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[INDUSTRY-UNIVERSITY LINKAGE^{1/}
WITH SPECIAL REFERENCE TO MANAGEMENT.

Draft report
of an Expert Group Meeting
Vienna, 3-7 September 1973]

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INTRODUCTION

Most developing countries assign a high priority to industrial growth, and they usually want it to be as rapid as is consistent with their other social and economic objectives. In this process, the institutions of higher education - universities, technical colleges and specialist institutes - have an important role to play (a) in providing the trained manpower needed for industrialization, and (b) in helping to harmonize industrialization with general social development.

To play this role effectively the educational institutions and industry must co-operate, but, unfortunately, all too often they have not done so. The institutions are preoccupied with their own internal and urgent problems of staffing, finance and expansion. Industry for its part is busy with its own problems and is usually unconvinced that the educationists have anything relevant to offer towards their solution. To bridge this gap in communication, effective linkages between industry and university must be established.

The awareness of the importance and complexity of this problem led the United Nations Industrial Development Organization to organize an Expert Group Meeting on Industry-University Co-operation, which was held at Vienna from 3 to 7 September 1973. The participants came from (a) international organizations concerned with technical education and training - the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Labour Organisation (ILO), the Organisation for Economic Co-operation and Development (OECD) the International Association of Students in Economics and Management (AIESSE), The European Institute of Business Administration (INSEAD), the ILO International Centre for Advanced Technical and Vocational Training (Turin Centre), and the Council for Technical Education and Training for Overseas Countries (CTEOTC); and (b) institutes or technical universities in the developing countries.

The participants were not representatives of their countries or their institutions. They were senior persons all of whom had had direct experience in developing industry-university linkages in some capacity. The discussions were, therefore, based on this experience and not simply on hypothesis or general argument. The Expert Group was composed of the following individuals:

Mikoto Usui
Léon Ter Davtian
Salomon Wald
N. Kubr
Vitaly Korsun
Eric Newbigging

Norman Hunt
Gilbert M. Sauvage
Samuel Paul
Hanjo Roosen
Raymond S. Milne
Manuel José Cabral

Slobodan Ristic
Mustafa N. Parlak
Mordechai M. Levy
Samuel E. Chukwujekwu
Benjamin Epstein
Mathias Mwangi

Mr. Paul served as Chairman of the Meeting and Mr. Hunt as Rapporteur.

The goal of the Meeting was to simulate the creation of more effective linkages between industry and university. For this reason the emphasis throughout this report is on action; chapter V includes specific recommendations for action by bilateral and multilateral agencies.

I. OBJECTIVES OF INDUSTRY-UNIVERSITY LINKAGES

Before considering the activities involved in linkages and their several institutional forms, it is necessary to set out, at least in general terms, the objectives. Why are industry-university linkages necessary? Historically, the training which has evolved over many centuries in industrialized countries has usually been related to operational needs. The modern sophisticated education of the medical doctor evolved out of the primitive apprenticeship training of the barber-turned-surgeon. The equivalent of the modern graduate engineer's education would previously have been gained during a long apprenticeship of practical experience under the expert supervision of a master.

By contrast, in the developing countries there has been less opportunity for this natural evolution of training since so much has had to be attempted in so short a time. Industry and university have tended to develop separately, making distinct and often unrelated contributions to the economy. The result has been a shortage of relevant skills in the industrial sector and under utilization of human resources in the higher educational system. Some form of linkage is therefore needed in order to improve the match between the needs of the developing economy and the outputs of the educational institutions. The problem exists also in industrialized countries but it is minimized because of many decades, even centuries, of feedback between industry and university which, despite all the difficulties of communication, has ensured a measure of continuing interaction.

In all countries interaction needs to be given positive initiation and encouragement; it does not necessarily happen spontaneously. However, it will not succeed if it is contrived; it must be based on an awareness of interdependence, upon a recognition of mutual needs. Both parties must have confidence that they are going to profit from the somewhat difficult task of working together, and it may take some time and effort to persuade them of this fact.

Advantages to industry: It stands to gain from linkage by -

- securing a supply of better qualified graduates having more relevant training because industry's needs have been identified;
- having access to a variety of post-experience training facilities which it has had a part in designing;
- being able to use the university's physical facilities and the expertise of its staff;

- benefitting from the research, consulting, data collection and technical resources of the university;
- improving its public image in the society in which it operates, and thus attracting more talented students to the industrial sector.

Advantages to the university: These are no less real and include -

- the opportunity to assess the needs of the economy and to develop its activities accordingly;
- access to industrial placements so that classroom learning can be related to practical experience;
- assistance from industry in curriculum development to ensure that curricula are relevant to local conditions;
- facilities for staff development by giving faculty members opportunities to gain practical experience;
- access to industry for both fundamental research and action research.

Advantages to society: Finally the economy as a whole benefits from industry-university interaction by -

- an improved return on investment in higher education;
- a more effective educational contribution to economic development;
- better utilization of human and physical resources;
- reduction in the incidence of the social and political stresses which accompany graduate unemployment.

The arguments advanced so far apply to linkages between all parts of the higher educational system and the industrializing economy, although it is convenient to use the term industry-university linkage as a piece of shorthand. The group of experts who met at UNIDO in Vienna, although they touched on a wide range of linkages, concentrated upon the area of "management". This is not to say that other areas such as science, engineering, and technology are any less important; linkages are needed there also. Nevertheless, interaction between industry and university in the area of management has a particular significance in (a) increasing the effectiveness of management as a catalyst in economic development and as a co-ordinator of the use of scarce resources; (b) improving the supply of people competent to manage the resul-

ting industrial developments; and (c) facilitating the replacement of expatriate managers with nationals.

For these reasons, many developing countries are establishing various kinds of facilities for management development and training, sometimes within or associated with, their universities and colleges. These countries believe that this is a necessary part of the industrialization programmes to which they are committed. The expert meeting, therefore, did not concern itself with debating whether industrialization was the "right" policy, or whether management development really was an important element in effective industrialization. It took the view that the majority of developing countries were in practice already committed both to industrialization and to management development and that its task was to consider the ways in which industry-university linkages could make that process more effective.

II. CONTENT OF INDUSTRY-UNIVERSITY LINKAGES

If the benefits to be derived from linkages are so substantial, why do they so often fail to evolve naturally? There is a number of typical barriers to co-operation which have to be consciously overcome in order to establish linkages; they include:

- preoccupation of the teaching institutions with their own pressing problems of finance, staffing and rapidly growing numbers of students;
- a certain anti-business attitude of mind on the part of some academics trained in the traditional subjects;
- university regulations and rigid conventions which discourage staff from interacting with industry, e.g. faculty promotion is traditionally on the grounds of scholarship and the staff member who spends his time consulting and doing action research may prejudice his career prospects;
- limited practical experience on the part of academic staff and, on the other side, an anti-academic attitude on the part of business men who may or may not have had a university education;
- scepticism on the part of industry about the relevance of university studies to its own practical problems - a feeling that they are "too theoretical";
- preoccupation of industry with its own immediate problems, e.g. difficult economic conditions, currency restrictions, government intervention, etc., which may make it neglect its longer term objectives for management development, research and training.

The above are substantial obstacles to be overcome and it is dangerous to assume that in time they will disappear of their own accord or that the creation of a Industry-University Advisory Committee will solve the problem. Left to themselves, the barriers to co-operation do not disappear but reinforce themselves as industry and university diverge still further in pursuit of their independent objectives as perceived from their sceptical views of each other. Therefore, if linkage is to be effective, a conscious strategy is almost always required.

The essentials are mutual commitment and joint activities; without them, committees, centres, associations and foundations will be ineffective. The initiative may be taken by the university, industry, government, or an international agency. In any case a good deal of prior informal contacts are needed in setting up whatever device is thought to be necessary to get the two sides talking to each other. It is

unlikely that real commitment will emerge by trying to establish a large, comprehensive scheme for collaboration immediately. It is more likely to result from joint activities in limited areas which can later form comprehensive linkages.

There are some important areas in which such practical joint action can begin; among them are:

- the promotion of relevant training
- the encouragement of practice-oriented learning
- faculty development
- research and information services
- continuous education, e.g. post-experience courses
- sharing of university facilities with industry and vice versa.

Promotion of relevant training:

The objective here is to bring university and industry together so as to ensure that education is relevant to the needs of an industrializing economy. The fundamental problem is to reconcile what often seem to be conflicting objectives on the part of industry and university. Industry - and often government - see the role of the university as to produce the educated manpower required in the various sectors for economic and social development. On the other hand, universities may claim that their major tasks are the traditional ones of education and research, and they cannot be expected to do everything.

However, in a developing country universities usually have to undertake many tasks which would be done by other institutions in industrialized countries, and if they are to get the balance right they must engage in a continuing dialogue with the "world of action" which uses their services and graduates. In this way they would not surrender their autonomy and academic freedom, but, by exercising it responsibly, make it that much more secure. Joint activities might include:

- joint industry-university surveys to assess national manpower needs;
- contacts with existing agencies such as employers' organizations, chambers of commerce and productivity centres to identify training needs;
- developing advisory panels to assist with curriculum development and evaluation;
- enlisting the co-operation of former students in organizing "experience groups" to discuss the relevance of their academic training to their

subsequent practical work;

- arranging joint meetings between university staff and practising managers to consider aims and problems;
- having industrialists on student selection panels to express the practitioner's point of view.

These are but a few examples of joint activities and any country establishing linkages will undoubtedly add others which relate to its own particular situation.

Encouragement of practice-oriented learning:

In management education the importance of applying knowledge as well as acquiring it is paramount, so the emphasis must be practice-oriented. This means that either practical or simulated experiences must go along side classroom theory and, to this end, industry-university linkage is essential. Relevant activities to make teaching more practice-oriented would include:

- the establishment of "sandwich" courses in which students may spend up to half of their period of study in industry and the other half at the university; whilst in industry they are regularly visited and supervised by a tutor so that practice and learning are fully integrated;
- the use of industrial projects to expose students to practical problems;
- provision of student vacation training in industry;
- development of local case-studies by collaboration between university staff and industry;
- use of practising managers as "industrial tutors" to students engaging in in-plant project work;
- using managers as visiting professors or part-time lecturers and making sure that their teaching is properly integrated with that of the full-time staff.

Faculty development:

The problem here is that in most developing countries there is an acute shortage of suitably qualified university staff, particularly in the management field where practical experience is a valuable adjunct to sound academic training. Consequently, there tends to be reliance on expatriate staff and inexperienced local faculty. Here industry-university linkages make a valuable contribution to faculty development by such activities as:

- seconding faculty to industry for such periods of time as may be practicable;
- industry allowing staff members to join project teams for particular, limited operations, e.g. installing a computer;
- having staff members "adopt" a company or group of companies for regular visits and discussions;
- revising faculty promotion criteria so as to reward not only scholarly research but also effective involvement with industry;
- encouraging faculty to engage in consulting which has some academic relevance;^{2/}
- where necessary, providing the infrastructure to do this, e.g. a Centre for Consultancy and Liaison;
- sending faculty overseas not just for more academic training, but for planned practical experience and, e.g. attendance on functional management courses in management training centres or with international management consulting firms.

Research and information services:

In many developing countries the university is one of the few substantial research resource available since government research centres and industrial R and D departments are limited. Often, too, the university is the most suitable place in which to locate computer data banks, information services and other time-sharing facilities. In these various roles, industry-university linkages are obvious, e.g.

- industry can use university staff on action research projects which can be beneficial to both parties;
- as a corollary it should recognize its responsibility to help wherever possible with fundamental research, e.g. by providing access to data;
- correspondingly, the university should recognize its responsibility to include in its research programme projects which are relevant to the needs of the developing society of which it is a part;

^{2/} Universities in developing countries are often reluctant to expose faculty to the attraction of industrial salaries and fees lest internal dislocations and antagonisms result as between faculty in those subjects which are directly relevant to industry and those which are not. This is a difficult problem which can only be resolved within the particular institution, but setting up a separate centre for consultancy can facilitate control (see page 23).

- universities may appoint liaison officers to facilitate interaction with the economy in this area of research and information services, with spin-off benefit to its other activities and faculties;
- universities may invite suitably qualified practitioners to act as consultants on their research projects;
- the university can act as a healthy corrective to any tendency there might be on the part of industry to take a short term view of development by arranging studies or seminars on important issues in social and economic development.

Continuous education:

Increasing recognition is now being given to the problem of up-dating the knowledge and skills of those whose formal education was completed some years earlier. There is a fruitful area of industry-university collaboration in such activities as

- post-experience management courses (evening, day-release, non-residential and residential seminars); the courses themselves can be jointly designed, taught and evaluated by academics and practitioners;
- these programmes can be based on clearly identified training needs and can, indeed, be devised in such a way that members of the course help each other to identify their own training needs, with the academics acting as catalysts and counsellors;
- university staff can be invited by industry to help plan and conduct tailor-made training programmes either in-plant or at the university;
- where the faculty is suitably qualified, consultancy-related training projects can be undertaken for particular companies or groups of companies;
- where the faculty is lacking in such qualifications but has the necessary potential, foreign consultants can collaborate on the initial projects to develop local resources.

Sharing facilities:

Expensive physical facilities such as computers, research laboratories and equipment and libraries, are often under-employed at various times. Better use of scarce resources and a measure of co-operative activity can be achieved by sharing arrangement of some sort between industry and university.

Set out above are six areas which may serve as a guide to practical and

realistic opportunities for industry-university linkage. Only some will be relevant to any one situation and most will require a deliberate effort to initiate and to maintain highly motivated participants. Usually the initiative will be with an enterprising academic or practitioner who will meet the challenge of change and create a climate of co-operation. His enthusiasm may well be infectious, the benefits of collaboration will become clear to others and joint activities will spread. So long as these innovators are in post the informal linkages may continue, but there is always a danger that staff changes or other demands upon staff time will threaten them. For this reason, it is usually desirable to institutionalize linkages in some appropriate form. The institutional form is not the real linkage - that inheres in the commitment of the parties concerned and the activities in which they engage - but it is necessary for the health and development of the linkage to have some instrument to continue a programme as personalities change over time.

Again the most appropriate form of linkage will vary from case to case and it is important to diagnose the needs of the actual situation and select the most suitable form or forms to meet them. The following chapter reviews a few such institutional forms which have been adopted successfully in several very different countries.

III. SOME CASE STUDIES

The paragraphs which follow briefly describe the salient features of linkages which illustrate the different forms that can be adopted to suit local circumstances. They are selected from among those which were analysed at the expert meeting and are by no means a comprehensive list.

University of Zambia:^{3/} The situation here is that of a young university in a country where there is an acute shortage of trained manpower. The need to relate university education to the manpower needs of the country has been fully accepted, and for this reason linkage with industry has been established through the medium of an Advisory Committee. This is a very basic arrangement for linkage and in this case it has proved its value.

The Committee meets two to three times a year to examine objectives and curriculum and to make arrangements for the vacation training of students. Also the academics have found it a useful means of gaining leverage with the University authorities where the perceptions of the staff in the traditional academic subjects and those in the more vocational ones diverge. Being composed of roughly equal numbers of academics and practitioners from industry and government, the Committee provides a forum for a continuing interaction between the University and its environment. It is interesting to note that the Committee has been considering more formal institutional arrangements for linkage. These would take the form of an industrial training fund to which all industries using engineers would have to contribute, and from which financial support for vocational educational programmes would come.

School of Administration and Economics, Universidad Madre y Maestra, Dominican Republic:^{4/} This case illustrates the way in which the problem of linkage has been tackled in a university in a small developing country. When it was decided to establish a Business School in 1963 it was agreed that this should be within the University so that it could draw on the resources of the University and also contribute to its other Schools, e.g. those of Engineering. This decision raised the problem of how to ensure that the new School would be free from undesirable constraints on innovation in teaching a vocationally oriented subject. There was also the problem of how to engender confidence in the new School on the part of a business community in which the majority of practitioners had little academic or

^{3/} For a full account of this linkage, see ID/WG.161/6.

^{4/} For a full account of this linkage, see ID/WG.161/3.

professional business training themselves.

In this situation, the need for dynamic and acceptable academic leadership was paramount in order to establish effective working relationships with business. Needs were surveyed, short post-experience courses were established, and then the undergraduate programme was launched with emphasis being laid on (a) a degree of specialization in one managerial function, e.g. marketing or finance and (b) vacation training in industry for the students. In this way, the work of the Business School was made more acceptable to a somewhat sceptical business community.

A further institutional linkage was proposed in 1969, namely the establishment of a Management Training and Advisory Centre to conduct management development programmes and undertake consulting work. Unfortunately the proposal has not yet been implemented and the rapid growth of the School, coupled with the failure to institutionalize the linkage, has meant that many of the things that the School was able to do when it was small do not now get done. For example, the two summer work periods have been reduced to one because of the difficulty of securing placements.

The case illustrates:

- the advantages of locating a Business School within a university;
- and conversely the limitations deriving from the differing objectives of academic and vocational subjects;
- the importance in this situation of dynamic academic leadership;
- but the dangers of relying too long on personal and informal linkages;
- and the need, therefore, to institutionalize the linkage and to make it a deliberate strategy.

Middle East Technical University, Ankara: This is a technological university, which has recognized that the training of engineers requires more than the traditional academic approach. It takes the view that in the modern world the period of superiority of the universities has come to an end in many areas of knowledge, and that there is a growing need to recognize that the universities and industry are, in fact, interdependent.

An example of the way in which the METU has met this challenge is provided by the School of Engineering which has initiated industry-university co-operation programmes for fifteen years. At first they were more or less accidental, depending upon personal contacts, but more recently they have become more systematic. Several

years ago, faculty members went in small groups to talk to industrialists about possibilities of joint activities. Initially, these were mostly in research and development work, but more recently approaches have been made to industry to encourage it to use the University's facilities, to provide practical engineers as part-time lecturers, to co-operate in the planning of refresher courses, and to give faculty members practical experience during the summer months. As a result the University has recognized the need to formalize these arrangements by appropriate regulations.

Another type of industry-university interaction at METU is the establishment of an extension campus at Gaziantep, a major centre of small industries. Here the University's resources can be directly applied to the problems of small business which are so pressing in many developing countries.

The case illustrates:

- the need to recognize the interdependence of universities and industry in the technological subjects;
- the value of action oriented research in encouraging a more positive relationship between university and industry;
- the need for useful results to flow from this research and to be communicated through effective linkages.

Technion Research and Development Foundation:^{5/} This foundation was established in 1952 as an agency of one of the major technological universities of Israel, the Technion. It is an example of a highly sophisticated institutional form of industry-university linkage, perhaps suited to a country at a fairly advanced stage of economic development.

It operates within a University which is committed to vocational education, but which insists, rightly, upon the importance of maintaining its traditional priorities in academic learning and research. The establishment of a separate agency for applied research, consulting, product development and testing, the TRDF, has created an effective linkage between the University with its longer term priorities, and industry with its immediate needs for practical applications of the University's academic resources. The TRDF is able to draw upon researchers from Technion's many faculties and departments without deflecting them from their major tasks. It is conducted as a business, but it ceases its activities in any field as soon as commercial

5/ For a full account of this linkage, see ID/WG.161/5.

organizations can effectively perform them.

The TRDF example illustrates that:

- it is usually easier for a technological university to establish linkage with industry than a traditional, general university;
- nevertheless, there are powerful advantages in institutionalizing that linkage through the establishment of a separate agency such as TRDF;
- there is a real problem in reconciling the conflicting demands upon universities in developing countries (a) to meet immediate needs and (b) to concentrate its energies upon education and research;
- and that this problem can be tackled by establishing an agency like TRDF;
- but, to be effective, it must be backed by resources which ensure that its work for industry is acceptable so that there is a genuine demand for it and a willingness to pay the economic costs.

In short, Technion and TRDF demonstrate that it is possible to meet the legitimate demands of industry for immediate and practical help, and at the same time to ensure that sufficient fundamental research is done to keep ahead of industry and to avoid simply peddling current practice. This is particularly important in the management area.

Management Foundation of East Java: This case illustrates the role of international agencies in promoting industry-university linkage, the agencies concerned being the American Ford Foundation and the British ODA (Overseas Development Administration). They have been sponsoring a project in Indonesia designed to build an effective management development resource serving the needs of industry, particularly in East Java.

The objectives are: (i) to develop the capacity of the local academic staff to act as management trainers; (ii) to establish a management institute as a continuing linkage between the academics and industry; and (iii) to train practising managers. The participants are: (a) a group of highly committed local industrialists in Surabaya, East Java, who formed themselves into a Management Foundation; (b) two universities, the University of Indonesia and the University of Airlangga, and the Surabaya Technological Institute; and (c) a private management training organization. All were concerned to develop a group of faculty members who would

have practical experience and credibility with industry.

The resources are these: (i) the local institutions provide the faculty; (ii) Ford and ODA provide the finance; and (iii) an international firm of management consultants provide the consulting expertise. A programme was devised consisting of a series of courses in several practical functional areas which had been previously identified by a training needs survey; these included materials management, quality management, production planning and control, and financial management. Each module lasts ten weeks and includes a four weeks course, followed by a six weeks supervised project in industry. At first the international consultant ran the course in English and supervised the projects, and in each functional area, the first course consisted of Indonesian faculty members and industrial trainers. The courses were then replicated, being conducted in Indonesian by the participants in the first round, with the back-up of the international consultant.

The strengths of the project are:

- it is essentially relevant and practical
- it is related to Indonesian conditions
- it uses Indonesian resources, with the international consultant merely acting as a catalyst
- it has a multiplier effect by training local trainers.

The weaknesses are:

- the use of commercial consultants is expensive;
- consequently, it is financially difficult to provide the local trainers with more than one training experience before being asked to run the courses themselves with the consultant merely acting as back-up.

Nevertheless, the experiment has been highly successful and all the participants both industrial and academic, are enthusiastic about it. The case illustrates:

- the importance of attracting a group of committed industrialists who are prepared to support the linkage;
- the value of co-operation between the several academic institutions and industry justifying the high initial cost of the operation;
- the role of a management foundation as an institutional expression of this commitment and co-operation in industry-university linkage;

- the advantages of co-operation among international agencies in promoting linkages;
- the usefulness of international consultants in developing local consulting and training skills.

Indian Institute of Management, Ahmedabad:^{6/} The previous case-studies have illustrated a series of linkages ranging from those within universities, through the establishment of semi-autonomous schools and centres, to independent management foundations which relate to, but do not form part of the university system. The IIM at Ahmedabad illustrates another form of linkage, namely the establishment of an independent, specialist postgraduate training institution standing between, but independent of, both industry and university.

Its objectives are clear, namely to train young people for enterprises in both the public and private sectors; for this purpose, an understanding of the needs of those sectors is essential, both in terms of present requirements and of creating agents of change for the future. Appendix V. describes in detail how effective are the linkages which IIM has established from the very outset. Before its teaching programmes began there was a detailed survey of market needs. The next step, before the post-graduate courses were offered, was to organize the senior executive programme which brought practitioners into immediate contact with the Institute and engendered confidence in it. Thirdly, the faculty were sent into industry for nearly a year to prepare their teaching materials before they implemented their courses.

Now that the teaching programmes are well under way, the interaction continues, with the involvement of practising managers in teaching, case-writing, selection panels, placement of students both for vacation training and for regular jobs, curriculum development and evaluation, and research. In turn, the faculty is encouraged to do consulting up to one day per week, and in every way to maintain close and continuing contacts with industry.

The case illustrates:

- the importance of academic institutions having a conscious strategy for interaction with industry and not leaving it to develop capriciously;
- that interaction does not come about as a result of establishing

^{6/} For a full account of this linkage, see ID/WG.161/4.

- committees; it requires commitment to joint activity;
- that this commitment and joint activity are more easily organized by a newly created independent institution than by a conventional university; its objectives are clearer and the traditional constraints fewer;
 - on the other hand, the relationships with other relevant disciplines are less direct and for that reason have to be more consciously cultivated if they are to flourish;
 - that there is a "critical mass" aspect of linkage; unless the scale of the operation is large enough to support an adequate range of activities, linkage is extremely fragile.

European Institute of Business Administration: This Institute, commonly known as INSEAD and located in France is an essentially multi-national, post-experience management school. The linkages with business are numerous, but the particular one to be considered here is the European Centre for Permanent Education (CEDEP), which provides a European model worthy of consideration in certain developing countries, where conditions are suitable. The idea is basically simple; it consists of an association of companies grouped around the Institute in a loose affiliation for interaction. The objectives are: (i) to engage jointly in the task of identifying particular training needs; (ii) to co-operate in designing programmes to meet those needs; and (iii) to evaluate the programmes and provide feedback to the Institute.

The method so far adopted has been a training programme of 106 days duration (roughly eight periods of two weeks) spread over two years. Thus the academic training is fully integrated with on-the-job experience, and is directly related to identified training needs. Each company undertakes to send a range of managers from junior to senior levels, so that the impact of the training is felt in all parts of the hierarchy at once. The companies meet the direct costs of the operation, plus a contribution to overheads, and the Institute provides the faculty and supporting services.

The case illustrates:

- the advantages to be derived from linkage not with industry as an amorphous mass, but with a group of specific companies;
- the institute gains a knowledge in depth of those companies and their training needs;

- the companies gain training experience designed specifically for them and not to some general specification;
- industry-institute interaction is frank and practical;
- the companies (provided they are satisfied with the training provided) are more open to approaches for research and case material, and more willing to use faculty members as consultants since they know each other well.

However:

- the method may have limited application in less developed countries since it is necessarily confined to medium to large companies;
- and the developing country university may feel constrained not to enter into such exclusive relationships with particular firms especially if, as is likely, they are the expatriate companies or multi-nationals;
- nevertheless, some modification of this method may be useful in effecting a transfer of know-how from the multi-nationals to the indigenous companies operating in developing countries.

Yugoslav Centre for Organization and Development, Belgrade: This case illustrates the importance of developing institutional forms of linkage which are appropriate to the local situation. The origins of the Yugoslav Centre lie in a recognition of the fact that since management is a social process, the systems of management education which have evolved in industrialized countries cannot simply be adopted without modification in developing countries.

This is a challenging task and one which demands substantial resources. The position in developing countries is usually such that unless there is co-operation between the various universities and with industry, resources are unlikely to be adequate. A solution which has been used in Yugoslavia is the creation of the Centre for Organization and Development assisted since 1971 by the UNDP, through the executive agency, UNIDO.

The Centre is an integrated and multi-disciplinary institution for consulting, research, and training. It integrates eighteen different institutes and consulting organizations. The objective is to coordinate their resources upon the task of developing an approach to management research and training as is appropriate to the

particular conditions in Yugoslavia, e.g. the "self-management agreement" for worker participation in management.

The Yugoslavia case illustrates:

- the great importance of recognizing the limitations on the direct transfer of management knowledge and skills from industrialized to developing countries;
- the value of linkages between universities and industry in the task of developing indigenous management education;
- the benefits to be derived from inter-institutional collaboration so that scarce resources can be more effectively developed;
- the useful contribution which international agencies can make towards accelerating such developments.

These eight case histories serve to illustrate the wide variety of legitimate approaches to the establishment of industry-university linkages. They are an institutional recognition of the fact that the concept of a "university" is not homogenous, but is, in fact, a continuum from the traditional university with the emphasis upon pure scholarship and research, to the "poly-university" which is characteristic of so many developing countries, where one institution has to do the work of many. Across this continuum, many different types of linkage will be appropriate, and the next chapter attempts the difficult task of putting them into a rough classification.

IV. CLASSIFICATION OF LINKAGES

The basis of the classification which is attempted in this chapter is the degree of formality which characterizes the linkage arrangement, varying from the advisory committee at one end to the tightly knit regional institution at the other. The objective is certainly not to suggest that one method of organizing linkages is better than any other. Instead, they are briefly described and their strengths and weaknesses listed, so that those who are responsible for establishing linkages in particular countries can decide for themselves which is the most appropriate form. Even then the model will certainly have to be modified to meet local circumstances.

It is suggested that there are broadly seven categories of institutional linkage, viz.

- advisory committees, related either to individual institutions or to regions or a nation;
- informal groupings of companies around a teaching institution;
- intra-institutional centres for industrial research, consultancy and liaison;
- independent specialist institutions separate from universities;
- management foundations or associations involving industry and university;
- government provision for linkages such as a national training agency cum levy/grant system;
- regional arrangements for industry-university linkage.

Advisory Committees: As in the case of the University of Zambia mentioned previously, many institutions have found it useful to bring their faculty members together with practitioners in an advisory committee in which needs can be identified, programmes designed, and some kind of feedback for evaluation provided. Once such a committee has been formed it can be used as a panel from which to draw groups of people to serve on working parties to look into particular issues, e.g. to examine curricula in detail, to help arrange placements for students and to assist with faculty development.

Some of the strengths are:

- the advisory committee provides a structure for industry-university linkage with the minimum cost and constraint;

- because they are advisory, such committees can provide expert knowledge without impinging on academic freedom;
- they can help to protect the institution against political pressures or a reactionary attitude on the part of the university;
- they are particularly valuable in identifying training needs and setting up new programmes;
- also in evaluating existing ones;
- they can be used to involve other bodies such as professional associations and chambers of commerce;

On the other hand, there are weaknesses:

- there may be a danger of assuming that setting up a committee creates effective linkage; this is too easy a solution;
- standing committees may be ineffective and lack real commitment if they have no executive powers;
- they may result in undesirable pressure being exerted by sectional interests;
- they may tend to be sterile after a time, especially if there is insufficient turnover of membership.

In short, the advisory committee is a useful device for the earlier stages of developing linkage. Provided it is supported by effective joint action, it can become the basis on which to build a more substantial form of linkage.

Informal Groupings: These may well emerge out of the work of an advisory committee, with the more committed members becoming sufficiently interested to involve their companies more closely with the university. As in the case of INSEAD, this can have powerful advantages:

- there is a real commitment on the part of companies;
- training is related to the reality of what those companies actually do;
- there are better opportunities for faculty consulting and research;
- and the possibility of transfer of know-how from the more to the less sophisticated companies in the group.

But:

- care must be taken to involve a balanced range of local public and private sector companies, especially if some of those co-operating are foreign or multi-national;
- the grouping is of necessity limited and for that reason it may be desirable for membership to rotate.

Institutional Centres: The university which has had experience of advisory committees and working with selected companies may decide that the best way of encouraging industry-university interaction without prejudicing its other academic and research activities, is to establish a Centre for Industrial Liaison. Such a centre, like the TRDF, will need enough autonomy to free it of inhibiting constraints on effective action, but may also be under the overall control of the university so that policies do not diverge.

In the United Kingdom in recent years, government finance has been provided to enable British universities to set up Centres of this sort and many have done so. This government money is for a limited period of pump-priming, after which the Centres are expected to be self-supporting from the income which they generate from research contracts, consulting, symposia and other aspects of industry-university linkage.

This form of linkage has many strengths:

- it is firmly under the control of the university but has the necessary autonomy;
- being part of the university system, staffing problems may be reduced as compared with independent agencies;
- it has a management structure which enables it to operate in a more businesslike way than university departments or staff members;
- it can draw on the total resources of the university and mobilize these on a project-team basis to meet particular problems in practice;
- it can engage in "asset farming" so as to get a better utilization of the physical assets of the university, e.g. computers;
- the university can protect itself against too much consulting being done by its staff, by insisting that all consulting assignments be handled by the Centre;

- it avoids proliferation of institutions and articulates the commitment of the university to linkage.

The weaknesses include:

- the possibility that the Centre's services will not be acceptable to industry unless the staff of the university are demonstrably competent to handle practical problems;
- too much consulting may be encouraged at the expense of academic research and publication, with consequent prejudice to the staff member's career;
- if the Centre controls all consulting, there may be opposition from the more successful members of staff who could gain higher fees independently.

The intra-institutional Centre for Industrial Liaison is clearly more relevant to the large, multi-faculty university than to the small or specialist institution. There is a critical mass problem here. On the one hand, unless the university is powerful enough to offer acceptable services, the Centre will fail; on the other hand, the existence of a Centre in a smaller institution can help to build up interaction to a level at which it can become self-supporting. This is where some pump-priming financial support from governments or international agencies may be necessary.

Independent Institutions: The advantages of independent specialist institutions such as the IIM at Ahmedabad were well illustrated in the previous chapter. The critical mass argument is, however, even more telling here than in the case of the intra-institutional centre. In order to justify the establishment of a separate institution it must be clear that (a) the task to be performed is unsuitable for existing universities; and (b) large enough and permanent enough to give a proper return over time on the investment involved.

Given that assurance, the strengths of the independent, specialist institution are great:

- its very independence from the constraints of normal university conventions is an advantage;
- it may not be restricted to paying the normal academic or government salaries and may thus be able to attract better staff;
- it can evolve its own criteria for promotion and reward of staff

and not be bound by academic traditions in this matter;

- it avoids the anti-academic attitude that many practitioners have towards universities;
- its linkages with industry are natural, necessary and in no way contrived.

On the other hand:

- it lacks the support of the relevant academic disciplines such as are found in the university;
- it may not have the prestige of a university and its qualifications may be undervalued;
- it does nothing to improve the linkages between the university and industry; rather, it may attract industrial support away from the university;
- it is expensive.

Management Foundations: Successful management foundations operate in many developing countries, including Nigeria, Kenya, Malaysia, Singapore and Indonesia. They are essentially a voluntary association of industries and individual managers, usually drawn from both the public and the private sectors, who form themselves into a legally incorporated body in order to improve the quality of management in their country. This they do by means of courses, conferences, seminars, meetings, libraries and a great variety of other activities.

From the point of view of industry-university linkage they are extremely important in that they express the commitment and, indeed, the involvement, of practitioners in the task of improving the quality of management in which the university also has a part to play. Because the initiative in forming the foundation is normally with industry itself, commitment is often greater than in the case of university centres or independent institutions. The university which is anxious to develop closer links with industry can often find in the management foundation a powerful ally.

Among its strengths are:

- the active involvement of managers, not as members of committee merely, but as lecturers and participants;
- it provides a vehicle for the exchange of expertise between managers

and between companies, especially between the bigger, foreign companies and the local, smaller ones;

- it is a non-government agency, independent of politics;
- it neutralizes the industry-university conflict.

It can, however:

- suffer from political in-fighting;
- become a mere "talking-shop";
- find great difficulty in staffing with full-time professionals once it grows beyond the stage at which the members themselves do all the work;
- fail to generate enough income to be financially viable once government or international agency support is withdrawn.

Government Provision: A number of countries, both developed (e.g. the United Kingdom and developing (e.g. Colombia) have expressed their commitment to industrial training by introducing legislation to finance and promote it. The two essential components are normally (i) some form of levy-grant system of raising finance for approved training, and (ii) some form of national training agency to mobilize training resources in universities, colleges, and elsewhere. Such a system is a powerful incentive towards industry-university linkage since it puts a cash value on such interaction and results in approved training.

Its strengths are:

- there is a financial stimulus to industry to engage in training and therefore to be involved with the training institutions;
- since, to qualify for grant, training has to be "approved", there is an incentive to identify training needs on the part of the academic institutions;
- some of the financial problems of linkage are resolved through the levy-grant machinery.

Weaknesses include:

- the danger that training is done for the wrong reasons, i.e. to qualify for grant;
- and that training is distorted by political considerations.

Regional Arrangements: There is an obvious economy of resources to be gained by co-ordinating the activities of the several agencies operating within a particular region. For example, mention has already been made of the Yugoslav Centre for Organization and Development. Another example, this time multi-national, is the Asian Institute of Management in the Philippines, which serves the countries of the S.E. Asian region.

The strengths of regional arrangements are obvious:

- resources are more rationally deployed;
- by pooling the requirements of a region, a larger operation can be justified and the critical mass problem resolved;
- training can be related to the needs of the region's industry and less reliance has to be placed on overseas training and expatriate trainers;
- "third country" training is facilitated.

However, the difficulties are considerable:

- particularly if several countries are involved, political constraints can prejudice professional development;
- in finding a common denominator for regional training, the needs of the individual countries or areas may not be so fully met.

Experience would suggest that regional arrangements are more likely to succeed when the demand for them evolves from the bottom up rather than being imposed from the top. There are substantial advantages to be gained, but great difficulties to be overcome, and there is a need for more knowledge of ways of overcoming the practical obstacles to the regional development of industry-university linkages. Since the UN family of agencies is supra-national, it could be argued that they have an important part to play in encouraging such regional arrangements.

However, this possibility, together with other opportunities for action by bi-lateral and multilateral agencies is the subject of the next chapter. As far as industry-university linkages are concerned, this present chapter has done no more than review a series of model arrangements. Inevitably it has concentrated upon the institutional forms, but it is important to emphasize that it is the commitment to linkage that really matters, not the form it takes. There is only disillusionment, to be found in setting up a committee, centre or institution and thinking that the problem is solved. The developing world is littered with empty shells resulting from

the concern for institution building rather than for the joint activities which those institutions were intended to promote. In turning to the role of the international agencies, therefore, this is an important emphasis to make.

V. ROLE OF THE INTERNATIONAL AGENCIES

It has been stated that one of the United Nations priority areas of the second development decade is:

- to accelerate activities such as education and training to meet increasingly responsible job requirements in industry and business, management consulting services and applied research.

The executing agencies of the United Nations have, therefore, a vital role in promoting industry-university linkages which are so important a part of this process of relating education and training to actual job requirements. The same is true of the bilateral and other international agencies. This final chapter is primarily concerned with the part which can be played by these agencies in promoting industry-university linkages. It considers first their role, second some possible activities, and finally their overall strategy.

The promotional role: In discussing the role of the international agencies, it is relevant to point out the importance of identifying the agents of change which can be expected to promote linkages in any particular case. Sometimes it will be the multi-national corporations, sometimes local industry, sometimes the educational institutions, and often the government. In these cases, the international agencies can exercise a supportive role, encouraging these indigenous developments by inputs of professional expertise.

Often, however, the international agencies themselves, in the absence of local initiatives, may be the agents of change, facilitating the establishment of linkages when a request is received from the country concerned. This may involve holding promotional discussions with institutions, industry and governments on the importance of a conscious policy for industry-university linkage. In some cases, it will mean that the international agency will sponsor some pilot projects at the request of governments. These projects can later be evaluated and the model can be used in other countries with appropriate modifications.

Activities: To turn now from roles to activities, these may be grouped under three headings, i.e. (i) information, (ii) initiation, and (iii) evaluation. The list which is given below is by no means exhaustive; it merely sets out those which most clearly emerged from the meeting of experts at UNIDO in Vienna. Possible activities of the international agencies might include:

(i) Information - The regional officers of the UN family of agencies could play an important part in identifying potential linkage programmes, to this end, they should be briefed on the importance of industry-university linkage and the various methods of effecting it.

- In view of the great disparities among developing countries, projects to assess local needs for linkage could be developed. These could then become the basis for detailed assessments of local training needs.

- It is all too easy for experience of linkage to be limited to one country, and there is a role for the international agencies in collecting experiences from various countries, analysing and evaluating them, and disseminating the results. Case histories of successful and less successful linkages could be published; particularly useful would be those which illustrated the value of linkage in promoting entrepreneurial and small business development.

- There is often a need for greater co-ordination among the international agencies, several of which may be working in the same country without any connection between them. More should be done to keep the various agencies informed of what the others are doing, since overall co-ordination and control are clearly impracticable. At least, experiences of linkage could be shared.

- In this sharing exercise, efforts should be made to promote interchanges between developing countries rather than relying solely on transferring experience from industrialized to developing nations.

(ii) Initiation - In view of the critical importance of such catalytic institutions as management foundations in promoting industry-university linkage, the international agencies could, in many cases, actively encourage their establishment.

- In doing so, they should take full account of the institutions which already exist. In many cases, local chambers of commerce, trade associations and professional bodies, as well as the educational institutions can usefully be involved.

- Also, they will have to have in mind the importance of involving the expatriate companies (often multi-national) with the local companies, so that there is a conscious policy of developing local management technologies by exchange of experience which can then be systematized through the linkage with the university.

- The international agencies should provide bridging finance where this is necessary. Often a local management foundation or university centre for industry liaison will find it difficult to finance itself in the early years before it can generate sufficient income from its activities. Without external support it may be

forced to pay salaries and fees which are too low to secure the services of the best people, and this in turn makes its future income less secure.

- This short-term financing is particularly necessary where it is thought necessary to bring in international management consultants. They have an important contribution to make, but they are expensive. External financing for a strictly limited period of time, together with an insistence upon the training of local consultants, can do much to build up a local consulting facility, e.g. among university staff members, which is critical in making industry-university linkage effective.

- Related to this is the matter of the role of the international agencies in staff development for effective industry-university linkage. Apart from making possible the use of international consultants, they can facilitate and finance schemes to enable university staffs to acquire practical experience either in their own region or overseas. Regional development of management probably deserves higher priority than sending university staffs overseas for further academic training; practical experience overseas could be a much more valuable input.

- The international agencies can make a contribution to curriculum development by, for example, financing an arrangement to bring in for appropriate periods of time suitably qualified academics and consultants to work with the local university in developing curricula which are relevant to local conditions and yet in step with international thinking.

(iii) Evaluation - Any individual country's experience is necessarily limited and self evaluation of it is difficult and highly subjective. The international agencies could perform a useful role in assisting this process of evaluating experiences in promoting industry-university linkage in developing countries.

- This process of evaluation could take a variety of forms, and the Vienna meeting of experts is one model. It would be useful to follow it up with a series of workshops on industry-university linkage, not, however, dealing with the issue generally, but specifically, concentrating on evaluating particular forms of linkage.

For example, there is increasing interest in the levy-grant system of financing industrial training, and there is no doubt that it is a valuable device in certain circumstances. But there may be a danger of its being adopted without due consideration of its limitations as well as advantages. It would be useful to have a UNIDO workshop to review the experience of those countries which have used the system, so that previous mistakes could be avoided, and modifications to meet local conditions could be considered.

- A UNIDO expert meeting would also be valuable in reviewing experience of regionalization of industry-university linkage. Regional arrangements are always difficult, especially if they involve several independent countries, but a rational use of scarce resources demands that they be seriously considered.

- A more radical approach to evaluation than the workshop model is the pilot project. Where host countries were willing for experiments to be made, it would be valuable for UNIDO (perhaps in association with international bilateral agencies) to run one or two practical projects trying out some of the models discussed in chapter IV. The major objective would be to evaluate them and see what conditions were suited to each and vice versa. Subsequent sharing of this experience could help to ensure that suitable forms of linkage were established in the future.

These, then, are some of the activities proposed for the international agencies at the Vienna meeting of experts. They are all consistent with the roles which were identified as being appropriate for these agencies in the earlier paragraphs of this chapter. In conclusion several strategic aspects need to be considered:

Strategy:

First, it is important to recognize that linkages rarely just happen; there is a need to develop a conscious strategy for industry-university linkage, and the international agencies could help to develop such strategies by:

- themselves taking initiatives; or supplying the necessary expertise to encourage, reinforce and guide local initiatives;
- financing on a pump-priming basis the tactics needed to implement the strategy.

Second, whenever an international agency, bilateral or multilateral, promotes a training activity in the management field, it should make it a precondition of support that:

- there is full recognition of the importance of industry-university linkage and commitment to making it effective;
- the institution concerned has a sufficient degree of autonomy from or within the parent university to enable it to maintain linkage with industry, and engage in relevant training, research and consultancy activities;
- it is of sufficient scale to make success possible; if the scale

is too small, then effective interaction with industry is crowded out by what are seen as prior activities, such as teaching;

- since effective industry-university linkage is a demanding activity, conditions need to be such as will attract and retain first class personnel.


Third, in this strategy of industry-university linkage, it is important to avoid the proliferation of institutions and, wherever possible, to use or modify indigenous institutions such as universities. However, this poses the problem of minimizing the adverse effects of traditional constraints on new types of activity, and the best institutional form of linkage will have to be individually designed to suit local conditions. The international agencies will normally be concerned to help establish catalytic agencies such as management foundations, centres for industrial liaisons, and regional arrangements, all of which have the objective of mobilizing the resources of existing agencies rather than duplicating them. This is an important caveat to enter, since there are powerful pressures tending towards establishing visible and prestigious institutions rather than more modest catalytic and co-ordinating agencies.

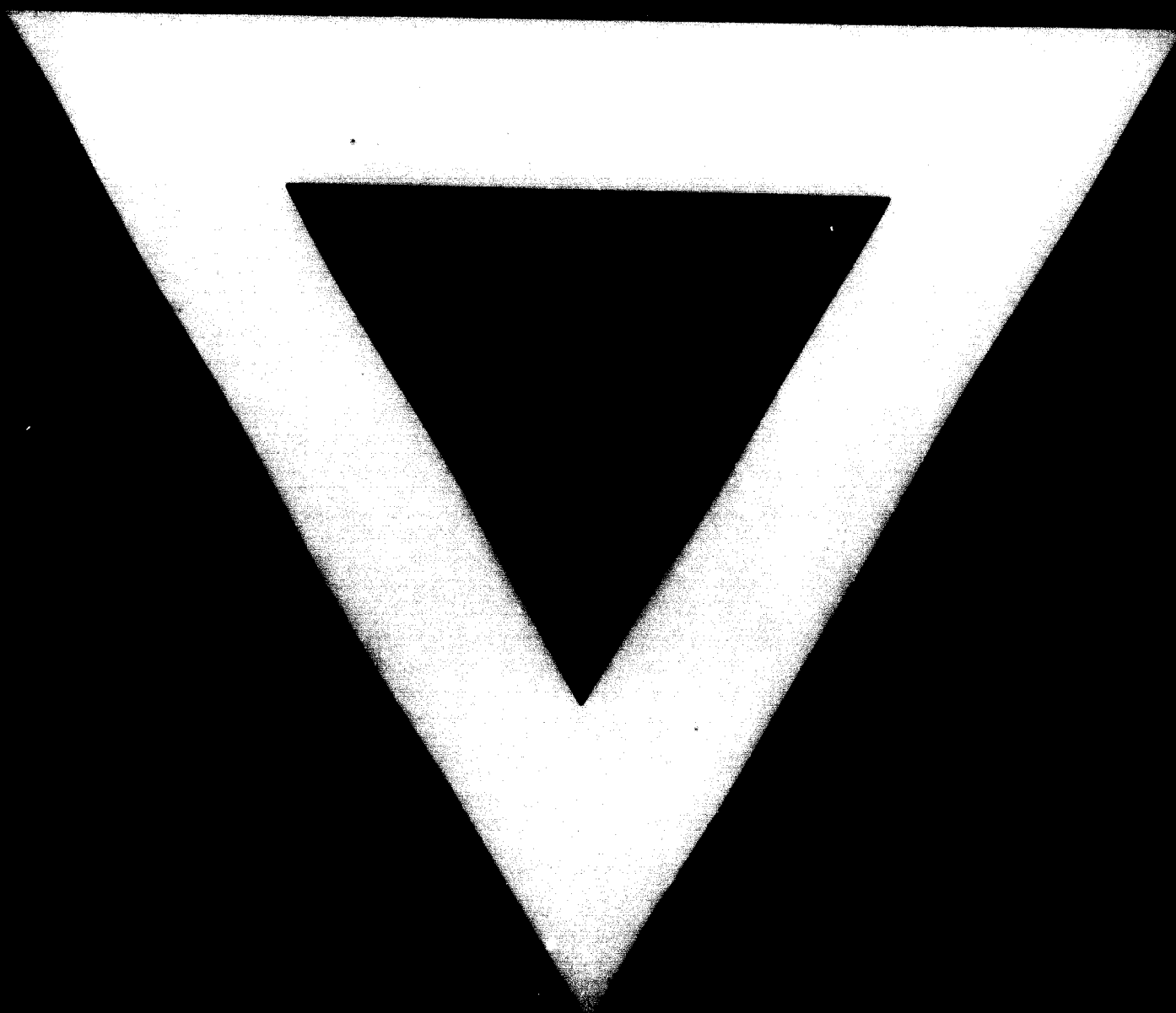
Fourth, in view of the scarcity of resources and the complexity of the task of establishing industry-university linkages in the many developing countries, the international agencies, both bilateral and multilateral, should co-operate wherever possible, or at least keep each other informed. To this end, consideration might be given to:

- the preparation of a manual of procedure with regard to international agency activity aimed at industry-university linkage; and
- the adoption of a convention whereby whenever an international agency is considering a project in a particular country, every effort is made to discover whether other agencies are involved or have been approached, so that duplication can be avoided

Annex

List of papers presented to the Meeting

- ID/WG.161/3 Measures to intensify industry-university co-operation
and to reinforce the capability of business schools to supply
well trained management resources, with special emphasis on
consulting services and summer work programmes
Manuel José Cabral, Dominican Republic
- ID/WG.161/4 Industry-university co-operation: The Indian experience
Samuel Paul, India
- ID/WG.161/5 Creating the university-industry interface in a developing
country - The Israeli experience
Mordechai M. Levy, Israel
- ID/WG.161/6 University-industry co-operation in Zambia
S. E. Chukwajekwu, Zambia
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