

workers with no prior industrial training or experience and technologies to produce goods that are less specialized, simpler to use, and more versatile than similar products made in the industrialized nations.”

Negotiation on technology imports. “. . . The U.S. should sponsor workshops to develop negotiating skills. Such workshops are currently offered at Georgetown University and Harvard University, for example. The UN also sponsors such programs . . . It might be desirable to hold some of these workshops directly under the auspices of an international organization such as the World Bank or UN agency. . . . Technology transfers may have negative impacts on the United States as a whole or on certain geographical regions, economical sectors and income groups.”

Health. “We propose that the United States encourage expanded international support for efforts to

demonstrate effective approaches to providing these services widely and at low cost . . . would emphasize preventative services (including nutrition, family planning, and environmental sanitation), relatively simple technology, and extensive use of community health workers and other paraprofessionals, along with intensified training for physicians in delivery of primary health services. Many small-scale programs along these lines have worked well, but with such notable exceptions as those in the People’s Republic of China and Cuba, few have been effective on a large scale.

“Given the nature of the needs in the fields of health, nutrition, and population, the initiatives recommended are somewhat more concerned with ‘soft technology’ (methods of management, organization, education, information, research, and evaluation) than with equipment. We suggest the need to develop new technologies, but, in general, we are more concerned with adapting and transferring existing technologies”

2. Why appropriate technology can’t work

One of the most authoritative voices against environmentalism in general and appropriate technology in particular is that of the Fusion Energy Foundation, a nonprofit organization devoted to the encouragement of the most advanced technologies. The August 1978 issue of the Foundation’s journal, Fusion, carried a statement on appropriate technology and its antidote, titled “World Development Requires the Most Advanced Technologies,” portions of which we excerpt here:

The primary goal of development is to increase the standard of living and educational level of the population. The only possible way of increasing per capita consumption is to increase per capita production — the productivity of labor. In turn, the productivity of labor can be increased only by the application of new technologies that substitute inanimate energy and machinery for human labor. By increasing productivity, such new technology increases the standard of living directly. At the same time, by reducing the time the society as a whole must work to maintain the current level of consumption and the existing means of production, increased productivity generates a surplus that is available for expanding the economy as a whole. The combination of increased consumption levels and increased leisure time available for education makes possible the production of a more highly skilled workforce, which, in turn, allows the implementation of still more productive technologies, continuing the cycle of growth and development. Such is the process by which the most developed economies

in the advanced and the developing sectors actually achieved their current success.

From this description of the goals and methods of development, it follows that the criterion for development strategy is the maximization of the rate of development. Our aim must be to maximize the rate of increase of labor power or productivity, and thus the rate of increase of the overall social surplus.

From these very elementary considerations it can be seen that the strategy of appropriate technologies is not one that encourages development. The very basis of this approach is to maximize the labor intensiveness of the technologies employed in the developing countries; in other words, to minimize labor productivity. By attacking the very motive force of development — increases in labor productivity — Such a strategy necessarily preserves existing backwardness

The failure of appropriate technology

What, in fact, will be the consequences of widespread implementation of a policy of labor-intensive development? What is proposed is the mere extension of the present low levels of productivity to a wider proportion of the existing population—an increase in the intensiveness of labor by the population as a whole. At the very best such a process can result in only very modest increases in production in proportion to the additional labor employed, increases barely sufficient to cover the increased consumption necessitated by productive output. No added surplus is generated, and thus no basis for continued growth produced. In fact,

the real situation is considerably worse, since any fixed level of technology tends to exhaust the resources available to it. For example, existing supplies of low-technology fuels such as firewood are already nearing exhaustion. Such limitations rapidly force upwards the cost of a fixed technology, leading to increasingly rapid declines in overall productivity and, therefore, in the standard of living. We conclude that even very modest "basic needs" cannot be met by the use of low-productivity technology for any length of time. Furthermore, the extension of labor time at current wholly inadequate levels of productivity and consumption must lead to the actual destruction of present labor power on a large scale.

How, then, can such a policy appear to be economical in terms of the low cost of labor? It is clear that this argument is premised on the preservation of the very conditions of misery that development aims to alleviate. Only if the cost of labor is calculated at the present grossly depressed wage levels can labor-intensive methods compete with more productive, capital-intensive ones. But precisely these grossly depressed levels are the principal hindrance to development. By the accurate measure of the resulting growth rate, capital-intensive methods are far more economically effective than labor-intensive ones.

In other words, appropriate technologies are only appropriate to the existing level of backwardness; they are wholly inappropriate to the task of development....

Capital-intensive development

Capital-intensive development is premised today on two interrelated policies. First, to provide the energy supplies necessary to sustain development, we must accelerate the implementation of existing nuclear energy technologies and put the development of the breeder and of thermonuclear fusion on a priority basis. Second, in the developing sector regionwide centers of industrial development must be created to act as the focus for high-technology industrialization.

It is clear that without the development of nuclear energy, insufficient resources exist to power capital-intensive development for any length of time. However, existing fission technologies can sufficiently expand and supplement energy supplies to ensure adequate energy growth for the next decade and a half. By the end of that period, liquid metal breeders and fission-fusion hybrid reactors must be on-line, and controlled thermonuclear fusion reactors could begin to be introduced, assuring a virtually unlimited supply of cheap energy for the future. An international program to develop fusion power within the next decade, a technically feasible objective, therefore, is a necessary aspect of any sound development strategy.

In the developing sector itself, capital-intensive

industry must be introduced by a concentric-circles process that upgrades the entire workforce. The core of such a process will be regional industrial centers, using combinations of nuclear and fossil fuel and hydroelectric energy to drive advanced-technology heavy industry (for example, primary processing industries). These centers will utilize the available skilled workforces in parts of the developing sector. Surrounding these centers will be secondary centers of light industry, more closely linked to rural areas (such as food processing). Around these secondary urban hubs, in turn, must be regions of advanced agricultural development.

In this manner, a relatively low-skilled population can be progressively drawn into industries requiring a higher and higher level of skill. While each industry maintains the highest possible level of productivity and capital intensiveness, the combination of industries of relatively lower and higher skill levels provides the basis for a continuous upgrading of the total population.

The combination of nuclear energy development and regional industrialization can provide the basis for rapid rates of development in the developing sector, as similar policies led to the industrialization of the advanced sector. It should be noted that such a policy is ideally and uniquely suited to reenergize the currently depressed industries of the advanced sector (such as steel) and to generally achieve a high rate of exports from this sector to the lesser developed countries.

Appropriate financing

Capital-intensive development is not only technically practical but also financially practical. The objection that large-scale importation of capital is impossible is based on the assumption of the current high-interest, short-term financing. Since capital-intensive development, although relatively rapid, begins to pay for itself only over a period of 15 to 20 years, such short-term financing precludes large-scale capital imports. If such financing is assumed, then indeed only technologies involving few imports — in other words, labor-intensive — are possible.

In fact, this is the real reasoning behind the appropriate technologies strategy — such technologies are those appropriate to existing financing schemes! Indeed, it was only in the early 1970s, when interest rates on loans to lesser developed countries rose rapidly and payment terms shortened, that the idea of appropriate technologies received widespread attention. However, if the primary aim is *rapid development*, then it is necessary to create *appropriate financing* — the provision of very long-term, very low-interest loans and credit arrangements that are suitable to capital-intensive development.