quality, adaptability to local conditions and price. It is perhaps a symptom of our time that Brazil, a country particularly generous to foreign investors, insists upon detailed screening—case by case—of the know-how purchases.

One may state without exaggeration that the country offering inspiration these days to the developing world in this respect is Japan that had long ago developed the art of choosing and buying foreign technology from alternative sources and at low prices. This does not mean that the developing countries lack awareness that Japanese policies and practices cannot be imitated elsewhere. Their aim is not to create obstacles to foreign investment and concentrate exclusively on the purchases of know-how, but to unravel—for negotiation purposes—the traditional package: foreign capital-technology-management.

There is no basis for a belief that the developing countries will abandon their present efforts to diminish the degree of technological dependence and to cut down the costs of imported know-how. What should be expected instead is an increase in the number of countries that will follow the road taken by Argentina, Brazil and India. Most probably, the main thrust of new policies will be directed towards elimination of all sorts of restrictive business practices that accompany the sales of technology under licensing agreements between foreign technology owners and domestic manufacturing firms. The main argument of the developing countries is that these practices, frequently embodied in licensing contracts, are not only illegal in the industrial countries themselves, but offer insurmountable obstacles to the entry of the semi-developed nations into world trade in manufactures.

It would be very useful to the technology exporting countries to take note of the described changes in the attitude of many less developed nations towards the problems of science and technology transfer. Otherwise, serious and unnecessary conflicts may arise between both groups that would not serve the best interests of the parties concerned. In this particular field there is a great need for mutual understanding and for keeping all channels of communication open. It is an encouraging sign that World Intellectual Property Organization (WIPO), that represents a meeting place for technology producing and purchasing countries, shows growing awareness of the issues involved.

The Concept of Appropriate Technology

by Dr Karl-Wolfgang Menck, Hamburg *

At the end of the second development decade the industrial countries’ technical aid is in the centre of severe criticism:

☐ to some of the LDCs it has made technologies available that they were unable to apply because the necessary qualifications were missing;

☐ to most LDCs technical aid has brought capital-intensive methods that ran contrary to the widespread under-employment;

☐ finally, for many receiving countries technical aid proved too costly because the methods made available to them necessitated imports from the industrial countries. For this purpose the LDCs have had to expend part of their already scarce foreign exchange.

In view of these reproaches, at least partly justified as they are, the concept of the technology transfer evolved. Particular methods and skills specifically geared on the aims and requirements of the receiving countries were to be made available to the receiving countries as appropriate or intermediate technology. In this connection appropriate or intermediate technologies are technical methods in the widest sense which have yet to be discovered and provided for the countries of the Third World.

The development of appropriate technologies is possible either by down-grading technical methods of the industrial countries according to the receiving countries’ aims and conditions or up-grading the methods known to, and applied in, receiving countries by way of supplementing them with technical capabilities of the industrial countries. Partly methods and techniques so far only held on the record are being practically applied again. It is in any case important that ap-
appropriate technologies are not "white elephants". Methods no longer remunerative or competitive in industrial countries should therefore not be exported to the LDCs. There have in the past been ample examples for this misunderstanding: the export of outdated German textile machines to countries of the Third World is no constructive contribution in the sense of development policy; such sort of equipment is labour-intensive but at the same time also prone to frequent and extensive repair. The supply of spare parts takes a long time and requires heavy foreign exchange expenditure. This sort of thing therefore helps the receiving country precious little.

It still remains to be clarified whether in individual cases certain raw materials should, when applying the principle of appropriate technology, in the receiving country be replaced by other more readily available materials. Experiments, such as using timber constructions instead of metal ones, have so far not resulted in cost saving unless people were willing to reduce simultaneously the life-span and operational quality of the installation. From experiences of this nature, A. Banjo of the Economic Commission for Africa was among those who deduced that the utilisation of materials locally available in the LDCs, but mostly no longer used in the industrial countries, would have to be in concurrence with the development of new techniques for any specific purpose. In this field, the know-how of industrial countries may well play a vital role in the shape of experiences already gained, although the experiences in themselves are not what is meant by appropriate technologies.

Labour-intensive Technologies

Apart from technical characteristics, appropriate technologies are determined by additional economic criteria which were also set out authoritatively during the discussion on technical aid. All measures of this technology are, for instance, to be as labour-intensive as possible in order to lessen underemployment in the LDCs. The industrial countries have recognised and accepted this intention of the LDCs in their endeavours towards an appropriate technology. But for the present, labour-intensive technologies pay homage only to the aim of lessening underemployment. But in spite of the nominally great differences between wages in industrial countries and those in the LDCs they have not in all cases contributed towards an increase of exports which, on the other hand, many LDCs strive at no less intensively.

The Criterion of Export Intensity

Mostly, the foreign exchange requirements have, as a result of labour-intensive appropriate technologies, been reduced only by means of tariff walls in order simultaneously with the measures of appropriate technologies to protect the goods produced under these measures. One has, however, not always succeeded in shifting the demand onto the domestic production and creating the necessary markets for the new manufacturing methods. As the experiences of the Kumasi University in Ghana have taught, one of the reasons may well be that labour-intensive finishing methods in the textile industry, metal working and in the timber industry can simply not compete with mass-produced cheap articles imported from various industrial countries. Against these goods, the quantities manufactured according to LDC home-technologies are too insignificant for satisfying the total demand. Mostly also the prices are higher, and the qualities lower, than those of imported merchandise. Local manufacture and end-assembly are moreover in no position to solve the LDC's big problem of spare-parts and thus fully to eliminate their dependence on imports even though domestic finishing processes are initially job-creating and the assembly, contrary to the finishing, is less knowledge-demanding and therefore more geared to the criteria of appropriate technology.

Even the distinctly labour-intensive manufacture of electrical appliances and radio sets helps domestic sales rather than the export to world markets. In the latter, the companies applying appropriate technology meet with difficulties in asserting themselves against cheap mass products in spite of many protectionist measures.

1 See H. Dickinson's contribution to the discussion on Development and Dissemination of Appropriate Technologies in Rural Areas at the Meeting in Kumasi (Ghana), July 17 to 28, 1972.
2 See K. H. Soh n, Entwicklungs- und Praxis der Deutschen Entwicklungshilfe (Development Policy, Theor- 
3 See A. Banjo's contribution to the discussion on Development and Dissemination of Appropriate Technologies in Rural Areas at the Meeting in Kumasi (Ghana), July 17 to 28, 1972.
7 See Results of the Conference of Appropriate Technologies for Development Countries, Berlin, October 4-6, 1971, and the Conference on Development and Dissemination of Appropriate Technologies in Rural Areas, Kumasi (Ghana), July 17-18, 1972.