OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

07239

Distr.
LIMITED

ID/WG.238/8
5 November 1976

ENGLISH

United Nations Industrial Development Organization

Ad Hoc Expert Group Meeting on Co-operation among Universities, Industrial Research Organizations and Industries and the Role of UNIDO in this Co-operation

Vienna, Austria, 29 November to 3 December 1976

CO-OPERATION AMONG UNIVERSITIES, INDUSTRIAL RESEARCH ORGANIZATIONS AND THE ROLE OF UNIDO IN THIS CO-OPERATION 1/

by

Tufail Ahmad Khan*

* Secretary-General, The Federation of Pakistan Chambers of Commerce and Industry

1/ The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the Secretariat of UNIDO. This paper has been reproduced without formal editing.

C O N T E N T S

Introduction:

At the time when Independence was achieved in 1947 there were hardly any industries worth the name in Pakistan. The Government was, therefore, faced with the formidable task of preparing and executing programmes for industrial development and establishment of more universities and other educational institutions. Initially considerable stress was laid on consumer-oriented and import substituting industries based on local raw materials and the technology involved in most of these industries was relatively simple. Because of the inbalance in supply and demand and the existence of a sheltered market, industrialists did not feel the need for development of research. Most of the plants set up were based on imported technology and turn-key jobs.

As for universities they were set up in the past by alient rulers with the principal purpose to produce local hands for assisting the colonial administration. Even the few subjects of science and technology that were introduced in the curricula under the pressure of national movements were confined to academic and theoretical teaching divorced from production, and the students forgot what they learnt because they never had the opportunity to apply their knowledge to practice. Obviously that system of university education was not meant for assisting domestic production: the foreign rule aimed at something just opposite - creating a vast profitable market for metropolitan products by with-holding and discouraging industrialisation in the colonies. This is the historical context in which there has been only nominal contact between universities on the one hand and industries on the other. Even the institutes of business administration which were set up in universities after Independence remained largely estranged from practice. Later, these institutes started conducting courses of industrial management for nominees from business and industry.

New Government New Policy:

It is only after the first-ever government elected on the basis of direct universal adult franchise came to power in Pakistan in December 1971 that steps have been taken under the dynamic leadership of Mr. ZULFIKAR ALI BHUTTO to make education serve the socio-economic objectives.

The Educational Policy of the new People's Government launched in 1972-73 covers the period 1972-80. It can be easily seen that results cannot be achieved in a short span of time, because it is a long-term exercise. Concrete results would be achieved only after the full cycle of the policy is completed. As the first essential step, the problems have been identified, objectives and priorities defined and steps are being taken to reach the targets. Already to meet the needs of manpower in a developing economy, college and university education has been put on the anvil. Curricula of integrated science courses have been drawn up and the facilities of laboratories, science apparatus, books and teaching have been enlarged. To produce middle level supervisory graduates, seven polytechnic institutes have been raised to the level of technical colleges, and Bachelors in Technology courses have been installed. To promote basic research of special interest to Pakistan, Centres of Excellence have been set up for

(i) solid state physics, (ii) analytical chemistry, (iii) geology, (iv) mineralogy and (v) marine biology at the universities of (a) Punjab, (b) Sind, (c) Peshawar, (d) Quetta and (e) Karachi respectively.

With the recent creation of University Grants Commission (UGC) and Pakistan Science Foundation (PSF), priority is being accorded to the creation of research facilities in universities. Increased allocations of funds are, therefore, being made directly by the Ministry of Education, and through these agencies, for the establishment of specialised institutions of higher learning. Financial support is being given to various scientific departments of universities for undertaking research activities in the related fields on the basis of projects.

It is certain that erection of higher tiers of learning and increase in their absorption capacity, diversification from general to specialised training courses, and shift from theoretical to practical fields would, in due course, integrate university education with industrial development. The country's future industrialisation, particularly in the public sector, will cover the area of chemicals, metallurgy, electrical and mechanical engineerings and transport. Sophisticated technologies in these industries will require that university level education should be geared adequately to serve industry. Besides, Pakistan will need research for the adaptation of imported industrial technology to local conditions. All this will, of course, multiply the contacts between industries on the one hand and the universities on the other.

Goal-Oriented Research in University:

During the past few years there has been considerable debate in Pakistan forums on the role of universities in the field of industrial research. It has been argued that universities should primarily concentrate on fundamental research, while applied research should be the concern of research councils and industrial research organisations like Pakistan Council of Scientific and Industrial Research (PCSIR). Recently the Government has formulated a Science and Technology Policy for Pakistan in which it has been stressed that research in universities should also be goal-oriented rather than only fundamental in character.

The textile industry has played a very important role in the formative stages of Pakistan's industrialization. Although there has been little or no research within this industry, the textile millowners have contributed to the operation of Pakistan Institute of Cotton Research and Technology by paying cotton cess. A textile Productivity Centre has been set up for technical guidance and assistance to the textile industry.

Consultancy and Research Institutes:

However, so far the number of industrial research institutes is inadequate compared to requirements. Industries have been utilising the consultancy services of Management Institute of Pakistan Industrial

Development Corporation. There is even a Management Association in the private sector which co-ordinates with the Management Institute. Industries have also been utilising the services of the under-mentioned bodies rendering consultancy services:

1. PAKISTAN INDUSTRIAL TECHNICAL ASSISTANCE CENTRE (PITAC)

   - which is charged with the up-grading of skills, production of new designs of tools and equipment on the request of industry and rendering of technical advice to industries;

2. PAKISTAN DESIGN CENTRE (PDC)

   - which offers advice on designs for industrial products for export;

3. NATIONAL DESIGN AND SERVICE CORPORATION;

4. INVESTMENT ADVISORY CENTRE OF PAKISTAN (IACP)

   - which conducts research in investment opportunities, prepared industrial projects and offers consultancy services both to private and public sectors;

5. DEPARTMENT OF PATENTS AND DESIGNS in the Federal Ministry of Industries;

6. PAKISTAN STANDARDS INSTITUTION

   - which is responsible for fixing national standards for selected industrial products as a measure of quality-control.

These institutions render local technical services.

Industry is deriving benefits also from a number of testing standards laboratories and institutes set up by the Government, such as Central Testing Laboratories (CTL) which provides assistance and guidance to industries in assessing the quality of raw materials and finished goods. (CTL is going to be expanded with UNDP assistance).

This statement will not be complete without the mention of Cotton Textile Industry Research and Development Centre (CTIRDC). This research institution was set up in 1973 to assist the largest private sector industry of Pakistan. So far 11 UNIDO experts have joined the Centre. Its field of activity includes textile technology, industrial engineering, product development, textile chemistry, weaving technology, applied research and instrumentation. Further, there is an efficiently functioning Wool Test House in Pakistan which helps exporters of wool and local industries using wool as raw material.

Mineral processing industries both in public and private sectors have been in contact with the Government-run Geological Survey organisation to utilise their findings.

There are some institutes also in the private sector which provide consultancy services to industry by project-making and preparation of feasibility reports for investment in specific fields of industry.

Ministry of Science and Technology:

The establishment of a separate Ministry of Science and Technology in the Federal Government is a big step forward and an index of the keen active interest the new Government has in scientific and industrial research.

PCSIR:

The largest industrial research organization in the country is Pakistan Council of Scientific and Industrial Research (PCSIR). It has the staff strength of about 2,000 including nearly 900 scientists and technologists. Many of them have been trained in specialised fields in advanced industrialised countries.

Broadly, the functions of the Council are divided under two main heads:
- ESTABLISHMENT OF NATIONAL LABORATORIES AND INSTITUTES
  for carrying out researches in pure and applied fields relating to the industrial utilisation of the raw material resources of the country, and
- PROMOTION OF ITS SCIENTIFIC EFFORT AS A WHOLE.

The Council has set up centres of functional laboratories at (a) Karachi, (b) Lahore and (c) Peshawar. These centres comprise research divisions dealing with chemicals, pharmaceuticals, fuels, minerals, oils, fats and waxes, glass and ceramics, food and nutrition, etc.

In the application of science to industry, the most important factor relates to the resolution of bottlenecks between scientific research and the actual utilisation of its results. To effectively cope with this situation, Research Utilization Boards have been set up in some countries with adequate funds under their control for the establishment of industries based on specific processes. Whatever the advantages of such an arrangement may be in the more advanced countries with highly developed industrial structures, it seems to be of doubtful utility in countries with a low level of industrial and technical capabilities. What is needed in such a situation is closest association of research groups all the way through from the laboratory bench-work and pilot investigations to actual commercial production.

In view of these considerations and on the basis of its experience in this regard over a number of years, PCSIR has evolved a practical procedure for converting its laboratory processes into industrially feasible propositions. According to this procedure, a process evolved in the laboratory is subjected, wherever possible, to pilot plant investigations for studying its economics and optimum working conditions. Through this procedure, it has been possible to lead many of them to successful commercial enterprises. Reference may be made in this connection to the process for the production of Vitamin 'A'

Concentrates from Shark Liver Oil; and also to a whole range of low-cost building materials, tack-free paints from semi-drying oils, hard-boards and insulation boards from agricultural wastes, low cost petrol gas plants for schools and colleges and industrial adhesives. All these and many other processes, which have reached the commercial utilisation stage, involve in their initial phase of development, comparatively small-scale industries trial units, pilot plants for which could be improvised from available equipment, or designed and fabricated in the workshops of laboratories. The position becomes very different, however, when a laboratory investigation is concerned with a large-scale industrial project, pilot plant equipment for which has got to be imported at considerable cost of foreign exchange, because the funds allocated to the Council are not adequate.

Efforts have been made from time to time by PCSIR and the FPCC+I (Federation of Pakistan Chambers of Commerce and Industry) to bring about close collaboration between Scientists/Technologists of PCSIR and representatives of industry. Towards this end, functional committees and advisory panels have been set up on which scientists and technologists have been given an opportunity to discuss the results of research with the representatives of industry. These discussions have proved to be useful because they have led to a better understanding on both sides. It may also be noted that Government has given suitable representation to industry on the Executive Council of PCSIR.

Functional Research:

In accordance with the present constitution of PCSIR, it is proposed to set up more functional industrial research Institutes by expanding the existing research divisions in the fields of national importance such as minerals, fuels, agro-industrial chemicals, pharmaceuticals, etc. The main idea behind this proposal is to ensure a more concentrated effort on the problems of specific industries. Under this set up, each institute would have its own Governing Body on which related industries would be represented adequately.

Another institute which has recently been set up through the joint collaboration of the Government and industry is the Hydrocarbon Development Institute of Pakistan (HDIP). The functions of the Institute include:-

a) evaluation of imported crude oils, review of specifications of POL products and economic studies on various aspects of petroleum and gas industry;

b) independent testing of both crude oils and petroleum products in relation to specifications;

c) development of indigenous technology for processing of oil and gas including optimum utilisation of surpluses, manufacture of non-blendable lubricants, etc.;

d) provision of consultancy and advisory services to oil and gas industry on payment;

e) development of training facilities for oil and gas industry at all levels;

f) to sponsor research into, and adoption of, technical standards for oil and gas industry equipment and like-wise specifications relating to derivatives and test methods.

The nationalised industries of the country have also come forward in individual cases to support research in universities and industrial research organizations. As a matter of fact, it has been proposed in the new Science and Technology Policy of the Government that industry should earmark 1% of its turn-over for the support of research and development activities. In individual cases, philanthropic organisations have made substantial contributions for supporting research training institutes. An outstanding example is the Husein Ibrahim Jamal Postgraduate Institute of Chemistry, which is headed by a very eminent scientist and has received significant financial support from industry.

During the past few years vigorous efforts have been made to forgo closer collaboration between universities on the one hand and industrial research organisations on the other. A concrete evidence is that some of the laboratories of PCSIR are situated very close to the universities so that exchange of scientists/technologists and sharing of facilities for research are made possible. Furthermore, joint committees have been set up in specific cases and scientists of PCSIR have been nominated on the Boards of Studies and appointed as external examiners. In some cases they have been recognised for research guidance leading to M.Sc and Ph.D degrees. The scientists and technologists have also been helpful by offering part-time lectures at universities to meet the shortage of teaching staff.

What Industry Expects:

Industry expects universities and industrial research organisations to offer guidance in the fields of feasibility studies, project-making and establishing research cells. It would be more helpful for the development of industries if the scientists and technologists working in Industrial Research Institutes or teaching in universities pay regular visits to industrial establishments for the solution of operational problems, and for advising on adaptation of imported technologies by local technical know-how, where-ever possible. They should also advise on avoidance of industrial accidents which may be caused by the ignorance of workers about imported technologies. Scientists and technologists can also advise on industrial utilisation of local raw materials and on the local manufacture of plants and machinery for such utilisation.

Inplant training facilities for individual training are conspicuous by their extreme paucity in Pakistan. The reason may also be that universities have virtually no industrial training programmes. But with development of the new educational and science policy of the government, such training facilities may be created in due course. It may make first organised appearance in the Public Sector, e.g. in the mills and factories under the Board of Industrial Management (BIM).

There are a few industries in the private sector which have research facilities. A notable example is that of Messrs. Packages Ltd., Lahore, which is helped by Punjab Engineering University. Messrs. Packages Ltd. have set up a modern research centre within their establishment. Another example of a private sector industry having research facilities is that of Messrs. Burly Paints Ltd., Karachi, who have set up a centre for research in paints and varnishes. However, there are many industrial concerns, particularly those in textiles, which have small testing laboratories and cells for simple research and investigations.

At the present stage while the domestic market remains sheltered, the export drive has introduced a strong element of competition. Conditions have, therefore, been created in which industrialists are themselves taking steps to set up research centres.

Very few industries have training programmes. However, there are some which execute training programmes for their own workers. These programmes are to be found in large-scale and medium-size industries. So far as small-scale industries and handicraft are concerned, they are mostly family concerns and the father prefers to train only his son, so that in cases where there are no sons to be trained the arts and crafts have died with the death of the craftsmen.

Collaboration between bigger units of industries is yet to reach a stage where they can use each other's facilities of training and research. Some industries in the nationalised sector or public sector are planning to institute training programmes for their own workers. For example, Pakistan Steel Mills Corporation has training programmes under execution for Karachi Steel Mills Ltd. Many workers have been sent to USSR, Iran and Egypt to receive training in various jobs in steel milling.

In the private sector there are about 20 Associations of different industries, e.g. All-Pakistan Textile Mills Association, Pakistan Steel Re-rolling Mills Association, Pakistan Sugar Mills Association, etc. Their purpose is to get together and discuss their problems and exchange experiences. Most of these 20 Associations have no training or research programmes, therefore, the question of utilisation does not arise. However, in the Public Sector industry, because of the centralised control through corporations, various units may start utilising each other's facilities of training and research as and when these facilities are created.

Valuable Foreign Assistance:

There does exist a network of co-operation between Pakistani industries on the one hand and industries in foreign countries on the other, in consultancy services, training and research facilities. The industries in Pakistan utilise the facilities provided by foreign participants in joint ventures. Foreign firms and companies operating in Pakistan send their Pakistani employees for training to their respective countries. Many private consultancy firms and companies in foreign countries render valuable assistance to industries in Pakistan in the field of management, training and research facilities. For instance, assistance is rendered to Pakistan both in public and

private sectors by International Management Co-operation Committee (IMCC), Tokyo, through FPCC+I. Foreign co-operation in training and research is considered in Pakistan to be of great necessity and importance both in the public and private sectors. Pakistan's industries have received valuable technical industrial research and training assistance from industries in developed countries such as the USA, U.K., France, Canada, Japan, Australia, Western Germany, New Zealand and some other countries. Pakistan has been receiving a great deal of technical assistance from industrialised countries in the development of gas, power and electricity and also in the exploration of oil and other minerals. For instance, Canada has provided to Pakistan nuclear power plant, its raw material and the needed training facilities. An agreement has been concluded with France for the provision of nuclear plant for the generation of electricity. On the private level most of the technical assistance in the field of textile industry in Pakistan has come from Japan which has also helped Pakistan in the exploration of minerals in Baluchistan. Foreign private companies have rendered large-scale technical aid and training to Pakistan in oil exploration. Technical assistance has also been received from some developing countries such as China, Turkey, Egypt and Iran. From Turkey and Iran it has come under the aegis of Regional Co-operation for Development (RCD). Taking into consideration training facilities available from all countries and international agencies, Pakistan utilised 549 training placements compared to 418 in 1973-74 and 276 in 1972-73. The value of equipment received was US$ 1.8 million in 1974-75. In 1975-76 Pakistan utilised 472 training placements and received equipment worth US$ 2 million and services of 263 experts.

Pakistan's Assistance to Developing Countries:

Consultancy firms and companies in Pakistan are rendering services to industries in other countries particularly in Asia and Africa. The position is that Pakistan imports the industrial consultancy services and training and research facilities from industrialised countries, and exports such services to developing countries. For instance, IACP (Investment Advisory Centre of Pakistan) has prepared tanning project for Tanzania. Pakistani experts have been helping Tanzania also in textile industry. The consultancy firms in Pakistan are also helping industries on a large-scale in such countries as Saudi Arabia, United Arab Emirates, Libya, Iran and many other developing countries. Pakistan is exporting her tubewell technology to some Middle Eastern and East African countries. Sugar Mills in Pakistan have rendered technical advice and assistance to sugar mills in Uganda, and in turn Pakistan received, through private industry, technical advice for sugar mill industry from Mauritius. There are regular arrangements for technical exchanges between Iran, Pakistan and Turkey under the aegis of RCD. Private industries in Pakistan have helped Iraq and Lebanon in establishing jute industries. Further, an industrial concern in Pakistan manufacturing paints has assisted Lebanon in the establishment of a paint and varnish industry. Private industries in Pakistan are also assisting Saudi Arabia in the field of tanning industry and construction industry. Indeed, Pakistan is assisting Saudi Arabia in the implementation of her very ambitious Five-year Plan. She is also assisting Saudi Arabia in the technological field and the educational field. There are technical assistance programmes under some industries in Pakistan for Sudan, Ghana and a number of other countries. Almost all universities in Pakistan have enrolled science and technology students from many Asian and African countries.

Triangular Co-operation:

Due to the foreign exchange position, Pakistani industries are facing difficulties in forging joint industrial ventures in developing countries. However, joint ventures can be forged in developing countries on a triangular basis: funds from petrol exporting countries, technology from industrialized countries and managerial and technical know-how and simple machinery and accessories from Pakistan. In this way, Pakistan can help in the establishment of many industries in developing countries such as cotton textile, man-made fibre textiles, tanning, footwear, metal, house construction, printing and publishing, food canning, manufacture of simple machinery, energy-using apparatii and accessories such as domestic gas equipment, electronic appliances etc.

Pakistani industries will welcome university students from other developing countries for inplant training which can be organised on a special basis. Pakistani industries are eager to establish liaison with the universities, industrial research institutions and industries of developing countries for exchange of experience and expertise, whatever may be its level, through exchange of technical delegations and missions. Pakistani industries have also executed study and training programmes for businessmen and industrialists from Iran and Turkey under the aegis of RCD. Pakistan has availed of similar facilities made available to her by Iran and Turkey.

What UNIDO can do?

UNIDO can do both in public and private sectors some vital infrastructural work to help establish effective liaison between (i) industrial research, (ii) industry and (iii) universities.
Following three suggestions are made:

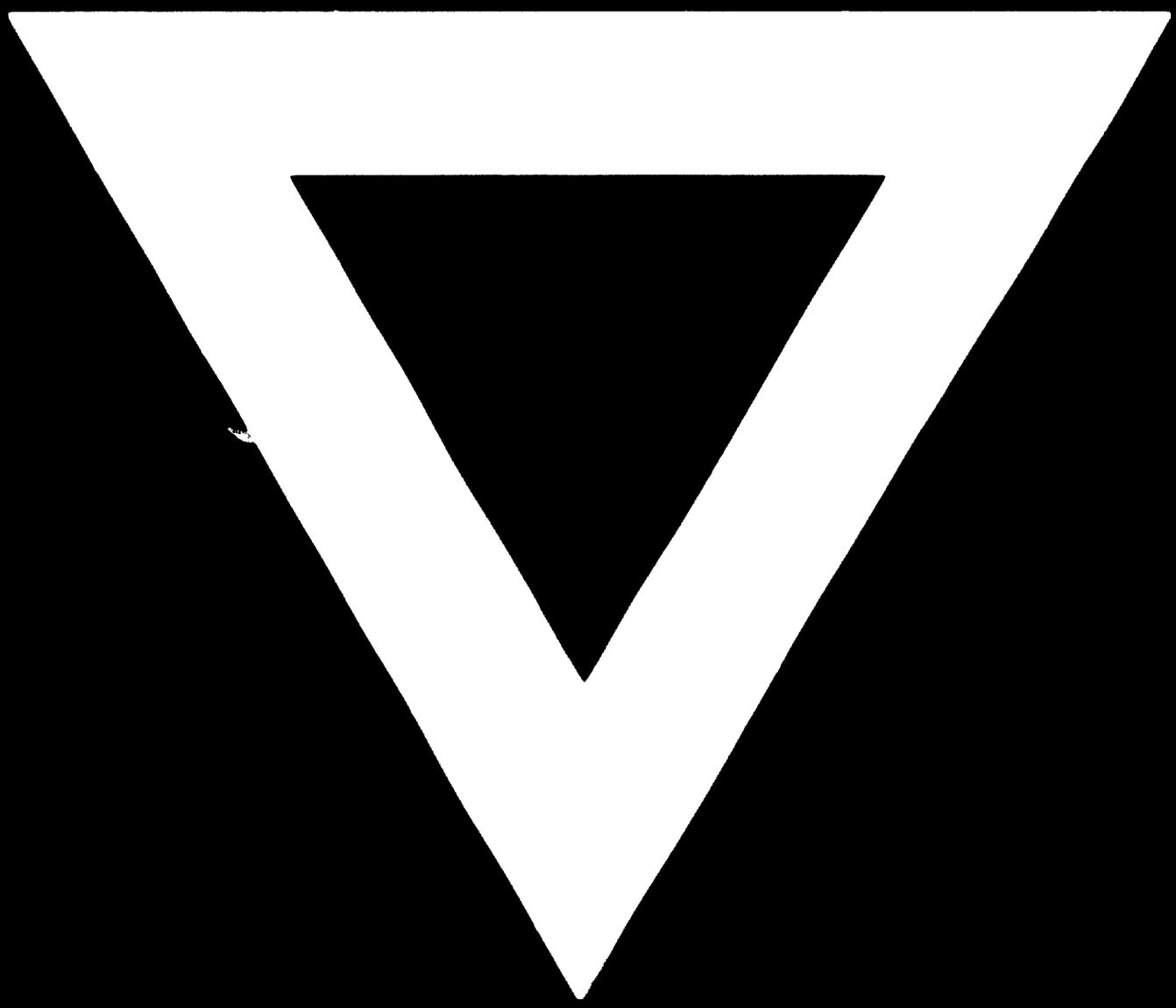
1. The existing facilities in the field of industrial research were reviewed by a UNIDO adviser who recommended suitable measures to offer technical assistance to PCSIR in the fields of engineering and pilot plants. In pursuance of these recommendations UNIDO has taken steps to offer necessary support for some of these activities in the form of equipment, advisory services and training facilities. UNIDO may take further steps to implement the recommendations made in the report of its advisor.

2. UNIDO may assist the industrial consultancy services and also provide experts to advise on domestic manufacture of plants and machinery for new industries based on domestic research in local raw materials. This will help evolution and development of indigenous technologies which is of vital and basic importance to all developing countries whose dependance on the import of industrial technologies from industrialized countries is heavy and costly.

3. UNIDO may provide a Consultant to help set up a Cell within the FEDERATION OF PAKISTAN CHAMBERS OF COMMERCE AND INDUSTRY (FPCC I) for advising on ways and means to establish effective and constant liaison between universities, industrial research institutes and industries.

[redacted]

C-266



77.06.27