



TOGETHER
for a sustainable future

OCCASION

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



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

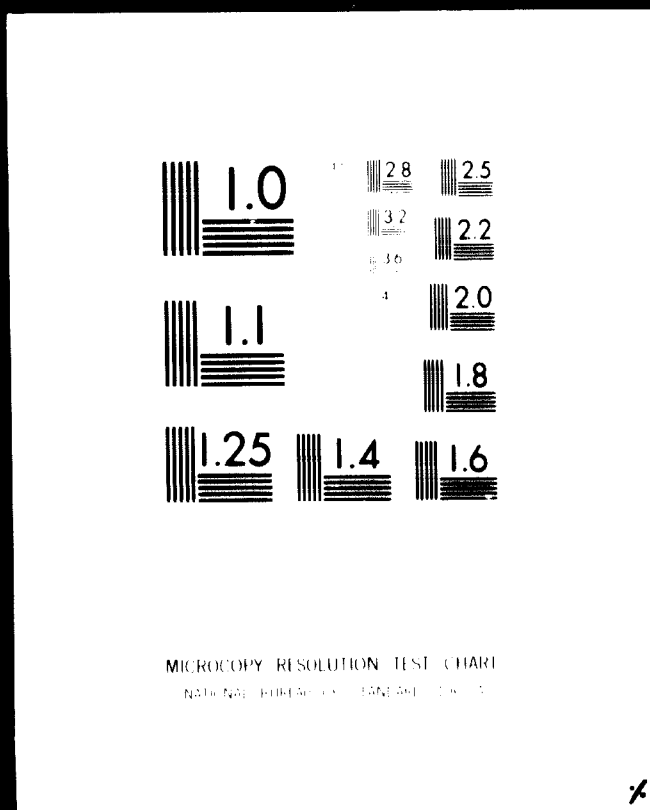
Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

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

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

1 OF 1



We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche.



01870



Distr.
LIMITED
ID/WG.238/11
12 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 - 3 December 1976

CO-OPERATION AMONG INDUSTRIES, UNIVERSITIES AND INDUSTRIAL RESEARCH
ORGANISATIONS, AND THE ROLE OF UNIDO ^{1/}

by

Prof. Samuel Paul*

002816

* Director, Indian Institute of Management, Ahmedabad

^{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.

id.76-6555

Co-operation among Industries, Universities and Industrial Research Organisations, and the Role of UNIDO

The terms of reference of the present Expert Group Meeting are wider than those of the 1973 Expert Group which was convened by UNIDO in Vienna specifically to examine issues of industry-university linkages with reference to management. The focus of the present meeting appears to be on a broader spectrum of higher education and research which includes sciences, engineering, technology and other applied disciplines relevant to the industrialisation process. There is also a greater emphasis on inter-institutional collaboration and the role that UNIDO can play in collaborative endeavours.

The purpose of this paper is to present a brief sketch of India's recent experience in respect of the co-operation between institutions of higher education and research, and industry. However, before recounting India's experience, a framework of analysis to facilitate an understanding of the issues involved is first outlined. In the final section, some recommendations are offered on the role that UNIDO could play in strengthening the co-operation between industries and the educational and research systems of developing countries.

I. Scope of Co-operation: A Framework of Analysis

Depending upon the objectives, complexity and stage of industrialisation, the scope, intensity and quality of industry-university co-operation (IU)¹ will vary from one country to another. If regional dispersal of industry is emphasised, more educational institutions will have to be brought within the picture than will be the case otherwise. A country which has progressed well along the path of industrialisation will be able to practise IUC on many more fronts than one which is far behind in terms of industrialisation. The point to be noted is that though the potential scope of IUC is wide indeed, the ability of developing countries to practise IUC or take advantage of its potential will vary from case to case.

The phenomenon of knowledge utilisation which is at the heart of IUC has been a subject of study by many scholars including behavioural scientists. Utilisation of knowledge is relevant not only to industrialisation, but also to all other aspects of development. However, given the overriding role of technology in industry, it assumes special significance in the context of industrialisation. Two factors highlighted by those who have studied knowledge utilisation deserve attention.² First, the process of utilisation requires a smooth and effective interaction among three subsystems, viz., an extension system, a retrieval system and a feedback system. Secondly, there are four elements which should play their parts in a co-ordinated fashion in order for knowledge utilisation to be effective. These are

-
1. To save space, this abbreviation will be used throughout the paper.
 2. Pareek, U., "Knowledge Utilisation in Social Sciences", ICSSR Newsletter, Vol. IV, No. 4.

knowledge source, knowledge form dissemination media and knowledge user. IUC is, of course, concerned with more than knowledge utilisation. Nevertheless, the concept of the three subsystems of extension, retrieval and feedback and the linkages among source, form, media and user seem equally relevant to IUC.

What are the areas or aspects of IUC that should receive priority? Here again, it may be useful to examine certain critical dimensions of industry and the educational and research systems closely. As dynamic organisations, both are engaged in acquiring inputs of various kinds, converting them into outputs and supplying those outputs to society. We might gain some valuable insights by analysing the role that IUC can play by dissecting the activities involved at each of the three stages of input, conversion and output. The exhibit on the following page lists a suggestive set of activities by sector and stage/process so that the interrelationships and potential scope of IUC can be readily identified. The nature of IUC and the type of linkage with educational or research organisations will not be the same for the different stages/processes shown in the Exhibit. Similarly, industry is not a homogeneous sector. There are large scale and small scale industries. There are indigenous and foreign dominated industries. Different strata or segments of industry are capable of different levels of IUC. The same could be said for the educational and research system of a country. This conceptual framework may be kept in view while evaluating the Indian experience in IUC.

II. IUC: The Indian Experience

The university/industrial research system in India consists of four distinct categories of institutions. (1) Universities which are primarily teaching institutions, (2) specialised institutes for science, technology and management concerned with both teaching and research, (3) national laboratories for scientific and technological research and extension, and (4) all India councils for planning, and controlling institutions working in similar fields.

There are over 100 universities scattered all over India. All of them are state supported, with numerous colleges affiliated to them. Among the specialised institutes, the Indian Institutes of Technology (IIT), the Indian Institutes of Management (IIM), the Indian Institute of Science and the regional Technical Teachers' Training Institutes (TTTI) deserve special mention. National laboratories for research exist in most important disciplines and industry groups. Most have been set up by the state, but a few represent co-operative endeavours between industry and government. Examples of the latter are the regional textile research organisations, Jute research laboratory and silk and art silk research association. All these laboratories and other research organisations are co-ordinated by the Council of Scientific and Industrial Research (CSIR) which is a national body constituted and supported by the Government of India. Similar councils exist in the fields of agriculture, medicine, technical education and management.

Industry in India is a highly differentiated sector. In numbers, the vast majority of industrial concerns are small in size. Far more dominant in terms of assets and output are the large scale indigenously

owned (private and public) enterprises and the foreign controlled multi-national firms. The latter's dominance is definitely declining even as the public sector is assuming the commanding heights of the economy. India has a wide spectrum of industries, reasonably well distributed on a regional basis.

The Fifth Five Year Plan and IUC

In the Fifth Plan which commenced in 1974, IUC was specifically mentioned as a feature to be encouraged through inter-institutional collaboration in research and extension and the creation of linkages between the generators and users of technology.³ The new Department of Science and Technology was charged with the responsibility of ensuring the user orientation of research. As a result, a number of measures were taken to strengthen IUC on a wide front. However, it should be remembered that many of the institutions referred to above were active in IUC even before the Fifth Plan's new emphasis was announced.⁴ I propose to devote less space to the experiences of these institutions, and instead lay more stress on the newer developments. The features of IUC in the Indian context which deserve special attention are summarized below:

Science and Technology

(1) The major institute of science and technology have set up "Industrial Research and Consultancy Centres" to undertake assignments for industry. Consultancy work of all staff are routed through these centres. Ceilings have been put on the maximum earnings the faculty can receive from such projects.

(2) Faculty in these institutions are permitted to work in industry on a paid basis during their long summer vacation in order to improve their understanding of industry problems and to be of use to industry.

(3) Major research projects of an inter-disciplinary nature are being undertaken as collaborative efforts involving several institutions. Special committees for research, design and development (RDD) have been set up in 17 states and these institutes are collaborating with them in order to encourage serious applied work and user orientation.

(4) Use of visiting faculty from industry and deputation of students to work for a period in industry have been features of these institutions for quite some time. Employers are encouraged to visit the campuses for recruitment. Similarly, sandwich courses for practitioners are provided by these institutions.

3. Government of India, Draft Fifth Plan, Vol. II, 1974, p.217

4. Thus, the experience of one of the Institutes of Management was summarised in my paper presented at the 1973 UNIDO Meeting. See UN, Industry-University Linkage with Special Reference to Management, New York, 1974, pp.39-47.

(5) In institutions which are engaged only in industrial research and extension, the CSIR has been making special efforts to encourage IUC. The selection of research projects is increasingly governed by the criteria of user interest and pay off in terms of immediate application.

(6) Several research institutes have established close links with user industries. The Central Leather Research Institute has been well known for its success in selling its new project and product ideas to manufacturers and servicing them well in respect of market studies, new processes and raw materials. Co-operative research institutions in textile have been particularly successful in IUC. The active involvement of industry in the working of these institutions is an obvious explanation of this phenomenon.

(7) Another category of institutions which has been able to promote IUC is the group of Technical Teachers Training Institutes (TTTI). At the stage of training technical teachers who will eventually work in engineering colleges and polytechnics, TTTI's have been able to establish close links with industry by arranging industrial training and visits, lectures by industry experts, and involvement of industry in the design of courses and management of the institutes. The TTTI in Bhopal keeps active contact with nearly 200 industrial concerns in India for these various purposes.

Management

(1) My Institute as well as others concerned with management education and research keep in close touch with industry. Among recent developments, special centres have been set up to study problems of specific sectors of the economy. Thus, work on bio gas projects, dairy development, electricity undertakings, and modernisation of rice milling have been undertaken at my Institute in close collaboration with industry. Other institutes have initiated work on the special problems of public sector industries, transport undertakings, etc.

(2) Institutions such as the Small Industry Extension Training Institute (SIET) and the Small Industry Service Institutes (SISI) maintain close links with small scale industry. They play an important role along with financial institutions in initiating and supporting small entrepreneurs. Collaborative research between them and my Institute on entrepreneurship problems have been in progress for quite some time.

Universities

(1) Universities in India are perhaps the weakest in respect of IUC. This is understandable in view of the massive size, preoccupation with undergraduate teaching and quality and morale problems of faculty that these institutions face. Individual universities located closer to industry centres have made some headway in establishing links with industry in respect of research, consulting and training. Sometimes, universities find it easier to work with other research agencies than to set up contacts for industrial research and consulting of the kind that the IITs have.

(2) There are problems of attitudes and values too which inhibit universities from pursuing IUC deliberately. Not many universities favour the idea of consultancy, and the concept of faculty earning extra income through such work. Fear of abuse is very strong and organisational devices to plan and monitor IUC do not exist in most universities. However, the various national councils like CSIR are beginning to increase the universities' interest in taking up research of relevance to industry and other sectors.

National Policy and IUC

(1) Mention has been made above of the role that the Government of India has played in strengthening IUC through its policies on science and technology and the setting up of new agencies and programmes to encourage user orientation in research and training. These policies are certainly an important factor to be reckoned with in evaluating IUC in India.

(2) It is the large, onlightened private industrial concerns which have until recently been active on the IUC front. With the tremendous growth of the public sector, it is now the giant and technology intensive public sector firms which are in the vanguard of IUC. Many of them are active in supporting collaborative research and training efforts.

(3) Industry generally has not been too keen on sponsoring research in academic institutions. The new policy of offering tax incentives (133% write off for financing specific research projects) has given a boost to industry sponsored research in universities and research institutions.

In summary, IUC in India is somewhat uneven across the educational and research system of the country. The extension concept is gaining ground in the non-university part of this system. The retrieval and feedback systems are not as well organised. India has considerable strength in terms of knowledge sources and knowledge users (industry). However, knowledge forms and dissemination media need to be strengthened to bring the sources and users together more effectively.

III. IUC and the Role of UNIDO

(1) The operation of IUC and the factors that make for its success in different settings are not well documented or disseminated. The Indian experience is not adequately known even within India since institutions are busy with their own work. UNIDO can perform a useful service by commissioning in depth studies of IUC in selected countries and involving outside experts from developing and developed countries in such studies so that a more balanced assessment of the experience is available.

(2) UNIDO may disseminate the findings of IUC studies through regional workshops attended by critical persons from the educational and research systems of developing countries so that their thinking is influenced by the experiences of others.

(3) Special programmes should be developed by UNIDO and other international agencies to influence the attitudes and values of university authorities and academic groups such that they take a more positive view of the role of the critical components of IUC such as consultancy.

(4) UNIDO may wish to evaluate the experiences of countries which have tried to use tax incentives and various other policy devices to encourage industry to participate in IUC. The findings of such studies may be made known to developing countries.

(5) IUC will be an uphill task where small scale industry is involved. Based on the successful experiences in this area, pilot projects may be evolved and tried out to encourage small industry to participate in appropriate forms of IUC. Financial institutions in most developing countries have a stake in the development of small entrepreneurs. The financing of IUC projects may be made easier if banks and related agencies are given a promotional role through international agencies such as the UNIDO or World Bank taking a lead in the matter.

Exhibit I

Sector Stage/Process	Industry	Education & Research Systems
INPUT	<p>Technology planning & new processes Design of equipment Market analysis and assessment Project formulation & appraisal Technical & managerial manpower planning Setting up of new units/projects Raw material development Product design & development</p>	<p>Planning of new institution Selection & induction of faculty Student selection Resource generation Development of teaching materials Planning of project teams Project formulation</p>
CONVERSION	<p>production planning & scheduling Input procurement Allocation of resources Productivity improvement Quality control Maintenance management Organisation development (including training & updating of people)</p>	<p>Instruction in classrooms-labs Field work - training in industry Student assessment/examinations Execution of research projects Consulting advisory work Faculty inputs from industry Sharing of facilities</p>
OUTPUT	<p>Market development Cost-volume-price decisions Marketing & servicing Distribution & logistics Product improvement</p>	<p>Placement of graduates Follow up of graduates Extension services Dissemination & utilisation of research Implementation of consultancy Media for interaction-conference/seminar Evaluation of output/joint appraisal</p>

B-902



82.09.27