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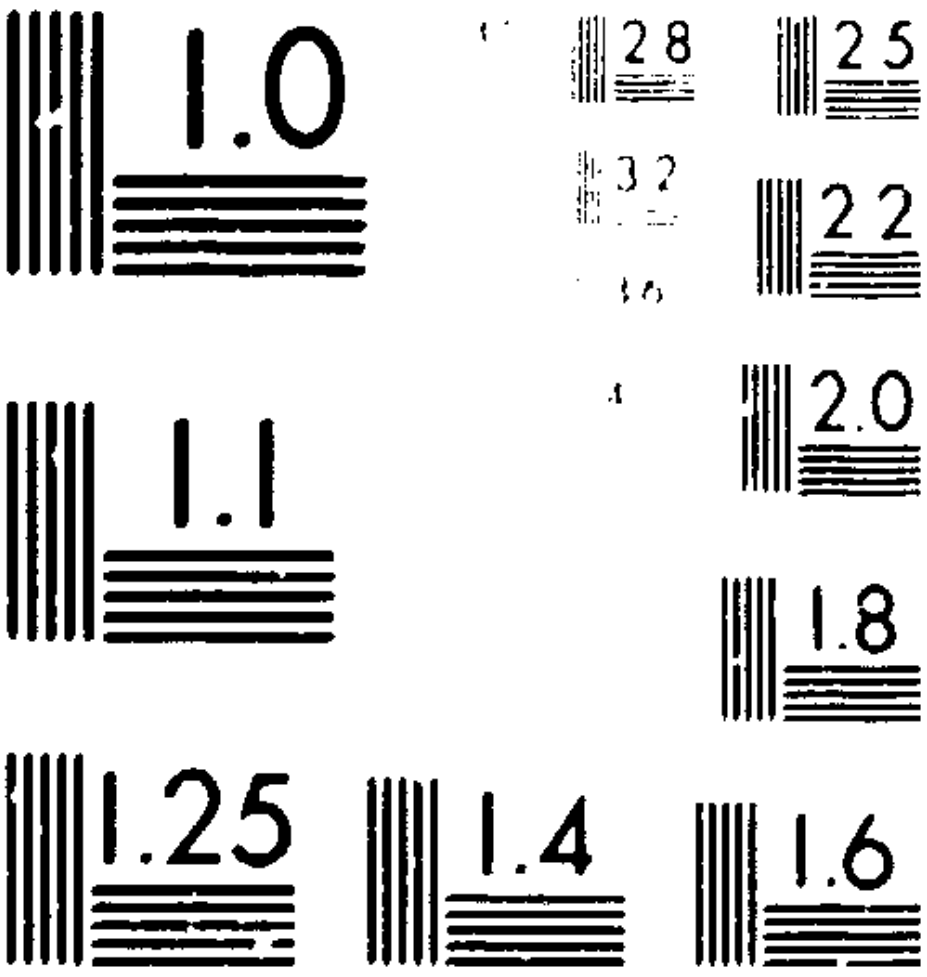

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THE ACQUISITION OF INDUSTRIAL SKILLS AND THE INDUSTRIALIZATION OF THE DEVELOPING COUNTRIES

A FIRST APPROACH SEEN FROM THE POINT OF VIEW OF A COUNTRY SUPPLYING TECHNOLOGY*

by

SICOFEP/CESI**

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** SICOFEP - A French group of training agencies; CESI - Centre d'études supérieures industrielles.

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INTRODUCTION

This report is part of the preparations for the consultation on the training of industrial manpower, decided on by the UNIDO Industrial Development Board for 1981. It constitutes the end of the first phase entitled "Diagnosis of the present situation". In agreement with UNIDO, the scope of this document is limited at this stage of the study, for various reasons:

- Since it is a preliminary study, it contains only partial and provisional conclusions, based on various analyses, and no attempt has been made to relate these to one another.
- It deals only with the educational (or technical) aspects of the concrete conditions for the negotiation and implementation of transfers of industrial skills.
- The research was carried out on the basis of data compiled in a country supplying technology, France. Even if certain points of view set forth here are also held by the recipient countries, this first phase of the report is nevertheless subject to the influence of the industrial environment in which it was worked out. That explains why, at this stage of the study, no global suggestions have been advanced on how to make transfers more effective and more conducive to the development of industrial skills in the developing countries.

The report for the second phase will have to contain suggestions and take the form of a synthesis. It will contain the conclusions and suggestions of various ongoing supplementary consultations:

- On the legal aspects of training contracts or contracts for the transfer of technology that include training services,
- On the capacity for industrial training represented by the initial national educational systems, on the basis of documentation provided by UNESCO,
- On the study of transfers of industrial skills (the supply of training, contractual aspects and modes of co-operation) seen from the point of view of the developing country.

This document includes the following chapters:

- The first, general, chapter entitled: "The problems of the transfer of industrial skills" enumerates the factors conditioning the training facilities that are to be used in a transfer of industrial skills.

- Chapter II is devoted to a qualitative assessment of the training made available by a country that supplies technology, namely, France, taken as a typical case.

  Chapter III presents the results of a technical and contractual analysis of a number of cases of the transfer of industrial skills.

- Chapter IV on the one hand prepares the way for the continuation of the work by presenting the hypotheses that can be advanced from a supplier country regarding the obstacles in the developing countries that pamper the acquisition of industrial skills.

Some guide-lines for the second phase of the study are presented in a short concluding section.

CHAPTER I. THE PROBLEMS OF THE TRANSFER OF INDUSTRIAL SKILLS

It is proposed here to describe in a general manner the factors that condition training directly linked to industrial development.

Before presenting these key points, some preliminary remarks will be made with the aim of defining the meaning that will be given in this paper to the terms "transfer of technology", "training systems" and "industrial skills".

The term "transfer of technology", as used today, covers exchanges of very widely varying services that are often combined in a highly complex manner. Thus, a transfer of technology may cover, in its widest acceptation:

- The basic engineering of an industrial unit according to a particular process (the combination of a number of items of equipment);
- The supply of equipment;
- The detailed engineering of each unit or industrial plant (the precise location of the equipment and the installations; connecting up the complex to the local power network, for example);
- The construction of the infrastructure and the assembly of the equipment;
- Verification of the correct operation of the industrial unit (turnkey);
- Manpower training;
- Verification of the operation and performance of the manpower equipment complex ("product-in-hand");
- The establishment of the maintenance system and the verification of the effectiveness of the manpower equipment complex in the medium and long term;
- The existence of engineering capacity through which the industrial complex can be developed by means of new investments or by changes in the manufacturing process.

The transfer of technology may therefore cover both:

- The production process;
- The supply and sales aspects;

- Working methods (management as well as manipulative aspects) and also the methods for the design of industrial projects, the conduct of construction and start-up operations and the capacity for development research, that is to say, engineering.

It goes without saying that the success of the transfer, whatever the type of contract concluded (for example, turnkey or "product-in-hand"), will depend not only on the qualities of the process and the equipment, and their combination, but also on the capacity of the people in the developing country to operate, maintain and develop the complex.

That is where the problems of training come in. In the light of such a wide definition of the notion of the transfer of technology, the term "training system" will be used rather than the more usual terms training campaign, programme or plan. Being more comprehensive than the latter, the concept of the training system also includes:

- The preliminary studies;
- The purpose of the training operations and targets;
- The direct components of training, that is to say, syllabuses, contents, methods and teaching facilities;
- The systems for the measurement of any shortfall;
- The systems for the maintenance and development of the skills of the staff;
- Finally, and perhaps, most important, the manner in which the parties involved, both suppliers and recipients, work on the design, implementation and development of the training, that is to say, the "co-operation mode" by means of which training capacity is itself transferred and grafted on to the host environment.

This paper will deal only with training problems directly related to industrialization, hence the use of the terms "transfer or acquisition of industrial skills". Before going into the mechanisms of the industrial training market proper (supply, demand and contracts) this first chapter will present the essential elements that will determine the training system and its effectiveness.

Key points for the description of a training system

A training system integrated with the transfer of technology can be described on the basis of five questions:

- What types of skills are transferred?
- In what technologies?
- By what agents are they transferred?
- To what host environment are they transferred?
- What is the mode of co-operation between the transferrer and the recipient?

The replies to these five key questions will indicate the main guidelines with regard to the resources to be used in the training system.

1. What types of skills are transferred?

This paper will distinguish between four types of skills, each requiring different training facilities, both because of their nature and their extent:

- The transfer of general and technical know-how, concentrating, for example, on the description and understanding of a manufacturing process. This first type of transfer may consist of the presentation of documentation in such a manner as to facilitate its assimilation; that may take several forms, from written documents, perhaps translated into the local language, to explanatory outlines, audio-visual material, syllabuses for courses, and teaching manuals or even technical assistance proposals.
- The transfer of individual know-how linked to a particular post. Such know-how will imply, in addition to general technical knowledge, the acquisition of manipulative skills and methods, hierarchical or functional relationships, reflex actions, and the capacity for initiative. This type of transfer will probably make it necessary for part of the training to be acquired in at least a simulated situation (in the training establishments, for example) or in a comparable situation, if possible on the premises of the manufacturer of the equipment or in a neighbouring factory, or, better still, after assembly, in the real-life

situation. It is known that, in almost all such cases, the acquisition of individual know-how cannot be genuinely verified until the equipment is actually operating.

- The transfer of collective know-how: This concept of "collective know-how" is not very prevalent, because it is difficult to define it, for example, in terms of a training objective and in terms of estimates in a training plan.

  It has been discovered that a team consisting of persons who have each completely mastered the skills and know-how related to their work also need, once they are on the job, to acquire collective experience, which essentially consists of systems of relationships depending on such fundamentals as technologies and cultural dominant factors. This type of transfer, or rather, this type of acquisition, since it depends to a large extent on the host environment, may therefore require the extension of training and an operating period on the job during the start-up period of the industrial unit.

- The transfer or acquisition of an industrial culture: This type of transfer is wider than that just mentioned and calls for the acquisition of professional experience, if possible, before the implementation of the project. That supposes that the industrial "fabric" of the recipient country allows it and that the necessary type of manpower is available on the national labour market. For each category of manpower (from the operator to the manager) the selection methods should take into account the degree of experience required. Consequently, the training plan should provide for shorter or longer courses varying according to the professional situation.

These four types of transfer or acquisition of skills are combined, sometimes more and sometimes less intimately, but are always found in combination. It is in the light of this fact that one must choose:

- The training methods;
- The sequence and relative duration of the phases of courses and training;
- The timing of the training in relation to the timing of the installation of the equipment.

2. What type of technology is transferred?

Here, it is not intended to make a typology of technology, but to distinguish between those types that permit quite a large degree of flexibility in their application and those that are very constricting in the systems of organization that they imply. In general mechanical engineering, for example, it is easier to suggest, according to the nature of the host environment, either workshops of the crafts type or technologically more complex industrial plants. In chemical engineering, it will on the other hand be more difficult to avoid sophisticated technologies and rigid industrial modes of organization. It goes without saying that, consequently, it will be either possible, or impossible, to base the training programmes on the characteristics of the host environment, for example, using experience acquired by craftsmen, increasing or delaying the use of less skilled manpower, etc. As a result, the training will either adapt and develop the skills acquired by the personnel before employment on the project or will have to "manufacture" skilled manpower almost from scratch.

Moreover, some technologies imply the acquisition of a relatively large volume of theoretical and abstract knowledge (petrochemistry, for example) before the apprenticeship in concrete know-how begins. Other technologies, on the other hand, which are much more empirical, can be acquired chiefly by on-the-job apprenticeship. Consequently, the extent of training programmes and the teaching methods applied may, here again, differ widely.

3. What supplier should provide the technology?

Three main questions arise with regard to the supplier (or the supplier environment):

- Has the industrialist sufficient command of his technology to be able to adapt it to an economically and culturally different environment? What experience has he of this necessary process of adaptation? Does he, for example, have the laboratories necessary for the development of products adapted to the needs of the country, etc.?
- What capacity has the supplier to make available appropriate facilities, apart from those assigned to the manufacture of the goods exported? In

particular, has he sufficient staff to make them available to his customer? Do his staff have the necessary teaching skills and can they train the necessary manpower?

- What capacity has the supplier of technology to select the partners who will participate in the project (engineering companies, training agencies) and has he the means and in particular the experience to monitor sub-contracting?

These questions are all related to the experience that every industrialist or industrial trainer should have acquired of operations relating to the transfer of technology abroad. These questions bring us back to the deep-seated motives of the supplier. Is export to him a trade, an essential mission which the enterprise has set itself, or a one-time occasion?

4. To what recipient environment is technology to be transferred?

The characteristics of the recipient environment should clearly be decisive factors in both the choice and establishment of an appropriate technology and in the definition of the volume, type and organization of the training facilities. In particular, data in three fields should be taken into account:

- The local educational system and the manpower available on the labour market; it will be necessary to study not only quantitative data (availability of manpower) but also more qualitative factors such as the level of knowledge (the problem of diplomas and their equivalence), the type of experience, and the length of the professional experience of the candidates for training;[1/]
- The rate of growth and the level of industrial development as well as the capacity for development research acquired by the recipient country;

1/ It would be advisable to take into account special cases in which the location of th industries would imply transfers of manpower either within one and the same country or between countries. That will generally be the case with mining and extractive industries, but it will also apply to industrial investments in countries with a low manpower potential. That eventuality may seriously affect the normal conditions for the transfer of technology, if expatriation and the problems raised by the establishment of the plant are not taken into account and built into the training system.

- The capacity of the recipient country to take an active part in the transfer, that is to say, its capacity to select, define and express its real needs, its capacity to keep pace with and participate in the integration of technologies and the training of its nationals, perhaps through proposing technical improvements or changes, and, finally, its capacity to evaluate the quality of the transfer and the acquisition of skills and to verify whether the results expected have indeed been achieved.

5. What is the mode of co-operation?

Here, it is a question of diagnosing the relationship between the two types of partners, the supplier and the recipient, throughout the transfer process. This co-operative relationship will be dominated by the will of each partner to implement the transfer:

- The expression by the recipient of the will:

  To acquire and integrate the technology (beyond what is implied from the institutional and development points of view, as described above as the capacity to take an active part in the transfer) with all that is implied with regard to:

  . Objective knowledge of the industrial and human potential available;

  . The pressure exercised during negotiations to associate this potential in the project (training system, industries, research-development and engineering institutions, etc.);

  . Continuous follow-up of the services of the transferrer;

  . Management of the local facilities involved in the transfer;

  . Sharing of responsibility in the transfer;

  . Sharing of responsibility in the partial and final results.

- The will of the supplier:

  To transmit a technology and his capacity to agree:

  . To equip himself effectively to exercise fully this particular "trade" of appropriate service involving the conceptual and design phase and the selection and preparation of technical assistance personnel who will be genuine trainers, etc.;

. To equip a foreign country with competitive training or production capacity;

. To take the risk of providing the recipient with a capacity for developing the skills of his manpower at the same time as developing the technologies that he has acquired.

The co-operative relationship, thus guided by the will of the two partners, will be expressed first in the contract and then, to some extent, in the implementation phase:

- In the contracts,[2] which could be classified in two categories, revealing the type of relationship that presided over their negotiations:

  . Contracts of the "defensive" type, separating the responsibilities of each partner, by means of which each tries to protect himself as far as possible vis-à-vis the other party from all the risks that might arise in the course of implementation;

  . Contracts rather of the "co-operative" type based on mutual trust between partners, setting out explicitly the forms of continuous collaboration and intensifying the zones of joint responsibility.[3]

- In the implementation stage[4] by the more, or less, continuous co-operative relationship, the integration of the facilities of the exporter and the importer, the diagnoses jointly made during the course of the project and any changes to the original contract, etc.

To sum up, the acquisition of industrial skills would be considered as successful if it satisfied the following demands:

- The different levels of knowledge and skills to be acquired had been precisely defined;

- The technology transferred were compatible with the host environment;

2/ Cf. Mr. Salem's consultation on the legal aspects of contracts.

3/ This distinction, which lies in the realm of educational philosophy rather than in the legal sphere, will be developed in chapter III.

4/ Cf. chapter III of this report.

- The supplier had the skills, the experience and the means to transfer technology and industrial skills (or monitor the services of any subcontractor);
- The importer were capable of acquiring and integrating the technology and skills;
- The mutual confidence between the parties made it possible for them to work shoulder to shoulder on the task.

The following chapter will present a qualitative account of the capacity of an exporting country, France, to carry out the transfer of industrial skills.

CHAPTER II. THE FRENCH SUPPLY OF INDUSTRIAL TRAINING AND ITS ORGANIZATION IN THE LIGHT OF DEMAND FROM THE DEVELOPING COUNTRIES: QUALITATIVE ASPECTS

Training directly linked to the industrialization effort of the developing countries differs in several respects from training offered by the basic educational systems (general, technical and higher education).

Industrial training meets specific and isolated needs:

- It is either integrated in the transfer of a very precise technology (in the form, for example, of a training programme included in a turnkey or "product-in-hand" contract); or
- It meets the very specific needs of an industrial complex, branch or zone (for example, in the form of a training centre).

In all cases, such training meets an immediate need, whether it is limited in time or is a long-term need, and has the direct aim of creating jobs or a particular technological development.

While they often share with basic education the characteristic that they are addressed to a non-professional population (young people without any experience of professional life), industrial training systems must provide technical training that is immediately operational and must therefore ensure the professional integration of the future manpower.

Since it is integrated with technology necessary for industrial development and has to ensure the development of concrete industrial capabilities in manpower and supervisors, such training will always be very close to the industrial enterprise. More than any other type of training, it uses the industrial environment as the "training field".

For that reason, French suppliers of training will be presented in the following order:

1. <u>First, the industrial enterprises, as suppliers of training</u>

Since they possess technology and the practical conditions for its application, they constitute both the reference point and the raw material "of industrial training", namely, the know-how and also the related aspects of organization and concrete management (supply, operation, manpower, etc.).

2. The public and private training and technical and educational engineering agencies, whether they intervene directly in response to a request, or whether they support industrial enterprises in the transfer of technology.

3. The national educational machinery in its capacity to respond directly to an industrialization project in liaison with exporting industrial enterprises.[5/] Here, the main question studied will be the capacity represented by the French university technology institutes and the Association Nationale pour la Formation Professionnelle des Adultes and some cases of specific training for the benefit of the developing countries.

4. Finally, assistance by the authorities for the export of industrial training, aimed at bringing supply and demand closer to one another. What policy do the authorities profess and what resources do they apply as a result?

I. The exporting industrial enterprises as suppliers of training

The public or private industrial enterprises have at their disposal technologies and concrete conditions for their application, at least in the special case made necessary by the environment (markets, industrial development, etc.), which is that of the industrialized countries. They, and they only, have the essential know-how, particularly that which is not identified and codified and is often related to individual attitudes, collective know-how and team work. This technological asset, which is essential for the operation of industrial systems, places the exporting enterprise at the source of any transfer of technology and thus of industrial training. Being constrained to export, industrialists have been compelled, under pressure from their customers, to integrate more and more know-how and processes with their export sales and to mobilize all their training capacity. The form of contracts has developed along these lines, adding to the guarantees of the good quality of the equipment sold guarantees of results regarding its productivity, which is placed in the hands of previously trained nationals (the "product-in-hand" system).

5/ Incidentally, a specific consultation paper, based on documentation available from UNESCO, shows how the national and basic educational systems can respond to immediate industrialization needs.

This new requirement has led the largest enterprises, or those most efficient in exports, to acquire training facilities, directly or indirectly. This tendency has been strengthened by the acceptance by the customers of a commercial concept of training integrated with the transfer of technology and equipment.

Before dealing with various ways in which enterprises respond to the request for training, it is advisable to state the limitations of their training capacity.

1.1. Limitations in the training capacity of industrial enterprises

This capacity suffers, since it constitutes an offer of training available for export, from a whole series of limitations, the most important of which will be presented below:

- The industrial enterprises often have only a relatively narrow field of technological experience. Except in cases of special investments or experience of the transfer of technology already carried out in various circumstances, they do not always have the capacity for technological adaptation or innovation that may be called for by the specific nature of the demand or the need, or the conditions for the acquisition of the technology by the recipient country.
- Command of the technology and know-how by the developing countries may imply, from the point of view of the exporting enterprises, the closure of all or part of a market or the creation of a competitive nucleus. For that reason they tend, if they can, to remain in command of all aspects related to development research, always retaining some degree of technological advance over their clients, by limiting access to the most advanced technologies.
- The transfer of know-how may also lead to the creation of a link involving technological dependence, implying for the recipient, in the medium or long term, the de facto obligation to appeal to the exporter both for maintenance (in the form of technical assistance) and for any technological adaptation or alteration that might be required, for example, by a development in the market.

This practice, which constitutes the creation of a so-called "captive market", may provide a by no means negligible permanent source of income. This reproach can often be levelled against "global" technology transfer implying the sale of a "package", consisting of know-how which cannot be dissociated from a very specific technology.

- Finally, the industrial enterprise has not a specific vocation for training. The conception and implementation of a training system, a fortiori in a foreign country, supposes in fact the presence of "educational technologists", exercising a genuine "trade", which the industrial enterprise a priori has no reason to master, except in two particular cases at least:

  . The technologies that the enterprise applies are specific in that the enterprise alone, by itself, can provide the relevant vocational training.

  . Its orientation towards export and the requirements of the customers have led the enterprise to provide itself or surround itself with training personnel capable of carrying out fully the transfer of its own know-how.

- Finally, the enterprise represents a "training field" which can be used for practical courses. In addition to courses organized on the occasion of the transfer of technology that they carry out for their own account, industrial enterprises receive requests to accommodate trainees, either directly from the requesting countries and their industrial training centres, or through the exporting agencies. The places available are very soon limited in quantity. In any case, that is true of many sectors in France in which the placing of trainees in enterprises is becoming more and more difficult, particularly in view of the organizational problems and costs involved.

Training therefore seems to industrialists in general to be at least a constraint and often an additional risk. Moreover, it seems difficult, particularly to non-training specialists, to verify the effectiveness of training, and the arguments put forward regarding the amount of the funds

to be applied seem to be open to question. For these various reasons, the "training component" of transfers of technology generally does not stand up very well in negotiations. When this part of the contract is negotiated by the industrialist, it is often compressed, so that the acquisition of know-how by the recipient may be largely compromised.

In addition to these various limitations, industrial enterprises, particularly the largest of them, and the largest exporters of technology among them, have chosen different modes of organization to respond to the demand for training.

1.2 Modes of organization of industrial enterprises

Different modes of organization that follow from four types of training services will be presented:

(a) The supply of "know-how" alone and the "subcontracting" of the "package assembly" function and, inter alia, of general training.6/

In the face of demand for the global transfer of technology (with the obligation to produce results, for example), the industrialist who has a process that he wishes to sell provides only the services and training facilities that he alone can supply, that is:

- The compilation of documentation, giving details of the processes, organizations, operation and management systems. This documentation may be compiled in different forms (more, or less detailed), depending on whether it is intended for engineers, middle-level staff or technicians, foremen or workers.
- Staffing for the courses in the factories when the specific nature of the posts so requires (in particular, higher-level supervisors and some key posts in other categories of personnel).
- The provision of technical assistance for training that is closest to know-how (on-the-job training, particularly during the start-up of the factory or during the initial operation period).

6/ The BSN group often uses this mode of organization, particularly in the "food products" branch.

All the other services (supply of equipment, assembly, management of all the training) are carried out by a consultant company, playing the role of "assembler" of the package, and alone responsible to the client. Although he is at the origin of the transfer, the owner of the process, i.e. the industrial entrepreneur, does not contract directly with the client and appears as the "subcontractor" of the "package assembler".

(b) The enterprise has its own training service for export.

In this case, the service takes over general responsibility for training, decides on the system and co-ordinates its implementation from start to finish.

Two extreme cases occur:

- The training service has no facilities of its own, apart from those required for the co-ordination and operation of training.[7] It chooses from the personnel of the enterprise the "ad hoc trainers" assigned according to the needs of the project and the availability of services and perhaps of volunteers.[8] These ad hoc facilities are supplemented by subcontractors providing services and taking on more or less global responsibility for training (see part II of this chapter, on agencies specializing in training and engineering).

7/ Peugeot and CDF Chimie often choose this type of organization.

8/ A delicate problem of a more general nature arises with regard to the choice of technical assistance and training personnel in all projects: for this type of task, the most effective personnel is often that which is least available. Motivation for expatriation is sometimes quite unrelated to questions of training and technical assistance; preparation for the task of a technical assistance trainer to work abroad is generally non-existent, for reasons of time and cost. Finally, the re-integration of expatriates is difficult to plan and raises problems of re-adaptation both for the host structures and the personnel concerned.

- The training service for the exportation of know-how is equipped to respond completely or as regards the main points to the needs for training and provides all the services, from the preliminary studies to, for example, the initial management of the centre.9/ This type of organization supposes a large and regular volume of transfer of technology activities.

For other reasons, certain enterprises have also "invested" in training for the export of know-how:

- They wish to retain over-all technical control of the transfer of technology and to limit the risk of "technology leakage" and competition, both in their own markets and in those of the recipient country and the international market.
- The technologies concerned are very highly specific and industrial skills can only be transferred by the owner.
- The enterprise is in a monopoly position in the French market.
- It has been assigned a long-term role by the authorities for the promotion of French know-how and technology.

Training thus integrated with the enterprise has the advantage of being close to the actual situation in which technology is applied. The approach to training problems is generally pragmatic and calls for the design of special solutions suited to each case. However, training is not

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9/ For example, Electricité de France has set up within itself a large department responsible for the design and implementation of training centres for the various trades in the generation and distribution of electrical energy. This (public sector) enterprise has accumulated a considerable volume of experience in this field, which it has institutionalized and for which it has constructed models (approximately 120 centres exist throughout the world). It should be pointed out that this considerable investment represents a deliberate policy of the authorities and EDF to ensure French presence in the developing world in this sector. Other enterprises, for example, EDF AQUITAINE, have set up less highly developed training services, devised case-by-case training plans and co-ordinated the actual work with teams consisting, partly, of ad hoc trainers.

always sufficiently exploited in this type of structure. In particular, those in charge of a restricted training service have generally not enough independence and weight vis-à-vis the technicians, those responsible for export and the negotiators to impose the point of view of the educationalist and to assign to the operation of the transfer of skills all the resources necessary for it.

(c) The enterprise entrusts to one of its subsidiaries the task of providing training services.

Two types of cases are presented here:

- The subsidiary is responsible for both engineering and training. That is the commonest case.[10/] The company thus has independence of operation and must create income of its own in the market prospected by the parent industrial enterprise, as well as concluding independent transactions. Being generally responsible for the technical quality of industrial complexes in France and abroad, these companies can simultaneously perform the following functions:

  . Technical engineering;

  . Technical assistance;

  . Training;

  . Supply of equipment;

  . Supply of know-how.

These companies often have vocational training centres in France and abroad which are very closely linked to the network of the factories in the group and those belonging to some customers, and have at their disposal, in addition to their own resources, facilities for vocational and on-the-job training that offer additional systems for apprenticeship and further training.

10/ Examples of subsidiaries of industrial groups: Creusot Loire Entreprise for Creusot Loire; Lafarges Conseils Etudes for Ciments Lafarges.

Since they are set up as autonomous units, they generally accumulate and formalize their training experience, and can work out and test methodologies and teaching aids. The advantage of this formula is that it makes it possible for training programmes to be posed and solved specifically, all the more so as they are generally so posed and solved within an industrial enterprise.

- Another formula, which is much rarer in France, consists in the establishment of a subsidiary specializing in human engineering. It seems interesting to us to analyse here the special case of one company of this type: SIRTES. This company 11/ was set up in 1975 by the "Renault" group. Its initial objective was to meet the training needs of the developing countries, using mainly the industrial skills acquired by the personnel of the group, both in terms of know-how and engineering and organization modes. The initial idea was to create, in order to mobilize this "body of acquired skills", a small business engineering team responsible for concluding contracts; then, a team of educational engineers specializing in transfer, responsible for formalizing the know-how of the group and devising training systems suited to demand; and finally, a unit responsible for providing services regarding material and administrative matters affecting expatriate personnel and foreign trainees in France. SIRTES intended to intervene in its own field, either by concluding contracts direct or by acting in support of one or other of the companies in the group (engineering companies, subsidiaries abroad, etc.).

- Finally, the resources that the "group" constitute have not been subjected to a global inventory, owing to the lack of a methodology that would make it possible to identify actual facilities available and because these resources were made difficult of access by their holders (psychological blocks, fears of evaluation).

11/ SIRTES: Société d'ingéniérie en ressources humaines et transfert de maîtrise industrielle.

- The know-how of the group has not been formalized in an organized, far less a systematic manner. This is done piecemeal. Personal relations and voluntary work play an important role in the establishment of teams responsible for bringing up to date and then, if necessary, adapting know-how (the initial idea to assign "formalizers" from SIRTES to the operating centres has been abandoned).

- Moreover, SIRTES had to provide itself, contrary to expectations, with its own permanent trainers, engineers or technicians, particularly as a result of the difficulties of assigning personnel from the group in question for a short period to a one-time operation. SIRTES encountered simultaneously the lack of "immediate availability" of such personnel, the difficulty of selecting the most suitable personnel, and the problems of re-integration.

- Finally, SIRTES, apart from having developed a training and human engineering sector in France, in order to stabilize itself, acts for part of its foreign turnover like an independent engineering company and in this case profits by the guarantees and the brand name image given by its attachment to the group.

This specific example has been analyzed in order to show the difficulties of mobilizing the industrial skills of an enterprise, be they technical in nature (availability of personnel suited for this type of transfer) or psychological; all of this takes place in the framework of a public sector group, whose general management, it can readily be understood, had definitely decided to try out the experiment.

(d) Examples of inter-enterprise organization in the framework of the profession.

Numerous inter-enterprise initiatives have been tried out, sometimes with success, in groupings, whether set up on the initiative of the management (this is the rarest case), professional organizations or training officers. Some significant cases are analysed here.

- On the basis of its experience in the establishment of vocational training centres at the request of the developing countries, a professional federation sets up a private company[12/] responsible under its own control and on a self-financing basis for developing this type of services in its branch of the profession (engineering for vocational training centres, training of trainers).

It might be imagined that agencies of this type could co-operate, case by case, with enterprises supplying technology, and contribute their professional skills in the training component of the transfer of technology. These are exceptional cases,[13/] either because the enterprises do not call in the services of this type of body or because the latter concentrates on the training centre type of activities and do not extend their services beyond the export of "model centres".

- The development of the SOFRE's. Under pressure from the authorities and some large enterprises, companies under the generic name of SOFRE's (Société française de réalisation et d'étude) were set up in some industrial sectors about ten years ago to be responsible for developing, each in its own sector, foreign operations with regard to studies, consultancy, engineering and often training. In fact, the functions provided directly by these companies vary widely, from preliminary market prospecting and the promotion of the industrial sector abroad to the conclusion of engineering contracts.

Generally, these companies are set up around a major leading enterprise[14/] and work in association with other enterprises in the branch, engineering companies and consultancy firms. These companies thus present in the international market a capacity for a very wide range

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12/ MECAFORM is a joint stock company set up by the federations of the mechanical engineering and metal-working industries.

13/ FIAS, which was set up a short time ago, intends in the framework of the aeronautics profession to respond to training needs of all kinds coming from its member enterprises. The development of its services and its capacity to co-operate case by case will be followed with interest.

14/ EDF for SOFRELEC, SNCF for SOFRERAIL, the major iron and steel enterprises for SOFRESID, etc.

of services in the framework of a professional branch, mainly for consultancy, studies and engineering. Training is not an important element for the SOFRE's. Some of them, however, have set up training departments[15] capable of meeting needs for the transfer of technology.

- The Confédération Générale des Petites et Moyennes Entreprises and the Agence pour la Promotion Internationale des Petites et Moyennes Entreprises (APIPME).

Smalle-scale and medium-sized enterprises are generally at a loss to meet requests for training linked with exports. The Confédération Générale des Petites et Moyennes Entreprises tried to organize an institution which would make possible assistance to small scale and medium sized enterprises in the establishment of subsidiaries abroad, through a whole series of export services which the size of the enterprises made difficult, in particular:

- Financing;
- Transport and insurance;
- Subcontracting transactions;
- Contractual assistance;
- Training.

APIPME has been in existence for two years: this agency is the focal point for a number of traditionally export-oriented major enterprises and banks[16] and is under the aegis of various ministries. It proposes to provide assistance to small-scale and medium-sized enterprises by informing them about procedures for export and establishment abroad, promoting their

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15/ SOFREMINES, for example.

16/ The following enterprises are associated with this agency: the Renault, Elf Aquitaine, and Air France groups, the Banque Française pour le Commerce Extérieur, the Banque Nationale de Paris, the Crédit Agricole, etc.

technology and their products and finally providing research facilities on appropriate technology. Moreover, it sets out to help small-scale and medium-sized enterprises in carrying out training campaigns connected with their exports by putting them into contact with training agencies and providing advisory assistance.

This agency is too recent for it to be possible to draw any conclusions. So far, no requests for training have been submitted to the agency by any small-scale or medium-sized enterprise. However, this type of structure is intended to encourage and help the small-scale and medium-sized enterprises to respond to requests from abroad implying training and the export of goods or equipment.

- Inter-enterprise groupings bringing together trainers who specialize in service abroad.

Five large industrial enterprises entered into association with a large industrial training centre to set up a pool of international trainers and an educational engineering capacity capable of responding to complex demands addressed to any of its members. This project provided each member enterprise with:

- A pool of high-level trainers and additional experience;
- A system of continuous further training of trainers;
- Facilities for methodological research based on experience.

In fact, the economic interest group (Groupement d'Intérêt Economique - GIE) has never carried out any operations for its own account, since the member enterprises have not had contracts of sufficient scope for the pool of trainers to be used. It can also be assumed that the general managements of the enterprises, although financing the operation, did not attach sufficient importance to an organization that concentrated on problems which they have a tendency to minimize, whose intervention case by case they were not certain to be able to control adequately.

However, some members of the GIE have entered into association with other enterprises to pool not their trainers but their working methods and often their methods for the design and operation of training plans,

negotiation of contracts, etc.[17/] There are other scattered working groups concentrating on the transfer of training within various para-professional organizations. These sporadic experiments are more the result of the will of a few individuals than of any impetus from the enterprises. In any case, they show that there does exist a will for methodological research. It may be thought that with some machinery for the encouragement of this type of initiative, which occurs in a relatively large number of instances, it would be possible to give it a wider and more productive dimension.

1.3. Industrial enterprises and the transfer of skills: some partial conclusions

From this analysis of the facilities offered by industrial enterprises and the modes of organization they have established to respond to requests for training, incomplete though diversified as it is, it will have been seen that the main points are the following:

- The most concrete know-how, born of experience in the workshops and factories of the exporting countries, is generally not identified and codified. Only formalization of this know-how will make possible a genuine monitoring of the transfer of industrial skills. This know-how cannot be effectively acquired by the recipients unless the training component of the transfer is very seriously studied and taken into account:
  - . In the presentation that is made of the formalization of know-how.
  - . In the importance attached to on-the-job training in courses and technical assistance.
  - . In the training in psychological aspects and teaching methods of personnel made available on an ad hoc basis.

17/ The Groupe de Travail Formation Internationale has for three years been bringing together the international training officers of large enterprises (Rhone Poulenc, EDF, Télémécanique, Peugeot, CII Honeywell Bull, Cofransid, etc., around the Centre d'Etudes Supérieures Industrielles.

- In addition to on-the-job training, the transfer of industrial skills requires the establishment of a complex training system aimed both at general basic training and at the acquisition of an "industrial behaviour pattern". The resources used and the duration of training tend, particularly after negotiation of the contract, to be under-estimated. The training function in this type of exchange should be revalued in relation to technical engineering functions, for example, both in the negotiation of contracts and in the implementation of the transfer. It would therefore be advisable to encourage relative autonomy of the training function in relation to the other functions making up transfers, such as "methods" or technical engineering.

- Transfers of technology and the acquisition of related industrial skills are particularly uncertain operations in which more failures than successes can be expected. Many of these failures are of a technical and pedagogical nature. Enterprises have, moreover, gained, independently of one another, a very wide range of highly diverse experience. If this volume of experience could be assembled and studied it could help in establishing methodologies, references, and teaching aids useful to the various partners in different types of cases. Any formula that would permit the accumulation and processing of experience is therefore to be encouraged.

- Finally, the exporting enterprises generally restrict information on technologies sold to the strict minimum in order to avoid the risks of competition and challenges to their market position. This concern for protection, while it may be justifiable in a short-term perspective, is more contestable in the long-term view. Moreover, technological development on the one hand and alterations in the structure of markets on the other hand show that in many cases these fears are not justified. The effectiveness of training linked to the transfer of technology (and therefore the effectiveness of the transfer itself), would certainly be increased if the recipients had access to technological information that was as wide as possible and if "technological timidity", obstacles and restrictions of every type were eliminated.

II. Private or public agencies specializing in training and engineering

These institutions, public or private, are different from national educational institutions (cf. section III of this chapter) and share the characteristic that they offer training services, some of them as their main activity and others as a supplement to technical or consultant engineering activities. After giving a general presentation of these bodies, I shall analyse some cases of organization and finally attempt to deduce some conditions for the utilization of services rendered by this type of agency.

2.1. General presentation

There are different categories of agencies:

- Training centres or agencies whose principal activity is the organization and leadership of training courses and making arrangements for the inclusion of foreign trainees in pre-existing courses. By extending their activities and under pressure from the French and foreign markets, these agencies have progressively developed their capacity for the design of specific courses in France or abroad and thus of pedagogical and educational engineering.

- Companies whose main activity is educational engineering, whether linked to the transfer of technology or not (they also provide leadership for training courses in the framework of the systems that they propose).

- Consultancy and technical engineering companies which provide services designed case by case, ranging from simple consultancy to the complete operational command of a complex project in fields as varied as civil engineering, industrial equipment, operation and management, human resources, etc.

- Finally, I shall draw attention to the recent establishment of engineering companies for technological adaptation. Their mission is to propose appropriate and integrated original systems, on the basis of the technologies and organizational modes of an exporter, on the one hand, and the knowledge that they acquire of the recipient

environment, on the other hand. Their services range from the provision of signs and markings in the local language to proposals for, and alterations to, equipment, or even the definition of products suitable for the local market.[18]

Such suppliers of training have very diverse characteristics which can be described as follows:

- The number of organizations is extremely high. The figure of 6,000 agencies[19] has been quoted, though no precise survey has been made, and many of these are export candidates. They vary widely in size (from several hundred engineers to one person) and their experience, particularly their foreign experience, is often scanty or heterogeneous.

- In the face of a declining domestic market for training, these agencies engage in very intense competition with one another for export orders (to some of them export represents a means of survival). This competition is also exercised in the recipient countries between companies that have created commercial subsidiaries or branches locally (that is to say, the largest of them).

- In view of this state of affairs, many agencies, some of them among the smallest, claim to be able to meet requests of every type with a basis of experience that is often insufficient, in such a complex field as the transfer of technology.

- However, the supply of consultancy services, training and engineering in France seems to be extremely diversified, and export-motivated and could thus meet requests of every type, provided that the choice of the suppliers and their organization (even if only case by case) were facilitated.

18/ CIMOS is a consultancy and specialized service company working on Arabization in the fields of industrialization and technical and vocational training. Although at the moment it is very marginal, one can note the value of applied research and design agencies whose principal mission it is to adapt and integrate technology.

19/ It can be considered that at most 10 per cent of these agencies are credible as exporters.

2.2. Some cases of organization and groupings

However, this profession has organized itself to some extent. Though it is far from the case that the supply is coherent, one can quote, either around the professional organizations, or in the case of more specific initiatives, some cases of groupings, some of which have failed, others are being set up and still others have been operating for several years.

- The Professional associations of consultancy, training, and engineering companies: the particular case of SYNTEC and ABETEX

More than half of the organizations are grouped in three professional associations. Only the third association quoted has acquired long experience in grouping and limited co-ordination of services offered.

UNORF (Union Nationale des Organismes de Formation continue sans but lucratif, a non-profit-making body, about 30 members) is only now envisaging, by bringing together the agencies that are most active in exports, joint action to invite the French authorities to take a closer interest in their export activities. The assistance requested could deal with preliminary prospecting, information for foreign countries regarding the characteristics of French suppliers, as well as knowledge of the needs of potential customer countries.

CSNFOR (Chambre Syndicale Nationale des Organismes de Formation) includes mainly the small training agencies. An interesting project for the establishment of an economic interest group (1976) was intended to enable its voluntary members to form a common front for export and to propose co-ordinated services in response to complex demands. The large number of small agencies and the competition that they engage in finally made it impossible to try out this form of organization.

SYNTEC and ABETEX. The Chambre Syndicale des sociétés d'études et de conseils is made up of 250 of the largest agencies in the profession. Having constituted working units by specialities and by problems, this professional organization promotes engineering for its own members. In the field of training, as the result of the market for French supply of training, a "SYNTEC Organisation et Formation" section has been set up,

whose members (about 35 agencies) have worked out and applied a code of professional ethics and charge co-ordinated tariffs, etc. Moreover, about 30 consultancy, engineering and training companies affiliated to SYNTEC have set up ABETEX (Association des Sociétés d'Etudes et de Conseil exportatrices) for the joint promotion of French engineering for export. Complex requests may be sent to the association, which will take responsibility for assigning them to one or more of its members. This association has the advantage of maintaining among the largest suppliers of engineering services a network of information on major industrial development projects under preparation.

- Other more sporadic grouping attempts deserve mention. These groupings, which occur around different centres of interest, may take various forms.

  . Commercial groupings for export. Two or more training agencies form a common front for export. For that purpose a subsidiary company of the training agencies is set up, which negotiates and signs contracts and co-ordinates the work done. Being based on supplementary training services (supplementing public services or offering different teaching methods, for example), such organizations need, in order to be viable, a joint conceptual basis (professional ethics, working methods, etc.). The complementarity of their capacity and the increase in their size facilitate both the prospecting of the complex market, the search for finance, access to certain information and relations with government departments.20/

  . Working and exchange groups. Here one can quote the Comité Technique de la Formation Professionelle et du transfert de technologie set up by the Franco-Arab Chamber (Chambre Franco-Arabe),

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20/ SICOFEP (Groupe français d'Organismes de formation) includes ACUCES (Association du Centre Universitaire de Coopération Economique et Sociale), CESI (Centre d'Etudes Supérieures Industrielles) and CEFI (Centre d'Etudes de Formation Industrielle) for their export activities. This company represents abroad the interests of a very considerable volume of educational facilities (about 300 training engineers).

which combines about 30 agencies and some enterprises for the development of relations with the Arab countries. It was created very recently following a symposium at which both suppliers and recipients of services were represented, and now meets regularly; it would be useful to observe the development of a group consisting of competing members, differing widely in size and field of operation, in the face of requests channelled through the Chamber of Commerce. It is also conceivable that in future more technical relations should be created between French suppliers on the one hand and the Arab demand and supply side, on the other hand.

The autonomy of this category of agencies vis-à-vis the industrial enterprises may bring to the transfer of technology the guarantee that the training problems will be raised as such and that their objectives, and the resources applied, will be more clearly specified; thus, there is less risk that the training system finally negotiated, being identified and distinct, will be under-estimated; finally, it should be easier to monitor its effectiveness.

Moreover, it is conceivable that an agency specifically providing training could exert pressure on industrial enterprises to induce them to push back further the technological limits of the transfer, even if only for educational reasons. In fact, training and engineering agencies are often quite highly integrated with French industry (commercial and financial links exist between them). For this reason, they cannot always exert on the co-contracting enterprises the pressure necessary to ensure that they "release" the technologies transferred and give the trainers and especially the customers the widest possible access to technological information.[21/] Finally, like the industrialists, they will be tempted

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21/ There are some agencies that are commercially and financially independent of industry. For example, that is true of joint bodies in whose governing councils the authorities, the professional and trade union organizations are equally represented. This also applies to agencies that have worked out original methodologies on the development of educational systems, such as "Quaternaire Education" or transfers of technology, such as CIMOS (see above).

on the educational side to limit the transfer of their educational technology and of their own maintenance capacity (in view of the risk of calling in question their own existence and the closure of a potential market). And that is all the more true, since in the short term it is in their interests to propose training systems implying de facto technical assistance that will last as long as possible (reference to technical assistance in relation to the development of the educational capacity of the client). The difficulties of this professional branch in export transactions can be summarized as follows:

- The very large number of "volunteers" for exports;
- The very wide size range of the agencies;
- The tendency to offer a very wide range of services.

The difficulty for the potential recipient countries or the industrial enterprises looking for subcontractors is to select, among such a diffuse supply of services, the most competent and reliable partner.

Different criteria may be used as a guide in the choice of a training partner:

- Experience abroad, first of all, that is to say, the capacity of the agency to adapt its personnel and working methods to a context different from its own.
- Experience of the type of project or industrial sector in which the agency will intervene; its capacity to accumulate, compare and evaluate such experience.
- The methodology of the intervention, particularly in the analysis of the host environment and the capacity of the agency to integrate its own services therein.
- The integration of the agency in the industrial environment and the type of technical relations that it maintains both with French industrial enterprises (integration in industrial projects, utilization of this environment as a reference frame, possibilities for courses, etc.) and with the industrial enterprises in the recipient countries to which it is under contract.
- But, on the other hand, sufficient weight and autonomy vis-à-vis the industrial co-contractor in order to make it possible that the education requirements will be taken into account seriously.

- Finally, the agreement of the agency to provide the customer not only with direct training service but also with the key to education maintenance and research and development.

III. The national initial and vocational training system

The initial educational institutions (public or private) provide general basic training considered by the developed countries to be a preliminary for industrial training. Moreover, the utilization of the educational machinery for the training of adults in production is a recent departure in the industrialized countries. Still more recent is the move to make this machinery accessible for the needs of the third world. Access to these facilities usually takes two forms:

- The accommodation of foreign trainees, especially at the university level (engineers and higher technicians) in educational establishments;
- Assistance in setting up national educational systems or establishments in the developing countries.

The utilization by the developing countries of the potential of the educational institutions of the industrialized countries has the following advantages:

- They are public services that are relatively disinterested in the commercial field, a valuable factor in view of the need for autonomy and the scant resources of the developing countries;
- They are training systems that cover all the tasks of industrial production (all the training levels required).

On the other hand, the existing gap between the industrialized countries and the developing countries raises notable problems connected with:

- The fact that general training in the industrialized countries is part of a development context that does not exist in the developing countries and therefore suggests reference systems or models that are not suited to the socio-economic and cultural conditions in the countries requesting training;
- The fact that these institutions often devote considerable time to general training (considered as a preliminary necessity) rather than to training that can be directly used in industry;

- The fact that the national training systems that are set up are frequently content to reproduce the models of the developed country, not only with their own limitations but also with their model character, which is less and less acceptable to the developing countries.[22/]

In the main, these systems are organized in an independent manner and are relatively distant from the industrial context (even though they respond to the quantitative needs of industry) and, owing to their structure, are difficult to adapt to sporadic and integrated training needs for the transfer of technology. However, various institutions tend to make exceptions and can represent a considerable capacity for industrial training, if they can be mobilized. Here, three cases will be chosen, the Instituts Universitaires de Technologie (IUT), the Association Nationale pour la Formation Professionelle des Adultes (AFPA), and the specific further training courses for engineers from the developing countries organized by some major training schools. These three types of educational institutions have the common characteristic that they are relatively closely linked to the industrial environment; that is what distinguishes them, in one respect, from the over-all national educational system.

3.1. The Instituts Universitaires de Technologie (university technology institutes)

The university technological institutes represent a very important source of training and have important advantages with regard to training needs arising out of industrial development:

- Owing to their size (47,000 students in the two-year courses, several thousand instructors) and the diversity of the professional branches covered, the university technological institutes can meet the needs of most of the industrial sectors;
- Their mission is to train, in two years, from the school leaving certificate or equivalent level higher technicians and supervisory staff whose "role it is to translate abstract concepts and the results of theoretical research into concrete terms". They should therefore

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22/ See the study on the educational system, op. cit.

be perfectly suited to the needs of the transfer of technology and the launching of industrial complexes related to a category of personnel that is generally rare in the market.

- Being relatively recent in establishment (1966), these institutes, while they have soundly based experience, have an organizational flexibility and a capacity for innovation that can be mobilized case by case, which the traditional educational institutions do not have.

In addition to accommodating foreign trainees, the university technological institutes should be able to meet diverse demands:

. The establishment of foreign technological institutes;

. Educational engineering in the establishment of specific training centres in France for groups of foreign students, etc.

Little has so far been done on these lines, except for a number of operations resulting from the initiative and determination of some presidents or directors of university technological institutes. These initiatives, which are almost individual in origin, seem to be confirmed by the recent establishment of a private association responsible for prospecting and negotiating with foreign countries contracts whose implementation would be entrusted to one or more university technological institutes. While this experimental formula has the advantage of offering greater flexibility to the administration as far as operational questions are concerned, the private character of the association makes this institution ambiguous. In any case, though real facilities exist and isolated initiatives come to light, it does not seem that the authorities responsible have decided to develop action abroad in a significant manner.

3.2. The Association Nationale pour la Formation Professionelle des Adultes (AFPA)

AFPA, which is closely linked to the national structure for industrial production and represents a considerable potential, mainly for vocational training, has taken a tardy interest in the industrial training needs of the developing countries. Even though the association declares at present that it wishes to give an active response to this market, the volume of

activities abroad still represents a very small share of its budget (less than 1 per cent).

It should be said that AFPA has not so far tried to carry out "prospecting" or to "sell" its services (the ministry responsible has just requested the general management to study ways and means of developing its foreign sector). It remains to be seen whether this very unwieldy organization (120 training centres, 20 psychotechnic centres, 41,000 working posts, 9,000 trainers, and approximately 80,000 persons trained per year) can mobilize its resources and above all adapt them to meet specific demands. Its potentialities are very wide:

- The training of skilled workers, office workers and technicians in French programmes (AFPA does not wish to develop this type of co-operation);
- The establishment of specific study curricula;
- The training of trainers (AFPA gives initial or further training to 6,000 trainers a year, about half of whom are to serve in its own ranks: 400 foreign trainees participate in these activities for the design of training courses by functions and posts);
- Engineering of vocational training centres (structure, syllabuses, training of trainers, supply of equipment, initial operation);
- Advisory services at the national level in relationships between employment and training (advice in planning and the vocational training system at the national level).

The problems that would be raised by a significant extension of these international activities can be imagined:

- The need to introduce flexibility into the system for the occasional assignment of staff to tasks that are often uncertain in outcome, without disturbing the operation of the institution;
- The adaptation and preparation of staff for non-repetitive and almost always experimental tasks;
- The capacity for processing and application of the considerable volume of experience present in the organization for the design and implementation of appropriate systems.

Moreover, having the status of a public agency, AFPA, although it can propose advantageous tariffs for its services, does not seem to have sufficient institutional liberty of operation to meet the needs of this type of market. The creation of a suitable structure could facilitate the development of a foreign sector. If this second national institution were to be oriented rapidly and substantially towards the foreign sector, it would be necessary to carry out internal and institutional transformations that are possible but that would entail a by no means negligible investment.

3.3. Specific further training of engineers organized by some major schools

Here, I shall quote two cases of specific training for foreign graduate engineers, some of whom have professional experience in up-to-the-minute technological subjects, when it is possible to set up a large enough group.

Two organizations have been set up to carry out and develop this type of activity:

- CESMAT (Centre d'Etudes Supérieures des Matières Premières) was established by a government decision in order to mobilize French training in the geological and mining sector and to support the establishment of training courses more suited to the needs of the developing countries; various specialiaed training courses for engineers are in preparation with the mining colleges in Nancy and Alès, and the experimental stage will commence shortly;
- CESELEC (Centre d'Etudes Supérieures en Electricité, Electronique et Informatique) has been established in the same manner, with an identical structure, to carry out a similar mission in the fields of electricity, electronics and information science. At the moment it is organizing two courses (16 to 21 weeks) dealing, respectively, with the generation and distribution of electrical energy and radio-communication systems.

These two organizations rely on the corresponding engineering colleges to place at the disposal of these groups the necessary technologies and trainers.

The Comité d'Etudes des Formations d'Ingenieurs (CEFI), an agency in which the government authorities, professional and technological circles and the engineering colleges are associated, is responsible for keeping track of these experiments, and proposing developments of the same type in the framework of the promotion of French technological training abroad. It would be useful to evaluate the extent to which this type of service is of value to the recipient countries and to study on the basis of other needs for the further training of engineers from the developing countries to what extent other educational institutions could provide a similar response.[23/]

Along the same lines, the cultural and technical co-operation service of the Ministry of Foreign Affairs receives requests for individual or group training within the national training machinery. It may verify the validity of requests and attempt to organize, whenever possible, suitable responses case by case, proposing if necessary formulae in which the services of various training institutions and schools are combined. This experience of the diagnosis of demand, research and selection and of combining the services of complementary institutions represents with regard to initial training an example that could be followed in the case of requests for industrial training and the transfer of technology. Unfortunately, this function seems to be carried out more or less unofficially and it does not seem that there is sufficient support from the authorities to systematize it.

The educational and vocational training institutions represented here, in a rather incomplete manner, display real capacity, which is little exploited for at least two main reasons:

- An internal difficulty in carrying out fully their traditional mission, both by substantially developing (10 to 20 per cent of their budget, for example) consultancy programmes and activities suited to the needs of the developing countries;

23/ CESMECA for mechanical engineering and CESGETRAM for public works, civil engineering and development could mount operations of the same type as those presented here and carried out by CECELEC or CESMAT.

- A lack of will and assistance from the authorities to these institutions to enable them to meet the needs of the market for industrial training and the transfer of technology, in view of their system of management, their mode of organization and the lack of conceptual and research facilities suited to these specific tasks.

IV. The French authorities and the transfer of industrial skills

It cannot be said that there is in France an over-all official organization encouraging the transfer of industrial skills, and the development of the recipients' capacity for industrial training. I shall state here:

- What policy governs this type of exchange,
- What is the impact of the organization encouraging exports on industrial training;
- The demands of exporters regarding these problems;
- Finally, a check-list of the functions that the French authorities could assume in order to facilitate the development of transfers of industrial skills.

4.1. France has no co-ordinated policy favouring the transfer of industrial skills

In France, it is exactly as if the policy for the export of technologies obeyed the priority given to the short-term growth of foreign exchange resources. The export of technology is essential for the equilibrium of the balance of payments of an industrialized country, hence the necessity to be as competitive as possible . this field, in view of the services offered by the other technologically advanced countries.

It will be understood that consequently no special, co-ordinated and coherent effort on the part of the State is made with regard to industrial training, which is said to represent a long-term investment (sometimes implying commerial and technological risks). In this field, France responds to demand, including that from the French-speaking countries for which technical assistance does not so to speak intervene directly.

4.2. Save in a few exceptional cases, the organization established to encourage exports does not deal directly with industrial training

4.2.1. The ministerial departments directly or indirectly concerned are very numerous, but nobody has been assigned a priority or co-ordinating role.

- National Education;
- Universities;
- Continuous Vocational Training;
- Labour;
- Industry;
- Agriculture and Food;
- Foreign Affairs;
- Co-operation;
- Foreign Trade;
- Finance.

An interministerial committee for the export of vocational training has been meeting for several years and merely performs an information function regarding activities carried out by any ministerial department in this field. (This body originally had the task of compiling all the data for a training export policy, to help in the rationalization of the French supply of training and to co-ordinate action by the public sector within itself and with offers of services from the private sector.) Although ACTIM, which is dealt with below, provides the leadership for the interministerial body, the latter has not been able to go further than the stage of information, owing to the lack of sufficient drive and projects on the part of the various participating ministries.

4.2.2. The organization promoting exports has only little direct influence on industrial training. Apart from the bodies promoting export, we shall mention here the efforts made in the fields of innovation and appropriate technology as well as the problem of the treatment by the authorities of the training requests submitted to them by foreign governments.

A. Bodies promoting exports and the export of training

Assistance to exporters is channelled in France through four bodies under the aegis of the Ministry of Finance, and partly of the Ministry of Foreign Trade, each of which has a specific responsibility:

- Information to exporters on foreign countries and markets is given by CFCE (Centre Français pour le Commerce Extérieur);
- Exports are financed by BFCE (Banque Française pour le Commerce Extérieur);
- Insurance (guarantee) is provided by COFACE (Compagnie Française d'Assurance pour le Commerce Extérieur) in the pre-study phase;
- The promotion of French exports is carried out by ACTIM (Agence pour la Coopération Technique et Economique), which is the only public body that intervenes specifically in the export of training.

ACTIM plays a direct role dealing with the export of industrial training in the wider framework of the promotion of French exports, in particular:

- Organizing the accommodation of foreign trainees in French industry, either by assisting a French export agency which has to train foreign personnel or in response to requests from foreign enterprises or, finally, at the request of the authorities of foreign countries. In addition to providing administrative support and medical services, ACTIM can supply accommodation, look for a host industrial enterprise, and provide organizational and interpreting services for a mission in the industrial sector or information and study sessions on a given subject;
- Carrying out diagnostic missions to foreign countries that are potential sources of requests,[24/] providing French exporters with:
  - . A precise description of the educational system (schools and vocational training);
  - . Information on training needs not met by the national system and representing potential for the creation of trade.

24/ A list of priority countries is drawn up every year. In it are concentrated the efforts made by France to encourage French exports. It covers mainly countries that are strategically important and relatively rich and are often making rapid progress in industrialization.

Exporting industrialists, like the public and private training and engineering agencies, have extremely valuable documentation on the subject. Incidentally, such missions offer ACTIM and the agencies that carry them out the opportunity to create longer-term institutional or economic links. This type of study has been made on four countries (successively, Iran, Venezuela, Nigeria and Mexico). This investment is carried out at a very slow rate (approximately one country a year) in view of the funds allotted to ACTIM for this task.

- Exhibitions on French services in general and training in particular have been tried out in Indonesia and Mexico.
- Activities of more limited scope with regard to the promotion of French supplies of services are carried out, such as the preparation of a yearbook of agencies exporting vocational training, which unfortunately voluntarily limits information to quite general data.

Finally, ACTIM has documentation centres in 14 foreign countries that provide an information base and a place of contact with potential importers.

Although the portion of its budget allotted to training is relatively very small (it is the only body performing a significant public mission in the matter of training), this association represents an infrastructure capable of considerable development if the French authorities wished to intensify their activities in favour of the export of industrial training.

Mention will be made here of the existence and the projects of the Centre pour le développement de l'information sur la formation (Inffo Centre),[25] which provides French enterprises with legal support and information on all vocational training courses, applying the French law under which continuous training is organized. This body has tried to play a part in the export of training. The public funds assigned have not allowed it to do more than provide documentation on the problems of international training and maintain an information network among European organizations of the same type.

25/ The Inffo Centre is under the aegis of the Secretariat of State for Continuous Vocational Training.

Finally, it should be pointed out that, since 1976, under pressure from the profession, the Compagnie Française d'Assurance pour le Commerce Extérieur (COFACE) has been underwriting training contracts on the same basis as capital equipment contracts. That was not the case previously, since COFACE refused to give aid with regard to contracts, which it considered as too uncertain or too risky, particularly when guarantees of results were included.[26] Considerable pressure had to be exerted by the profession to bring about the development of COFACE in this respect.

3. Support for innovation and appropriate technology

These fundamental fields will be emphasized, but on the fringe of problems of industrial training. However, relatively large efforts have been noted in various fields:

- Industry and crafts, under the aegis of the Ministry of Industry (Innovation Commission);
- Agricultural equipment in relation with agricultural research and rural development, connected with French co-operation (Centre d'Etude et d'Expérimentation du matériel agricole tropical).

In both cases the State encourages the creation of new technology appropriate for the developing countries on the basis of more traditional techniques (craftsmanship production, for example) or climatic, economic or cultural conditions abroad. Three fields of activity have been defined:

- Building materials of local origin;
- Appropriate transport equipment;
- The food industry.

These activities remain limited in scope and are marginal, as a result of the scant support given to them.

26/ COFACE underwrites pre-study activities (reimbursement of part of the expenses in the case of non-award of a contract following an initial visit) and also guarantees the conclusion of operations in the case of interruption of the contract through the fault of the purchaser or through non-payment.

However, one case of the design and manufacture of appropriate equipment deserves to be quoted as the basis for some remarks on the application of technology suited for recipient countries. This is the case of the manufacture by a medium-sized industrial enterprise[27/] of a low-power tractor designed specifically for working in a tropical zone and in small agricultural holdings. It should be explained that France has a considerable research infrastructure in tropical agriculture and technical extension work, owing to its colonial past. This infrastructure (and the funds made available) were decisive factors in the success of the project, in formulating the idea for this new type of tractor and in working out precise specifications in the light of field experience. The next necessity was to find an enterprise prepared to produce the equipment. Large enterprises were contacted without success, owing to the difficulty they experienced in departing from their normal design activities. Only a small-scale or medium-sized enterprise was able, by agreeing to take a probably large risk, to adapt itself to these specifications and show a genuine capacity for innovation. It was possible to carry out experiments, thanks to research bodies, and, once the product had been developed, the experiments were continued in a number of rural areas with the support of rural development assistance companies, which took responsibility for placing the equipment with customers on credit and for training the users in its maintenance. From this successful experiment, a certain number of conclusions can be drawn regarding the conditions for the application of appropriate technology and concerning the infrastructure and assistance of every kind that are the prerequisites in a case of this kind.

- The design came from a research organization, which, while it happened to be French, had nevertheless acquired considerable experience of the host environment.
- An enterprise capable of innovation had to assume a considerable risk, partly financing the "applied research".

27/ Société Bouyer: manufacture of small agricultural equipment, particularly of the "power-driven cultivator" type.

It is interesting to note that a large enterprise[28/] capable of assuming much greater risks had not the capacity for innovation in a field outside its normal "market".

- The distribution of the equipment is in the hands of a company that has, in the recipient environment, a large economic (credit) and educational (extension workers) infrastructure, without which the adapted product could not have been sold in sufficient numbers to pay off the initial investment.
- It has not been possible to obtain information on the direct cost of the innovation. In itself, that cost must be substantial, but it should be offset against the benefits that the user country derives.

C. The processing of training requests from governments of foreign countries

Frequently, in the face of a market that is as disorganized as that for the supply of training, the governments of the countries requesting training submit to the French authorities (particularly on the occasion of official travel and missions) requests for industrial training together with assistance in the choice of their private sector partners and a "public guarantee" regarding the quality of the services that the latter propose. Nothing is official in this field and the State refuses to guarantee an offer in this way. However, it is certain that numerous requests are received by the authorities and finally reach exporters. At the moment, it is not possible to find out how these requests are routed and what criteria are used in routing them.

As far as requests to the national public or para-public training machinery are concerned, some reticence can be observed on the part of the authorities regarding intervention in helping in the selection, choice and organization of offers. A fortiori, the State wishes not to appear officially and objectively in matters related to the private industrial sector.

4.3. The exporters of training have for several years been making specific demands of the authorities

We shall not present here corporatist claims, as these differ from one category of exporters to another. However, the majority of the

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28/ That enterprise was the Renault group, which, after the experiment, now seems to be capable of responding to this type of request.

suppliers of training adopt a policy of waiting and submitting claims, seeking from the State help and assistance in order to remedy a situation for which they are partly responsible. These claims are intended to serve the following objectives:

- Regulation of the supply market;
- Better equipment of suppliers to respond to requests whose specific demands they do not wish to be the only ones to meet;
- Development of foreign markets.

It has been possible to satisfy some claims during the last five years:

- As mentioned above, export credits and insurance (guarantees) have been extended to training contracts or to the training component of technology transfer contracts;
- Some diagnostic missions have been carried out regarding the educational systems and training needs of the countries requesting assistance in this field;
- Improvement has been achieved in the accommodation of foreign trainees, particularly for courses in enterprises (improvement in status, material conditions and insurance).

There is still a whole series of suggestions regarding which the French authorities have not yet adopted a position or in which study of the conditions for implementation have not led to any result, as, for example:

- Setting up for the use of industrial exporters and potential customers a genuinely referenced index of French services (this suggestion goes beyond the yearbook of training organizations brought out by ACTIM);
- Setting up an index of training requests, in particular those at the moment in the hands of the authorities;
- Active encouragement for groupings of suppliers (either directly or through the professional associations);
- Assistance to exporters in training their engineers, technicians and trainers to adapt themselves to industrial training tasks in a foreign context (training of diagnostic analysts for vocational training and the training of trainers);

- Developing research on the "technologies" of transfer and the development of the industrial training capacities of the developing countries;

- Developing the accommodation of foreign students in our educational system and reforming the latter in order to make it respond better to needs arising in training requests directly linked to industrial development.

All these suggestions are aimed at increasing and facilitating exports; in any case, they show that, on the French supply side, there is some awareness of its difficulties, lack of organization and contradictions.

4.4. Tentative conclusions regarding the French supply side: main lines of suggestions for better adaptation of supply to demand

Starting from the case of France, it seems that machinery conducive to the adaptation of the supply of industrial training to the real needs of the developing countries should, at the level of an exporting country, assume various functions. It is intended to enumerate these functions here, without going into details, and without any attempt at coherent presentation, merely indicating along what lines suggestions for policy and resources to be used could be made, whether the latter derive from the suppliers of technology and training, the authorities, or, failing those, any other institution.

Six major functions can be distinguished:

1. An information function

- Regarding demand expressed and the needs of the developing countries;
- Regarding the supply of training available on the one hand in the industrialized countries and on the other hand in the countries submitting requests.

2. A diagnostic function

- Diagnosis of demand in order to verify that its expression actually reflects a real need;

- Diagnosis of supply to highlight the genuinely available capacity.

3. A supply organization function providing for:

- The grouping of training organizations offering services;
- Better relations between industrial enterprises and the suppliers of training;
- Better organization of small-scale and medium-sized enterprises to respond to industrial training needs.

4. A contact function between supply and demand providing a support service for the party submitting the request until he has the guarantee that an organized offer can meet his needs under optimum conditions.

5. A research and development and technical support function favouring the adaptation of enterprises, organizations and people to quite specific activities:

- By the accumulation and dissemination of experience;
- By assistance for innovation and the development of appropriate technologies;
- By arousing awareness among all those concerned on the supplier's side to the specific nature of transfers of technology and industrial skills and giving them appropriate training.

Along these major lines various suggestions could be put forward, all of which would aim at optimizing the capacity of a country like France for the supply of services and the qualitative adaptation of this supply to the training needs of the developing countries.

These suggestions should make good the inadequacies revealed by the analysis of the services offered in France and in particular help to remedy:

- Its extreme diversity;
- The timidity of industrial enterprises, caused both by their lack of motivation to adapt and the fear of technological risks;

- The necessity sometimes experienced by private training agencies to export at any price;
- The low capacity of the national educational institutions for adapting themselves to a limited and specific demand for industrial training;
- The reserved and somewhat inactive attitude of the authorities.

Consequently, with particular reference to this latter point, certain hypotheses could be advanced regarding the role of liaison between supply and demand that the international agencies could assume.

CHAPTER III. TECHNICAL AND CONTRACTUAL ASPECTS OF THE TRANSFER OF INDUSTRIAL SKILLS

The analysis of a number of cases of the transfer of industrial skills, in their technical and co-operation, and contractual, aspects, has made it possible to compile a list, which has pretentions to be exhaustive, of the essential characteristics of this type of exchange. In the first part, this "analytical methodology" of a transfer will be presented. Applied to the cases studied, it makes it possible, in a second part, to outline what is in general actually found in contracts and what is the practice in the implementation stage in point of the mode of co-operation between the parties. At this stage of the study, certain fundamental inequalities and imbalances between the supply and demand sides can be measured. Through this research, carried out from a supplier country, certain technical and contractual practices can be elicited. These first conclusions will have to be supplemented on the one hand by a study of the legal aspects of contracts[29/] and on the other hand by taking into account the point of view of the host environment and the experience of the recipients of transfers. For that reason, the elements contained in this chapter must be considered as provisional.

I. An "analytical methodology" of the transfer of industrial skills

An instance of the transfer of technology in the broad sense of the term between two parties (or two types of parties) could be described by means of three sets of factors:

(a) A set of resources belonging to the two parties:

- Technological resources of the supplier: equipment, know-how, teaching facilities, engineering capacity, etc.;
- Resources of the recipient such as population, educational system, existing training centres, etc.

(b) A set of results expected and perhaps attained by the two parties on completion of the project; what remains beyond the end of the contract:

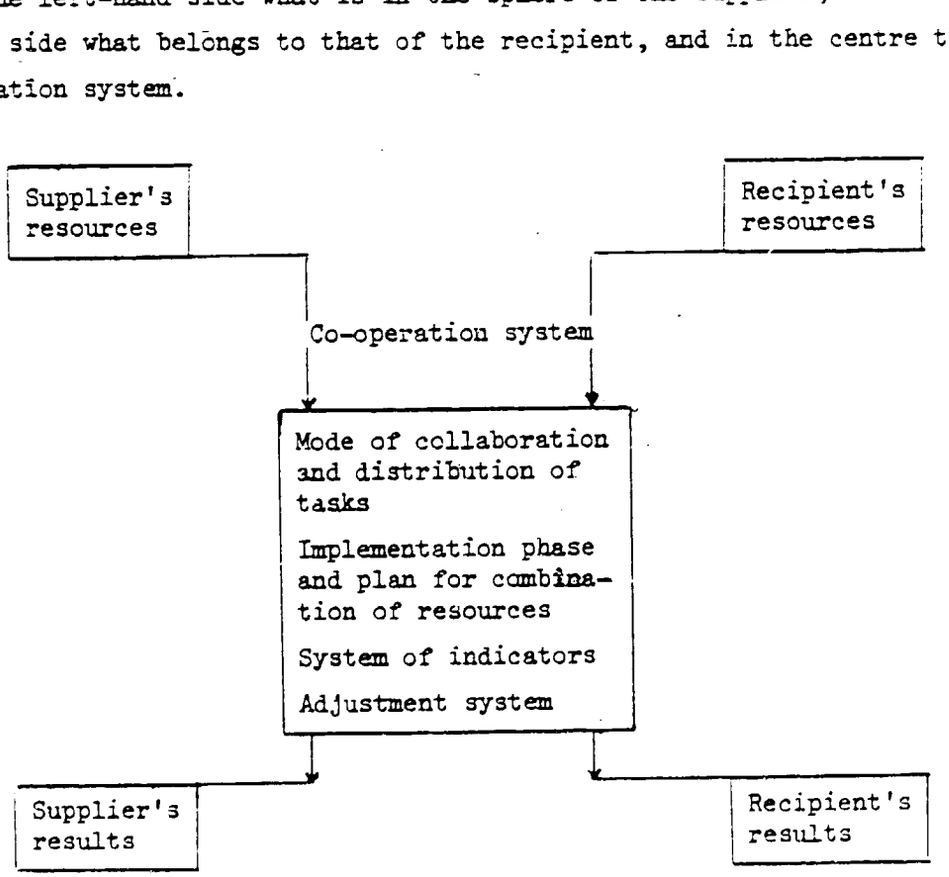
29/ See the consultation by Mr. Salem, op. cit.

- Results for the recipient which characterize the completion of the contract: the plant in operation, or the training centre equipped, perhaps operating after the initial start-up period;
- Results for the supplier: a financial result but also experience of the transfer, additional experience in engineering, for example.

(c) A system of co-operation limited in time (the duration of the project), which could comprise:

- The principles that govern both the collaboration and the distribution of tasks among the parties at the various stages of the transfer (in its preparation, implementation and evaluation);
- The implementation phase in which the various elements of the transfer (planning, joint implementation, dovetailing of the contributions of the two parties) are integrated;
- Indicators of the operation of the system;
- Adjustment systems by means of which it is possible, according to the partial and final results, to reorient and if appropriate renegotiate the resources to be used and their combination.

The general methodology is presented in the diagram below, showing on the left-hand side what is in the sphere of the supplier, on the right-hand side what belongs to that of the recipient, and in the centre the co-operation system.



The diagram clearly shows the transfer to be an example of co-operation making possible a combination of two types of resources, over a specific period of time, to arrive at a certain number of distinct results for each of the parties beyond the end of the contract.

The process for the initial negotiation of the contract as well as the more or less continuous adjustment during the implementation phase bring these elements into play together and favour this or that component rather than any other, according to the reciprocal interests of the partners, their practice in negotiations and their respective political or economic weight.

It can be supposed that at the end of the negotiation phase or at the end of the implementation of the contract the discrepancy between resources used and results obtained is more, or less, balanced and more, or less, favourable to one or other of the two types of partners.

Before presenting in synthesis form the results of the application of this "analytical method" to the cases of transfers studied, essential characteristics of the components (resources, results, and co-operation) constituting this methodology will be presented.

1.1 Characteristics of the recipient's results

Here one can distinguish the purpose of the training system, its degree of permanence, as foreseen in the resources used, and finally the concrete objectives, that its operation makes it possible to attain.

- The aim of the training system: the fundamental role attributed to it in relation to the nation, region, or industrial sector and in the context of technological, economic or social development;
- The degree of permanence and final autonomy of the training system: the training project may be limited to a certain number of persons trained, but it may also comprise:
  - The provision of buildings;
  - The acquisition of educational materials;
  - The acquisition of an educational process (system, content, methods) for one or more training programmes: training of trainers;

- The establishment of a capacity for training trainers;

- The establishment of an educational engineering capacity.

It is sufficient to define what is the final degree of autonomy of the recipient, that is to say, the capacity of the training system thus created to take responsibility for its own maintenance, development and possibly transformation.

. The objectives of the training system that can be defined in terms of observable results:

- The description of the "product" of the training system: the number of persons trained, the level of qualifications, for what duties and at what rate of "output";

- The description of the training system in terms of resources available and modes of operation (system for management, development, evaluation, etc.).

1.2 Characteristics of the supplier's results

. The financial result and its justification:

- What corresponds to the resources he assigns to the operation (remuneration of personnel, equipment, depreciation of his installations, etc.);

- What corresponds to the sale of the educational process (the cost of audio-visual materials and related operating factors, etc.).

While this result is clear, the same is not true of a whole series of other factors, less often identified and taken into account in the contractual relationship.

. The technological outputs resulting from the new experience and the development of the partner's own technology, export capacity and the training of those people who have taken part in the operation;

. The fundamental motives of the supplier

What is the purpose of this operation? Is it:

- To use under-utilized resources;

- To sell equipment;

- To create a long-term market; or

- To penetrate a country or continent?

1.3 The resources of the supplier assigned to the operation

Not only the educational facilities generally identified precisely in the contracts, but also operating systems and methodologies will be stressed here.

- Existing educational resources directly assigned or sold: trainers, technical assistants, documentation, educational aids, premises for practical courses, standardized tests, etc.;
- Design capacities and methodology made available for the operation (resources of the consultancy office and teaching methods);
  - Design capacities for original selection modes;
  - Design capacity for training systems, courses, or curricula;
  - Evaluation methodology;
- Management and control of training systems
  - Operating modes;
  - Maintenance system;
  - Modes for the correction of shortfall;
  - Development management.
- Control system for the export operation itself
  - Resources assigned to the co-ordination of the internal resources of the supplier and the external resources (subcontracting);
  - Resources to be assigned to adjustment or renegotiation, if necessary, in the light of any shortfall.

1.4 Resources of the recipient assigned to the operation

A distinction will be made between the resources of the recipient country and the resources specifically assigned to the operation:

The resources of the recipient country which contribute to the implementation of the transfer:

- The local training system (educational system, vocational training centre);
- The industrial enterprises as a training and accommodation field for the future trained personnel and having ad hoc and potential "trainers";

- The engineering companies and technical and educational consultancy bureaux in relation to the contribution that they can make in terms of methodology, tools, design services, follow-up and monitoring.

These resources can themselves be supplemented by those coming from countries that are geographically and culturally close to the recipient country.

The resources assigned specifically to the operation constituted by the importing enterprise, when one exists, and also the resources made available in the operation for its implementation:

- The population to be trained and its characteristics;
- The trainers and the training facilities;
- The "training engineers", their experience and capacity;
- The operators and managers on the recipient's side responsible for co-ordinating their own facilities and for follow-up of the operations.

1.5 The co-operation system

The co-operation system characterizes the relationships existing between the partners throughout the operation, from its original conception until the final evaluation.

- From the point of view of the principles of co-operation and the system for collaboration and the distribution of tasks;
- From the point of view of the measurement of shortfall and modes for adjustment or renegotiation of the contract.30/

The principles of co-operation:

Two extreme and opposite systems can be distinguished:

A system for the separation of responsibility and the distribution of tasks in which the implementation of the tasks of one party depends on the implementation of those of the other. For example: selection will be made by the supplier once the recipient has assembled a population of candidates determined in advance quantitatively (the basis for the selection) and qualitatively (the level determined).

30/ This does not refer to cases of lawsuits leading to the suspension of services but to what happens beforehand when any shortfall is noted.

. A system of joint responsibility under which the two partners are associated in key decisions concerning the project. This system may, to take the previous example again, imply the establishment of a project group with joint representation responsible, following evaluation of the level of the candidates, for deciding on the appropriate selection method.

This distinction is made here because of the possible consequences of one or other of the systems on the degree of assimilation by the importer of the educational technologies and methodologies and therefore of engineering capacity (this question will be further dealt with in section II.C). These modes of co-operation may be practised at different stages of the operation, the following being quoted here:

- The analysis and diagnosis of the needs of the importer;
- The diagnosis of the available resources of the exporter;
- The basic designing of the project and its detailed elaboration;
- The implementation and continuous evaluation systems during implementation;
- Final evaluation.

In this field, in addition to the mode of organization chosen, it will be necessary to evaluate the weight of the technological and negotiating "power" of the two parties.

. <u>The implementation phase and the plan for the combination of resources</u>

This defines, in the form of an advance estimate, the manner in which the resources of the two parties take over from one another or are combined and in which the joint results appear at the different stages, from the original conception to the evaluation of the project.

. <u>The systems of indicators</u> will make it possible, at various stages of the implementation of the operation, to point out any shortfall between advance estimates and real achievements. They should make it possible to measure:

. The actual time schedule in relation to planning estimates;

. The quality of the services and the partial results:

- Quality in relation to advance estimates;
- Quality in relation to the subjective impression of what is necessary at any given moment in the implementation of the transfer.

This permanent diagnostic function must in fact not only give indications on what is being done in relation to forecasts but must also indicate whether the resources initially provided for and the operation of the project are genuinely compatible with the results expected, and possibly whether the results expected at the end of the project are always realistic.

. An adjustment system making it possible, according to the nature of any shortfall observed:

- Either to take decisions regarding corrective and compensatory measures (decisions of a technical nature);
- Or to renegotiate the contract and change one or more of its components: results, resources or mode of co-operation (a more political decision).

An operation for the transfer of skills seems thus to have been described in the fullest possible manner. This method also seems to be quite applicable to a pure training operation (the establishment of a training centre, for example) as well as to an operation for the transfer of technology including training services.

In this latter case, the pattern may be applied to the over-all operation in the same manner. However, experience tends to prove that it is desirable to discriminate between training services and those linked with the other aspects of the transfer of technology, by establishing, whenever necessary, links of dependence between what belongs in the sphere of the transfer of equipment and technology and what belongs to the training sector.

This methodology has made possible an analysis of a number of contracts and transfers. However, it deserves to be tested in depth and, if necessary, supplemented and refined with each type of party, whether on the supply or the demand side. In particular, it will be necessary to verify whether it actually makes it possible to reveal the dynamics of a transfer and its induced effects and any degree of interdependence or connexion that there may be between the supplier and the recipient once the contract has been signed or co-operation has commenced.

Remarks on the bipolar conception of the transfer

In fact, frequently more than two parties are associated in transfers. The contracts may be tripartite or quadripartite, one or more trainers being associated with the supplier of equipment. But a financial party (for example, the banker of the recipient or an international financial institution) may also intervene in the negotiation and, although he is not properly speaking a co-contracting party, he may impose, during the negotiation or implementation of the transfer, contractual provisions or possibly modes of co-operation. At the stage of this research, this other party will be treated as equivalent to the recipient or the supplier.

II. Results of the study of cases of the transfer of industrial skills

About fifteen cases of the transfer of industrial skills have been analysed:

- Either on the basis of the contract, if it has been possible to obtain it;
- Or on the basis of conversations with the officers responsible for implementation on the supplier's side.

The operations studied cover all the types of transfer generally encountered.

(a) Cases comprising solely training services

- The accommodation of foreign trainees in pre-existing training courses in France;
- A specific course in France for trainees from a foreign industrial enterprise;
- The organization of specific training courses in the recipient country;
- The establishment of an industrial training centre on a turnkey basis or with the obligation to produce results.

(b) The case of the transfer of technology including training services in different forms

- Technical assistance, study and consultancy services within a training service or an enterprise;
- Training associated with the sale of equipment, of the turnkey type;
- Training included in a transfer of the "product-in-hand" type.

From the technical study of these various operations and the reading of a number of contracts, it is possible to discern various general considerations:

- Regarding the place of training in the operation studied;
- Regarding the manner in which training projects are usually described in contracts;
- Regarding the tendencies observed in the modes of co-operation practised and the relationships of equality or technological domination.

On the basis of these considerations, it will be possible to outline certain suggestions which will have to be tested and supplemented in other case studies, in particular taking into account the point of view of the recipients.

2.1 The place of training in contracts

The place taken by training in a contract varies greatly per se, according to whether the partners have been at pains to specify the importance that they assign to training and their relative experience and skill in this field. But this place varies also according to the type of contract, depending on whether it is a pure training contract or a contract for the transfer of technology. In the latter case, the transfer of equipment and technology, training appears most often to be handled very superficially:

- That is what is most frequently observed when training appears only in the contract itself. In this case, often only the principle of its existence and some generally rather vague elements are apparent, on the basis of which an over-all and more or less lump-sum price is deduced.
- More often, the article or articles devoted to training refer the reader to a technical annex. In this case, very diverse degrees of precision may be observed. Nevertheless, here also, the specific definitions are generally at the level of the means to be used and everything that makes it possible to evaluate directly the cost of services: (for example, the type of personnel assigned to the training and the duration of their assignment as well as the concrete and material conditions for the implementation of training.

In pure training contracts (or those separated from transfer contracts), training appears as such. In this case, the conditions are most favourable for the presentation of the essential provisions in the body of the contract. While the forms taken by this presentation of the operations are again very diverse, certain trends summarized here are apparent from case studies.

- In certain cases, the analysis of contractual documents in the light of their final form after negotiation is a very complex process. Either because there are two conflicting modes of presentation (technical and legal) between the partners, giving rise to documents that are dualistic in conception, or because the contracts are negotiated by parties who have very different experience and skill on the subject of training (or else that the negotiators are not training practitioners), they contain provisions that are very partial or technically insignificant, mixing up successively essential data and points of detail. Frequently, the contracts emphasize a whole series of specific or material details and conceal the main elements that can characterize training services. These details may incidentally hamper the process of implementation rather than guarantee the quality of the services.
- Provisions are encountered whose language can be significant only to practitioners of the profession. In fact, in many cases not only is a highly specific professional jargon used but also ideological and ethical concepts appear, knowledge of which is necessary for an understanding of certain parts of the text.

Whether intentional or not, this frequent confusion in the presentation of pure training contracts, in addition to the legal problems that it may raise in the event of a dispute, may conceal numerous examples of vagueness regarding the conditions for their implementation.

2.2 The technical characteristics of industrial training operations

Reverting to the methodological pattern presented in the previous section:

- Resources: Recipient
  Supplier
- Results: Recipient
  Supplier
- Co-operation systems

and applying it to the cases studied, an attempt has been made to discriminate between those elements in the contracts (but also in the presentation given of the conduct of operations) that are privileged and precisely defined and those that are more generally vague, concealed or omitted.

(a) Features usually appearing in contracts

The resources directly assigned by the supplier to the operation, in particular those that form the logical basis for remuneration. Quantitative data are more numerous in this case (personnel assigned by level for a given duration, teaching facilities) than qualitative data (teaching methods) or dynamic data (management and operational procedures, development capacity).

- The calculation of the remuneration and the details of the material conditions and the assignment of the expenses due to travel by personnel and transport of equipment;
- The results of the recipient: the main effort lies in general more in the limitation of the result expected from the services. More rarely, one encounters precise objectives expected from training, presented, for example for a course or a training centre, in the form of precise capabilities of trainees on completion of the training. Commitments thus appear more on the "negative" than on the "positive" side.
- The conditions for co-operation are in general also not very clearly specified, except through the planning of implementation, the interdependence of the tasks of the importer and the exporter and conditions for settlement in the event of dispute.

Here, only the general tendencies observed will be mentioned. Some contracts have much more complete and precise characteristics.

(b) The contracts are often silent or vague on many essential provisions, the most important of which are mentioned here:

- Firstly, the order often fails to state the degree of final autonomy of the requesting party, that is to say, precisely in what form the importer has a guarantee of carrying out by his own means the maintenance and development of the teaching facilities acquired;

- The resources of the recipient appear more in the form of constraints (level of trainees before selection or training) than in the contribution that may be constituted by the local training system or the existing industrial "fabric", etc. A fortiori, local engineering companies and consultant firms (particularly if they are few in number or in the embryonic stage) that would be capable of participating in following up the transfer are rarely associated in the work.

- Finally, the results of the supplier practically never appear, apart from payment for services, that is to say, what constitutes the purpose of the export from a technological and experimental point of view and with regard to commercial relations and the creation of a network. And yet, these motivations are essential if one is to describe the manner in which the exporter will operate the project and his own services, just as they imply, in the main, the attitudes of the supplier in the preparation and adjustment of the transfer.

(c) The co-operation systems chosen do not always favour a genuine transfer

Here, the basic technical hypothesis is that the keys to the design and management of a training system are not genuinely acquired except to the extent to which these functions are carried out by the recipient. For that reason, the transfer of a training system cannot be genuinely complete unless the importer participates as much as possible in all stages of the operation and, at each stage, bears part of the responsibility in decisions. A co-operation system conducive to such transfers therefore implies joint responsibility that is as frequently or as continuously practised as possible. However, contradictory positions are observed, both on the side of the recipients and of the suppliers.

- Some recipients, disappointed by the unsatisfactory results of many training and transfer of technology contracts, tend to assign more responsibility to exporters by making them assume alone commitments regarding results. While the effects may be positive in the short term (immediately after the termination of the contract), the long-term efficiency of this method may be doubted in a number of cases, in the light of the problems raised by maintenance and development (adaptation to new markets, for example).

- The suppliers, for their part, may prefer to implement all the services directly and as much as possible by themselves, enjoying more freedom in carrying out the operation, all the more so as they have been compelled to enter into a commitment regarding the quality of the results. They also keep to themselves the methods for the conception and operation of this type of project.

However, joint responsibility in the transfer of industrial skills is not always realistic or to the advantage of the importers.

- The exercise of joint responsibility demands from the recipient sufficient technical competence to be a genuine partner of the supplier and to be in a position of strength in "continuous negotiation". The result to be expected from this type of co-operation is the reverse when the importing partner is in a position of technical inferiority. He may be thus the prisoner of the deleterious consequences of "joint" decisions, which are not really under his control. Experience shows that recipients hesitate to accept this type of formula and in any case have relatively less facilities at their disposal than suppliers to carry as much responsibility as the latter.

- Joint responsibility compels the supplier to open himself up, often more than he would wish, to the recipient and to reveal his operational and management methods and his technologies to an extent very much beyond the minimum required by the contract. The attendant risks make the suppliers hesitant to adopt this mode of co-operation.

(d) "Defensive" or "co-operative" contracts

Parallel to these modes of co-operation, one can observe in separate or pure training contracts two types of cases: contracts of the "defensive" or of the "co-operative" type.

- Contracts of the "defensive" type are by far the most numerous, either as the result of a strategic choice or because the dynamics of negotiation almost of necessity lead to this form.

This type of contract provides for the maximum of eventualities in which one or other of the parties is absolved from responsibility, in case of difficulties. The result is a very comprehensive document that is so cumbersome that it makes its implementation di ficult when unforeseen eventualities occur. The establishment of this type of contract is a long and difficult process, each working meeting being a "passage at arms" in which the attempt is made rather to neutralize clauses involving commitments, by means of what are called "bolt-holes", rather than present the most favourable conditions for obtaining results.

- Contracts of the "co-operative" type are much rarer and are possible only if a climate of trust (and therefore thorough knowledge of the other party) has been established between the parties. This type of contract refers more to the results expected from training in the host context.

Rather than make a list of the difficulties a priori and considering possible repercussions, this type of contract covers the procedures for joint decision, making it possible throughout the implementation period to introduce desirable solutions that would further the achievement of the result. Implementation planning seems to be less rigid. Consequently, the adjustment system must be very highly developed and function very smoothly.

(e) Modes of co-operation, climate of confidence and mutual knowledge of the parties

Between the time at which the contract is negotiated and the implementation phase, the climate of relationships between the parties develops as the "zone of confidence" takes shape. The contract, negotiated at the beginning of the period, generally shows a type of relationship based on mutual distrust Once the parties have been broken in to working side by side, having acquired a fairly thorough mutual knowledge of their respective working methods, the genuine capacity and resources of each, the contract may appear unsuitable, both in its spirit and in certain technical and organizational provisions. This leads one to advance two suggestions:

- The phase in which the two parties get to know each other before any proposals for negotiations regarding the contract is of paramount importance. The two parties have an interest in devoting considerable time and resources to this process in the two directions: the supplier has an interest in getting to know the environment and in assimilating the demand, gaining his own impression of the relationship between the request and the need. The recipient will benefit from a study of the capacity of the supplier, his working methods and experience. This phase is generally not made possible by the system of inviting bids, in which the general framework of the proposals is fixed before an analysis of the recipient and transferring environments is made.

- It would be advantageous to negotiate contracts whose form permitted progressive adjustment of the relationship between the parties. That is the reason why contracts should state rather the modes of organization as a result of which reorientation decisions can be taken during the implementation phase. This suggestion is strengthened by the very nature of training services, which require, more than any other, continuous evolution and the frequent questioning of the resources used, sometimes even the readjustment of the objectives.

III. Some guide-lines for more effective forms of co-operation in industrial training

Various lines for suggestions or evolution concerning the supply side and its relationship with the demand side have been mentioned in the previous chapter. They will not be recapitulated here but will be supplemented by a study of concrete conditions and contracts for co-operation. This study suggests some general guide-lines for action which would aim to modify the relationships of co-operation and encourage the recipients to acquire and develop capacity for industrial training and technology. The following four guide-lines will be highlighted:

- Precision in the objectives of a transfer of industrial skills:
- Participation of the local training systems;
- Co-operation procedures between the parties;
- A whole set of activities aimed at reinforcing technically the position of the demand side in co-operation relationships.

3.1 The objectives should be defined as accurately and for as far ahead as possible

In a field that is so fraught with risk and so hard to evaluate as training, the parties could devote their attention to describing without ambiguity the capabilities, particularly the qualitative capabilities, of the persons trained and the performance of the training systems set up at the end of the contract. But the objectives must also be defined in order to ensure that the system established has a genuine capacity for long-term development and maintenance.

3.2 The training systems of the developing countries should be mobilized more

To the extent that their technical skills satisfy the needs of the project and even if they do not appear to be always as efficient as could be wished, the training systems of the recipient countries should be associated in the training activities, for two main reasons:

- Being integrated in the host environment, it can be considered that they will be educationally more efficient and produce more results than imported systems;
- More systematic association in projects compels these structures to adapt themselves to industrial needs and may make possible intervention by them beyond the completion of the project.

3.3 The modes of co-operation should be as associative as possible

That is an essential educational condition for a genuine transfer, that is to say, for the transfer of capacity for the conceptual side and for self-development. For that purpose, two conditions must be met. On the one hand, the supplier must accept the rules and the risks of an associative game. On the other hand, the recipient must have such technical weight and position that he can be a genuine partner in this co-operation system. One can imagine, and past experience bears this out, that exporters who have a vital need to export adapt themselves willy-nilly to numerous demands of recipients and will organize consequently. On the assumption, it would be for the latter to reinforce their position techni

3.4 Technical reinforcement of the recipient's position

In this sense, proposals should be worked out with them, on the following main lines:

- Each request should be formulated after a thorough diagnosis of the needs of the requesting country, taking into account all the resources at its disposal;
- The choice of the supplier or suppliers, in view of an extremely fragmented and competitive market, should be facilitated in the light of qualitative and adaptability criteria;
- In their preparation and during the negotiation phase contracts should offer an opportunity for initiating a mode of co-operation that is as associative as possible and on the other hand should provide the maximum of guarantees concerning results;
- Finally, it would be advisable to devise all possible methods by which a requester could be assured of a remedy or technical support that could be used in the event of difficulty in implementing contracts.

It is in particular along these lines that it would be possible to develop, with the countries on both the demand and supply sides, a search for all the concrete solutions possible.

CHAPTER IV. OBSTACLES IN THE DEVELOPING COUNTRIES THAT HAMPER THE ACQUISITION OF INDUSTRIAL SKILLS: HYPOTHESES FROM THE POINT OF VIEW OF A COUNTRY SUPPLYING TECHNOLOGY AND TRAINING

The following remarks are not the result of a synthesis of the receptive capacity of countries obtaining technology and training, but result essentially from what is expressed by the suppliers regarding difficulties that they have encountered during transfer operations. The point of view is therefore once again that of the supplier countries, with all the partiality that that may imply.

The problem of the receptive capacity and conditions for the acquisition of industrial skills and technologies is a decisive factor in the success or failure of the "graf' '. These problems cannot be seriously studied except with the requesters and, as far as possible, on the spot. Thus, the data on which this chapter is based should be subjected to study among the recipients or should trigger off a confrontation with them.

An attempt has been made to discover what could be, from the point of view of suppliers, the causes of the obstacles that hamper the acquisition of industrial skills, which have been classified in four major categories. The obstacles are alleged to be the result of:

- The type and policy of development in the recipient country;
- Inadequacy in the technological and educational infrastructure;
- The institutional position and the status of the requesting party;
- The availability and source of financing for the transfer of training or technology.

I. Obstacles linked to the type and policy of development in the recipient country

Two sources of difficulty are mentioned, related to:

- The characteristics of the population and its non-availability,
- The priorities given to economic and industrial development.

1.1 Obstacles linked to the characteristics of the population in the recipient country

Two factors should be taken into account here:

- The quantitative availability of the population from a demographic point of view and its qualitative availability, that is to say, taking into account its greater or lesser degree of preparedness for the exercise of the trade or the industry. These two problems are connected, but generally one or other predominates.

- Some countries with very small populations, for example Qatar, are compelled to import foreign manpower in order to ensure their industrial development. The migrant population, which is very mobile and therefore not settled, and often has a very low basic level of training, raises extremely delicate training problems: the volume of the investment in general training, linguistic and cultural problems, inter alia at the level of establishing teams, the assignment of posts of command, etc.

A similar problem, already referred to, is raised when the industrial investment is located in regions with a very low population density (if not desert zones) implying population movements. In this type of case, the choice of the technology (utilization of manpower and its qualifications) and of the training system should be the subject of serious study beforehand.

Another fundamental difficulty lies in the gap, which is sometimes very great, between the traditional life of the population and the level of basic knowledge and, very much beyond that, the style of professional life that is demanded by their integration in industrial projects. There are training thresholds below which an industrialist and a foreign training agency, whatever their experience in the transfer of technology, can no longer operate efficiently. There also, the choice of technologies is important, but the handling of the training must be shared technically between the recipient country and the supplier or suppliers.

1.2 Obstacles linked to the type of priority given to economic and industrial development

In general, three types of development priorities are found, some of which create obstacles in the way of training, at least in the short term.

(a) Priority is given to growth and investment

This policy brings immediate results in the industrial infrastructure but generally, in the short term, to the detriment of national industrial ownership, the replacement of senior staff by nationals and technological and economic independence. The rapidity of industrial growth is often incompatible with the development of schools and training centres, and industrial training remains limited, to a large extent, to on-the-job training.[31/]

(b) Priority is given to all-round industrial development

In this case, training is effectively taken into account in all its forms: the "product-in-hand" system and national industrial training centres, by sector or by complex. The difficulty is in general the absence or inadequacy of liaison, generally as a result of the mobility of supervisory staff, to ensure proper long-term integration of the external action and to preserve satisfactory efficiency in the training investment.[32/]

(c) Finally, priority is given to the creation of a "fabric" favourable to technological development before industrial development proper, on the occasion of a pause in investment or at the same time as industrialization at a measured rate. The initial basic training, vocational training and industrial integration are compatible with slow industrial development. Coherent planning of educational investment is then possible.[33/]

It is clearly not for us to make choices only on the basis of the training criterion; other factors come into play, such as raw materials, the world market, the early availability of finance, etc.

31/ The industrial development of the Republic of the Ivory Coast during the last ten years is one illustration of this.

32/ Here the example of Algeria can be mentioned, which, simultaneously with very substantial industrial development, has carried out an all-round industrial training investment.

33/ The cases of Tunisia and Morocco could be studied along these lines.

However, it would be most instructive to verify where there is a relationship between the industrial training policy (or perhaps the lack of it) and the type of demand expressed, on the one hand, and the degree and rate of economic and industrial development, on the other hand. This question will be examined further in the following section, and an attempt will be made to discover from what level of resources and technological experience the request for training changes from an isolated request linked to a transfer to a request for the strengthening of national training institutions.

But beforehand, we shall mention the tendency in numerous requests to seek the most sophisticated technologies or the very elaborate models which are known to operate in a developed environment, whatever the host environment for the investment. This type of technology, in order to be efficient, may involve an industrial infrastructure or professional experience on the part of manpower which the host country does not have. In the choice of more, or less, advanced technologies that are more, or less, compatible with the handicraft industrial experience of the host country, there are educational arguments of which greater account could be taken, such as, for example, the progressive principle in the degree of complexity of the technology acquired.

II. Obstacles linked to the inadequacy of the technological and educational resources of the recipient country

The difficulties encountered here lie in the field of the conditions under which a technology, investment or capacity for industrial skills is "grafted" on the host environment and the potentiality of that environment for "fixation" and integration. In general, this grafting process raises less difficulties when there are locally the institutions, methods and experience by which it is possible to provide for:

- A diagnosis of the training needs, taking into account technologies, the availability of manpower and local training facilities;
- The selection of potential suppliers by qualitative criteria (operating methods, sensitivity to the integration of training projects, etc.);

- The design of training systems and the monitoring of their implementation (engineering capacity), including local facilities;
- The negotiation of contracts taking the above into account (needs, supplier, system chosen).

The inadequacy of the "host infrastructures" is not always taken into account in the formulation of the request or, during negotiation, of the results expected from the supplier's services. These necessary infrastructural facilities differ according as to whether the request is aimed at the development of the national training capacity or at a more restricted industrial investment.

In this latter case of the transfer of technology, the requester should be equipped to reply very precisely and objectively to questions regarding the level of training and qualifications of the available manpower and the genuine capacity represented by the local educational institutions, since the industries and industrial training centres may be made use of with his active participation. The experience acquired in the country should enable the requester to fix a general training framework (volume, duration, package) compatible with the results that he expects from it.

- In the case of demand aimed at reinforcing the national training machinery, the requesting party should provide the facilities necessary for the permanence of the educational system set up, at the level of the long-term study of the needs for trained manpower, the availability of national trainers, an adequate effort for the training of trainers, and their status vis-à-vis the other categories of manpower in the industrial branch (or the administration). Moreover, it should be possible to verify that the precise terms of reference of the request are compatible with the existing educational system and its expected development.

In both cases, finally, the integration of the project will be all the more successful if two conditions on the demand side have been satisfied:

- The maximum precision and objectivity is obtained in the evaluation of those resources of the requesting party that support the implementation of the transfer;

- As far as possible all the factors in the recipient country that can be integrated in the project (training centres, engineering companies, documentation, industries, etc.) are associated with one another.

These conditions will be all the better fulfilled if the country's experience in transfer, and also that of other recipient countries, is systematically analysed, formalized and used as a reference and methodological basis.

III. Obstacles linked to the institutional position and status of the negotiating partner in the recipient country

Depending on the institution to which they are attached, the partners in the recipient country often defend different interests and priorities and negotiate with different motives.

A national institution tends to favour long-term training and the cohesion of the project with existing equipment and the national development plan; an industrial partner will favour the immediate results of training and the satisfaction of his shorter-term needs; a bank in the recipient country will have the priority of equilibrium in the balance of payments, etc.

These priorities, all logically based, are not always consistent with one another. When these various representatives participate in negotiations in one form or another, sometimes at different times, the result may be the establishment of projects or contracts that suffer because of the sometimes contradictory demands of each. Implementation may also be disrupted by delays or rigidity in financing, administrative authorizations, etc. The co-ordination between the different representatives on the demand side is all the more difficult since training projects lie at the point of intersection of a number of enterprises and departments. It is then, in general, very difficult to find one person or institution to represent all the other institutions taking part in the project on one footing or another.

Other difficulties are related (and this does not contradict what has been said above) to the genuine possibilities and "qualities" of the body representing the requesting party, both in the negotiation and in the course of implementation of the projects:

- Has the representative genuine power of decision and sufficient margin for manoeuvre in the negotiation of the contract? Often, political or technical decisions are taken without his participation.
- Has he the capacity to formulate the real needs? In that respect, is he sufficiently supported technically by competent agencies in the diagnosis and the study of needs, preliminary projects, etc.?
- Has the representative an institutional position or status that will enable him to mobilize the local resources that will participate in the project on one basis or another?
- Can the supplier be assured of the adequate permanence of his negotiating partner? Will the decisions that are taken with him be accepted and taken into account by his successor?

All these questions relate to the possibilities of the representative of the recipient country to involve himself and to commit the resources of his department in the conception, implementation and evaluation of training projects. In addition to the capacity for acquisition represented by what is called the host infrastructure, there is the will to mobilize this capacity.

IV. The available facilities for financing training

This point will be mentioned only because it is in fact the resultant of all the others and depends mainly on the importance attached by the requesting party (or the financer) to training problems, the degree of priority assigned to training in industrial development and the conception that the requesting party has of the market value of this product.

It is regrettable that the sources for financing industrial projects do not give rise to an opportunity to verify that the resources planned are satisfactory in quantity and quality, in view of the results, particularly in the case of the transfer of technology.[34/] At this level, it would be quite possible to apply a number of criteria and technical and

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34/ The World Bank, for example, submits the financing of rural development projects to an entire series of quantitative and qualitative standards.

educational standards derived from the most significant experience, making it possible, in the event of inadequacy, to refer the projects back to the originators.

Development priorities, host infrastructures, the manifest will to assimilate and integrate the foreign contributions - these three factors, in the opinion of the suppliers, condition the success of training projects. But they also condition the degree of participation of the requesting parties in the operation, the quality of their monitoring and their capacity to master the operation of the project beyond the completion of the contract.

CONCLUSION

This first approach to transfers of industrial skills seen from an exporting country leads to the formulation of various partial conclusions, both on the nature of the transfer and on the limits of the capacity for the supply of training.

- Transfers of industrial skills are quite specific operations. If they are to be successful, it is necessary that the supplier and the recipient should innovate in their services and their attitudes, should provide themselves with specific resources and acquire, each on his own account, original working methods. In certain cases, particularly when the training is provided by an industrialist, it has been seen that the transfer could bring in an "adaptational" intermediary between the supplier and the recipient.

- The study of French supply of training services has proved it possible, in view of its diversity, to find suppliers qualitatively suitable for meeting the demands of a transfer of industrial skills. However, it appears on the whole that (except when there is an institution that specializes in transfer proper) the supply of technology and training abroad is subject to a whole series of restrictions and limitations. These are mainly due to the risks of competition or the reduction of potential markets, making the export of technology and training an operation that has nothing natural about it.

- On the other hand, export remains, for French suppliers, a vital necessity for many reasons, particularly because it provides a substitute for a declining domestic market. Finally, it is known that the pressure exerted by the authorities, at least in the case of France, will be inadequate to help, let alone constrain, suppliers to respond to all the demands of genuine industrial development in a recipient country.

For that reason, it is suggested that the search for solutions should be directed along three lines:

- Defining a series of suggestions that would conceivably be implemented by the authorities on the one hand and the professionals in industrial training on the other hand;
- Reinforcing as a priority the recipient countries in their capacity to diagnose, operate and evaluate transfers of industrial skills; that supposes that the capacity of the recipient countries to formulate requests and integrate the contributions from abroad has been evaluated;
- Setting up at the international level and for the benefit of both suppliers and recipients, preventive assistance, from the preparation to the negotiation stages of contracts, if not assistance in cases of serious difficulty in implementation.