co-operation and co-ordination in the field of petrochemical industry on national, regional and interregional levels.

Finally, he outlined the salient points and conclusions of the draft background paper which was prepared by UNIDO Secretariat in co-operation with the Arab Industrial Development Organization (AIDO) for the regional consultation on the analysis of the development of this industry, particularly in the developed countries and in the Arab countries indentifying opportunities for investment in certain products. He also pointed out that the Arab organizations co-operating with UNIDO in the preparation for the regional consultation have agreed to prepare a number of documents to support the issues to be discussed at the consultation. He expressed his appreciation to OAPEC and GOIC in this regard.

V. Statement on present status and future prospects of the petrochemical industry in the Asian and Arab regions

A brief review of the present status and future prospects of the petrochemical industry in the Arab region was presented by the representative of the Arab Industrial Development Organization (AIDO) illustrating the general trends and accomplishments of the petrochemical industry in the Arab region, indicating the main feedstocks used, product orientations, capacities, production, consumption, potentiality and future prospects. He also clearly pointed out the characteristics of the Arab petrochemical industry as being mainly based on ethane feedstock and therefore a limited variety of products with the absence of basic and intermediate petrochemical products required for the manufacture of synthetic fibers, synthetic rubber and other aromatic based materials.

AIDO's representative also indicated that although numerous

possibilities of co-operation exist yet no practical mechanism is available to realize them. These facts call for intensive marketing studies with special reference to Asian-Arab markets for basic, intermediate and manufactured petrochemical products where consumption potential and substitution policy should be considered. Emphasis was also made on the importance of the downstream industries which require less complicated technology and could be of higher profitability and are labour intensive.

VI. Petrochemical industry in the Asian countries

Participants from Asian countries (Pakistan, Malaysia, Indonesia, India, Sri Lanka and the Republic of South Korea) have briefly reviewed the status of the petrochemical industry and its future prospects in their countries. They have also indicated the possibilities of regional and interregional co-operation in general. Some Asian countries had declared their readiness for specific areas of interregional co-operation; Pakistan called for joint venture investment in Pakistan, and India's representative expressed the willingness of India to share their experience in technology absorption achieved in different petrochemical plants with other countries who have, in turn, same technology for mutual benefit. During the discussions, participants from Asian countries have reflected their views on the development of the petrochemical industry in general and on the specific issues of co-operation, marketing, impact of technology and the development of infrastructure. Details of these viewpoints are presented separately under each item discussed in the summary of the discussion (Part VII).

VII Summary of the discussions

After a brief review of the status of the petrochemical industry in the Arab and Asian countries including a review of the participants and organizations concerned, the presentation of a comprehensive introduction by UNIDO's representative on the nature and objectives of the consultation meetings, a review of the outcome of the three global petrochemical consultations convened in Mexico, Istanbul and Vienna in 1979, 1981 and 1985 respectively and the objectives of the Asian-Arab meeting which was organized in preparation for the regional consultation on the petrochemical industry in the Arab countries scheduled to be held in 1991, the discussion was opened to the participants.

Participants agreed in principle that the issues selected for the regional consultation on the petrochemical industry in the Arab countries represent the most important and essential topics for the development of this industry regionally and interregionally.

Some participants raised the question of benefits gained by developing countries from these consultations and what are UNIDO's contributions. It was explained that many countries have efficiently utilized UNIDO's model contract for the petrochemical industry. In this respect, it was indicated that Indonesia alone has saved about one-hundred million US Dollars and Kuwait has achieved fruitful contracts in a much shorter time of negotiation by adopting the principles of UNIDO's model contract.

UNIDO's representative also commented that UNIDO has offered technical assistance to developing countries such as Pakistan; however, the most important objective of the consultation is to provide a forum to help developing countries in discussing their problems, identifying obstacles, finding practical solutions and organizing themselves.

The representative of the Arab Industrial Development Organization (AIDO) stated that AIDO has put a lot of weight on the petrochemical consultation. He added that the petrochemical industry is a vast industry, its products are innumerable, and no single Arab country could actually produce all its products. This fact lends itself to further regional and interregional co-operation. The point raised in this respect is to thoroughly examine the question as to which country should produce which products. For instance, oil and gas rich countries with adequate financial resources may orient themselves mainly to produce basic and intermediate petrochemicals while labour intensive countries are to focus on downstream manufacturing units. He finally called for closer co-operation between the Arab and Asian regions on the basis of identifying specific projects and areas for such co-operation and asked if UNIDO could help in conducting market surveys to this effect.

Many participants have indicated that lack of adequate information is a hindering factor to the development of the petrochemical industry and to fruitful co-operation and co-ordination regionally and interregionally. They emphasized the importance of establishing a data bank for promoting the

development of this industry and enhancing co-operation between developed and developing countries and among developing countries themselves.

One participant indicated that permanent arrangements are required for setting up a data network and a forum for exchange of experience in this field. There is a lack of adequate co-operation and co-ordination between the various petrochemical fora operating in this area. He proposed that a small group be formed to prepare for this work until 1991 when the consultation will be convened.

Co-operation, co-ordination and integration

In the context of co-operation, co-ordination and integration in the field of petrochemical industry in the developing countries, UNIDO's representative pointed out that the historical background of petrochemical development in these countries indicated that this development was based on the utilization of locally available raw materials, particularly natural gas; and hence it started with little interaction or integration with other sectors of the national economy or with other regions. The second historical condition on which this industry was developed was the fact that it took account of high prices of oil and other feedstocks, a fact which is quite different today. He also referred to the lack of co-operation and integrated action between producers of basic and intermediate petrochemical products and the processors of these products.

AIDO's representative emphasized the need for co-operation in the development of the petrochemical industry and cited examples of some developed countries where in spite of the severe national competition one could clearly notice, on the other hand, the close co-operation among the producers in sharing joint facilities such as pipelines, shipping terminals and other common activities in order to maintain the competitiveness of the industry. Another participant supported this view and emphasized the indispensability of co-operation.

A participant remarked that regional co-operation schemes between his country and neighbouring countries were initiated by setting up a joint venture company "Gulf Petrochemical Industries Co. (GPIC)" between his country, SABIC from Saudi Arabia and Kuwait Petrochemical Industries Co. (PIC)

to produce and market ammonia and methanol. He added that production from both units amounted to 771,625 metric tonnes in 1988 which was 16.9% above design capacity.

A participant from a country partner in this scheme commented that mutual co-operation between groups of countries should take into consideration the specific interest of these countries.

Many participants supported the principles of co-operation provided that it be based on reference to specific and concrete problems. OAPEC representatives stated that various elements of co-operation should be identified and needs and capabilities of each region matched against each other. Ways and means would have to be developed to deal with this problem. One representative supported co-operation and suggested to exchange information on marketing and on sources of funds. Another representative emphasized on production sharing as being the leading element in co-operation followed by investment and then by other elements. A third participant stressed that the real problem of co-operation is lack of information and that there is an urgent need to move forward in information sharing. He added that in the context of the Organization of Islamic countries a number of products have been identified and feasibility studies have been made, but nothing has been achieved. A representative supported the need for information exchange and suggested the utilization of UNCTAD's work on the establishment of mechanism for database focal points before launching regional or global information networks. She indicated that her country has established a working relationship for the exchange of information with SABIC. AIDO's representative proposed that UNIDO might work out an outline and mechanism for co-operation in production and marketing for basic, intermediate and final petrochemical products. A participant supported the establishment of an information centre for South/South co-operation, while other participants found it more practical that UNIDO be the focal point of such information and until such time when a South/South centre could be established.

AIDO's representative also stated that numerous possibilities of co-operation exist, many of which have been already posed in this meeting; and hence it will be necessary to call on UNIDO to study, work, and outline a practical mechanism for fruitful co-operation and co-ordination in production, marketing and information, taking into consideration the aspect of comparative

advantage for production of basic, intermediate, and manufactured petrochemical products with a view of maximizing the use of local resources and of vertical and horizontal integration. He also mentioned that when discussing co-operation and co-ordination in production, it should be noted that basic petrochemicals involve high investment and high technology while downstream industry yields higher profitability and is labour-intensive. In this respect, he requested UNIDO to prepare project profiles for downstream products to encourage expansion of petrochemical use, especially in agriculture, clothing, construction, and housing.

The representative of one Asian country stated that co-operation, co-ordination and integration in the petrochemical industry is very important, both at home and abroad. In his country all petrochemical managers have monthly meetings to discuss problems related to plants operation particularly to safety and training and to exchange of information on their future plans. The government instructed petrochemical companies to organize safety committees and report on results achieved. He finally hoped that all countries having petrochemical plants meet periodically and exchange information since there is a global interdependence in this industry.

One representative pointed out that in the development of the petrochemical industry, there are many areas of co-operation in investment, equipment supply, technology transfer, engineering, training, trade and R & D, etc. She singled out training and hazards and environment control as being specially amenable to co-operation. She also added that as a part of planning the petrochemical industry in her country, they have been securing the development of inputs required for the petrochemical sector taking special care of manpower development at all levels, including the setting-up of institutes for higher management for this industry, institute for safety management, and petrochemical data services. She added that now when these services are in place they could be extended for further regional and interregional development.

ESCWA's representative stated that the UN and other regional and interregional organizations could act as a catalyst or promoters of co-ordination, co-operation and integration efforts; however, it is necessary to have a permanent platform, a type of organization or establishment which will allow present effort to continue and to develop further.

One representative suggested that UNIDO should be the focal point for organizing co-operation in information-sharing and the creation of a regional information centre to be supported by member countries.

Marketing of petrochemicals

Many participants emphasized the importance of developing the internal markets of the developing countries by expanding the downstream processing industries and increasing the application of polymers in sectors of the economy such as communication, food, pharmaceuticals, construction, apparel, agriculture, etc. Some participants pointed out that customs and tariff barriers are far too high and even prohibitive at times to allow the national development of local markets. One representative pointed out that his government's policy was based on the premises of creating a big internal market by expanding the downstream petrochemical processing industry to such a degree that it will make it feasible to build a world scale petrochemical complex; therefore the local markets would be able to absorb a certain share of the production for the viable operation of the complex. A participant from an Asian country referred to the importance of availability of information on supply/demand balances and the crucial role of imports and difficulties associated with it at times. She pointed further out that they share information with SABIC in this field.

UNCTAD's representative emphasized the importance of regional marketing studies and a mechanism for a data base to be established for the purpose of appointing focal points on trade and fora for exchange of information as part of such mechanism. He also pointed out that statistics on trade in petrochemicals in Arab countries are not readily available, which makes it difficult to study and to develop the markets. Another representative stated that marketing also involves feedstock which is a non-renewable resource and the policy of his country is to look towards the satisfaction of the needs of downstream industry; and in case of excess availability of basic and intermediate products then look for export. He added that, in the first place, they study domestic supply (import substitution). He mentioned that 94,000 tons of PCV was imported so far but now local production started. He also pointed out that it is interesting to look at dumping practices; he noted that after they started production prices of import were lowered unreasonably.

The UNCTAD representative enlightened the participants about a recent survey they have conducted in one of the developing countries which is a leading producer of petrochemicals. Main problems facing this industry were summarized as being: poor infrastructure, small local market, absence of funds for market expansion, non-tariff restrictions, high customs duties in the developed countries, lack of adequate market information, and disregard for the advantage of trade agreements.

Many participants felt that a global system of trade would be very useful and beneficial, and that global negotiation on this aspect would help developing countries.

ESOWA's representative emphasized the importance of information availability and called for the establishment of regional organizations with the help of UNIDO to act as catalysts. He added that information should be conceived as part of a system. He also emphasized that the internal market is an extremely important factor in development of petrochemicals.

One participant suggested to have world wide discussion on the supply/demand situation in the 1990's.

A number of participants emphasized that marketing is interconnected with a host of other issues; such as co-operation, impact of technology and the development of infrastructure. One participant supported this view and pointed out that they need to create a proper climate for implementation and for the creation of proper conditions for exchange of information. He also added that his country has considerable experience in joint ventures but it is important to create a large market for which we should co-operate without finding need to crush each other. Many participants referred to the positive role of barter and joint ventures in marketing.

AIDO's representative pointed out that marketing strategy should be linked to production and pre-investment planning. In studying market possibilities in the developing countries studies should not be restricted to figures of actual demand but should also include potential consumption and the substitution possibilities. Finally, he stated that UNIDO could form a working group to prepare a market study for petrochemical products with special reference to Asian and Arab markets.

Another representative from Kuwait mentioned that it is important to study changes in the world petrochemical industry and identify factors that may have a great impact on its future course such as:-

the shift of major producers away from commodity chemicals towards speciality petrochemicals, such as engineering polymers, composite materials, and biopolymers;

- since the major producers are pulling out of commodity petrochemicals and others (oil and gas rich countries) who have an economic advantage, might have to play greater role in current technical support and R & D activities geared to process and product improvement which were normally provided by the multi-national corporation. Thus, commodity petrochemicals would have to be taken up by the new producers who need to share up own R & D and technical support activities; and

- the presence of environmental regulations is producing shift of manufacturing facilities to less developed countries.

One participant also pointed out that establishing a petrochemical complex in any area need to consider economic advantages and disadvantages of each country or region on the basis of feedstock, consumption, infrastructure, finance, trade regulations and tariff, and manpower.

In addition, he pointed out the importance of the exchange of information and experience where UNIDO could act as a centre for receiving and distributing information to each country.

The representative of OAPEC outlined the main elements of the marketing study (impact of the Arab petrochemical industry on world markets) which his organization is preparing as a contribution to the regional consultation. The study will cover:

- a brief review of the current status of the petrochemical industry in the Arab countries and prospects for its development up to the end of this century;

- production and consumption of major petrochemical products in the Arab region (plastics, methanol, NTBE, etc.);

- review of the petrochemical industry in major regions of the world (installed capacities, projects which are expected to be operational by 2000);
- production, demand and excess/deficit of major petrochemicals in various regions;
- import and export (current and potential) of major petrochemicals from the Arab region to various regions of the world;
- analysis of current and future impact of Arab petrochemicals on world markets.

The representative from ESCWA pointed out the need for the establishment of an information system to handle data base type systems which not only collect data, but analyze them to the extent of serving the downstream end of the petrochemical industry. He added that such an effort will help in organizing co-operation, co-ordination and integration through the different levels and spectrum of the petrochemical industry. He also stated that scientific and technological efforts should start with emphasis on the problem of consumer market expansion in the region to ensure the maximum use of petrochemical products in local markets, and that such efforts will lead to product development and internal market development.

One representative observed that the meeting sees the wisdom of setting up joint ventures where up-stream industries are concentrated in resource-rich countries and downstream in countries with a large market and a wide human resources base. But appropriate incentives supportive to this effort must be discussed, possibly in the forthcoming meeting in Tunis.

Another representative reviewed the conditions of their petrochemical plants and indicated that the production would be directed mainly to the domestic market with some surplus to be exported to countries in the region. He also mentioned that Malaysia would continue to examine the possibility of building downstream petrochemicals such as aromatic and ethylene derivatives, methanol- and ammonia-based petrochemicals, depending on the local, regional and international markets for consideration.

A representative from an Asian country stated that permanent arrangements

are required for a data forum since there is no adequate co-operation and co-ordination between the various fora working in this field to serve both producers and consumers. He suggested that maybe a smaller group could be established for this purpose and report to the consultation in 1991. This group (committee) could act as a depository for data which are to be presented to decision-makers. He added that the proposed market survey should be extended to include identification of investment projects. He proposed that greater co-operation between the Islamic Development Bank and UNIDO should be forged in the field of economic co-operation and integration in the petrochemical industry in particular in trade and marketing of petrochemicals. The petrochemical industry, he noted, is most amenable to horizontal and vertical market integration.

Another representative from the same country stressed on the importance of identifying sources of petrochemical supplies to the Asian-Arab regions and to establish Asian-Arab petrochemical joint venture facilities and added that a common market similar to the one in the EEC could be thought of. Improvement of demand/supply balances would also entail better co-ordination with ASEAN countries. The same representative called for extension of downstream petrochemical processing industry and increasing their field of application offering them special incentives such as soft loans and buy-back arrangements.

Impact of technology

It was unanimously agreed that the impact of technology is of utmost importance in the development of the petrochemical industry, and participants pointed out the constraints and difficulties involved in this area.

Participant from an Arab country raised the issues of national prestige, pressure from outside to concentrate on certain areas, pooling resources among several countries on certain prospects and the lack of integration between national producers, R & D centres and academic institutions. He proposed that it would be useful to have a blueprint for adapting locally developed technology at the production scale and to concentrate on new technology, particularly electronics (UNIDO might co-sponsor a workshop for this purpose). He cited the example of UNIDO's Genetic Engineering and Biological Center established in Italy.

The participant from ESCWA emphasized the need first for a data and information system on a national level which would set the basis to co-operate on a regional level. He pointed out that although there are many scientific research activities at national levels they were not enough to create a critical mass for effective results to be achieved. He also stated that scientific and technological efforts should start to concentrate on the problem of consumer market expansion so as to ensure the maximum use of petrochemical products in local markets. Also efforts should be made to elevate the level of teaching science and technology as to be able not only to prepare engineers and scientists but also to create centres of excellence for scientific R & D. He also pointed out that advanced engineering is vital for petrochemical plant construction, in particular engineering design and manufacturing.

Many participants have indicated that adequate financial resources are not available for R & D activities. Participant from one country agreed that R & D requires a great deal of experience. In his country the problem in R & D is the low level of investment. The investment as percentage of output remained at 0.99% in 1986 compared with Japan's 2.8% in 1985. He also referred to the trends in developed countries where they concentrate their efforts on producing technology intensive and high value added products. He added that R & D required to be focussed on specific areas such as engineering plastic and fine chemicals.

The participant from one Asian country also indicated that they have ample manpower but lack financial resources for R & D. He suggested that some special fund be established for this purpose and the results of R & D thus supported be patented in the name of funding countries and be freely available for information sharing.

One participant stated that petrochemical industry is identified as a thrust area for development in her country. In dealing with co-operation in the field of technology she said that it could broadly be divided into three areas, namely technology absorption, application development by the and processing industry, and process technology development.

She pointed out that her country has done considerable work in application development of polymers in agriculture, building and construction,

furniture and engineering applications (automobiles & electronics) and is willing to share their experience on a mutual benefit basis. She also added that her country has plastic research centres in each state of the country and offer numerous courses on polymer science.

OAPEC's representative said that processing industries are in continuous development, particularly in polymer production, project design, engineering design, etc. This implies necessity for developing national engineering design capabilities and licensing.

Some participants proposed the setting up of a fund for information sharing and to cover the cost of R & D. Compensation for R & D effort will be on competitive grounds.

A participant from another country stated again that in technology sharing, specific problems are to be identified such as the impact of electronics on plant operation.

He added that ties between research centres and companies should be strengthened, and consideration should be given to safety and environmental effects. He also concluded that the best way to co-operate is to get people of the same interests together (for marketing, R & D, operations, etc.) because no regional groupings exist. UNIDO could help in organizing such a meeting.

The ESCWA participant drew attention to the negative impact of the new technological advances on the developing countries since the propagation of some of these technologies will largely affect prices and consumption of raw materials and semi-finished products produced in these countries.

AIDO's representative proposed that UNIDO should prepare a study on trends in technological development in the petrochemical field.

One representative has indicated her country's achievements in process development and mentioned that they have successfully commercialized indigenous technology on benzene extraction (two plants running) and in the process of commercialization of xylene isomerization.

ESONA's representative pointed out that the development of petrochemicals requires advanced engineering activities in design, etc., urging concerned governments and organizations in the region to encourage the establishment of such activities. He also emphasized the need for engineering skills in basic research leading to pilot plant designs and then to scaling-up to commercial sizes.

He then referred to the environmental effects of the construction of petrochemical projects in any location, which must be thoroughly evaluated, considering both the direct physical influence and the far-reaching implications of the use of its products and modes of disposal. Combatting the negative socio-economic effects must also be objectively evaluated.

He drew attention to the activity of the UN Center for Science and Technology for development in the fields of science and technology and the assistance it extends to developing countries, in particular its activity in the Advanced Technology Alert System (ATAS), which studies the new advanced technologies and their implications.

A representative from an Arab country stated that:

- It is useful to have a blue print for adopting locally developed technology at the production scale (India could prepare such blue print);
- Emphasis should be placed on new technology like electronics, particularly advanced control and informatics and suggested that UNIDO might co-sponsor a workshop on this subject;
- The intracountry connection between scientific institutions and the industry (operating companies) must be encouraged and fostered as well as contact between countries in the region;
- There should be special emphasis on new products and technology in petrochemicals. The example of the International Centre of Genetic Engineering and Biologicals established by UNIDO and IIT in Trieste and New Delhi is a useful example to copy.

The representative from another Arab country indicated that in his

country there is a hydrocarbon research centre to which all fertilizer, petrochemical, petroleum and oil refining companies are associated. There is also a special institute for hydro-carbon sciences which also caters for all African countries. A polymer department exist in one of the oldest research institutes in his country (20 years old).

Another participant from the same Arab country indicated the need to create a documentation centre for the petrochemical industry covering the Asian and African region where roster of capabilities of the different countries are kept and disseminated. He suggested that in order to avoid duplication, R & D activities should be distributed to countries of the region by specialization. A programme for the exchange of experience and plant visits could be initiated as well as the creation of joint venture engineering companies and an Arab trading company.

A representative from an Asian country stressed the need for the development of special institutions to deal with research and development and on the need to establish proper linkage at grass root level between the universities and industries in each country as well as between government and institutions dealing with R & D.

Development of infrastructure

It was established by the participants that inadequate physical, human and organizational infrastructure presents a real handicap for the development of petrochemical industry in developing countries.

One representative stated that infrastructure should be considered as a whole, not only its physical component. For example, creation of regional institutions for training in the petrochemical industry, research institutes for polymers, marketing research activities, engineering design, downstream industries adopted to the real consumers needs and the issue of environmental effect at plant and product level (biodegradable polymers and recycling) also belong to the creation of infrastructure.

Another participant called for the utilization of regional experience for management training instead of going to the developed countries. He also proposed encouragement of the recruitment of local labour.

Another participant from the same country stated that safety and hazard studies must become a mode of operation in all petroleum & petrochemical plants. He also supported the issues of safety, environmental control and manpower training, particularly middle management.

The representative of one Asian country pointed out that infrastructure such as railroads, ports, storage facilities, etc. are extremely important for setting up and operating P.C. plants. He added that his government had made a considerable investment for building the required infrastructure facilities in order to reduce the private sector's financial burden. Consequently, domestic consumers would be able to purchase low cost petrochemicals and consequently, he recommended others to do so.

Another representative has emphasized the importance of training and exchange of experience. He pointed out that complete dependence on international organizations or companies caused them unnecessarily high investment rates for their plants because such companies, as he stated, look after their own interests and not the benefit of developing countries. Therefore he called for creating a regional technical grouping to assist in studies, design and implementation of petrochemical projects.

The issue of sharing the cost of infrastructure was also brought to the discussion where participants felt that it is not fair or correct if the cost of infrastructure is not shared by other sectors. The petrochemical industry in developing countries would lose its competitive edge if it had to bear the total cost of infrastructure at grass root level.

Representatives at the meeting agreed that the minimum requirements of infrastructure should be considered from the beginning in plant cost.

One participant stated that the main problem in his country is transportation because of the fact that it is composed of so many islands.

Another participant pointed out the social benefit the petrochemical infrastructure brings to society as a whole, an aspect which should be considered in the cost/benefit analysis of petrochemical plants.

One participant urged UNIDO to do more in the field of development of

human and financial infrastructure. She also mentioned that the field of environmental hazards and safety is very amenable to co-operation.

Another representative emphasized the the need for training programs which should be arranged so that the trainees could widen their knowledge in specialized fields. Also, opportunities should be made available for on the job training of technical staff. Facilities should exist for exchange of technical personnel among member countries for training purposes; and finally he suggested holding seminars for exchanging ideas and views to be organized in the member countries. He pointed out that educational programs for training purposes should be in accordance with the countries' needs with attention to the environmental implications arising from petrochemicals.

In the context of manpower planning, one representative pointed out that they have a central institute for plastic engineering and tools; and additional courses in operations are being organized in the industrial training institute for preparing technicians for the processing industry.

On the individual country level, one representative remarked that at sub-regional, regional and interregional level public awareness on the importance of the petrochemical industries should be stimulated, and that universities and high-standard specialized institutions could act as a pivot or boot strapping mechanism to prepare engineers and scientists of high standard as well as to serve as models for other higher education institutes in these regions.

He added that perhaps one of the important items in building the infrastructure for petrochemicals is effective marketing reserach studies. This will serve the industry in its different stages of development and in future forecastings and foreseeing developmental activities. Such activities could also handle the data base.

The representative of one Arab country called to pay attention to safety and environment as part of infrastructre.

Other Issues

In addition to the four issues mentioned above several participants

expressed the desire to add new elements to be further discussed at the forthcoming global preparatory meeting.

Several representatives suggested that socio-economic factors emanating from pollution, environmental protection and recycling should be included. Another representative stressed upon the need to include manpower development in the infrastructure issue. A participant called to attention the danger to the environment associated with the transfer of waste from developed to developing countries and its dumping.

Many participants referred to the need to include financing as an issue of major importance.

VIII Conclusions and recommendations

1. There was a general appreciation of the work done in the first preparatory meeting and of the background document prepared by UNIDO on "The Development of the Integrated Petrochemical Industry in the Arab Region". The participants expressed their concurrence with the set of the issues selected by the first Preparatory Meeting which was held in Vienna, 27-30 September 1989, namely: co-operation, co-ordination and integration; petrochemical marketing; impact on technology; and petrochemical infrastructure.
2. It was generally agreed that no matter what issue is to be considered, there is a need to provide and share adequate information to all the countries in the region to help them formulate proper policy with regard to co-operation, co-ordination and integration including marketing and production sharing, joint venture, financing, technology and physical and human infrastructure, training and R & D, etc.
3. It was also agreed that the petrochemical industry lends itself more than any other industrial sector to sub-regional, regional and interregional co-operation particularly with regard to production sharing both on horizontal and vertical levels.
4. It was pointed out again and again that the meaning of integration in the petrochemical industry should not be limited to vertical integration within the bounds of the petrochemical industry alone but should be extended to other economic sectors in which this industry plays an important role. It was emphasized that this industry and its products play a positive role as an agent of economic development across all sectors and activities on the national level. Indeed, it was pointed out that when developing this industry one would be better advised to start from the bottom line by first developing the downstream processing industries to serve such vital sectors as shelter, clothing, food, water management, construction, health care, etc., and move upwards into the intermediates and basic petrochemicals. It was pointed out that the petrochemical industry contributes to development of both the national economy and assures its own development.
5. Due to the scientific base of this industry and its fast technological changes, its dynamic linkage with R & D institutions and with the academic and scientific community was thought to be essential for ensuring its development

on a continuous basis. Furthermore these linkages would have to be backed up by adequate technical services such as engineering design, consulting and national capabilities to manufacture and fabricate equipment and components.

6. There was a general agreement that proper action would have to be taken to strengthen and maintain public awareness regarding the social and economic impact of petrochemical industry and its products on the environment and safety.

7. Under the issue of co-operation, co-ordination and integration it was felt that such co-operation should be based on clearly defined objectives of mutual benefits to the co-operating parties. Moreover, co-operation should cover the whole range of activities related to the petrochemical industry such as investment, trade, marketing, production sharing, training, technology development, etc. It was pointed out that co-operation in the establishment of petrochemical plants or in production sharing or in marketing would afford the participants in such scheme opportunities to reap the benefits of economy of scales and thus improve efficiency both at the producer and the consumer ends.

8. In order to make co-operation possible it was generally felt that a proper system or network of information be created to serve particularly the Arab-Asian region or if possible other regions as well. Such a network should be made readily available to all countries, producers, consumers and other beneficiaries in the region(s). Information would be particularly effective for co-operation in areas where sharing of high cost and pooling of scarce resources are needed such as the establishment of new petrochemical complexes, regional engineering services, equipment manufacturing, centres of excellence, etc.

9. It was emphasized that marketing information and transparency of supply/demand balances in various regions and in countries within the regions were essential for the identification of investment opportunities in this sector. It was also indicated that in this area international organizations such as UNIDO, UNCTAD, the regional commissions and other governmental and non-governmental organizations could play an important catalytic role in the organization and provision of fora and systems for the exchange of information and experience. It was pointed out, however, that there should be established

on national/regional and interregional levels proper institutions to take care of these activities on a permanent basis.

10. It was indicated that appropriate fora may have to be established to perpetuate co-operation on a permanent basis and to institutionalize this important activity and expand its scope of coverage on a continuous basis. It was further indicated that experience shows that little benefit would be achieved if discussion on co-operation were maintained at the general level. In order to make it more effective there is a need to focus on specific action, fields, systems and modalities i.e. to move from talking about petrochemicals in general to specific products or processes and to move from speaking about removal of trade barriers in general to those related to specific products and countries. To do this it was felt necessary to undertake in-depth and serious studies in various fields related to the petrochemical industry such as regional survey of markets and identification of investment opportunities at the level of specific projects.

11. Two aspects of marketing were thoroughly discussed, the first relates to the creation and consolidation of the internal markets in order to substitute imported products to release the burden on foreign exchange, on the one hand, and to replace traditional products and thus preserve scarce natural agricultural and forestry resources and make them available for other economic uses on the other. The expansion of the internal markets requires the adoption of adequate national policies in favour of developing the downstream petrochemical processing industry. Availability of local research and development and back-up services facilities are essential for the growth of downstream petrochemical industry both in existing fields of application and in developing new ones in response to the requirements of the local market.

12. Several experts pointed out in this field the danger of dumping practices and price manipulation which hamper the development of the national market. A policy with regard to providing adequate incentives, removal of tariff and non-tariff barriers and bureaucratic restriction on import and licencing would be needed to allow the free expansion of the downstream petrochemical processing industry.

13. The second most important point discussed under marketing relates to regional and international co-operation and co-ordination as well as

production sharing, vertical and horizontal integration. Co-operation in these fields would result in mutual benefit to both consumers and producers in the region or across the regions. Adequate and transparent information are needed to draw up effective marketing strategies. Several experts expressed their desire to exchange such market information and indeed their preparedness to provide case studies in this field in their own countries. The creation of an appropriate network of information, on marketing, possibly through the assistance of UNIDO, UNCTAD and other international and regional organizations, would be of advantage to the countries concerned. It was also pointed out that there is need in the region to harmonize policies regarding tariff and nontariff barriers in order to create a conducive climate for co-operation and confidence building which are important for market expansion.

14. Under the item of technology transfer and development it was generally agreed that the petrochemical industry, being a science based and technology intensive sector, requires both producers and processors to take adequate provision to keep abreast on a continuous basis with the rapid technological development involved in this industry. In order to ensure this it would be necessary to establish on national level adequately equipped R & D centres to cater to processors and producers alike and to be able to advise producers and adapt products according to the needs of the consumers.

15. Whenever possible specialized R & D centres should be established to serve specific needs of the national economy such as R & D centres for plastic in agriculture and water use and management, for construction or for engineering plastics, etc. The important role of these R & D centres in ensuring the application of international standards quality of products to satisfy the need of the end users was emphasized. Moreover, it was pointed out that adequate linkages would have to be established between R & D centres and industry as well as between R & D centres and the universities and other specialized institutions. In view of scarcity of financial and skilled human resources and the need to avoid unnessecary duplication, co-ordination between the various centres indicated above was thought to be of paramount importance.

16. It was also felt that creation of centres of excellence in R & D on national or preferrably on regional level would be important to the development of this industry particularly with regard to basic research in polymers and their application and in engineering designs and manufacturing.

Such centres would have the capacity to transform laboratory produced scientific results to pilot plant operation scale which may be adopted at a later stage to commercial production.

17. It was pointed out by several experts that there is a need to study the impact of emerging technologies on the future development of this industry. Such study would need to consider such impact at both ends; the feedstock needed for the production of basic and intermediate petrochemicals on one end and the consumer products on the other. For the latter part emphasis would have to be put on its impact on the environment and quality of life.

18. As far as the development of petrochemical infrastructure is concerned it was pointed out that this would have to be considered in its entirety which includes all its components such as feedstock, human, organizational, technical and financial infrastructure due to the strong linkages among these elements. Due to the very high initial cost involved in the creation of such infrastructure as well as the cost consequential to its failure, the experts pointed out that proper planning would have to be strictly observed to secure the provision of appropriate infrastructure before starting the construction of a petrochemical plant.

19. It was also pointed out that since physical petrochemical infrastructure also serves the national economy and social welfare in addition to the petrochemical industry, it would not be correct to appropriate the whole of its costs to the petrochemical complex alone. Doing so would in many cases render petrochemical complexes established in developing countries uncompetitive with similar plants in developed countries where most elements if not all such infrastructure is readily available. Socio-economic benefit cost analysis would thus have to be applied in evaluating the viability of petrochemical plants in developing countries. Horizontal integration of the petrochemical industry on a regional or sub-regional level was considered as one mean to minimize the cost of infrastructure related to the petrochemical industry.

20. In the development of the human and organizational infrastructure emphasis was put on the need to develop appropriate training facilities at technical, managerial and scientific levels and to establish the proper linkages between these institutions at a sub-regional and regional level. The

assistance of international organizations - such as UNIDO and the regional commissions was thought to be important in helping in the creation of such institutions and their use for training. Institution building at this level should also involve the creation of mechanisms for appropriate linkages between universities, R & D centres, industry and other scientific institutions. It was pointed out that adequate government financing should be provided to equip and maintain the operation of such institutions at an effective level.

21. In preparation for the forthcoming global preparatory meeting the following action arising from the above conclusion may be considered.

a) As a follow-up to this Preparatory Meeting it was agreed that the forthcoming global preparatory meeting should consider in addition to the above-mentioned issues and points the recommendations which are stated hereafter. It was also agreed that the duration of the meeting should be extended by one day to a total of five working days since it was felt that the agenda for this Preparatory Meeting was too tight. As far as the date of the global preparatory meeting is concerned it was agreed that it is not necessary to have it in May next year as suggested before but at a later date in order to allow for adequate preparation of the background papers which are to be prepared by UNIDO, UNCTAD, OAEPC and GOIC. This is in addition to the desire expressed by some member countries to prepare case studies or position papers on the petrochemical industries in their countries. Provisionally it was thought that the meeting should be convened some time in the third or fourth quarter of 1990 in Tunisia as indicated before, or at another location if conditions do not allow it to be held there.

b) Considering the importance of information for the promotion of regional and interregional co-operation in the petrochemical industries at all levels ~~request~~ UNIDO in co-operation with UNCTAD and other regional organizations to study the feasibility of establishing a system of information which could be developed into a regional and interregional information network at a later stage for consideration at the regional consultation meeting on the petrochemical industry in the Arab countries.

c) In order to facilitate the process of effective regional and inter-regional co-operation request UNIDO and the other co-operating organization (AIDO, OAPC, GOIC) as well as UN regional commissions to prepare specific market surveys and in various regions with a view of identifying supply/demand balances, opportunities for new joint-venture investment on sub-regional and regional levels and providing basis for planning of new units, assessing their competition and/or their integration on regional and sub-regional basis.

d) In view of the unanimous conclusion and recommendations of the Vienna preparatory meeting and this Asia-Arab meeting recommend that the main issues for the regional consultation should remain: co-operation, co-ordination and integration; marketing of petrochemicals; impact of technology; and petrochemical infrastructure with due consideration to the additional points raised in the discussion at this meeting. Countries are invited to prepare background documents on the petrochemical situation in their own countries to reinforce these issues. UNIDO is requested to synthesize the conclusions and recommendations of these case studies.

e) In view of the rapid technological trends in this industry UNIDO is requested to study the impact of technological changes on both feedstocks and consumer products on the future development of the petrochemical industry in developing countries. Particular reference should be made to environment protection and safety.

f) It is recommended that national governments should take adequate steps to establish/expand/reinforce R & D centres and scientific institutions dealing with the petrochemical and hydrocarbon industry and to ensure that adequate linkages between R & D centres, the industry and universities and other scientific institutions are established. It further requests UNIDO to help in the establishment and expansion of such centres on national and regional levels on request of member states. Regional centres of excellence could provide valuable services to the industry.

g) Appropriate mechanism should be established to ensure the availability of appropriate forum for the exchange of information and experience on all aspects of the petrochemical industry. UNIDO and other specialized international and regional organizations could act as a catalyst for the initiation of such mechanism with a view of its future development into self sustained entities.

ANNEX I

AGENDA OF THE MEETING

Monday, 27 November 1989

9:00 - 10:30 Registration

10:30 - 12:00 Opening of the meeting, election of the chairman and
 adoption of the agenda

14:00 - 15:30 First Session:

Brief review of UNIDO's activities in the consultation
in general and for the petrochemical industry in
particular with special reference to this meeting and
its main objectives (to be presented by the UNIDO
Secretariat).

16:00 - 17:30 Second Session:

- Brief presentation of present status and future
prospects of the petrochemical industry in the Arab
Region (to be presented by UNIDO, AIDO, OAPEC, GOIC)
- Review of preparation for the regional consultation
and progress of work to be implemented by the
co-ordinating and other regional organizations

Tuesday, 28 November 1989

9:00 - 10:30 Third Session:

Discussion on the main issues of the consultation -
co-operation, co-ordination and integration - with
special emphasis on Asian-Arab co-operation

11:00 - 12:30 Fourth Session:

Continuation of the discussion on main issues -
marketing of petrochemicals

14:00 - 15:30 Fifth Session:

Continuation of the discussion on main issues -
impact of technology

16:00 - 17:30 Sixth Session:

Continuation of the discussion on main issues -
development of infrastructure - and discussions on
follow-up activities for the regional consultation.

Wednesday, 29 November 1989

9:00 - 10:30 Seventh Session:

Discussion of recommendations regarding the final selection of the main issues and topics for the consultation as well as other related matters

11:00 - 12:00 Eighth Session:

Discussion of the agenda for the global preparatory meeting in Tunisia

14:00 Ninth Session:

free - (preparation of the report of the meeting by the Secretariat)

Thursday, 30 November 1989

10:00 - 12:00 Tenth Session

Adoption of the recommendations and closing of the meeting

Friday, 1 December 1989 and Saturday, 2 December 1989

Visits to plants and other sites in Karachi, Lahore and Islamabad

ANNEX II

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ANNEX III

LIST OF DOCUMENTS

- Report of the first preparatory meeting on the Regional Consultation on the Petrochemical Industry in the Arab Region
- The Development of Integrated Petrochemical Industry in the Arab Region