News and Comment

New Research Programs: Help for Underdeveloped Nations . . . and for Underdeveloped Industry At Home

The foreign aid budget this year contains, for the first time, a substantial amount of money for research. The aid agency's new research office recently let its first two contracts—to the University of Wisconsin for studies in land reform programs, and to a consortium made up of M.I.T., the Stanford Research Institute, and General Electric for studies aimed at producing power supplies especially adapted to the needs of villages in the underdeveloped lands.

What is most remarkable in this is simply that it was not done sooner. We have been spending several billions a year on foreign aid for 15 years now. For the first few years the money was going almost entirely to Western Europe, under the Marshall Plan. The effort there was to rebuild what had been destroyed during the war, rather than to build entirely new social and economic systems; the problems of planning and technology were much the sort that both the United States and the recipient countries were accustomed to dealing with; the whole program was carried out in an impressively short time: by 1952, 5 years after the program was begun, its work was essentially complete.

For the past decade, though, our economic aid has been increasingly aimed at the underdeveloped countries. The development of the new countries cannot be carried out with anything like the speed of the Marshall Plan, nor as we have increasingly recognized, can our role be simply one of supplying the captial or attempting a direct transfer of modern technology to the new countries. This was bound to lead, sooner or later, to an awareness of the need for some reasonably substantial program to see how our money could be used more effectively, but the awareness has been slow in coming.

A good deal of relevant work has been done by the universities and foundations and by various government agencies, such as the Agriculture Department; a good deal has been learned from the results, or lack of results, the program was producing in one country or another. But until this year the aid agency itself had no research budget and not even explicit authority to sponsor research when an especially attractive proposal came up, although it did so on a few occasions at the very end of the Eisenhower Administration, after the President's Science Advisory Committee had taken it upon itself to encourage this sort of venture. But progress was slow in coming, and slow in taking hold. One reason for this was simply that the State Department had never sponsored any significant amount of research; the first such effort was in the new Disarmament Agency, organized only a few months before the research program was set up in the aid agency. If you have never done something, it is always easier to continue to not do it, at least until a gross need becomes apparent, or until a new Administration comes in that is determined, almost on principle, to do things differently. In this case both pressures came at once. The new Administration brought with it a great gusto for change, which might have been enough, by itself, to produce the new office. On top of this, the kinds of changes the new Administration put through, generally, in the foreign aid program accentuated the need for a research program. One change was the attempt to put the program planning on a long-term basis, and research is a natural component of any long-term planning. Another was the idea of tying American aid to a commitment by the recipient countries to programs of broad economic and social reform. If American economic aid was to go almost entirely for building highways or dams or hospitals, it was possible to apply American technology directly to the aid program. Since we have emphasized the need for such things as mass literacy programs and land reforms, there is obvious usefulness in a research program to teach ourselves something about how these things can be accomplished.

The aid agency plans to let contracts totaling about $6 million in the current fiscal year, under the authority to sponsor research granted to it as part of the new foreign aid legislation passed last year. It hopes to get congressional approval to make commitments for at least $20 million more during fiscal 1963, beginning this July. This is a respectable amount of money, but modest enough considering either the multibillion annual cost of the total program or the great possibilities for useful work in this high-priority area. We are really just beginning to learn how to handle, in a reasonably effective way, the business of encouraging the development of the underdeveloped countries.

The currently planned or already funded projects include some that are very general: studies, for example, of the relation of political to economic development or of the problems involved in constructing the long-range plans we are asking the recipient countries to develop. Some have to do with what are really administrative problems within the agency; getting satisfactory personnel has always been a problem, for example, and perhaps the problem can be lessened, at least a bit, by formal studies to see what kind of people have turned out to be effective, and from this, what kind of criteria or tests can be used to weed out unsuitable applicants.

Another group of projects will be the social and legal and economic studies designed to learn something about how to go about such things as the land reform and tax reform programs we are asking the recipient countries, particularly in Latin America, to carry out. A striking problem, here, is that land reform has usually been accompanied by at least a short-term but sometimes sharp decline in production. What can be done to minimize this demoralizing effect?

Finally, there are the strictly technical projects: what kinds of teaching techniques are best for countries in which few people are qualified to teach, and indeed in which a large part of the population is illiterate? A few

months ago a textbook of psychology was published which was a printed version of the program of a teaching machine: a machineless teaching machine. (The book was described in an editorial in *Science*, 25 Aug. 1961.) Perhaps it is possible to develop a book that could teach illiterates how to read, using pictures, with little help from a literate teacher.

Or on the problem of village power supply, for which one of the first two contracts was let: Is it best, for example, to try to supply a sealed unit that will run for several years without maintenance, or should you use a cheaper unit but one that requires that someone in the village be trained in its maintenance?

What new crops can be adapted for cultivation in countries that are now subject to the instability of the one-crop economy?

What are the possibilities in the various areas for combining locally available materials with other products, such as plastics, to produce cheap construction materials? There is an acute building shortage in most of the underdeveloped countries.

All of this is the sort of work that waits to be done on the problems of the underdeveloped countries. A good deal of it is about as unglamorous as it can well be: work that is deliberately not in the forefront of modern technology but in the backwaters; attempts not so much to advance technology as to scale it down to a point where it is most usable in lands which have neither the trained people nor the capital to make the direct transfer of the latest technical developments the most useful kind of aid.

Underdevelopment at Home

Here at home, meanwhile, the problems of our own underdeveloped industries are also beginning to get a good deal of attention. Shortly after the new Administration took office, two of the President's Cambridge friends and advisers, Jerome Wiesner and John Kenneth Galbraith, suggested that the government could be a great deal more effective than it has been in stimulating the development of civilian technology, and so stimulating the economic growth on which the Administration has put so much emphasis. A White House panel was set up with staff support from the Council of Economic Advisers, the President's Science Advisory Committee, and the Commerce Department. It has been looking particularly at the situation in industries such as transportation, textiles, and construction, where productivity advances have been lagging far behind the rest of the economy, and at the problem of trying to see that more benefit from the defense and space research efforts, by themselves more than half the research and development investment of the nation, filter through to the civilian economy.

One thing that is being sought is the most suitable way for the government to organize research institutes in cooperation with business interests to push technical development in industries where the individual firms are too small or too financially insecure to mount substantial research programs. In the area of seeking greater civilian application of defense research there is the possibility that exchange programs between defense and civilian industries could be developed, with engineers and scientists spending an occasional year working on the other side of the fence; hopefully, this would lead to the desired greater spillover of the defense-developed technology into civilian applications. The problem here has been that as we have gotten into the missile and space period, defense research has come to have less direct relevance to civilian uses, and, on top of this, an increasing share of the defense work has been done by highly specialized firms with little experience or interest in civilian products. An exchange program could help alleviate this, by putting product-minded men from civilian industry where they would be working with the advanced technologies developed in space and defense research, or conversely, by putting men with a solid background in the new and specialized technologies to work on civilian product research. For as the civilian and defense technologies have grown apart it has become difficult merely to translate data from one to the other; we require, too, the transfer of insights that are hard to communicate except through working on related projects in the two areas.

A third example of something that might be done is in the area of housing, an enormous industry with a great many potentialities for innovation which have not yet been realized, in part because of the reluctance of mortgage lenders to finance home construction in which radical techniques are utilized—use of the new super-strength glues instead of nails, for example. But the Defense Department is a huge buyer of housing, does not have to worry about mortgages, and so might well both encourage innovation and save itself a considerable amount of money by doing so. The White House Panel on Civilian Technology is expected to produce a report on some of these matters within a few weeks.

Partly as a result of thinking along these lines, the man appointed to the newly created post of Assistant Secretary of Commerce for Science and Technology, J. Herbert Holloman, is expected, indeed was selected, to turn his post into something quite different from what was being thought of when the Eisenhower Administration first asked Congress to create the post in 1960. The principal objective then was to have a top-level, scientifically trained administrator to watch over the substantial Commerce Department research programs. (The Commerce Department includes the Bureau of Standards and the Weather Bureau, plus several other bureaus engaged in research—a $100-million-a-year operation.)

Congress got around to passing the bill authorizing the post early this year, and Holloman was appointed only a couple of months ago. But he apparently intends to spend as little of his time as possible overseeing the administration of the existing Commerce Department research programs, and as much as possible working in this new, or newly emphasized, area of stimulating the development of civilian technology.

The expanding research in both the areas described here, for the aid program and for civilian technology, has the incidental effect of drawing attention once again to the problem of scientific and engineering manpower. There is a limit to what can be done with a limited pool of trained talent. As has been frequently noted, there is plenty of money available for graduate education. An engineer or scientist coming out of college with a good record has the problem not of getting a government-financed fellowship but of deciding which of the many available he would like to take. Sooner or later, we can assume, Congress will authorize a commensurate effort to increase the supply of graduates for whom these fellowships are competing. But not, we can also assume, this year, although it is hard to see how the problem can be avoided too much longer.

—HOWARD MARGOLIS