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Why Not Stop Transfer of Technology?

by Jean-Max Baumer, St. Gall *

One of the crucial themes in the dialogue between North and South is the nature and volume of the transfer of technology from the industrialized to the developing world. In contrast to the demand of overcoming the "technology gap" Prof. Baumer argues that the postulate should rather be formulated as "reduction of technological dependence".

In the North-South dialogue the developing countries (better: economically poorer nations) insist upon an acceleration, an improvement, a simplification and a cutting of cost of the transfer of the industrialized nations' technology into the Third World. The reasoning of these countries is founded in the following chain of thought: Without technology, too little or no development; development, that is growth, however, is urgently needed; the modern technology of the industrialized countries is the right technology for this growth, thus this technology must be transferred from North to South in increasing measure.

The industrialized countries agree with this attitude because the productive effect of their technology is well known to them and in addition to this a transfer of it brings in highly welcome income. For this reason they are indeed against a cutting of costs and basically against any kind of simplification of the getting hold of their technology. Thus the confrontation between supply and demand takes place on a more technical level, like in discussion of different models of international trade, the forms of joint ventures, of direct investments, modalities of patent law or licencing contracts, in the possibilities of education, of university-partnerships, or of scientific and technological aid in general.

Surely everyone agrees that technology is only a means to an end and not a goal in itself. Three chief goals of development in economically poorer nations can be cited:

Fulfillment of *basic* human needs, both material and non-material.

Greatest possible use of a community's *own potential* through broad social participation and control.

Harmony with the natural *environment* ¹.

Science in general and technology in particular are undoubtedly important instruments of man in promoting his physical comforts, his general welfare, and channeling nature in its given state into the service of man. The three goals on the level of strategy can thus be applied in unchanged form to the operational level of technology as a means to the described end.

The next step is to describe more closely the profile of an up-until-now generalized claim in which technology is determined by certain normative expectations – coinciding with the equally normative contents of the goals of development mentioned. Technology – understood as a method to do things – is made "appropriate" through these modelling norms; it becomes a technology appropriate to these criteria (AT).

Appropriate Technology: a Profile

AT (assumed or self-developed) should cover local unsatisfied basic needs; it is directed towards the situation of the poor, that is, the majority of the population.

AT attempts to induce a process of growth which immediately integrates a maximum portion

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¹ A. K. Reddy, Various papers and discussions on and about the Indian situation, Bangalore, India.

of the population and enables them to profit from the results. This broad development is to be given priority over a high rate of growth.

AT is culturally compatible, recognizes given local thought and behavior patterns and causes only slow, digestible changes in the direction of the desired social evolution. Existing traditional starting points are used for further development.

AT accomplishes ecological circulatory economy with renewable local raw material, is frugal in the use of energy with a minimum of pollution and a maximum of recycling.

AT provides extensive employment, does not attempt more than is physically possible and is meaningful. It strives for use of little capital per job, avoids excessive specialization and makes use of locally available labor, just as in the case of raw materials.

AT avoids processes of economic concentration by operating to a great extent at costs that can be financed by local surplus; it makes means and materials for production attainable for broad numbers of the population and claims smaller factories with smaller production for the smaller local market.

AT is invented, developed, furthered, constructed, produced, managed and maintained to a great extent on the site. The enormous and many-sided learning effects are a result of local innovation centers. By means of self-help and local self-sufficiency, there results local technology and this makes possible, strengthens and is conducive to local, self-sufficient social development.

To be sure there is nothing especially new in describing AT this way or that. However, have the proper conclusions been drawn in the South as well as in the North pertaining to the required technology transfer?

Technology Assessment

How many of the technologies developed in and for industrialized countries meet the requirements of this ideal profile? If the catalogue of criteria were like running the gauntlet, with as many clubs as there are single criteria, that is, demands to be fulfilled, then almost every technology of industrialized countries would be beaten black and blue in the course.

To understand this one must not necessarily know a lot about the Third World. It is sufficient to consider first of all the effects of our technology on ourselves. On the success side of the

balance are time-, manpower- and income-surplus². But since developing countries suffer already from time- and manpower-surpluses they do not need to acquire them through technology. And as pertains to income-surpluses, the idea is to produce income for all, instead of surpluses for a few. On the expenditure side of our technologies are new debits such as those of nerves, of the mind and of time (long distance transportation), of environment in manifold ways, victims of outdated education, the good technologies on the edge of the road of the alleged better technologies in the sense of "creative destruction" of Schumpeter, the overestimation of material values and alienation through many living and working conditions. Whoever has digested this balance for industrialized countries must apply these technological effects in addition to peoples and countries who exhibit completely different cultural, ecological, social and economic structures and processes.

Can one still earnestly claim our technologies possess global validity and everything should be set at stake in order for them to have an even greater universal propagation effect?

Psychological Effects

One of the chief disadvantages of modern technology transfer – according to Jéquier³ – lies in the paralysis of self-initiative and of the innovative spirit, two fundamental elements for "development" in general, as we pointed out previously.

Following such lines of thought enables one to see into Fuglesang's hypotheses⁴, wherein AT is primarily a way of thinking and secondarily the transposition of an idea into a "machine". Not the paralysis but instead the stimulation of the joyousness of innovation in a job is urgently necessary. Also a demystification of technology is required; that is, the masses should recognize that they can do it. Finally the population must recognize and discuss their problems among themselves and be able to suggest solutions instead of being confronted with finished (unsuitable) solutions from abroad.

Technology is a constitutive characteristic of development strategy. If the idea of the "nucleus", the "self reliance" strategy (selective autarchy according to the principle that only what one cannot make oneself should come from abroad) is chosen then this requires a "self reliant tech-

² E. Küng, *Steuerung und Bremsung des technischen Fortschritts* (controlling and slowing-down technological progress), Tübingen 1976.

³ N. Jéquier, *La Technologie Appropriée*, Paris 1976.

⁴ A. Fuglesang, *Communicating Appropriate Technology*, in: *Development Dialogue*, No. 1, Uppsala 1977.

nology"⁵. The definition of technological needs must take place at the site of the development problem. In fact, appropriate technology can only be defined there, because in the laboratories in industrialized countries the conditions in these distant places are not known. The initiative in relation to technology transfer would have to come from developing countries, which would seldom have to be the case since they could solve many – probably even most – of their technical problems pertaining to basic needs with their own simple and appropriate methods.

Havemann⁶ stated quite correctly that the transfer of technology across national borders is no innovation, that even through historical eras technology transfer had taken place. However, it makes quite a difference whether there exists a controlled pull (induced by the one in need of technology) towards solutions or whether the one in need has succumbed to a technology flood regulated from abroad. The industrialized countries' many-sided sales attempts and the existence of multinational business as bearers of technology make a "push model" more conclusive than a "pull model".

Now one might argue that the required slowing down of technology transfer pertains to the export of "finished technology" – an affair of the balance of trade – therefore the transposition of know-how would have to be carried out all the more intensively. This, however, would make things even more difficult because correspondingly complicated infrastructures, development, test, and production installations would become necessary in poor countries. Thus one should have the courage to go the way of AT until the end: local innovation centers would have to be built up in developing countries; centers which work out, try out and utilize with their own means if possible, for their own purposes, their own technical solutions. This will only be possible – notwithstanding some exceptions – at a more simple technical level than ours.

Innovation Centers

And it works! The "Sun Basket" of Hyderabad; the windmill in Ethiopia, which is three times cheaper and yet more efficient than the cheapest imported product and utilizes local raw material and labor; the methane gas installation "Indian pit design"; the dig-and-sow machine of the Indian Agriculture Research Institute; the Nigerian corn dryer; the Ghananian TEK brick press; the as-

phalted corrugated cardboard developed in India as building material; the Chinese "wheelbarrow"; pressed wood made of rice husks; caulking material made of coconut kernel; and hundreds of other things⁷. A survey of all such techniques would give the impression of a formidable department store for technology from and for the developing countries. This development must be encouraged. Praise is due that country which utilizes the most of its own technology, and not the one which possesses the latest foreign technology. The nation deserving the most applause is the one which makes use of the most simple means according to economic principle, and not the nation which holds the principle that the best cannot be costly enough.

The degree of intensity with which a country itself pursues innovation, (e.g. independent renewal, invention, improvement and application) determines the degree of national capacity to act. National technological and thus economic "performance-capacity" is achieved when a national production apparatus can steer its own build-up and its accumulation under national control. This is most likely to be the case when a country can produce not only the needed end products or the intermediate products, but also the producer goods themselves. Only then is sectorial coherence – as Mettler⁸ calls it – achieved. In this sense almost all developing countries would have to re-conquer their "performance-capacity" instead of importing as much technology as possible. Whoever is in favor of the Third World's greater independence of industrialized countries, must stand up for a slowing down of technology transfer and a simultaneous furthering of innovation centers in the Third World at a necessarily lower technological level. It is interesting to note that during the Napoleonic wars the USA suffered a twenty-year discontinuation of deliveries from Britain of the most simple items such as nails, hoes, or material. The result was very advantageous for the USA, for there began under conditions of quarantine an amazing process of innovation which was no longer at the mercy of the paralyzing influence of higher and more modern quality English products at lower prices than the American substitutes.

Now that we have presented our theoretical restrictions with regard to trade as well as know-how technology transfer, there remains the large third category of transfer; that is, of basic knowledge. Here transfer restrictions must be put aside. Laws of aerodynamics, the law of gravity, the

⁵ Word-creation by Al Imfeld, Gottlieb-Duttweiler-Institut, Rüslikon.

⁶ H. A. Havemann, *Technologie-Transfer in Entwicklungsländer* (technology transfer into developing countries), *Der Versuch einer Strukturierung mit besonderer Berücksichtigung Lateinamerikas*, in: *Zeitschrift für Lateinamerika*, 7/1975.

⁷ UNIDO, *Technologies from Developing Countries*, ACE/T No. 1, No. 2, No. 3, Dec. 1974/March 1975/Nov. 1975.

⁸ B. and P. Mettler, *Entwicklungstendenzen aus französischer Sicht* (development trends from the French point of view), in: *WIRTSCHAFTSDIENST*, No. 7/1976.

origin of the winds, the outline of the precepts of metamorphosis, in short the fundamental knowledge as the basis for application is valid there just as here and everywhere. Since it is principally "free" at everyone's disposal, its attainment is limited only to the cost of obtaining the information and of course the "cost of understanding".

The Reality

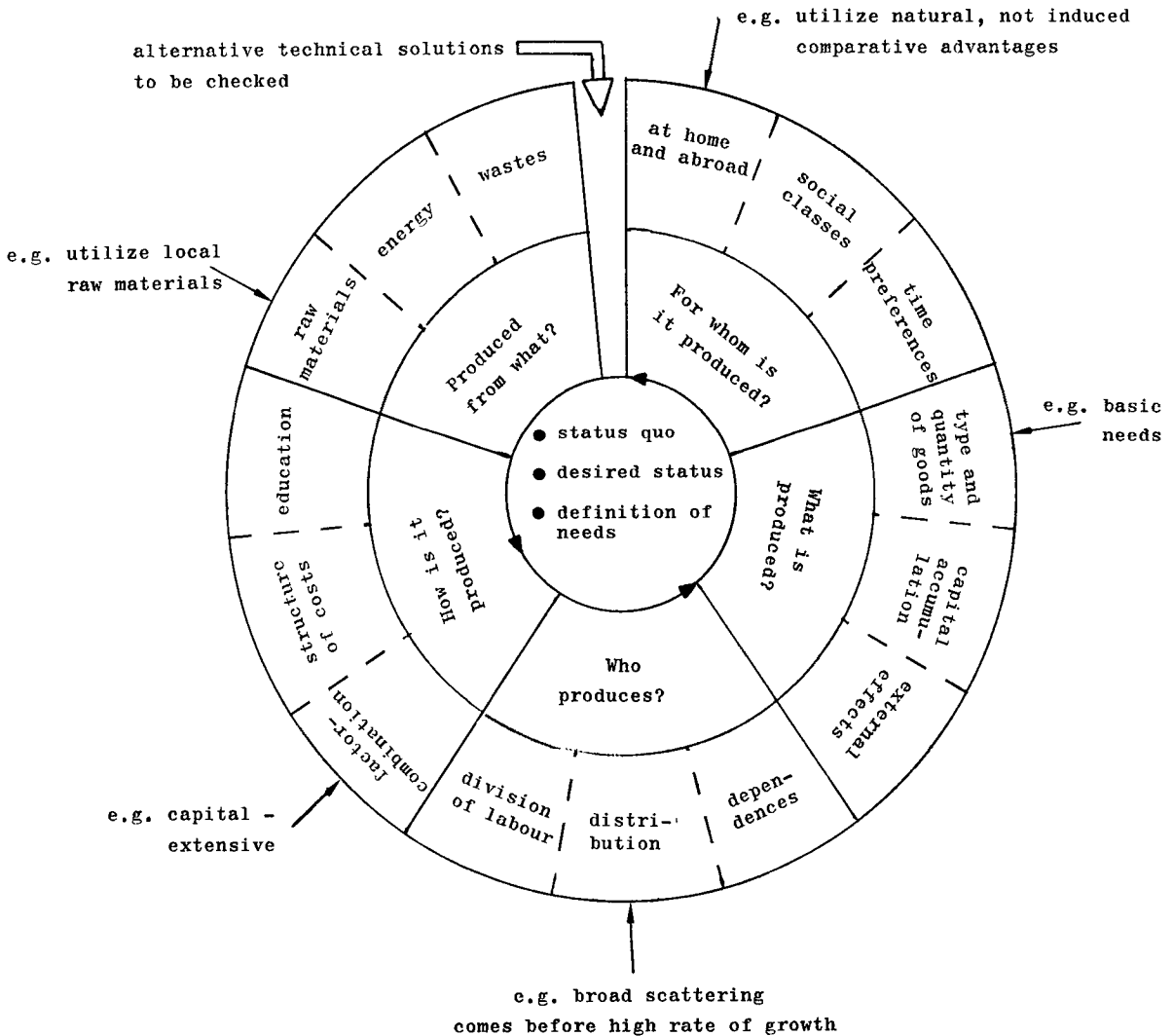
What does everything said above actually mean for technology transfer? Realistically one must assume that the major part of technology transfer will continue to take place on the basis of private business by concerns which operate at their own expense, at their own risk and corresponding profit or loss. One must further proceed from the fact that most of the ruling elite in poor countries

will continue to demand modern, foreign technology in the future in spite of the fact that 30 years of such demands have led to hardly any process of development; often the contrary has been the case.

As an economist, one would have to ask oneself why business does not see the obvious marketing opportunities in the Third World for AT and take advantage of them by corresponding bids? There are many reasons for this. The easiest way would be to offer one standard solution to all. Moreover, large series cut average costs. In addition – as a 1976 Harvard study shows⁹ – multinational corporations have little inclination to adapt established products to special conditions of poor

⁹ U.S. Government Printing Office, Proposal for a Program in Appropriate Technology, Transmitted by the Agency for International Development, 94th Congress, 2nd Session, Washington 1976

A Model of Technology Evaluation



countries, for they have a tendency to create products for higher income classes while a simplification and making cheaper of modern products for lower income classes is obviously of less interest to them. This has to do with the fact that our industry desires and has to protect its development with patents. "Simpler" things are hardly patentable. Thus industry develops more complicated things, subjects them, if possible, internationally, to patent protection, thus curbing the activities of the desired innovation centres in developing countries and creating new dependence. Since our industry is dependent upon as much "added value" and profit as possible, the development of simpler techniques in smaller series (because intended for localities) at lowest costs (because villages are poor) brings naught. The level and structure of costs of our industries would make even the cheapest techniques much too expensive in comparison with production in the developing country.

Now we should be delighted over all these circumstances that should prevent the development and export of AT by the industrialized countries, since we claim that the research and development should take place in the developing country. There remains, however, the beauty-flaw of the broad transfer of modern, expensive technology which no "code of conduct" will be able to change. If developing countries seriously want to protect themselves from this, they themselves must build up a technology import filter as fine or as coarse as their strategical and technological needs dictate. This import filter could – simplified – pose five main questions with reference to three variables which are each to be further described normatively. The earlier defining-description of AT serves as a guide for the normative description of the variables.

It thus becomes particularly clear that the determination or choice of a specific proper technology can only be undertaken under consideration of numerous questions pertaining to development strategy. The developing countries have not only to pose these questions but they must also give the answers. And the role of the industrialized countries?

The Challenge

They must understand that technology transfer is within itself a secondary matter. Of prime importance is the development of technology at the site of the problems themselves. The postulate cannot be formulated as "overcoming technological gap" but rather "reduction of technological dependence"¹⁰. Problems can be solved in tech-

nically quite differentiated ways – from simple to very complicated – and our "drawer-technology" is only in the rarest cases the best solution. Furthermore industrialized countries must understand that adaptation of technology to norms other than technical and productivity-oriented norms has become an important matter itself. The technological research in the industrialized countries – 98 % of world research involving US \$ 60 bn per year – serves primarily four goals: productivity and replacement of man, fame, profit and security. The real problems, however, are the ecological situation of the world and the economic poverty of the majority of human beings. Reason enough to turn the existing hierarchy of research priorities upside down¹¹.

As pertains to the Third World, the industrialized countries would have to decrease their technological offensive, a measure to which they would be forced by the developing countries by means of their import filters. Thus the way towards independent solutions in the Third World would be made freer. Yet cooperation with industrialized countries would be altogether feasible and in part indispensable: In the realm of basic knowledge on the one hand and in applied R & D on the other hand, as long as the industrialized countries are prepared to take the expression of the needs of their partners seriously instead of forcing solutions upon them. This requires the insight that not every technological process of renewal must occur on an industrial basis. In 1900 80 % of all the patents in the USA were given to individual inventors, and in 1957 the figure was still 40 %. Here the state should play the role of pacemaker with its development services by supporting such initiative. It could include interested industry in such joint ventures of innovation by mapping out duties on the one hand (coercion to alternative solution) and financial aid on the other (decrease of market risk).

The best way towards an allround thriving development of technology would indeed be the exemplary effort of the industrialized countries with more simple, more human and ecologically appropriate technologies, for the well known effect of demonstration is always impressive whether for highly complex or for more simple technology. Only then will also the transfer of technology from South to North be able to enrich us in a fascinating manner.

¹⁰ See also K. W. Menck, *Der Technologietransfer nach den Entwicklungsländern (technology transfer into developing countries). Grundlegende Konzeptionen und Lösungsansätze*, in: *Internationale Entwicklung*, ÖFSE, 1978/II.

¹¹ K. Marsden suggests in: *Progressive Technologies for Developing Countries*, in: *Essays and Employment*, Geneva 1971, that a portion of the global aid-money be diverted into R & D for Appropriate Technology.