

A. S. Bhalla and Dilmus James (eds.), *New Technologies and Development*, Boulder: Lynne Reinner Publishers, 1988.

The major issue addressed by this book is whether new technologies (e.g., electronics, satellite communications, etc.) can be "blended" with older technologies in such a way as to meet "basic needs" of poor populations in the less-developed countries. In particular, the question is whether these new technologies can be applied in traditional activities, by small-scale producers, to produce and deliver basic needs, types of goods and services (e.g., medical care, food, shelter).

The book is a sequel to an earlier effort which presented case studies of "blending" with the hope of assisting government agencies in less-developed countries to adapt the new technologies to the needs of their poor. According to the editors, this book differs from the earlier one in that it presents a wider range of cases, and it places more emphasis on adaptation to small-scale activities.

"Technology blending" seems to be a new buzzphrase, displacing the no-longer-trendy phrase "appropriate technology." It is now recognized that developing countries need not be restricted to using local materials and traditional techniques; that indeed television distributed by satellite might well be "appropriate" for a developing country, even though no one in the country can build or launch a satellite.

The new concern is that these "frontier" technologies may adversely impact the poor, especially the rural poor (2). The editors tell us that if these technologies are labor displacing, "they may aggravate the already acute unemployment problem." In the very next sentence, however, the editors warn us that "at current factor prices in developing countries, these technologies may not always be economically feasible compared to alternatives that may be available." In short, if these technologies are cheaper than labor, they may make unemployment worse; if they're more expensive than labor, they won't be used at all. One has to ask, What is so profound about this observation, which after all is simple economics?

In addition, the editors warn us that these technologies may increase the dependence of rural sectors on urban industry. Which is to say, they may cause farmers to become customers of their

nation's growing industrial sector. One has to ask, What's wrong with that?

We have several decades of experience to show that Third World peasants can successfully adapt new technology to their daily lives. For instance, I can recall seeing, in the early 1960s, rice farmers in Thailand plowing their fields, one hand holding the reins of the water buffalo, the other hand holding a transistor radio to one ear. Nevertheless, the idea that peasants cannot adapt to new technology is still widely held. One would have thought that the successful use of Stinger missiles by Afghan *Mujahedin* would have been the final nail in the coffin of this idea. However, like Dracula, the idea seems to rise from the grave regularly. This book is just one more such resurrection.

Regardless of the editors' ideas about technology, the case studies are the real meat of the book. What can one learn from them? They cover a wide range of technologies and settings, including lasers for land leveling, Computer Aided Design and Computerized Numerical Control (CAD/CNC), photovoltaic electric sources, remote sensing, and microcomputers in schools.

The case studies are actually quite good. They carry little or none of the ideological freight of the book as a whole.

The case study on CNC (actually written by one of the editors) illustrates this point. It provides a detailed look at the introduction of these technologies into several nations (Brazil, Hong Kong, Singapore, Italy). While the presentation is largely anecdotal and qualitative, it does go into some depth, and presents comparisons and contrasts among the different nations. It provides an explanation of how the technologies have been used, and what their effects have been.

The study of automation in the French footwear industry is, by contrast, highly quantitative. Here the reader will find not only a detailed description of production practices, but hard data on relative costs of various alternatives.

The study of photovoltaic (PV) electricity generation is likewise a very quantitative study. The author has collected information from a wide range of sources regarding actual applications of PV in areas where an electric grid has not yet been established. These include irrigation pumping, refrigeration, lighting for health centers and

similar activities in remote areas, street lighting, and powering of telecommunications relay stations. Moreover, the study includes considerable analysis of the relative costs of alternatives (PV, diesel, biogas, wind, animal, human, etc.). As might be expected, PV has found acceptance in areas where other sources of electricity are either not available or are more expensive. Moreover, it has fitted in well in peasant villages.

Yet another quantitative study is that of laser leveling for grading of agricultural fields and construction sites. This looks not only at the direct labor cost eliminated by use of laser leveling, but the return from reduced water consumption and increased productivity of farms leveled with this technology. Only brief mention is made, however, of the training of operators, and nothing is said about the prior skills of the operators.

It is impossible to describe each of the book's cases in this review. Suffice it to say that the remainder share the high quality of those described above. Many are full of quantitative data; the rest, although anecdotal, still describe not only the technology application but the context in which the technology was introduced.

Despite the substantive nature of the case studies, we still need to ask, Why is "blending" alleged to be a problem? That is, why the need for this book, and the studies behind it? The opening chapter presents an answer. There is, we are told, a difference between "traditional" and "industrial" sectors of an economy. In the traditional sector, there is some flexibility in the mixture of labor and capital which can be used for a particular operation. Labor can readily be substituted for capital, and vice versa, without disrupting anything. For instance, one can hire some ditch-diggers, as well as use a trenching machine. In the industrial sector, by the nature of modern technology, labor-capital ratios are fixed. There is no flexibility.

This idea of "labor intensive" vs. "capital intensive" production is yet one more which won't die, despite being refuted numerous times. Milton Friedman relates a case of English cloth-making machines introduced into Japan. The British warned their Japanese customers not to run the machines above a certain speed. Above that speed, the threads broke frequently, and the machines would have to be stopped while the operators tied the threads, increasing the costs of

production. The Japanese promptly disobeyed the injunction of the British. They ran the machines all-out. Of course the threads broke. The Japanese maintained a crew of workers who (somewhat like a race-driver's pit crew) stood around doing nothing until a thread broke. They then promptly tied it and got the machine running again. The point is a simple one. In England, capital was cheap and labor expensive. It made sense to run the machines slowly, reducing the return on capital, to avoid using expensive labor. In Japan, capital was expensive and labor cheap. It made sense to get as much return on the capital as possible, even if this meant incurring some labor costs. This example shows that even with advanced technology, there is still some degree of flexibility with regard to mixing capital and labor.

The ultimate reason for the book can be found, I believe, in the fact that many of the contributors are bureaucrats of one kind or another, and many of the rest are consultants or academics who make their living doing studies for government agencies. They simply do not trust the market to function, nor do they trust peasants to recognize their own best interests. The contributors are convinced that only under the control of a wise and paternalistic bureaucracy can new technology safely be introduced into Third World countries.

Despite this mindset, the case studies do show many examples of the successful "blending" of technology, purely through market operations. For instance, the study of the introduction of CAD/CNC into the clothing industry in Hong Kong shows that this technology had the effects of upgrading the skills of the workers, of allowing small enterprises to produce small batches at costs competitive with large-scale firms, and of reducing the inventories of these enterprises. No government intervention was needed to achieve these gains, and no unemployment resulted from the new technology.

In summary, if you want to see how several modern technologies have been introduced into non-technological cultures, this book is a good source of information. However, it would be best to take with a grain of salt the contributors' concerns about the need for careful control of the "blending" process.

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