

Outlook for Technology Transfer

Emergence of Third World orders is creating new pressures for inevitable changes; we are at crossroads

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The history of technology transfer is as old as that of mankind.

Does this mean, at the beginning of the 80s in this 20th century, that the future of such transfers calls for extraordinary thoughts or particular fears, as did the approach of the fateful year 1000 in Europe long ago?

Doubtless the present in which we must try to spot the paths of the future is at a crossroads, arrived at the beginning of the 70s after 25 "postwar" years which were marked by reconstruction and enormous development in industrialized countries, and also by decolonization.

Today, two series of changes are running together:

122 — International economic relationships are changing, Third Worlds (and there are several) are emerging, interdependence is increasing (particularly industrial interdependence), and the international monetary system is in crisis.

— Gradual changes in society in the industrialized countries, together, in particular, with changing values.

The emergence of various Third Worlds has multiplied the actors on the scene and the number of interactions between them. International economic relationships are falling into anarchy. We are looking for new laws or new regulatory systems. Technology transfer has not escaped from this situation, and, under pressure from Third World countries, efforts are being made to establish a Code of Conduct for Technology Transfer, at the same time as a Code of Conduct for Restrictive Commercial Practices, and there is a desire to revise the Paris Convention.

Even so, for the 80s and probably for the rest of the century, we shall continue to be able to distinguish two worlds of technology transfer:

— First, transfers between industrialized countries taking place in a substantially uniform world and doubtless continuing to account for more than three-quarters of international transfers, whether one counts the number of operations or the amount of remuneration paid.

— Second, transfers to developing countries, which countries are very different from each other

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and often raise difficult problems concerning training, technical assistance, and remuneration.

TECHNOLOGY TRANSFER BETWEEN INDUSTRIALIZED COUNTRIES

The present situation

For centuries in Europe, craftsmen travelled to learn their craft and at the same time international organizations (which at that time, were not multinational corporations but religious orders) disseminated technology. Technology was transferred geographically by transferring people.

Some of these people were creators — creators of new commercial methods: creators of new financial techniques; creators of new forms of association; and inventors of new technology. A legal system, and particularly laws for protecting intellectual property grew up to protect these creations, and for inventions in particular, a monopoly was instituted in exchange for the publication of the inventions to the general benefit of progress in science and technology.

All these developments occurred in a system based on free enterprise, free association, and freedom of contract, while the regulation of these freedoms and the repression of their abuse were provided, in particular, by competition laws.

Today, this world of industrialized free-enterprise countries with market economies can be described as a homogenous world so far as the process of technology transfer is concerned:

— In industrial organizations people are trained to an equivalent level both in the technical field and in the managerial field.

— The environments of industrial organizations are comparable, given that they all operate as an integral part of the same social and economic system, the industrial society.

— Technology transfers are based on the system of industrial property in its widest sense, that is to say including know-how and unfair competition, and transfers are arranged by contracts between like organizations.

— Since the licensor and the licensee have equivalent general knowledge, the technology can generally be transferred merely by passing on technical information to the licensee, for example, by the teaching of a patent specification or by the communication of know-how.

— Technical information is generally communicated without a guarantee as to the result, unless there are special precautions to be taken because of the risk involved in a massive investment specifically required to implement a given tech-

nology.

There are two types of licensors:

—First, inventors who do not exploit and who do not seek to exploit their own inventions themselves.

—Second, industrial licensors who do exploit the technology.

For the nonexploiting inventor, the object of licensing is to find the best buyer, that is the best possible exploitation together with the best possible remuneration.

Industrial Licensors

For industrial licensors, licensing is merely one technique among others such as exporting goods, organizing sale's networks, and setting up sales or manufacturing subsidiaries. Unlike the nonexploiting inventor they have industrial know-how whose communication raises an important problem — that of competition between the licensor and the licensee. Inventions and know-how constitute a major element in the economic clout of an organization operating in an economy which allows free competition both domestically and internationally. An organization is thus not prepared to communicate these elements to its competitor or potential competitors without obtaining an adequate return. That is why, in most cases, licensing is linked with investment and technology is transferred only to foreign subsidiaries.

Of course, competition laws are there to avoid and to stop abuse. But it seems to be fairly clear that if such laws forbid various things and put limits on the use of industrial property rights without taking proper account of this state of affairs, they merely contribute to reducing international technology transfers between independent organizations.

In summary, technology transfer between organizations in industrialized countries:

— Takes place in a climate of mutual understanding.

— Does not present insoluble problems of remuneration and payment.

— Does not usually pose problems of technical assistance and guarantees.

Technology can thus travel easily, with little more than the various laws on competition to regulate its movement.

Outlook for the Near Future

What gradual, or revolutionary changes can we expect for tomorrow?

It seems to me that, unless the crisis in the international monetary system worsens without solution and this leads to stagnation or to recession coupled with protectionism, these characteristics of technology transfer between organizations in industrial countries will not change significantly during the 80s.

And considering that licensing is an advantageous solution when there are barriers to the circulation of goods, it could even be that protectionism would lead to an increase in licensing.

In any case, it must not be forgotten that the in-

dustrialized countries will have to solve:

— Problems concerning economic balance in relation to changes to the international context: savings in energy and raw materials, restructuring due to a changing international division of work, and developing activities that meet the new needs of the Third World.

— Problems connected with change in their internal structures and their values, automation, pollution; etc.

Result

If industrialized countries measure up to this challenge, it will mean that new technologies are developed while the technologies exchanged between industrialized countries will be changing as follows:

— There will be a drop in transfers of those technologies that will be exploited more and more by the Third World.

— There will be a birth or growth of transfers of new technologies: microprocessing, data processing, new forms of energy, improved utilization of conventional forms of energy and raw materials, new materials, etc.

There will probably be an increase in technology transfer in service industries, which will occupy an ever increasing portion of activity in these countries.

This technological, economic and social change will doubtless be accompanied by modification in technological capacities and the capacity for investment of organization in industrialized countries. The present geographical currents of technology transfer will thus change:

— What will become of the present predominance of the United States?

— What will Japan do?

— What niche will be occupied by Europe?

Finally:

— Either the industrialized countries will go to sleep under the impact of the international crisis.

— Or, more probably, these countries, or at least some of them, will continue to express their capacity for innovation and their spirit of enterprise by facing the challenge, and there will continue to be a very large amount of technological transfer between industrialized countries, and indeed this amount will probably increase overall.

TRANSFERS OF TECHNOLOGY TO DEVELOPING COUNTRIES

Present Situation

The characteristics of technology transfers to developing countries are very different from those of exchanges of technology between organizations in industrialized countries.

In many cases, the gaps in the technical training of their personnel are large. It is not enough just to transmit technical information. The personnel need training, and technical assistance must be provided over a long period.

Also, in many cases, the industrial, social and administrative environment makes it precarious to operate industrial equipment designed for industri-

alized countries. Technologies and industrial equipment must be designed and produced to match the environment in which they will be used. In the other cases, the problems are financial problems. In yet other cases, the transfer of technology can run up against all of these difficulties together.

In fact, it is necessary to distinguish between four types of developing countries.

— Those which have industrial managers and technicians, but do not have enough money to finance the desired investment, and who are suffering even more than the industrialized countries from the energy crisis.

— Those which have the money because of their oil and mineral resources but do not have the appropriate managerial or technical manpower.

— Those which have neither the money nor the manpower but do have natural resources to exploit, or a large, young and expanding population.

— Those which have none of these things.

In some developing countries foreign investment has been paying for industrialization over a period of time.

Certainly, this industrialization has taken place in the context of multinational corporate policy, but it is not realistic to deny its existence or to pretend that it is entirely evil. In some cases, it has resulted in workers being trained on the job, and it may have catalyzed the creation of other activities. It thus could have begun an industrial environment.

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Reduced Activity

At present, partially because of national laws already established concerning foreign investment and the acquisition of technology, technology transfer is already being reduced or prevented:

— Either, in countries of the first category mentioned above, because of excessive administrative hassle and low or extremely low remuneration which have a dissuasive effect on the suppliers of technology.

— Or, in countries of the second category, because of the problems of training in the absence of an adequate industrial and administrative environment, which themselves lead to unrealizable requirements for guarantees, and cause the supplier of technology to run risks which are themselves high enough to be dissuasive.

Overall, the rejection, at least in part, of foreign investment and industrial management by the supplier of technology (otherwise known as the rejection of multinational corporation or fear of neocolonialism) leads to a situation which at present is unsatisfactory for both parties.

Several draft codes have been studied to contribute to the edification of a New International Economic Order.

Certainly, one must avoid abuses which have from time to time been committed. This is one of the objectives of these codes. However, these codes also want to say what ought to be done generally speaking. This does not seem to be realistic or capable of creating favorable conditions for the transfer of technology to Third World countries.

The infinite diversity of situations is not taken into account and legal terminology is used to deal with problems which require, above all, solutions on a financial and a personnel training level, and indeed on the level of the organization of worldwide trade and of conditions of safety.

In industrialized countries, competition laws regulate a highly dynamic circulation of goods and technologies. In North-South relationships, the conditions favorable to the development of such circulation remain to be created.

Outlook for Near Future

During the 80s, and probably from now to the end of the century, only a few countries currently said to be developing countries will be capable of joining the ranks of the industrialized countries. A few others will have begun to make significant progress in that direction and to have created the conditions suitable for a second phase during which they will have a real chance of getting in the running.

For these countries, that supposes that they will obtain the necessary managers and technicians, that the country as a whole accepts the economic and social transformations of such industrialization, and that they will be able to finance the investment. Financing could be accomplished by developing their own resources, with the help of a system of international finance, or by accepting foreign investment by offering reasonable conditions.

All of this can only be gradual. It can require several generations, because of the transformations necessary by individuals and by society as a whole.

Finally, there remain those countries which will not develop in this way.

Concerning those countries in which there is a real chance of transfers of technology taking place, which technologies should be transferred? Probably much the same as today:

— Technologies intended to satisfy the most basic needs of some of these countries — food, housing, clothing, health, etc.

— Conventional technologies corresponding to primary transformation industries or to labor-intensive industries which will move to developing countries with the shift in the division of work, whether organized or spontaneous.

— Technologies specific to the goods which certain developing countries wish to manufacture at home, for their own consumption or for a regional market, or which organizations in the industrialized countries will offer for this purpose.

Proportions Change

However, compared with the present situation, the relative proportions of these different categories of technology are likely to change. No doubt, there will be a development of transfers of technology between developing countries.

A major problem is that of "suitable" technologies. Indeed, the technologies which are transferred relate:

— Either to international products suitable for

trading on the markets of the industrialized countries.

— Or to goods for local consumption which must be matched to local requirements or to local preferences.

In the second case, the technologies transferred must be adapted. In the first case, it is also possible that the technologies need to be adapted to local working, economic or social conditions.

Potentially, there is a large field of activity here for firms of consulting engineers and even for manufacturing industries which will feel the need to adapt themselves to a world which no longer wants just to buy goods, but which wants to buy the techniques for developing its own activity. But it would be illusory to suppose that the problem is simple to solve, and if it is not solved it is all the fault of bad will on behalf of the industrialized countries.

This is a research and development problem or an innovation problem more than one of transfer of technology, and (whether this problem is dealt by industrialized countries or preferably by cooperation with the developing countries themselves) we cannot escape from the question of return on investment, that is to say, in particular, on the volume of possible applications.

Finally, while it is obvious that the transfer of tried industrial technology is difficult in countries which are not sufficiently prepared to receive it, it is nonetheless, manifest that the transfer of appropriate technologies will encounter the additional difficulties of being novel projects.

Another major problem will remain — for a long time — namely, the training and technical assistance needed for all those countries which have not got the necessary managers and technicians. This means that the industrialized countries or their organizations will have to train and provide personnel for this task. The training will have to be matched to meet local requirements, as well as the technology. However, this also means that the buying countries must find ways of training these managers and technicians and then keeping them in industrial jobs at home, to avoid too much "brain drain".

World Commerce

A further major problem will be that of reorganizing world commerce and of increasing the con-

sumer capacity of developing countries in parallel with the increase in their productive capacity. Otherwise, we must not expect organizations in industrialized countries, who have the know-how and are already confronted with sometimes enormous risks and difficulties of remuneration from their technology transfers in developing countries, to consent to the creation of competitors. Nations themselves think the same way.

Another important problem for development in some Third World countries lies in the means for enabling the technology of small business to be transferred. These businesses often have a vital role to play in the economy of industrialized countries at the sides of the large and very large corporations.

Finally, since transfers of technology are only one factor in economic activity, their future development will naturally be a function of the way in which the world economy as a whole is organized, and in particular, of the way in which this world economy organizes itself to distribute the revenue of development, with the concern both for human fairness and for economic efficiency seen on a worldwide scale.

In any case, transfer of technology cannot exist in a climate of confrontation and hostility concerning transfer. It is not simply a question of communicating technical information which has been kept more or less a secret, but of teaching others to master an industrial activity. Long-term cooperation in a climate of mutual confidence and in the interest of both parties is necessary.

The interdependence of the present world is incontestable and multiple. However, this signifies that each objective may appear as a preparation for further objectives and that there is a danger of public systems becoming paralyzed before international problems of so vast a size and such complexity. This worldwide interdependence certainly requires worldwide solutions. But there are also problems which are better solved if they are taken, or taken initially, on a regional scale.

Finally, yes, we are at a crossroads and even at a dangerous crossroads. The transfer of technology has a bright future before it if the world manages to reorganize its economic relationships. Will it manage? We must ardently hope so, even if it is not entirely clear that it will.