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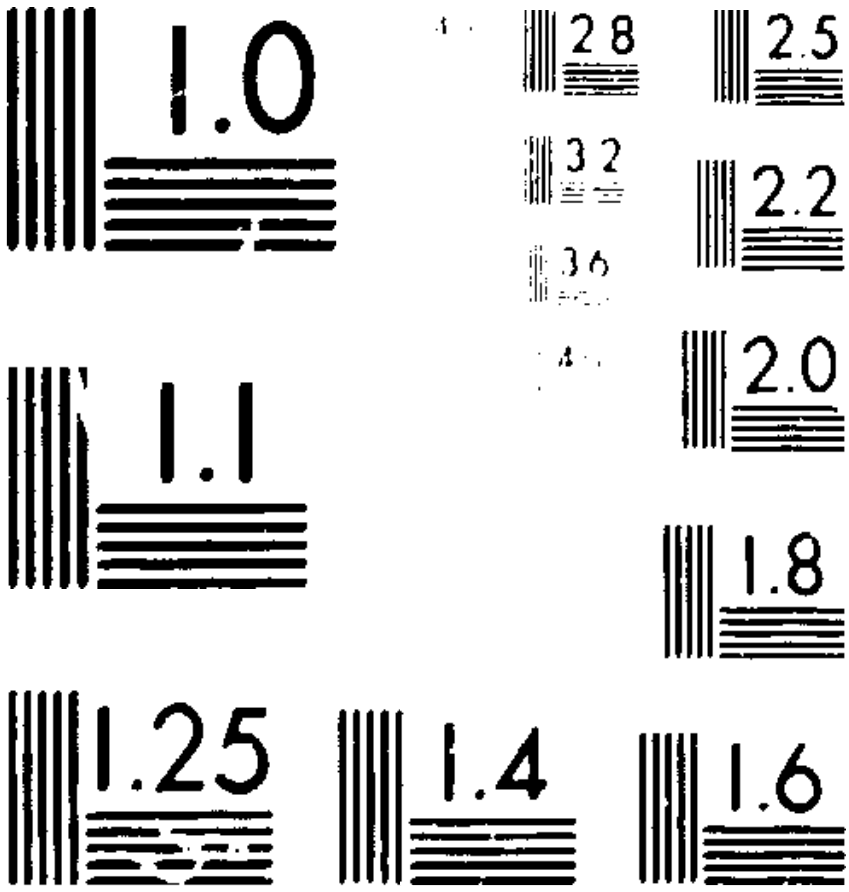

United Nations Industrial Development Organization

Experts Group Meeting on
The Petrochemical Industry in the ECWA Region
9-12 June 1981, Vienna, Austria

Sponsored jointly by:
United Nations Industrial Development Organization (UNIDO)
Economic Commission for Western Asia (ECWA)

DRAFT

REPORT (Petrochemical industry, ECWA region)

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592

List of Contents

I. Objectives

The objectives of the meeting was to investigate, analyze and determine the basis for a policy guideline and criteria to be applied in formulating an optimal production and investment strategy for the petrochemical industry in the Arab world.

II. Organization

The meeting, organized by the Joint ECWA/UNIDO Industry Division of ECWA and the Sectoral Studies Branch, Division of Industrial Studies (UNIDO), was held at the International Centre (Building C) in Vienna from 9 - 12 June 1981.

Seven experts from the ECWA region participated in the meeting in their individual capacities. Representatives of five international organizations and bodies also attended the meeting (Annex 1).

The working language of the meeting was English. Documents to the meeting including background and working papers was prepared independently by ECWA and UNIDO, although close consulations on major issues and contents of the studies took place between the two organizations (Annex 2).

The agenda for the meeting was agreed upon during the opening session, and followed through (Annex 3). In the closing session, a summary of discussion prepared by the Secretariat was reviewed by the meeting with the view of ascertaining important issues that need to be pursued further.

III. Opening session

The meeting was opened by Dr. Abd-El-Rahman Khane, the Executive Director of UNIDO, who was introduced by Mr. I. Angelov, Head of Sectoral Studies Branch. After welcoming the participants, Dr. Khane noted the importance of the Petrochemical Industry as one of the most dynamic industrial sectors and as one of the main subjects of consultation between the developed and the developing countries. He pointed out the importance of the industry to the ECWA member states since most of them are currently undertaking ambitious plans for its development and stressed the importance of the role that the region will be playing in this

context towards the end of this decade.

Dr. Khane drew the attention of the participants to the importance of this meeting in view of the prospects of developments of the petrochemical industry in the Arab states and its future influence on both micro and macro economic levels, which will influence the global context of development of this industry. In affirming his views, he noted briefly the radical changes in the structure of cost of production of basic and intermediate petrochemicals in favour of feedstock, which in turn, shifts the emphasis from the market to the feedstock supply sources when considering new locations of petrochemical plants. Furthermore he noted the changes that were undergoing the market due to the economic recession of the 1970's which resulted in a deep decline in the demand for petrochemicals specially in the developed countries. In conclusion, Dr. Khane emphasized that restructuring of the petrochemical industry on a global level should proceed on the basis of mutual understanding, co-operation and joint action between developed and developing countries in order to ensure the healthy development of this industry in the future.

Following Dr. Khane's opening speech, Mr. Ribhi Abu El-Haj, Chief of the Joint ECWA/UNIDO Industry Division, delivered the address of Dr. Mohamad Said Al-Attar, the Executive Secretary of ECWA. He stressed the importance of the petroleum based industry to the oil producing countries particularly in the ECWA region since most of these countries have rather limited natural resources aside from oil. But due to the advanced technological and skill reguirement of the petroelum based industries, this industry drawn largely on production and technology resources available in advanced countries, resulting in the development of technological skills in this industry in isolation of the rest of the industrial sector, a process which in turn has failed in leading to a cumulative process of growth of the economy as a whole. In this context, Mr. Abu-El-Haj stressed the importance of the regional dimension to the development of this industry and hence, of regional co-operation to insure a strong internal technolgocial and production base in the near future and a stronger and more durable entry into the international market in the longer run. He went on to point out the aspects of co-operation and coordination that should be included in the overall regional framework. Finally, he emphasized the complementary of regional

co-operation and the overall global strategy for the healthy development of the petrochemical industry in the Arab region.

IV. Introductory remarks on major topics

A. The prospect of developing the petrochemical industry in the ECWA region

Mr. Tariq Al Khudayri made a presentation of the ECWA position regarding the ways and means of speeding the development of the petrochemical industry in the Arab states. In this connexion, he introduced a list of issues which appear to be most relevant for consideration at the meeting.

For each of these issues, some specific points offer practical and useful suggestions for regional co-operation. Furthermore, they were requested to advise ECWA on the selection of a limited number of issues that merit detailed analysis and/or serious consideration by the decision makers in the Arab states at subsequent meetings.

In the course of his presentation, Mr. Al Khudayri made brief statements as to the prospect of developing the petrochemical industry in the Arab states, referring to the changes in this industry's structure on a global level in the 1970s and their features which included:

1. the slower growth rate in demand that resulted in over capacities in the main developed markets although the increase in feedstock prices were not readily transferred to the final products, a fact thatresulted in below-cost sale prices of many products and a noticeable closure of old plants in certain product areas in the developed countries;

2. the change in production costs in favour of feedstock and energy costs as a result of the uncertainty regarding security of feedstock supply that led to stalling investment decisions for new capacities in developed areas particularly where environment protection policies are strict and costly, thus encouraging the establishment of future capacities near hydrocarbon resources;

3. the shift in the ownership structure of the industry where oil majors were increasingly moving towards the downstream industry at the expense of traditional major chemical producers, thus inducing further

integration of the industry and closer co-operation between petroleum and chemical companies (MNC);

4. the increasing role of governments in the developed countries in supporting traditional producers, particularly in some Western European countries and in Japan, with reater protectionist policies by increasing tariffs and non-tariffs barriers against petrochemical inputs from developing countries. favouring the imports of only raw materials.

In analysing the potentials and constraints in the Arab states with regard to this industry, the availability of feddstock resources and financing capabilitites were considered the most favourable factors. The important factors which might constitute some obstacles in the way of developing this industry in the Arab states were cited as:

1. the difficulties in marketing the products because of
   - the limited national markets which may not sustain economic size complexes independently;
   - the difficulties in penetrating the developed market mainly due to trade barriers, and
   - the difficulties in competing with traditional suppliers in other regions.

2. low technological capacity because of
   - the shortage of skilled manpower to accommodate the high technological requirements of the industry, particularly on a national level in most countries;
   - the lack of adequate physical infrastructure, and
   - the ineffective institutional set-up and policy instruments relevant to the development of this industry.

In defining the requisites for developing this resource-based, export-oriented and higly technology/capital industry, remarks were made regarding
- the oligopolistic nature of this industry on a world-wide basis which necessitates its planning within the context of the petroleum sector as an integrated industry;
- the nature of assistance rendered by developed regions in the context of co-operation arrangements between Arab enterprises and firms from

developed regions which in general have been confined to the sale and construction of production facility and arm-length operation technology with limited provisions for assistance in marketing to enable an effective entry into the world market, and the minimum stipulation for efficient technolgy transfer process

that leads to higher level of technological independence of the Arab States;

- the size of the Arab States regional market for products and inputs that might ensure a substantial outlet to justify a minimum scale economy which assists in developing other economic sectors;
- the importance of a regional approach in designing a mechanism to catalyze the development process of the industry, and provides an effective utilization channel for the limited technological resources.

Furthermore, a reference was made to the important and relevant recommendations adopted by most regional meetings regarding the main parameters and areas of a regional approach in developing this industry, i.e.

i) the establishment of joint Arab enterprises for the production and/or marketing of petrochemicals;

ii) co-operation arrangements with the view to:
   - encourage increased consumption of products on a regional basis;
   - formulate a strategy with respect to target markets, feed-stock processing and pricing policies, trade negotiation, etc.
   - improve inter-regional trades;
   - exchange marketing and technological information

iii) the participation in a regional technological system that leads towards the development of technological capacity for a more effective role of the indigenous skills in the planning and implementation of petrochemical projects;

iv) investing in specialized regional institutions (for marketing, engineering, training or research) that would be instrumental in developing this industry.

The limited progress attained in realizing effective co-operation in this field was attributed to the absence of instituted programmes to follow on these recommendations. The scattered attempts made to propagate fruitful common positions on this subject remained merely an academic exercise, even though there have been some successful attempts for collaboration between certain regional organization in defining critical issues where regional co-operation would be imperative. The short fall of most attempts was related from the cutset to the omission of a follow-up procedure and a proper mechanism in the pursuit of an action-oriented programme.

After a brief enumeration of the risks attached to investment in the petrochemical industry and of the factors influencing the absorption capacity of the Arab States in developing this industry, Mr. Al Khadayri presented the issues which ECWA felt were to get prior consideration at the meeting, namely:

1. Marketing, potential and constraints
2. Low technological capacity
3. High cost of production and distribution
4. Regional co-operation

B. UNIDO Second World-wide Study on the petrochemical industry: a process of restructuring.

The study was introduced by Mr. J. A. Ghani. He indicated that the study has concentrated on the analysis of the restructuring process that has been taking place in the industry particularly since the mid 1970s and the main factor effecting this process and the tendencies appearing thereof.

The study established that the growth of demand of the developing countries on products of the petrochemical industry during the 1980s will be nearly twice as high as that of the developing countries. The number of developing countries producing petrochemicals during the period 1979-1987 will nearly double, i.e. will reach 27 to 30 countries. The share of developing countries in the increase in demand during the period 1979-1990 will range from 20-50 per cent on thermoplastics, a little over 50 per cent for synthetic fibres and some 25-30 per cent for synthetic rubber. In the meantime supply in developing countries will grow at faster rates than demand but in spite of this they will remain dependent for mayor part of their demand on developed countries.

In discussing prices and cost structures the UNIDO study has shown that prices of petrochemicals during the 1950 and 1960s have been falling relative to other manufactured energy. But since 1973 radical changes in the price structure have occurred and this tendency is expected to be irreversible. Close analysis of the cost structure of 16 petrochemical products in developed and developing countries locations has shown that most of these products could be competitively produced and marketed in developed countries. Sensitivity analysis of the comparative costs of production has further shown that by 1985 the competitivity of these products in developing countries will improve substantially.

Mr. Ghani pointed out that measures of co-operation between developed and developing countries should be initiated to facilitate the flow of these economically produced products to developed coutries. Mr. Ghani indicated that trade in petrochemicals has increased in value by 20 folds during the period 1950-1970. Most petrochemicals are traded within a captive market (more than 80 per cent). It is expected that there will be a change in the trade structure, whereby the share of new producers from the developing countries will substantially increase. The study

further noticed that the structure of tariffs in the developed countries is so constituted that it discourages the exports of intermediate and finished plastics coming from developing countries and that there is a need to ease tariffs and effect a change in their structure. A common negotiation between developed and developing countries is warrented.

Analysis of the feedstock situation shows that the industry will continue to rely primarily on crude oil and natural gas for its feedstock and energy supply during the 1980s and 1990s. It further shows that critical supply situation of feedstock has hastened the restructuring process in favour of those who control the supply, namely the major oil companies. The potential of a motor fuel/feedstock remains to be a possible danger that may confront the petrochemical industry. The tight feedstock situation has also encouraged the search for alternative feedstock which is going full steam ahead though with limited success as a competitor to oil and gas on economic ground. Feedstock flexibility has become a stand practice in the industry.

When technology was considered,it has been indicated that basic and intermediate petrochemical technologies has achieved a certain degree of plurarity while speciality petrochemicals are closely guarded by patent protection. As a result of the restructuring process in the petrochemical industry major chemical companies are moving towards speciality products leaving basic and intermediates under the control of the major oil companies and major independent state assisted companies. The future trends in technological development is expected to take the same direction. No major technological breakthrough is expected to take place in the 1980s. It was stressed that it exists a need for the improvement of conditions of technology transfer to developing countries.

The last chapter of the study, Global co-operation in the petrochemical industry, shows that the deep structural changes are in process in the petrochemical industry. The main beneficiary from this process are the major oil companies. In the meantime the oil exporting countries will gradually become a major partner in the petrochemical industry, particularly in basic and intermediate petrochemical production. There is a need for co-operation between the oil producing countries, the developed countries and the other developing countries in order to ensure the future development of the industry on a smooth basis. Such co-operation could best be established on the basis of the

collective management of interdependency which would ensure the security of supply of feedstocks, the opining of the markets of developed countries to petrochemical products. Two approaches were proposed: a meeting OPEC countries and other developing countries to be followed by one between developed and developing countries.

C. Important topics for consideration

To facilitate the Meeting in achieving its objectives, the experts were invited to:

- Analyze the demand and supply projected to the years 1980-85-90;
- Review the factors influencing the absorptive capacity within the Arab states in determining priorities and procedures for phasing the implementation of petrochemical projects;
- Analyze the risk attached to the investment opportunities on a national and regional level in the Arab states, in particular those related to international monopoly, technology transfer, production and product distribution cost;
- Draw guidelines to assist future regional (Arab) and international consultation meetings in determining certain issues that require co-ordination and collaboration;
- Examine ways and means to acquire a share of the world market;
- Discuss the form of co-operation among the Arab states for the acquisition of the suitable technology and production facility;
- Outline the basis in developing a joint-venture for consideration by some or all Arab states for the production and marketing of petrochemical products.
- Make recommendations as to strategies to be adopted by the developing countries for the development of the industry in their regions;
- Elaborate on the form of co-operation between developed and developing countries and among developing countries to enable the orderly development of the industry for the mutual benefits of all concerned.

- Review the ways and means to facilitate the marketing of the developing countries of petrochemical products in the markets of the developed countries including long-term marketing arrangements, lifting of tariffs and non-tariffs barriers on the basis of multinational negotiation;
- Propose the forms of co-operation between developing countries including the establishment of regional and bilateral production and marketing petrochemical enterprises.

V SUMMARY OF DISCUSSION

A. Supply/Demand Projections

Remarks were mde in regard to projections of supply and demand appeared in the UNIDO study. Some experts pointed out that projection figures as reported were rather confusing and in some cases, supply-demand balance is not clear or logically explained. Also it was suggested that as it is the case with most projections, these data were not to be used as basis for policy making pertaining to new investment. In this respect, ECWA noted that projection figures constructed by different studies for the last 10-15 years vary considerably, and on the average, appear to be on the high side.

UNIDO projection of supply was based on existing, planned or committed capacities as of April 1980. In considering the discripancies between supply and demand figures, it was agreed that there should be a distinction between demand and consumption, with the emphasis on consumption as far as end products are concerned vz demand for basic materials which is usually based on downstream processing industry needs as a captive market.

In general, projections of supply seem to be rather nigh according to some participants, while others thought that projected figures for demand might have been underestimated. The last argument was supported by few experts who referred to the drive of traditional suppliers in building new capacities at a time when they calim that there were excess capacities in comparison to demand. To this must be added the fact that a great percentage of the existing capacities (supply) in the developed countries are absolete and may have to be deleted from the supply side.

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Irrespective of projected supply and demand and market situation some experts felt that petrochemical producers in the Arab states might not find it hard to sell their products as long as they use their strong position as major oil exporters. Furthermore, it was pointed out that a major factor to break through the international market would be in building more capacities particularly in view of the expected shift in production trend in traditional producing areas toward specialized products.

An appropriate mechanism to effect fast development of new capacities in the Arab states could be a strong leverage in negotiating trade agreements with developed markets. However, it was the opinion of few experts that an aggressive approach would in effect disrupt the market and instead, entry into the market should be made in an orderly manner.

At one point, the idea of disrupting the market was questioned by one expert who felt that the developed markets might be closed to the Arab producers and it is better to look into the open markets of developing countries. This would merit sound analysis of supply/demand projection according to the same expert.

UNIDO's position with respect to the development of an approach to effective marketing was to look into ways and means to insure markets for developing countries without disrupting the world market, particularly in view of the favourable competitive position of these countries in the world market. Furthermore, it was suggested that traditional producers were likely to understand the situation and the advantageous position of the oil producers and be willing to negotiate better arrangements for

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developing the indu-try near oil resources, especially as far as basic products are concerned.

It was also pointed out that bilateral negotiation might be fruitful when directed toward the addition of specific products to the GSP[1/] list. The GSP could be an effective instrument in promoting marketing, especially when considering that no multilateral arrngement within the context of GATT were envisaged in the near future. In this respect some experts identified the weaknesses attached to the GSP in comparison with the GATT negotiation mainly due to the restrictive measures usually imposed on imports from outside custome unions inititating the system. Moreover, a general approach surpassing the bilateral and product by product approach covered by the GSP might be more fruitful and inducive to this industry.

Trade barriers are quite prohibitive according to few experts, and in order to negotiate arrangements to deflate their effect, competitive production position, both cost-wise and quality-wise would be needed as one of many tools within the context of a long-term strategy. These tools could be moe effective if they are used by the Arab states collectively.

It was felt by the experts present that supply/demand projections indicated the possibility for Arab states to establishment of new production capacities. Their positions as new producers/exporters could be substantially improved if they join forces in this respect.

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1/ GSP generalized system of preference.

B. Production Cost

(i) Location factor

The location factor pertaining to cost of production as appeared in th UNIDO world-wide study (pages 109-113) was rather on the high side according to most experts some of whom cited other studies, results of which illustrated lower values. An overall figures for the location factor reported by some experts from the Gulf area in the area of 1.2-1.3.

UNIDO's position on the subject was that even with such high location factor (1.5), the projects evaluated on the basis of this figure proved to be viable, and this by itself could be a positive point for negotiation in favour of the developing countries. One expert, however, made the point that reporting high location factors might have a negative impact during contracts negotiation. On this matter, it was suggested that in the future, the Arab enterprises be consulted on actual investment costs analysis.

The meeting agreed that while immediate correction was deemed necessary with regard to figures used in the study, any information on the location factor provided by the Arab states will be incorporated in the following edition of the study.

In concluding the discussion on the subject of the location factor, it was agreed that in general the concept of location factor might be used only as an indicative tool of comparative analysis planning purposes and not in connexion with determining the actual cost or be used as a basis in assessing projects feasibility.

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(ii) High cost of production and distribution

Introductory remarks were made in regards to the:

(i) areas of high production cost resulted from inadequate project planning and implementation activity;
(ii) relative effect of different cost elements on the competitiveness of the products;

The meeting was invited to consider areas where cost reduction could be affected:

a) through proper planning;
b) by the development of appropriate national policies and government support;
c) as a result of regional co-operation;

On the subject of cost, it was mentioned that some elements have been usually overcosted and that a careful analysis was needed with a view to finding ways and means to reduce their cost or its effect on the overall production and distribution cost.

Examples of overcosted elements might be found in such items as site-construction, spare parts and maintenance, social and general economic infrastructure, capital cost, etc. It was suggested that there should be a distinction between developmental costs in regard to infrastructure investment and production cost. It was also proposed that a costing formula would be needed to determine the viability of the plants taking into consideration the developmental effects in determining their efficiency. In this context one expert proposed that a study on this issue be conducted to serve as a guideline in minimizing the impact of the cost of general economic infrastructure on projects viability because of the high magnitude of this cost which frequently overloads the overall investment costs.

Other areas of high cost were discussed. The overall cost of some elements was attributed to inadequate planning and implementation procedures. The effect of few cost elements on the overall cost was considered high enough to warrant the design of specific policies in conjunction with the development of a new criteria for petrochemical project evaluation in the region. Two such cost elements were feedstock and capital. Another item which invited serious attention in this respect would be the magnitude of the rate of return on investment (ROI) anticipated. It was suggested that the ROI pertaining to petrochemical projects should be considered in the light of the developmental internal

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rate of return, rather than using an arbitrary figure (i.e. 5 per cent or 25 per cent) which might be considered in conjunction with the standard concept of profitability. In this respect, some experts supported the idea of initiating a study to develop a price formula for feedstocks to serve as a guideline in project costing and evaluation instead of employing the opportunity cost concept.

Another area which most experts considered of a priority nature for immediate investigation was that regarding the high cost of distribution, i.e. shipping, storage and terminalling. Few experts expressed their support to the idea of initiating a study to solicit ways and means which would in effect reduce these costs. Some reference was made to on-going studies on shipping conducted by some regional ordanizations such as OAPEC on specific relevant products, (i.e. gasious feedstocks). Furthermore, it was suggested that the Arab maritime and tankers company might be in a position to provide more information based on experience to enhance the investigation activity.

C. Marketing constraints

It was suggested that the marketing problems facing Arab petrochemical producers might be attributed to the:

(i) Limited domestic market as manifested by the:

- low per capita consumption of all synthesized material mainly due to the low level of development of downstream processing industry and augmented by

- the regional trade barriers.

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(ii) Uncompetitive position in the international market, due to:

- the olegopolistic nature of the international market, with highly integrated industry and well situated traditional producers-suppliers who have been in control of the basic technology and in command of efficient marketing system;

- the problem of relatively high cost of distribution of petrochemicals produced in the Arab states;

(iii) Trade barriers; particularly in developed markets.

For discussion, ECWA proposed the following:

(a) the establishment of a regional marketing system as an instituted function in a petrochemicals producers association.

(b) System of consultation to elaborate on:

- the means for developing the domestic market;
- the scope of co-operation with developing countries for marketing petrochemical products;
- the scope of co-operation with developed regions.

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An important area in conjunction with marketing constraints, where some experts thought there was a need for co-operation and thorough investigation, was that concerning transportation (namely shipping and terminalling expenditure and conveniences). It was suggested that this area in addition to other marketing problems can be handled on a regional level initially by a committee as a focal point attached to AFCFP [1/], until production became large enough to allow an independent federation. A major function of this committee would be to facilitate exchange of information on all marketing aspects and to draw guidelines for developing the domestic market. Other experts felt the urgency of establishing an independent federation from the outset in order to pave the way for effective functioning before plants became operational.

While the idea of a federation was considered of an urgent nature to initiate immediately such important activities as the development of downstream industries, some experts raised a point regarding the effectiveness of such federation and its leval entity in connection with the joint ventures that included non-Arab partners. This point could be accommodated for since similar situation already prevailing in AFCFP where the interest of Arab producers has been preserved, according to one expert.

The experts agreed that the regional market ought to be investigated and developed as an important outlet for the Arab states production whose bulk would still be for export outside the region.

1/ All current Arab petrochemical producers have been members of the Arab Federation for Chemical Fertilizers Producers (Kuwait).

The developing market in other regions was considered as another outlet but it would require promotional incentives which may take the form of an economic aid or technical assistance programme to be expended by the Arab states to the developing countries. A detailed study would be needed to assess the size and all relevant aspects of these markets according to some participants, as a start for initiating the establishment of a marketing system or an approach for the Arab producers collectively.

For better results in overcoming market constraints and in view of the nature of the industry, a proper marketing system would be imperative, but for better results such a system should involve a multi-dimentional function. As an activity the marketing system might be instituted within a petrochemical producers federation independent of AFCFP, or it could be in the form of an independent corporate fully staffed to handle all activities including technical back-up services, specially for performance products. The latter activity might necessitate the establishment of a regional R and D programme specialized in product adaptation. A study might be needed to assess the viability of such a programme.

One expert thought the issue of instituting a producers federation should be left to the producers to decide upon its functions. Furthermore she pointed out that a marketing system might be a too-far reaching tool at this stage of the industry development in the Arab states.

Some experts felt the importance of adequate terminalling and shipping facility in marketing the products. Other experts added that the integration feature of the industry and the inclusion of a wide range of product mix would be a positive factor for efficient marketing. In this respect, reference was made to relevant studies carried by OAPEC, AFCFP (on shipping) and GOIC (on downstream products) for consideration and/or augmentation in conjunction with future studies on marketing and the marketing system for the Arab states.

Marketing co-operation was supported by all experts as a priority function. One form of co-operation suggested was the establishment of a shipping and terminalling facility. It was agreeed that regional marketing co-operation arrangements should not interfere with national trading functions and its supporting institutions already in existance. Rather it was considered that any regional marketing arrangement should establish a link with relevant functions for mutual understanding and benefits.

With different views expressed in regard to the form of regional co-operation on marketing and the establishment of producers federation, it was obvious that there was a need for preparatory work before bringing the matter to the producers'attention.

D. Technological aspects and constraints

In conjunction with this issue, the following topics were introduced for discussion:

(i) The shortfalls of prevailing procedure in acquiring relevant technology;

(ii) The low level of indegenous technological capacity that led to a high technological dependence.
- weak technological infrastructure;
- limited technological skills.

To remedy the situation, ECWA proposed the following functions for consideration by the meeting:

a) Instituted training programmes for the development of technological skills. An example cited in this respect was the ECWA training programme for the building of technological capabilities in petrochemical industries in the ECWA region.

b) Instituting selected technological activities;
- Process and engineering design;
- Research and development; initially for product adaptation and application.

All experts thought that, in building technological capacity in the Arab states, priority should be given to training of skilled manpower, and most experts insisted that training of operational skilled manpower is most urgent at this stage. An opinion was expressed regarding the effectiveness of on-the-job training of operational manpower in conjunction with construction activities and in operating plants vz training institutes. Inthis context a reference was made to on-going programmes for training operational manpower ir related industries such as fertilizers and oil operationa and which might serve the purpose momentarily in training operational skilles for the petrochemical industry, in view of the similarities in the characteristics of the production facilities of these three sectors. Another opinion was expressed in support of national rather than regional programmes for training operational skill since in most cases facilities and prevailing training procedures were usually tailoured for the need of that particular country. Furthermore, advanced enough to support training programmes within the region, they could facilitate on the job training for the whole region as it was envisaged in the case of the fertilizers training programme already functioning.

Training programmes on a national level might continue to be conducted through construction/management contracts or via management contracts tailoured for this purpose. In the meantime, the qualification of vocational institutions and necessary incentives to encourage high rate of attendance ought to be looked into.

For up-grading technological skills, ECWA project [1/] was considered

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1/ Training programme for the build-up of technological capabilities in the petrochemical industry in ECWA region.

by the experts as a good experimental course which could be developed and instituted with the help of all benefiting and concerned organizations. In discussing this particulars of the project remarks were made with respect to the training activity pertaining to design which some experts though that since it would be mainly related to the management of engineering design techniques and design concepts, the output might not be significant without strong supporting facilities including data bank and innovative tools. Thus a follow-up action to institute engineering desing on a regional basis ought to be planned.

Concern was expressed by all participants regarding the low level of indegenous technological capacity and its effect on the economics of the industry in general, particularly in view of the high turn-over of expatriats. The idea of instituting on a permanent basis a training programme rather than an intern programme was deemed essential by some experts to remedy the situation. Others expressed their views with respect to the weak technological system for which a centre for the transfer of technology incorporating all essential elements including a data bank was deemed essential.

On research and development, some experts argued that such an activity was most essential for developing this industry. In planning such activity, a nucleous specialized in a specific related area should be considered. The existing unspecialized national research and development institutions might not serve the purpose and should not be used as a model , since on the main they have failed to achieve their objectives because of their weak links to industry.

With limited resource and due to the infancy of the industry, few experts felt that on research and development activity could start modestly on a regional basis as a specialized function for product application, i.e. plastics, etc. But such activity should be linked to all operating plants and relevant technological centres (specialized in engineering consulting, research and development, data gathering and dissimination , etc. Furthermore, the activity might be developed as a consulting function linked to engineering design and operation trouble shooting system in different plants.

The increasing need for highly qualified staff and an efficient system, to review contractors training programmes as well as their design and specification induced some experts to be in favour of establishing a company for regional engineering consultancy tied up to a regional research and development activity.

Duplication of activities and multiplication of relevant institutions including a joint consulting centre, a transfer of technology centre, etc was considered by one expert to have a negative effect in building the technological capacity. More appropriate move should be toward strengthening existing infrastructure and creating the mechanisms that insure the links for proper coordination and effective utilization of indigenous resources in delivering consultancy services and in initiating non-existing essential activities such as research and development

An important outcome to such move would be the strengthening of the bargaining power of the concerned enterprises, a position badly needed particularly since the Arab states are embarking on a full scale development programme including aromatics and downstream industries.

In this context, views were expressed in support of an in-depth investigation and analysis of all technological aspects, infrastructure and skills in the Arab states in order to develop a clear concept for a long-term strategy regarding the technology transfer process, starting with formal education onward. In this respect one expert thought that the brain drain problem ought to be reviewed too.

It was agreed that the proposed investigation should determine the shortfalls of national institutions and the prospects for better efficiency. This might include a review of possible coordination of relevant regional activities with all relevant national establishments including those concerned with training to promote higher level of technological absorption and capitalize on the limited resources.

E. Regional co-operation

The concept of regional co-operation was introduced with brief statements regarding the general characteristics of functioning trade and industrial enterprises. Modalities for co-operation in developing the petrochemical industry examined included:

- Joint enterprise for a production facility; mainly for aromatics and major intermediates;
- Joint activity for the development of technological capacity;
- Joint marketing system;
- Inter-governmental negotiation for the liberalization of trade in the Arab states;
- Collective approach to multi-national trade negotiation;
- Periodic consultation on technical and commercial aspects of the industry; promotional aspects and incentives for higher consumption of products within the region and the development of downstream industries, planned projects, contractual aspects, bargaining position, etc.
- Joint technical services and/or advisory body.

To elaborate on these points, the meeting was invited to discuss:

- a medium and long term plans for regional co-operation, elaborating on the approach and form of co-operation in each function; production, marketing, technology, etc.

- the appropriate criteria in determining the feasibility and concept of profitability to be applied in support of regional joint ventures in order to have them operating with the least handicap in serving the ultimate development objective.

In discussing the modalities of co-operation, the experts expressed their interest in investigating the possibility of a joint-venture for a production facility. However, while some experts were in favour of investigating a joint enterprise for aromatics and major intermediates, others expressed their views in favour of an investigation pertaining to a joint enterprise for downstream products because of the planned basic aromatics production facilities in three ECWA member states. In this context, it was pointed out that GOIC has been investigating the viability of petrochemical intermediates production faculty, and co-operation with other agencies ought to be initiated to pursue the matter further, although GOIC studies were usually meant for its member states.

The reservation expressed regarding a joint aromatics facility was contested by other experts on the ground that the share of the Arab states in the world market would be small even when all national projects were commissioned, thus the notion of competing against each other might not be valid. Furthermore the increasing share of Arab states in the world market should be imminent in view of the change in the industry structure, but any delays in building more capacities might have a negative effect. Also it was pointed out that regional downstream facilities were needed to support national or an regional basic materials plants.

An important co-operation programme was seen in a joint negotiation activity for lifting of trade barriers in developed markets. It was suggested that negotiation might include bargaining with suppliers of equipment. Crude oil incentives to non-oil developed countries was considered as the strongest leverage for bargaining in the marketing of petrochemicals when considered within the context of national energy. oil policies.

UNIDO has been looking into possibilities of promoting co-operation among all parties concerned on a global level in line with the above mentioned concepts for negotiation. In this respect, some experts expressed their support for conducting a comprehensive study on the status of the petrochemical industry in the Arab states. This study might be initiated in conjunction with the feasibility study on aromatics/intermediates joint production facility, identifying the Arab states industry position in the world market and the production gaps to be filled by these states.

F. Long-term agreement on a global level

UNIDO secretariat presented the issue paper on long-term agreement which would be presented at the Second World Consultation Meeting on Petrochemicals. In response to a querry pertaining to the initiation and to the approach for long-term agreement the representative of UNIDO it was stated that UNIDO was requested by the First Consultation to prepare a paper on this issue with the view of presenting a general outlook on the meaning and purpose of long-term arrangements in support of the development of this industry and prospection parties to use them. It would be up to the interested parties to take the initiation in following the matter further.

The second important issue to be deliverated was the identification of the petrochemical products to be covered under such arrangements. An important aspect to be raised would be required to cover the supply of these products and the price conditions. In other words the participants would have to formulate the basis of a price setting mechanism.

Finally it was stated that the important point of marketing should be settled by identifying the marketing responsibility and relevant channels.

It was pointed that such arrangements have been concluded in some ccuntries but UNIDO had no way of judging their fairness or effectiveness, since it had no access to any contract related to such arrangements. It was suggested that co-operation with UNIDO on this matter would, no doubt, improve its chances of rendering more useful services in this domain.

One expert expressed an opinion regarding the developed countries position on the subject by saying that long-term arrangements were exclusively dealt with by individual enterprises.

Most of the experts present expressed their appreciation of the issue paper and thought it was comprehensive and useful.

G. Follow-up arrangements

In the course of its deliberation, the meeting discussed the priority areas where immediate action should be initiated. In that context, the experts agreed that a follow-up programme which might include field work investigation, surveys and studies should be designed in order to formulate a well defined position for consideration by decision makers. To define the programme in detail at this stage, communication with the concerned national and regional agencies was an important step.

Thus the meeting agreed to the idea of establishing an advisory ad-hoc committee to pursue the matter further, with the notion that such committee would meet during the fourth quarter of 1981 after some preparatory work was made. Terms of reference would be communicated at a later date.

In this respect, the meeting noted the importance and the need for conducting the following studies.

(i) A study on the techno-economic aspects of a regional petrochemical complex:

a) projection of demand for plastics, synthetic fibres and synthetic rubber in the Arab states, based on a thorough sectoral analysis for selected individual products rather than just a macro-economic analysis related to aggregate demand; assuming a certain growth of local domestic industry and taking into consideration substituted products of natural origin.

b) a comprehensive analytical study on the status of the Arab states petrochemical industry as integrated into the world market, based on country reports.

c) based on the results of(a) and(b) and taking into consideration world trend in consumption and production, technological factors, regional co-operation arrangements, the absortive capacity and risks attached, and national policies; a detailes feasibility study for a joint production facility will be made.

(ii) A study on shipping and terminalling systems for petrochemicals, in the following groups:

- chemical gases; ethylene, propylene, butadiene and VCM;
- chemical liquids; basic aromatics, methanol, styrene, ethylene glycol, acrylonitrile, etc.
- end (solid) products; polymers, fibre intermediates (DMT, TPA), resins precursors (phthalic anhydride) urea, SBR, etc.

The particulars of the study would be devoted mainly to bulk shipping of basic and major intermediates, and comprise: history of shipping and bulk movement in relation to geographic supply and destination, parcel size, shipping capacity, terminalling facilities, tankers economics and cost, tanker capacity and economics vs projected demand, projected time-charter rates, projected cost, etc.

(iii) The technological barriers and the status of the technological capacity pertaining to the development of the petrochemical industry in the Arab states.

iv) Areas of high cost of petrochemical projects in the Arab states where proper planning and adequate policies would be effective to minimize their magnitude: ie. general economic and social infrastructure, feedstock pricing, capital cost, site construction and spare parts.

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1. Organization of Petroleum Exporting Countries (OPEC), Vienna
   Mr. Omar Shinshin, Head Downstream Operation,
   Mr. Fathi Gebril El-Kabti, Engineer
   Mr. M. Maldonado

2. United Nations Conference on Trade and Development (UNCTAD), Geneva
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3. Economic Commission for Europe (ECE), Geneva
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