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Engineering Services In a U.S. Foreign Assistance Program for the 1990s

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Engineering Services In a U.S. Foreign Assistance Program for the 1990s

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Role of Capital Projects

Capital projects—at one time a major and valued component of U.S. foreign aid—now account for a minuscule percentage of the U.S. foreign assistance program. While a variety of historical factors contributed to this decline, it is now clear that the pendulum has swung too far. Where appropriate, capital projects can both advance U.S. foreign assistance objectives and improve the competitive position of U.S. goods and services.

As we prepare to enter the last decade of the 20th century, it is particularly appropriate that the U.S. foreign assistance program should be appraised in the light of the historical record, the current situation, and the factors that seem likely to dominate the future of the United States and the world. The legislation, policies, and procedures that govern the operation of today's foreign assistance program, though revised periodically over the years, stem first from the Foreign Assistance Act of 1961, as amended, and second, from a set of economic and developmental assumptions not wholly suited to present and potential future world conditions.

From its inception, capital projects played a major role in the U.S. aid program for developing countries. Infrastructure, after all, was a precondition to economic growth in developing countries as it had been in the reconstruction and renewal of war-torn Europe and Japan.

Following World War II, throughout the 1950s and into the 1960s, the United States took the lead in international economic assistance and in the overall world economy. Within this framework, the U.S. Agency for International Development and its predecessor agencies developed lending and technical assistance programs that broke new conceptual and programmatic ground and extended U.S. assistance on a scale previously unimagined. Following the Marshall Plan, and attempting to emulate its successes, those responsible for U.S. foreign assistance gradually became aware that many of the preconditions facilitating reconstruction of Europe did not exist in the developing countries. Gradually, it was realized that a host of cultural, institutional, demographic, policy and other new constraints would have to be dealt with.

From its inception, capital projects played a major role in the U.S. aid program. Infrastructure, after all, was a precondition to economic growth in developing countries as it had been in the reconstruction and renewal of war-torn Europe and Japan. Road networks, power generation and supply, potable water, sanitation facilities, and water for irrigation were considered basic to socioeconomic development. Furthermore, capital projects constituted a relatively efficient way to transfer resources, and

were capable of management by U.S. engineers, whose technological capacity and managerial know-how were unequalled. It became increasingly evident, however, that attaining sustained economic growth was no easy task. While a number of countries progressed more favorably, such as Taiwan, South Korea, Singapore, Cyprus, Turkey and Brazil, their successes were often based on circumstances not easily duplicated in most developing countries.

Capital projects not only provided the infrastructure urgently needed, but also enabled a rapid infusion of capital into the LDCs, substantially increased local employment, and fostered the growth and development of the construction and associated industries.

During this period, many AID-financed engineering projects were successfully completed, and concurrently, thousands of engineers and technicians from developing countries were trained in the United States and returned to become the managerial and technical core upon which their countries have come increasingly to rely. These projects not only provided the infrastructure urgently needed, but also enabled a rapid infusion of capital into the LDCs, substantially increased local employment, and fostered the growth and development of the construction and associated industries.

While some of the infrastructure projects of the period did not achieve the results that had been anticipated, they comprised only a small portion of the total engineering effort. Unfortunately, the numerous successful projects have not been acclaimed, whereas failures have been pinpointed and have attracted critical attention often beyond that deserved.

Where there were failures, in many cases this resulted from inadequate economic analysis and program development. Often the effects of injecting a new technology into the complex natural and cultural systems of Third World nations were poorly understood. When project failures were observed, it was easier to reject the infrastructure project per se than it was to understand the interactions of the full set of program variables, which included U.S. policies and practices, as well as Third World cultural, socioeconomic, political, legal and environmental conditions.

These non-project variables only came to be appreciated at a later date, based on accumulated experience. These variables typically included constraints such as price policy (subsidization of poorly performing organizations and inadequate attention to making operations self-sustaining); lack of career patterns, incentives, and opportunities in LDC institutions to retain needed personnel; poor choices of technology; inadequate preparation of recipients to manage and operate projects (e.g., power plants, water treatment and wastewater plants, road

Aside from the very large AID programs—primarily in Egypt and Pakistan—infrastructure projects have become rare components of the AID program.

By abandoning capital projects and other modern technology-oriented programs, in countries where they are an appropriate form of development assistance, the United States has unwisely eliminated a balanced approach that could generate more returns for the United States, while also better serving the needs of the countries we are assisting.

systems), and many associated reasons, some of which were completely outside of the engineer's realm of responsibility as understood and practiced at that time. *(This has changed. Engineers, in their role as program managers and as primary consultants, are responsible for the broader aspects of the multidisciplinary and often multi-sectoral projects that have subsequently evolved.)*

Capital Projects and Basic Human Needs

For these and perhaps other reasons, a significant change occurred in AID, and there was a turning away from capital projects, which increased over time to the present point at which, aside from the very large AID programs—primarily in Egypt and Pakistan—infrastructure projects have become rare components of the AID program. While many countries where AID operates continued to require a variety of infrastructure projects, financing of these projects has passed to other organizations, e.g., the multilateral development banks, bilateral assistance and capital transfer (lending and grant) programs of Japan, Germany, France, Canada, and increasingly, the EEC. While those countries also finance some projects having a high Basic Human Needs (BHN) content, the ratio of BHN to capital projects in their foreign assistance programs is much lower than in the U.S. program.

Proponents of the BHN approach have by and large argued that capital projects have no part in the U.S. foreign assistance program, given the fact that the United States is a debtor nation that cannot afford "expensive" infrastructure projects. Infrastructure projects, they argue, should be the exclusive domain of the World Bank, regional development banks, and those countries who can afford to finance them. The proponents of capital projects make no similar claim that BHN projects should be eliminated from the U.S. program. What we do argue is that a balanced approach would enable the United States, with limited financing, to provide funding for many front-end studies with project implementation using follow-on financing furnished by the multilateral development banks.

We also argue that by abandoning capital projects and other modern technology-oriented programs, in countries where they are an appropriate form of development assistance, we have unwisely eliminated a balanced approach that could generate more returns for the United States, while also better serving the

needs of the countries we are assisting. The relationship between each country and the United States is unique and must be dealt with in each case based on that uniqueness. Development projects do not stand only on their individual merit, but constitute sectoral and country programs that, when fully and effectively integrated, have a synergistic effect. Nearly every country in which AID operates has identified, by its own means or with other external assistance, capital projects that have development potential. In many cases, experience shows, these projects have a high priority within the developing countries' investment portfolios. Moreover, there have been projects in which countries made it clear that a U.S. investment would be welcomed or even preferred.

Less than three percent of U.S. aid goes for capital projects, the lowest percentage among major donor countries.

Former U.S. Ambassador Ernest H. Preeg has drawn some comparisons among major donor countries' emphasis on capital projects as a component of their foreign assistance programs. He notes that ". . . there is a striking asymmetry among bilateral aid programs with respect to the relative role of capital projects." (3, p. 176) As shown in Table I, less than three percent of U.S. aid for bilateral projects in a number of major areas goes for capital projects, the lowest percentage among major donor countries.

Other major donors—who finance U.S. engineering companies' competitors in the international market—place a drastically different priority on capital project assistance than the United States does.

Table I makes it clear that other major donors—who finance U.S. engineering companies' competitors in the international market—place a drastically different priority on capital project assistance than the United States does. Japan, with respect to this reported official assistance alone, invests nearly eight times as much as the United States in dollar value in capital projects ($2.9 billion vs. $373 million), and nearly 20 times as much as a percentage of total assistance. Is our economic acumen so much greater than the Japanese that we can fail to learn from their example? Does our program, as U.S. opponents of capital projects argue, merely reflect a valid choice that the United States has made in molding its foreign assistance program along a non-capital projects line?

Table I Capital Projects as Percentage of Bilateral Assistance*

Japan	45.8
Denmark	33.0
Norway	22.5
Germany	20.8
U.K.	15.4
Canada	14.0
Sweden	13.3
France	13.0
USA	2.3

*Consessionally financed bilateral projects in energy, telecommunications, and transportation, 1985-86

Source: Ernest H. Preeg, "Trade, Aid and Capital Projects," *The Washington Quarterly*, Winter 1989, p. 176.

Supporting the Appropriate Technology

The term "appropriate technology" came into use largely because development assistance programs made people aware that the same technological package cannot be used indiscriminately regardless of the specific conditions to which it is to be applied.

An analysis of the effects of different levels of technology should be made, with no necessary predisposition to low technology (which in many cases implies high labor input) over high technology.

As indicated previously, each country development program is unique, and must be dealt with on that basis. This does not mean that higher technology must be excluded out of hand as being inappropriate in every developing country situation.

A more valid question is, "What role should higher technology have in the overall configuration of each country's development plan?" It is neither necessary nor desirable for each developing country to go through every intermediate step as it advances to higher technology levels. An analysis of the effects of different levels of technology should be made, with no necessary predisposition to low technology (which in many cases implies high labor input) over high technology. This analysis should identify ways countries can "leapfrog" over intermediate levels if a higher technology is more cost effective, shows promise of moving poor countries ahead more quickly, and there is no indication of serious negative side effects that cannot be ameliorated.

To match U.S. strengths and identified needs of developing countries obviously makes sense, and it is difficult to see how this would violate any developmental precepts.

The other major consideration for this assessment is to identify technology in which the United States has a clear lead or is at least highly competitive. To match U.S. strengths and identified needs of developing countries obviously makes sense, and it is difficult to see how this would violate any developmental precepts. This approach would have the further advantage of reducing the dominance of other countries in key fields, e.g., the Japanese targeting of telecommunications in Southeast Asia and the Pacific. Some areas in which the United States is strong that might be considered include industrial and hazardous waste treatment and disposal, System Control and Data Acquisition (SCADA), and operations and maintenance management.

Provision of Engineering Services in U.S. Foreign Assistance

AID reported 25 engineering contracts for FY 1987 totaling $131,814,792. This figure understates the actual comprehensive value of engineering effort.

Engineering contracts are a sizable, though not major component of the AID program. However, the percentage is small in comparison with the engineering program content of other major donors.

Engineering services are provided in several ways. Independent consulting engineers, as the name indicates, maintain no construction, commercial, or manufacturing affiliations which might bias their professional judgement. In most cases, services of these engineers (and architects) are obtained by Quality Based Selection (QBS) under the Brooks Law (P.L. 92-582). ACEC supports the comprehensive use of the Brooks Law, which maximizes selection of the best technical approach at a fair, negotiated price. Design/construct companies are a separate group that ordinarily perform all tasks from preliminary studies through completion of construction. They sometimes manufacture equipment or have proprietary processes (patents) to which they give preference in construction. A third approach is that of contractors, who build facilities and other infrastructure in accordance with designs prepared by engineers or architects.

Collectively, architects, engineers, contractors, constructors and surveyors, with associated crafts, labor personnel, and support staff constitute the U.S. construction industry, a major contributor to the U.S. economy. In 1987, according to a survey by *Engineering News Record (ENR)*, the top 60 U.S. design firms were awarded more than one billion dollars in contracts, while in the same period the top 40 U.S. contractors won $18.1 billion worth of foreign contracts.

ACEC at the present time does not have access to the data necessary to provide the total dollar volume of business its members have carried out for AID, either cumulatively or in current contract worth. However, a survey of AID's report of contracts in effect for FY 1987 shows 25 engineering contracts totaling $131,814,792 in effect for that period (2, passim). This figure understates the actual comprehensive value of engineering effort, however, for two major reasons. First, as AID projects have become more multidisciplinary over the years, some projects that have not been classified as engineering have nonetheless contained millions of dollars of engineering activity, e.g., the Water and Sanitation for Health Projects (WASH), Irrigation Support Project for Asia and the Near East (ISPAN), and some Indefinite Quantity Contracts (IQCs). Second, where engineers act as subcontractors to a non-engineering prime contractor, the AID report does not separately give the engineering subcontract

amounts. In addition, the referenced AID report does not list some large-scale contracts such as the Greater Cairo Wastewater Project, which is the largest project of its type in the world. It can nonetheless be seen that engineering contracts are a sizable, though not major component of the AID program. However, the percentage is small in comparison with the engineering program content of other major donors.

U.S. Competitive Position

A study by Price Waterhouse (1) concludes that engineering services are the "opening wedge" whereby countries establish close ties with client organizations—ties that lead to subsequent detailed design for roads, plants, and other facilities, for the preparation of specifications for equipment, and for the procurement of that equipment from the country that provides the design. In this way, early involvement by engineers multiplies returns for the country that carries out pre-feasibility and feasibility studies and conceptual design of projects. It also links clients in LDC institutions more closely to training programs, management approaches, and a continuing developmental interaction with the country that, by providing assistance, strengthens ties.

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Where the United States is displaced from this relationship, however gradually, a shift also begins in terms of frequency of U.S. contacts with decision-makers, especially the technically trained elite, who, more in developing countries than in the United States, are likely to decide the direction of their nations' futures. Over time, we submit, the United States may find itself increasingly edged out as a trading and assistance partner in significant technological areas by this process, coupled with a weakening of political ties. Already, in too many cases we are beginning to find ourselves on the down side of this relationship. The more this pattern is established, the more difficult it will be to reverse.

The United States has often lost out on excellent opportunities that our competitors have recognized. The French, for example, saw the potential for their tunneling and subway mass transit technology, and vigorously promoted their assistance, winning competition for subway projects in Mexico City; Santiago, Chile; Sao Paulo, Brazil; Seoul, South Korea; and even Chicago. The availability of French funds and strong governmental support were important in each case. Similar cases may be cited in the areas of port development, grain handling and storage, power generation and transmission, and water supply and sanitation, all of which are essential to the attainment of conditions without which Third World development is impeded.

For most countries, a valid mix of capital projects and related technical assistance and BHN projects can readily be established. As indicated, our foreign competitors see the validity of this

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argument and structure their foreign assistance programs accordingly. The United States, alone among the major donor countries of the world, has excluded or minimized its capital assistance program *beyond* the point of best returns for recipient countries and ourselves. A balanced program that would increase both the influence and effectiveness of the U.S would include more resources applied to assist with major efforts in water supply and sanitation, irrigation networks, power systems, transportation links, and environmental protection and resource management, and would also aid in other, smaller scale capital projects that promote local and regional development.

For these reasons and others, it is imperative that the role of capital projects in the U.S. foreign assistance program be closely assessed. We now turn to specific issues and proposed ways such an assessment can lead to stronger, more vital U.S. aid program.

Using Capital Projects in Critical Problem Areas

Whatever the configuration of the aid program that emerges from current deliberations, it is recognized by all parties that U.S. expenditure on the scale common in the 1960s is highly unlikely. Furthermore, there is little patience, either within Congress or the public at large, for money spent on projects that do not yield significant benefits and do not generate a genuine process of development.

Engineers no less than others want to avoid allocation of U.S. funds to infrastructure which developing countries see as something that has been foisted upon them, and for which they therefore have no responsibility in terms of effective upkeep and operation.

Engineers no less than others want to avoid allocation of U.S. funds to infrastructure which developing countries see as something that has been foisted upon them, and for which they therefore have no responsibility in terms of effective upkeep and operation. Such projects are an anathema to engineers and financing organizations alike. We therefore consider it a joint responsibility of ACEC and the U.S. government to identify ways U.S. funds can be used to best advantage.

We recommend the following:

Third World Cities and Peri-Urban Areas

Analysis of demographic data shows that urban and peri-urban growth in developing countries is continuing at a pace so rapid that existing problems, if unchecked, could swell to gross proportions, and new ones could proliferate over the next two decades. While a national annual population growth rate (AGR) for Third World countries of 3.0 percent is considered very high, the average AGR for Third World cities is about 3.5 percent, and rates of 7 percent are reported, yielding a population doubling time of only ten years. The Third World's rural population approximately doubled from 1920-1980, but during this same period the urban population increased by about a factor of ten, from 100 million to a billion. (6, p. 173) The planning and implementation apparatus and resources available to Third World nations cannot meet the need generated by this rate of growth. Almost 90 percent of world urban growth over the next thirty years, at present rates, will occur in Third World cities. (7, p. 36) Table II gives estimates of the population of some major Third World cities with projections to the year 2000.

Table II. Population of Third World Cities

	Population (Millions)	Est. Population Year 2000
Mexico City	16.0 (1982)	31.0
Sao Paulo	12.5 (1980)	25.8
Bombay	8.0 (1982)	16.8
Jakarta	6.2 (1977)	15.7
Manila	5.5 (1980)	11.5
Bogota	3.5 (1977)	9.6
Lagos	4.0 (1980)	10.5
Nairobi	.8 (1979)	5.3

Source: Jorge Hardoy and David Satterthwaite, *Shelter: Need and Response, Housing, Land and Settlement Policies in 17 Third World Nations*, cited in 6, p. 176.

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In such areas as solid waste management, water supply and sanitation, air pollution control, and transportation networks, there will be a need not only for infrastructure, but for institutional support systems and revenue schemes to keep the systems self-supporting.

Many of the most serious problems can be significantly alleviated only by effective use of capital projects.

It has been observed that problems occur at three levels of the environment as a result of urban population growth. These are the internal environment (the home and immediate surroundings); the city environment itself, as characterized by, e.g., air and water quality; and regions in which cities are located, as they are affected by the city's requirements for items such as land, fossil fuels and fresh water. (6, p. 171) Each of these levels can benefit from foreign assistance provided through engineering and capital projects, and moreover, many of the most serious problems can only be significantly alleviated by this approach.

In such areas as solid waste management, water supply and sanitation, air pollution control and transportation networks, there will be a need not only for infrastructure, but for institutional support systems and revenue schemes to keep the systems self-supporting. An example given in *State of the World, 1987* (6) describes a situation of the type engineers regularly encounter:

> As Third World cities reach astounding proportions, they are outgrowing the administrative capacity of local governments. Many are struggling to provide the most basic of services. In Alexandria, Egypt, a sewage system built earlier this century for 1 million people now serves 4 million. Lack of investment capital to upgrade waste treatment and drainage systems has left parts of the city literally awash in raw sewage. (7, pp. 40, 41)

Problems with impure water supply and sewage systems that promote water-borne diseases in urban and peri-urban areas go beyond the administrative capacities of local governments, however, and can, in the final analysis, only be adequately dealt with by the provision of adequate infrastructure. Of course, a range of technical assistance is necessary to support the effective use of the infrastructure. There must be understanding of the attitudes and behavior that affect how systems will be used, of the role of community participation in planning and implementing projects, and of sources of finance that will make the system self-sustaining. But when all of the studies have been conducted, there must still be an infrastructure system designed and built before the goals of water-borne disease reduction and improved public health can be attained.

A range of technical assistance is necessary to support the effective use of the infrastructure.

An adequate U.S. program needs to include at least the design phase for the infrastructure elements in its foreign assistance program after having provided early technical assistance to assess the scope of the problems and a variety of ways of dealing with them. U.S. engineering companies' experience in assessment and resource management can help by providing not only the required technology, but training in program management, systems maintenance, and finance for sustained effective operations.

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Safeguarding the Environment and Managing Natural Resources

With the approval of the U.S. National Environmental Policy Act (NEPA) in 1970, national attention became intensely focused on environmental matters. Although presidents and their administrations have placed varying degrees of emphasis on environmental programs since 1970, environmental activists have kept before Congress and the public the problems they perceive to be seriously endangering the environment.

Attention to international environmental problems closely follows the pattern of those in the United States. The first major arena for discussion of Third World problems was the 1972 Stockholm Conference on the Human Environment sponsored by the United Nations. This conference was marked by an unusual amount of disagreement among the Third World nations and between them and the developed nations about the priority that should be placed on environmental considerations and how programs should be designed and implemented in the Third World. There was *general* agreement by Third World delegates,

however, that developed countries:

- Could not dictate to them whether they should have an environmental program
- Could not establish the priority an environmental program would have, if they decided to have one
- Should not channel funds to environmental programs at the expense of existing development programs aimed at growth and distribution
- Could not expect Third World nations and people to forgo their economic opportunities for the sake of environmental preservation (especially if of primary interest or benefit to the developed world)

There has been a growing awareness in both developed and Third World nations that environmental problems are not confined to the more advanced nations and, in fact, respect no national boundaries

As one analyst described the Third World delegates' viewpoint

> The developing nations contended that the damage to the environment was not of their doing, that the industrial nations were primarily to blame, and that countries just now emerging from privation should not be expected to forgo the higher standard of living resulting from economic growth and industrial development in order to save what the wealthier nations have endangered. (7, p.318)

It is in the interest of these countries and of the United States that most of these problems be dealt with sooner rather than later, as they are likely to be more severe and costly if they are neglected or insufficiently dealt with now.

More recently, there has been a growing awareness in both developed and Third World nations that environmental problems are not confined to the more advanced nations and, in fact, respect no national boundaries. The growing list of actual and potential international and Third World environmental problems cover a broad spectrum. In the Newly Industrialized Countries (NICs), as manufacturing and commercial resource-based activity increases, waste generation and resource despoliation is proliferating more rapidly than the necessary control mechanisms—laws, policies, regulations and procedures, and trained specialists.

It is in the interest of these countries and of the United States that most of these problems be dealt with sooner rather than later, as they are likely to be more severe and costly if they are neglected or insufficiently dealt with now. Moreover, there is now a much higher degree of acceptance by most Third World countries that their environmental problems require action. A number of countries have recently established offices or agencies

at the national level to assess problems develop policy, devise plans, and coordinate environmental activities. Many of these countries have been in contact with the U.S. Environmental Protection Agency, and most are receptive to applying methods similar to those used in the United States to deal with their own problems.

There are a number of ways U.S. engineers can assist these countries, and provided that the U.S. government includes environmental assessment and protection in its reformulated foreign assistance, we recommend that the following be considered.

Engineers have gained enormous experience in all phases of comprehensive environmental regulatory and remedial services, from the earliest studies through the construction management phase. No other group can bring to bear this depth or range of experience.

- Using Engineering Companies as Program and Project Managers

  In implementation of U.S. environmental programs for EPA and state governments, U.S. engineering companies have been the leaders. Engineers have gained enormous experience in all phases of comprehensive environmental regulatory and remedial services, from the earliest studies through the construction management phase. No other group can bring to bear this depth or range of experience. Many of the multi-project operations in a U.S. Federal region exceed in scope and problems the national programs of Third World countries. In addition, because environmental actions nearly always cross disciplines, engineering companies have had to establish networks to draw on the services of a wide range of specialists, including anthropologists, archaeologists, agronomists, economists, regional planners, forestry, fishery and wildlife experts, and many others. The primary means for obtaining these services have been consortia, joint ventures, subcontracts, and recruitment of individuals for temporary assignments. In short, the role and capability of engineering companies have greatly expanded to meet the needs of the development programs that have evolved. Yet there are currently few projects within the AID program where this U.S. capability and experience can be applied. This can be rectified by:

- Identifying the countries having various environmental problems which it is in the U.S. interest to help, on a prioritized basis

- Providing assistance in specifying the range and nature of problems requiring priority attention

The role and capability of engineering companies have greatly expanded to meet the needs of the development programs that have evolved. Yet there are currently few projects within the AID program where this U.S. capability and experience can be applied.

Training officials and staff from the appropriate country organizations, both in the United States and in-country, in the technical and management skills needed to operate environmental programs and manage projects more effectively. Where necessary, this should include visits by foreign legislators to the U.S. Congress and state governments to learn how the U.S. Federal and state governments formulate and pass the necessary legislation. Technical and managerial training can be delivered by U.S. engineering companies, federal and state agencies, and other organizations.

Training, Technology Transfer, and Institution Strengthening

Training, technology transfer, and institution strengthening, while not identical, are closely related and interact to affect some common objectives. If the three are used effectively in mutually supporting ways, they can go far toward attaining a major goal in developing countries: trained staffs able to utilize relevant technology in effectively functioning institutions. By definition, one or more of these factors is deficient in developing countries. This section deals with contributions each can make, and how they interact to reach broader objectives.

The ultimate aim of training is to improve the effectiveness of organizations in setting and reaching objectives leading to attainment of national development goals.

Training, as used here, refers to the development of job-related knowledge or skills, with emphasis on skills, by employees of Third World organizations. Training is aimed at improving performance in a job held currently, or in preparation for a job in the same field or a related field.

The ultimate aim of training is to improve the effectiveness of organizations in setting and reaching objectives leading to attainment of national development goals. The emphasis is on learning by doing, through training tasks, simulations, on-the-job guided work, workshops and other adult learning approaches. Although training may include lectures, discussions and seminars, these are not the major means of conveying knowledge, and cannot be used to develop skills. Considerable research indicates that the most effective training is given in-country under conditions similar to those of the participants' work place. However, under some conditions, training elsewhere is appropriate.

As applied to capital projects, the objectives of training are:

- To increase the likelihood that jobs carried out by individuals and units in organizations will be performed effectively
- To improve planning, operations and management
- To enable organizations to make more effective selection and use of relevant technologies
- To increase the quality and efficiency of projects throughout the project cycle
- To reduce costs and improve productivity
- To enable the top leaders of organizations to assess and revise their strategies, aims, and policies as necessary

A well-devised plan is needed in the early stages of project formulation to select the most appropriate technology configuration.

Technology transfer shares several objectives with training. In common with training, technology transfer aims at improving planning, operations and management; increasing quality and efficiency of projects; and reducing costs and improving productivity. Technology transfer, however, involves the delivery of a methodology, process or product beyond that which is conveyed by training. As used here, it encompasses a very wide range, including such items as techniques and processes (for, e.g., site selection, road-paving, installation and start-up of systems, quality control, resource recovery, cost estimating, and literally hundreds of other engineering and managerial activities). It also includes the hardware that facilitates these operations, such as CADD-CAM, flue gas scrubbers, plant information and control systems, and chemical water treatment kits, to name only a few.

In later project stages, detailed plans must include how the developing country organization will gain the capacity to use the chosen technology effectively. This may require a commitment to train ministry staff as technicians, operators, and repair personnel and to establish a system for maintenance and a budget to support it.

The term technology transfer, though currently generally well-received, may have either positive or negative implications for Third World development. It is positive when Third World organizations that receive the technology also develop and retain the capacity to use the technology wisely and effectively under a range of circumstances. It is negative if the receiving organization is basically limited in its ability to apply the technology in either similar or different circumstances, or to adopt the technology to fit changed conditions when that is called for.

Technology is transferred as the result of the efforts of several groups of people, including the receiving ministry or other developing country organization, the financing organization, the consultant, and sometime the equipment manufacturer or

At present, there is no U.S. strategy or financing for promoting transfer of U.S. technology.

ACEC and its member firms are prepared to work with AID or its successor to make the necessary assessments and plans to strengthen the U.S. effort in training, technology transfer and institution strengthening. This would produce stronger economies in the developing countries, better trading partners for the United States, and a more secure future market for U.S. goods and services.

supplier. While it is important for all of these groups to be committed to the aim of technology transfer, there is reason to believe that the commitment of the indigenous group—i.e., the developing country receiving organization—plays the most important role. Carl Dahlman of the World Bank, who has studied this process, suggests that transfer of technology may substitute for local mastery (ability to use a technology effectively) rather than serve as a source for it, unless the indigenous organization makes a strong and well-planned effort to master the new technology. (8, pp. 12-14)

This implies that a well-devised plan is needed in the early stages of project formulation in order to select the most appropriate technology configuration. Later, when the project is being proposed (AID's pre-implementation technical assistance phase), detailed plans must include how the developing country ministry or organization will gain the capacity to use the chosen technology effectively. This may require a commitment to train ministry staff as technicians, operators, and repair personnel and to establish a system for maintenance, including spare parts, maintenance manuals, and a budget to support them.

In practice, many developing country organizations object to using their funds to pay for training. While they say they rate training highly, they have often been reluctant to designate or release for training the required staff or to use their own funds for this purpose. As a result, training and technology transfer components of projects have sometimes been seriously weakened.

U.S. engineering consultants have come to appreciate the importance of training and technology transfer to continued successful operations during and following projects on which they are engaged. Moreover, engineering companies realize that successful promotion of U.S. technology is essential to compete with their foreign counterparts. But at present there is no U.S. strategy for promoting transfer of U.S. technology, and no finances are available to pursue this opportunity on an integrated strategic basis.

The reorganized aid program should consider that projects that lack the necessary training and technology transfer components are much less likely to succeed in development of a continuing process of indigenous development. In short, projects will not continue effectively after external assistance has been completed, and the investment made by the United States may be lost.

Without training and technology transfer, U.S. objectives for its development assistance program will be dealt a severe blow.

Without training and technology transfer, there can be no meaningful institution strengthening, and without effective developing country institutions, U.S. objectives for its development assistance program will be dealt a severe blow. ACEC and its member firms are prepared to work with the U.S. aid agency (AID or its successor) to make the necessary assessments and plans to strengthen the U.S. effort in training, technology transfer and institution strengthening in a way that will result in both more effective development projects and the promotion of U.S. technology. This would produce stronger economies in the developing countries, better trading partners for the United States, and a more secure future market for U.S. goods and services.

Assistance in these areas and others that can be identified should include training, both in country and at operating sites in the United States.

Achieving a Multiplier Effect for U.S. Funds

At a time when the United States must deal with an enormous budget deficit, available funds must bring the best returns for the amount invested. Here are some ways we believe this might be done.

TDP works well because it is relatively small and flexible. Its effectiveness will be furthered by the extension of independent statutory authority conferred by the 1988 Trade Act.

The current level of funding for TDP, $25 million, is too low. It should be raised to $50 million over the next two or three years.

Enhancing the Trade and Development Program

ACEC has previously gone on record to support the Trade and Development Program (TDP). The engineering community and others who work with TDP have found this program to be very responsive to the needs of U.S. business. TDP's regional coordinators and field staff have identified projects and financed studies that have promise for expanding U.S. exports.

Just as importantly, TDP has been highly responsive to individual firms coming forward with proposals to develop export-generating projects, and TDP has innovated new and potentially valuable trade development approaches, including "trade-related training" and the Investor Assistance Program.

In addition, TDP's effectiveness has brought forth new legislative authorities relating to funding of education and training activities and financial assistance to state export programs.

In part, TDP works well because it is relatively small and flexible. Its effectiveness will be furthered by the extension of independent statutory authority conferred by the 1988 Trade Act.

While expanding such a program too rapidly and too greatly might deprive it of the very conditions that have made it successful, the current level of TDP funding, $25 million, is too low, and good prospects must be forgone because of insufficient funds. The new education/training and state export assistance authorities noted above could together consume up to $15 million in TDP funding in 1989 and 1990, thus reducing funding available for project-specific trade development assistance. Such projects have sometimes been lost to foreign competitors simply because they offered more money than TDP. We do not suggest that TDP should be engaged in bidding contests to overwhelm other countries' similar programs. Rather, there is a need in

Typically, emerging projects take several months to as long as two years to be developed to the point that TDP can make a funding commitment.

ACEC supports "no-year funding" authority for TDP to provide needed flexibility.

Significant overseas opportunities are being lost due to lack of timely, responsive, and competitive export financing. The programs and practices of the U.S. Export-Import Bank are in need of continuing re-examination and improvement.

some cases for TDP to be able to increase the ante somewhat if the probable returns to the United States warrant this, and not to forgo desirable projects for lack of funds. Accordingly, an increase of TDP funding to an eventual level of $50 million seems justifiable and desirable. This might be done in phased steps over a period of two to three years to enable the TDP Director and staff to incorporate the additional funds while at the same time modifying the program to accommodate the new scale of operations without losing the functional efficiency characteristic of the program.

Finally, the nature of TDP's trade development mission calls for optimal capability to be responsive and to react to changing conditions. In this regard, it is often difficult if not impossible to synchronize the process of application, review and funding of export-generating projects with the normal yearly federal funding cycle. Typically, emerging projects may take several months to as long as two years to be developed to the point that TDP can make a funding commitment, since much of the process is dependent on the actions of foreign government agencies, multilateral development banks and other entities providing follow-on funding. In other cases, projects that have programmed for TDP funding have unexpectedly been cancelled, funding sources withdrawn, or delayed late in our fiscal year, leaving TDP with little or no time to substitute other worthy projects. In such instances, TDP funding can be lost.

With this background, ACEC supports "no-year funding" authority for TDP to provide needed flexibility.

Providing for Continuity of Export Financing

While TDP financing had often served as an effective "door opener" for U.S. firms pursuing significant overseas opportunities, that door is just as frequently slammed shut, due to lack of timely, responsive, and competitive export financing. In this regard, ACEC believes that the programs and practices of the U.S. Export-Import Bank are in need of continuing re-examination and improvement.

Over three years ago, EXIM established the Engineering Multiplier Program to enhance trade finance available to U.S. engineering and architectural firms pursuing engineering opportunities overseas.

Because this program's availability and application may not have been well-understood, and especially because the interest rates associated with the program ceased to be competitive vis-a-vis other medium-term trade financing, very few of the preliminary commitments made have resulted in approved loans.

ACEC believes the Engineering Multiplier Program should be reviewed jointly by EXIM and representatives of the U.S. engineering and architectural community to determine what, if any modifications, can be made to make it useful and attractive to consulting engineers and other design professionals.

U.S. design professionals engaged in export-generating activities in the overseas market can benefit significantly through use of risk insurance instruments of the Foreign Credit Insurance Association (FCIA). Currently, FCIA intends to phase out its current services policy, developed in 1972, in favor of providing coverage through its short-term single buyer or multibuyer policies. ACEC believes that these instruments can be effectively adapted for use by consulting engineers following appropriate modifications based on consultations with design professionals.

With appropriate modifications, FCIA risk insurance instruments can be effectively adapted for use by consulting engineers.

Finally, while EXIM has made great strides in adapting its programs and practices to the growing U.S. services economy, the information and training provided by EXIM continues to be heavily geared to manufactured goods and/or commodities exporters, and the structure and content of its training seminars are slanted towards financial institutions. With this background, ACEC believes that a separate "short course" focusing on application of EXIM/FCIA trade finance and risk insurance programs and instruments by services providers, including consulting engineers, would lead to more widespread and effective use of these programs and instruments.

Establishing U.S. Trust Funds in the Multilateral Development Banks

Prior to engaging in a project, the multilateral development banks (MDBs) require pre-feasibility and feasibility studies, environmental assessments, and operational and management studies. In an increasing number of cases, these studies use trust funds contributed by individual countries and earmarked for work that will be exclusively carried out by their nationals and the recipient country. This obviously gives the donor country an advantage in conducting the remainder of the project.

The United States needs to establish trust funds comparable to our competitors' to finance the preliminary studies that are vital to follow-on sales of design services, construction management, construction, and equipment sales.

Trust funds represent the cost of doing business, and in the long run they will cost far less than the value of the business lost.

In the World Bank, 23 countries to date have established so-called Trust Funds (actually specifically designated accounts with quick and simple procedures to facilitate their use). The countries having these trust funds set forth the criteria for their use, e.g., countries where they may be used, sector, and so forth. Generally, these funds are not large (less than $5 million).

While it is still too early to evaluate fully their effectiveness, there is clear evidence that in some cases U.S. firms have been passed over because the United States had no trust fund.

The United States presently maintains a trust fund only in the Africa Development Bank. Even there, the funds have been supplied by the Trade and Development Program (TDP). While we applaud TDP's willingness to use its very limited funds in this way, it is a case of "robbing Peter to pay Paul," as these funds then become unavailable for other feasibility studies that TDP would carry out.

We recommend, rather, that other funds should be made available for preliminary studies financed from Trust Funds, based on the potential return to the U.S. economy through follow-on sales of design services, construction management, construction, and sale of equipment.

We submit that these funds represent the cost of doing business, and that in the long run, they will cost far less than the value of the business lost. We therefore urge the establishment of a fund at a modest level in each MDB, to enable U.S. firms to compete on the same basis as their competitors.

U.S. Co-financing of MDB Projects

Trust funds and co-financing go hand in hand. Many of the developed countries that have established trust funds with MDBs also are co-financing specific portions of bank-funded projects. Unless the U.S. foreign assistance program includes similar activities, the market for U.S. services and goods on MDB-funded projects will continue to shrink. This will adversely affect the foreign trade balance.

In some cases, AID has collaborated with MDBs to co-finance projects. For example, there has been collaboration between USAID/Islamabad and the World Bank for the Pakistan Private Energy Project. AID is providing money for some early studies and the design of the Private Sector Energy Development Fund.

Many of the developed countries that have established trust funds with MDBs also are co-financing specific portions of bank-funded projects.

Much more needs to be done to identify major projects where AID can co-finance the early studies that will enable U.S. engineering firms to increase the chances that follow-on work can be won by U.S. companies.

Study is needed to identify where additional U.S. nationals are needed in MDB program positions and any barriers to achieving them.

"a loan pool that will provide up to 30 percent of private power project costs in Pakistan." (4, p. 1)

This cooperation of AID with the Bank was fostered by the critical need to infuse private sector finance into expansion of power generation sources, because power shortages have been identified as one of the most critical barriers to economic development in many countries.

Even though this specific project does not hold much promise for expanding the market for consulting engineers, who by and large do not have investment capital, we believe AID's move is a positive one. As a result, we recommend that much more be done to identify other major projects where AID can co-finance the early studies that will enable U.S. engineering firms to increase the chances that design work, construction, equipment purchases and other activities may be won by U.S. companies, while at the same time multiplying the effect of the U.S. input.

Placing U.S. Nationals in International Lending Institutions

The U.S. Government has placed U.S. nationals in higher-level legal and administrative positions in MDBs, but has paid less attention to placing U.S. staff in key program positions. While U.S. staff in administrative and legal positions offer assurance to our government that the MDBs are being managed in accordance with U.S. standards, they do not provide the highly qualified professional staff essential for preparation, analysis and operational oversight of sound projects for bank financing.

U.S. nationals in these positions would make it easier for U.S. firms to do business with the MDBs.

Study is needed to identify where additional U.S. nationals are needed in MDB program positions and any barriers to placing them.

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AID
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mw Due: 1/5/89 w/Report
Action: TDP for Woods/Sig.
Info: Woods R LOGs, AA/PPC

File No. 601

December 21, 1988

Mr. Alan Woods, Administrator
Agency for International Development
Department of State Building
320 21st Street, N.W.
Washington, D.C. 20523

Dear Alan:

The International Engineering Committee of the American Consulting Engineers Council (ACEC) would like to submit for your review the enclosed report entitled "Engineering Services in a U.S. Foreign Assistance Program for the 1990's." We firmly believe that the recommendations contained in the report will improve the U.S. Foreign Assistance Program.

The American Consulting Engineers Council (ACEC) is a trade association representing 5000 independent consulting engineering firms. Our firms provide a broad range of planning, design management and related engineering services for a variety of public and private clients in the U.S. and around the world. The International Engineering Committee is composed of those members who do a good portion of their business in overseas markets. Their work is often for or through U.S. and multilateral foreign assistance agencies like the U.S. Agency for International Development, the U.S. Trade and Development Program and the multilateral development banks.

U.S. Engineering firms are often on the front lines of U.S. trade promotion efforts providing feasibility studies that if completed successfully lead to follow-on exports of U.S. goods and services. As a result engineering is often referred to as the opening wedge to foreign markets. The enclosed study is an examination of key programs within the U.S. Foreign Assistance structure and suggests ways that scarce resources can be made more efficient to promote world development and at the same time the export of U.S. goods and services.

We respectfully request your agencies' consideration of the enclosed report.

Sincerely,

Wayne Weiss

Wayne Weiss, Chairman
International Engineering Committee

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