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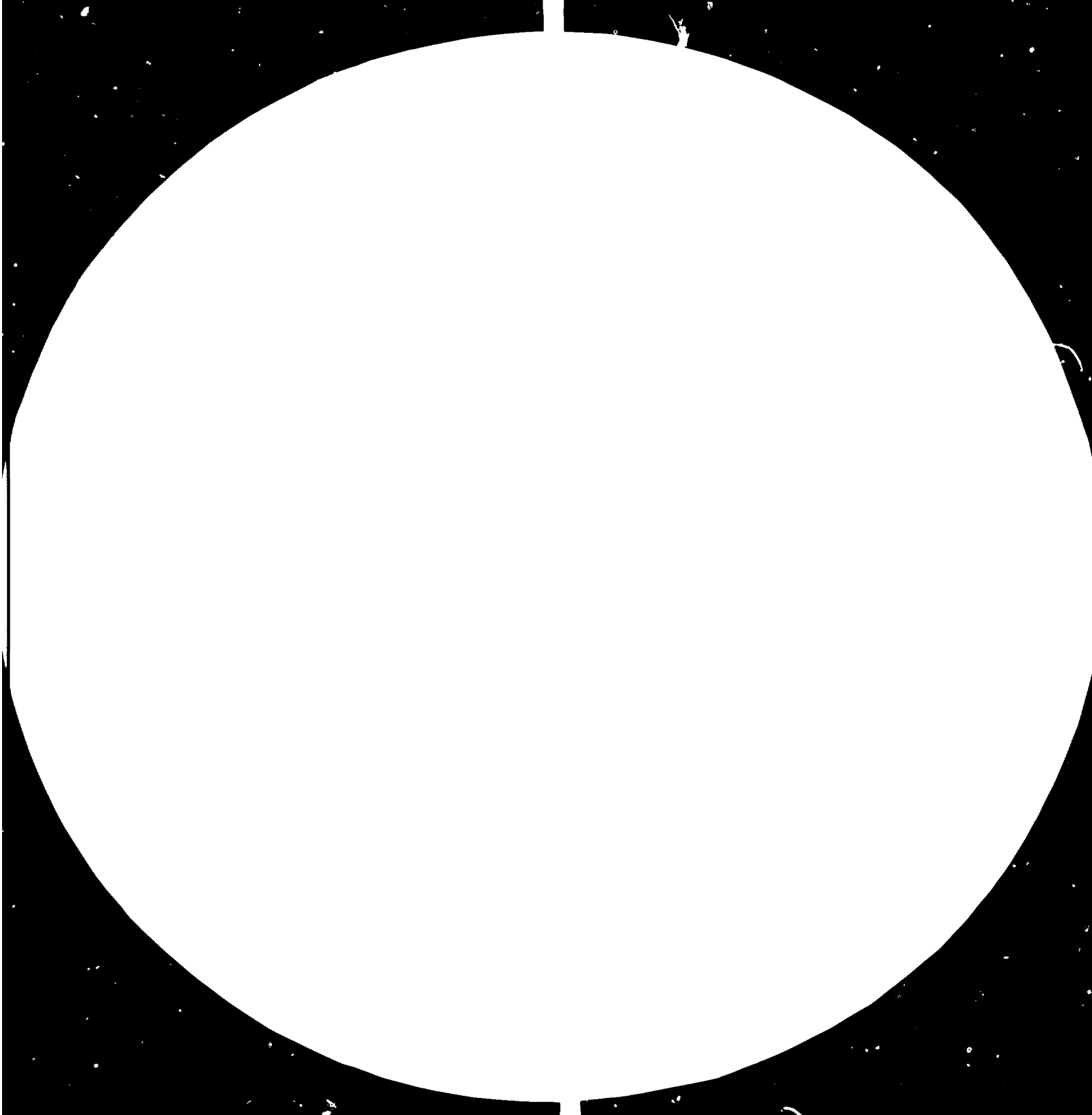

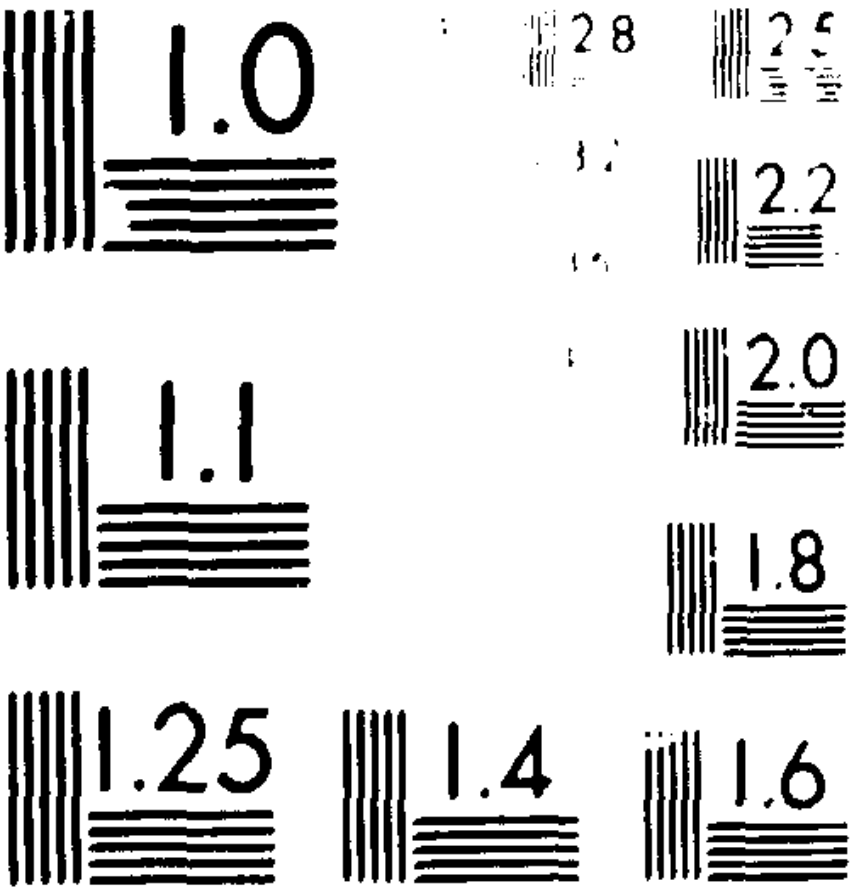
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Distr.
LIMITED

ID/WG.350/16
26 February 1982

ENGLISH

United Nations Industrial Development Organization

Expert Group Meeting for Exchange of
Experiences on Technology Services
Delivery System (TSDS)

Manila, Philippines, 2 - 6 November 1981

STRENGTHENING AND MODERNIZATION OF THE TECHNOLOGICAL PERFORMANCE OF SMALL AND MEDIUM SCALE INDUSTRIES IN PAKISTAN *

by

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CONTENTS

A. INTRODUCTION

1. Small-scale industries play on important role in any economy, advanced or developing. In Pakistan, this sector employs more than 75% of the industrial labour force and accounts for about 30% of value added of the manufacturing sector as a whole; its contribution to the GNP is around 4.4% compared to the contribution of the largescale sector of 10.8%. The share of manufacturing sector in our exports is about 60% and the contribution of the small industries is around 18%.

B. DEFINITIONS

2. Smallness is a relative nation; it is not possible to find a generally acceptable statistical definition. Definitions of small-scale industry vary considerably from country to country. The term 'small scale industry' in Pakistan is applied to all production enterprises having fixed assets, excluding cost of land upto Rs. 3.0 million; this limit until recently was Rs. 0.5 million only.

3. There is no separate classification for medium scale industries, but for the purpose of this paper, based on the size of the industries the term would be used for enterprises with fixed assets upto Rs. 7.5 million.

C. INSTITUTIONAL FRAMEWORK FOR SMALL SCALE INDUSTRIES

4. Pakistan Government has made continuous efforts to improve the conditions of the small scale industries through policies, special incentives and establishing institutions for their promotion.

5. "Small Industries Corporations" established by the Provincial Governments have set up a large number of Service Centres, training-cum-development centres. (The total number of centres set up by these Corporations has increased from 9 in 1970 to 56 in 1981), Industrial Estates, Industrial Parks and provided marketing facilities, financial assistance and credit facilities. The Organization also privides pre-investment counselling and guidance to the prospective entrepreneurs. U.S. $30 million loan has been approved by World Bank this year for small scale industries in the field of textiles/ garments, surgical goods, leather goods, sports goods and light engineering.

6. The Pakistan Industrial Technical Assistance Centre (PITAC) assists industry in designing and manufacturing high precision dies, moulds, jigs, fixtures etc. and also trains and upgrades the skills of personnel in technical-managerial fields.

7. Industrial Development Bank of Pakistan: This bank was established in 1961 to provide medium and long term finance to small and medium scale industries, the upper limit for grant of loans being Rs. 4.0 million. The bank functions within the board policy framework laid down by the Government and the industrial investment schedules drawn by it from time to time. The bank provides credit facilities in the form of local and foreign currency loans, guarentee and equity to industrial concerns. Loans are given for setting up new units and for balancing modernisation & expansion of existing units. In addition to financial assistance, the bank gives technical,

administrative and management advice to the clients in the planning and execution of their proposals.

D. R AND D INSTITUTIONS

8. The Pakistan Council of Scientific and Industrial Research (PCSIR) is a statutory, autonomous and the largest scientific and technological organisation in Pakistan, which came into existence in 1953. It employs a little over 2000 staff members including approximately 550 scientists and technologists with its own multi-functional laboratories at Karachi, Lahore and Peshawar, Fuel and Leather Research Centre, National Physical Standards Laboratory at Islamabad and Pakistan-Swiss Training Centre for Precision Mechanics, Instrumentation and Optics.

PCSIR is active in a wide range of scientific and technological disciplines, which include: Minerals, glass and ceramics, and metallurgy; food technology and fermentation; oils, fats and waxes; agro-and industrial chemicals; pharmaceutical and fine chemicals; polymers; leather; solid fuels; solar energy, Chemical engineering and pilot plant design and development; Rural technologies; Applied physics and scientific instrumentation; Applied Biology; Industrial Liaison;

Starting with barely a dozen scientists, 1950s was devoted primarily to recruitment and training of scientists and construction of laboratories. During the 1960s using the strategy of demonstrating processes on a pilot plant scale or fabrication of prototypes, PCSIR's efforts were directed to development of industrial processes/technologies. During the 1970s efforts have been directed towards creating links with

established industries, and for this purpose range of functions and activities have been gradually widened. Scope of work now includes the following:-

: to explore and examine the natural wealth of the country and see how it can be developed;

: to adapt processes to local conditions;

: to develop new processes, products and technologies aimed at:-

i) utilization of natural resources;

ii) import substitution;

iii) export promotion;

iv) reducing unemployment and under-employment;

v) to satisfy national needs.

: to solve the problems of the industry which can be categorised as follows:-

i) to develop new products or services aimed at diversification plans;

ii) develop new uses/markets for existing products or of their waste materials;

iii) to provide technological services such as physical, chemical and biological testing, trouble shooting, productivity studies etc.

: Technical Consultancy for establishment of new industries; critical scrutiny of proposals for new investments with a view to determine suitability of the process/ technology through raw material assessment, examination of process variables and technology options; techno-economic feasibility studies;

: 'Development of Rural Technologies' with emphasis on items like fuel needs, fertilizers, food preservation, cheap building materials, utilization of crop wastes and such other technologies as can be generated locally on a more commercial scale. Basic improvements in traditional technologies also comes under its purview;

: Emphasis is be on delibrate use of in-house projects to build up areas of specific technical competency likely to be needed to serve industrial demands in the coming 4 to 5 years;

: To adopt measures for the application and utilization of research results and establishing closer-links with industrial sector.

9. APPROPRIATE TECHNOLOGY DEVELOPMENT ORGANISATION (A.T.D.O.):

An ATDC cell was initially created in the Ministry of Science and Technology in July 1974, and trarsferred to the Planning Division in April 1975. It was given the status of an autonomous body in 1977 and shortly thereafter returned to the Ministry for Science and Technology. It finances R & D projects to research institutes, universities and in the private sector and undertakes extension work to promote utilisation of R & D results.

10. PCSIR'S CONTRIBUTION TO SMALL-MEDIUM SCALE INDUSTRIES

VILLAGE LEVEL FOOD PROCESSING PROGRAMME (VLFP): This project deserves special mention in the context of what is being discussed in this meeting; this was the first major national, US-aided, technological effort directed towards improvements in the technological performance of small scale

industrial sector, and involving an expenditure of around Rs. 7.5 million. Conceptual framework for the VLFP project was developed by Pakistani and American members of the US-AID office in Pakistan in 1975 and in July 1976. The Appropriate Technology Cell of the Planning and Development Division of the Government of Pakistan invited proposals through advertisements in national press and abroad to provide technical services to "identify, develop, test, produce and within limits disseminate intermediate technology suited for village level operation in Pakistan for processing of sugarcane, oilseeds and ricebran" PCSIR in collaboration with Denver Research Institute (DRI) - PCSIR had already an effective linkage with DRI - submitted a proposal and out of a dozen contestants, this team was finally awarded the contract for VLFP project. Services of Industrial Advisory Centre of Pakistan (IACP)were also used for socio-economic aspects of the project. The project was carried out in four carefully structured overlapping phases;

Phase I: analysis of secondary data, and collecting and analysing of field survey data to establish economic and engineering parameters of equipment to be developed in the course of the project.

Phase II: a world-wide search for appropriate technologies and identification of the most promising ones in the light of the criteria developed during Phase I.

Phase III: evaluation of the prototype equipment and food processing techniques acquired in phase II. Though not provided in the original proposal, considerable R & D inputs became essential to achieve the overall objectives of the project.

Phase IV: Industrial extension activities including field demonstration and marketing of improved technology;

This project has just been completed and the final report is in the press. On the basis of about six demonstration units set up sofar, the following benefits of the projects have been identified:

(i) Using the improved technology on an electric power driven and operating it following the program guidelines, the field test of cane crushing in NWFP yielded an absolute increase in juice extraction from cane of 43% to 60% or an increase of nearly 40%. In Punjab on the animal driven crushers, average yield was increased by 11 to 13%. Improvements in the processing techniques increased both the quality and quantity of the resulting "gur".

(ii) Similarly locally fabricated Lahorei oil-expellers have been redesigned with the result that the residual oil content of oilcake has been reduced from around 12% to 8%; the existing units can also be modified at nominal costs.

(iii) Overall economic impact of the VLFP project has the potential of increasing country's GNP by more than Rs. 1000 million and Pakistan Government is therefore planning to go-ahead with intensive extension activities to reap the benefits of the outcome of the VLFP project at a cost of around Rs. 4.5 million spread over three years. PCSIR and ATDO would be jointly responsible for this extension activity.

(iv) In respect of animal driven oil-expellers, it was found that best technology was already available in Pakistan around Multan; knowledge gained in the course of the project

would provide useful inputs for designing of mini-sugar mills.

11. Monographs entitled, 'Highlights of the achievements of PCSIR' (1981) and"PCSIR-industry linkage" (1980) are available from PCSIR to those who may be interested in the overall activities of PCSIR. But perhaps the most useful of PCSIR's activities have been development of industrial processes and technologies based on its own researches and which are most appropriate for small to medium scale industries. Over the years it has licensed over 250 processes; almost two-thirds of these are in commercial production with annual turnover in the range of Rs 40 to 50 million. Furthermore as a result of special funds having been made available for major pilot plant studies in recent years, PCSIR has reached a stage where it can now set up small and medium scale industries on a turn-key basis.

12. VLFP project was an eye-opener for PCSIR; till then it had not appreciated the role it can play in the promotion of the established small-scale industries. It is now fully alive to the situation and has undertaken study of leather, carpet, foundry and electroplating industries on its own. The procedure that is being used is similar to that adopted for VLFP, namely to first determine the state of art, study the world scientific, technical and commercial literature, followed by the formulation of a program leading to advances in product quality, performance and productivity.

13. Commissioning of idle plants: Whenever imported plants have failed to function, PCSIR has been called upon to provide technical services for putting them into operation; typical examples are:

Paper Cones and Bobbins for Textile Industry: An entrepreneur planned to import a plant for the manufacture of paper cones and bobbins. He found that technology of the process was available and that he would need to spend about Rs. 3.0 million in foreign currency if purchased on a "Turn-Key Basis". A private expert technician offered to procure a plant for half the cost and on payment of additional 15 to 20% convinced them of his ability to help them put the plant into production.

Plant was therefore purchased, imported and installed by the suppliers in 1963. What actually happened between the firm and the expert technician is not known. The firm found itself with the installed unit but was unable to start production for almost two years. They sought the help of PCSIR in 1965.

PCSIR simulated the conditions of the plant in the laboratories and developed the process know-how required for the manufacture. 800 lbs of two different types of resins needed for production trials were produced on a pilot-plant scale. Subsequently the plant for the manufacture of the resins was designed, fabricated and installed. One month's effort was needed to completely try out the process. Services of our technical experts were loaned to the firm for almost one year to help them with production and train their personnel.

14. MANUFACTURE OF BAKELLITE MOULDING POWDER: In one of the industrial estates of punjab, two 5-ton/day plants for the manufacture of bakellite moulding powder were imported around 1966 on the re-rommendations of an adviser to the industrial

estate. Import of the plant did not include process know-how for the manufacture. For almost two years the plants remained idle. They finally got in touch with PCSIR which developed the process know-how and sent its scientists/engineers to put the industry into production. PCSIR efforts were also responsible for fabrication of a small grinding unit for saw dust at a cost of only Rs. 15,000, wheras the smallest imported unit costs around Rs.300,000. Both of these firms have been in production since 1969.

Similar services were provided in the following cases: (a) Salman Industries, Gujranwalla: Manufacture of glass wool; (b) Standard grinding wheels: besides commissioning of the plant, formulations for the bonding compositions were also developed for them; (c) Afzal Industries: manufacture of cinema arc electrodes, and (d) Kashmir development Corp., Jhelum: plant for the manufacture of urea-formaldehyde adhesive and know-how for preparing a stable liquid glue.

PCSIR provided a few critical inputs such as formaulation of ink, accelerated method for testing ink quality and corrosion resistance for steel balls to Messrs sayyed engineers, Gujranwalla during setting up a ball point manufacturing unit based on imported technology; this was a unique effort and its case history has been included in a book, 'Appropriate technology for development: a discussion of case histories' by D.D. vans, and L.N. Adler published by Westview Press, Boulder, Colorado.

15. Consultancy service:

These services are provided on a payment of an annual fee for providing information/guidance on technical matters, 'trouble shooting' and quality control problems; services of

PCSIR personnel are made available on deputation for brief periods, for which the firm has to pay the salaries. At any one time 20 firms are on our list.

Consultancy is also provided on case to case basis and on an average about 100 jobs are handled annually.

Glass industry has made the maximum use of these services in an effort to improve the quality of their products and make greater shift to use of indigenous materials. Nearly 30% of the skilled technicians at supervision level working in this industry are former employees of PCSIR: one of our senior scientist left us to start his own technical consultancy work and another to start his own small-scale glass industry.

16. Training: PCSIR organises special training programmes on request; it also trained apprentices on its pilot glass making unit, most of whom have been absorbed in the industry. For a number of years it kept providing one of its senior staff members to work as a principal of the Ceramics training institute set up by Small Industries Corp., in Gujranwalla.

17. REPORTS:

'Do IT YOUR SELF REPORTS': such reports are prepared on request of those who desire to have pertinent available information but would like to solve their own problems; this is comparatively a recent activity but reports have been prepared on graphite and welding electrodes, smallscale manuacture of greases, detergents, and special information reports Ca 'Tetrapak' etc.

5. CONCLUDING OBSERVATIONS

18. All the organisations covered in this paper have intensified their efforts during the last 10 years or so to promote small scale (including traditional technologies) and

medium-scale sector; there has been close interaction between PCSIR and ATDO in respect of technologies suitable for rural areas; however a normal mechanism which would link all the organisations dealing with this industrial sector is lacking.

19. Importance of R & D component for this sector of industry is not generally appreciated; even when the VLFP project was formulated, the original concept was that all that was needed was to identify the available equipment technologies in the world, try out the promising ones in the country and all that would have to be done would be to copy it or by the licensing right if necessary, and introduce it in the country; this project would have been a total failure without a strong dose of R &D.

20. All categories of small-scale industries whether they be handicrafts or artisan enterprises or cottage scale industries or be they modern manufacturing small to medium scale industries must be continually upgraded; these cannot be allowed to stay static; to achieve this, an integrated effort is called for.

21. PCSIR and ATDO has given considerable thought to broadening the scope of conventionally accepted philosophy of appropriate technology, importance of mini-plants for setting up manufacturing units andalso appropriate technologies for output generation which could be competitive with large-scale industrial sector; results of these delibrations have been included in a monograph on 'Appropriate technology' brought out this year by ATDO.

22. I am therefore looking forward to learn about the experiences of the UNIDO effort in this country to develop the integration between the various organisations to serve the small

to medium scale industries and to the recommendations that would emerge from the delibrations of the working group.