



USAID Development Information Services

Memorandum

To:
From: Jeffrey Swedberg, PPC/DEI/DIS
Date: April 9, 2003
Re: Design of Infrastructure Projects

This paper summarizes available material available from USAID and other sources regarding the design and implementation of successful infrastructure projects. Section I was adapted from a USAID/CDIE analysis, which focuses primarily on USAID experience in designing rural development projects. However, it contains numerous principles that are relevant for the infrastructure sector.

Section II focuses on specific case studies and evaluations of infrastructure projects implemented by USAID in the past. A case study of an infrastructure project in Nepal, emphasizes the principles to combat corruption. It is followed by summaries project evaluations in the Philippines and Lebanon. A final bibliography page provides source information if you wish to further investigate information summarized here.

Section I. Principles of Successful Infrastructure Projects

A. Management Strategies

Characteristics of Successful Infrastructure Project Managers

Experience from USAID evaluations and studies sheds light on some of the characteristics of successful managers. Development managers should have flexibility for making quick decisions and taking independent actions in response to unexpected and changing conditions. These managers require mechanisms for a two-way flow of information to the local field level and back. Moreover, they not only need to focus their efforts on the project's short-term construction and production objectives, they also must be concerned with such issues as ultimate development impacts and longer term institutional capability and sustainability. Their operations should be cost-effective, reliable, and efficient and should be based on careful financial management planning. In addition, managers must have an entrepreneurial spirit to ensure the continuation of funds--whether from private revenue sources, donor assistance, or public budgets--to cover essential expenditures for maintenance of the development activity. Also development managers need to be project "champions" or salespeople, effective leaders, negotiators, and coordinators, because the successful performance of their projects is frequently dependent on external policies or critical institutional linkages.

Local Participation in Management Decisions

A key finding from USAID project evaluations is the importance of some form of beneficiary participation in project management decisions for successful project performance and sustainability. The nature of such participation, however, has varied considerably. For many infrastructure projects, such as irrigation, rural roads, and electricity and water systems, the active involvement of local community organizations in infrastructure planning, construction, and maintenance decisions was found to be critical

to project success and sustainability. Moreover, project experience has made it clear that the intended beneficiaries' perceptions of the value of project services profoundly affected their utilization of the services. For example, farmers' perspectives on the timeliness and reliability of the services and considerations of affordability, ready access, and, ultimately, profitability and risk affected farmers' decisions to adopt new agronomic technologies and practices.

Management Strategies for Improving Project Performance and Sustainability

Experience with the management of infrastructure projects offers several key lessons concerning the broad range of responsibilities and skills required of project leadership. Aside from the obvious responsibilities for meeting short-term construction schedules and production targets, experience suggests that management needs to focus on two other aspects in order to achieve successful project performance and sustainability.

First, there must be a concern for whether the project is likely to achieve its ultimate development impacts, and if not, why not. Various changes in policies or other unanticipated external conditions may be constraining the achievement of the project's ultimate development goals despite successful achievement of intermediate project implementation targets. To effectively deal with such situations, project managers responsible for implementation must have the flexibility to adapt project targets and strategies to changing conditions. Project managers must also have the capability to influence those external conditions by developing cooperative interagency linkages and interpersonal relationships with important actors whose actions may influence project outcomes and impacts.

Second, development managers should look beyond the short-term objectives of the project to consider the best strategies for achieving longer-term sustainability of the project's services and benefits after donor assistance ceases. To achieve sustainability, attention has to be paid to such issues as the development of indigenous institutional capability and the achievement of self-sufficiency of the project's human and financial resources.

Management Strategies for Addressing Internal and External Problems

Managers of infrastructure projects have typically faced serious internal organizational and staffing problems, such as high staff turnover, low public sector salary scales, low morale and minimal performance incentives, and lack of funds for support equipment, supplies, and transportation. Such obstacles as counterproductive organizational cultures, graft and corruption, and bureaucratic red tape were also often encountered. Yet successful development management required more than effective supervision and motivation of employees within the implementing organization. It also required an external focus on coordination and interaction between the project and other organizations with related and interdependent functions. It required ability to motivate and influence these other actors, to develop external support for project goals, and to manipulate external policies, factors, and conditions that affect project performance. Effective managers required a flexible style and independence in order to adapt project targets and strategies in response to unanticipated or changing external conditions and constraints.

Management Strategies That Enhance Indigenous Institutional Capacity

In the past, an overemphasis on achievement of short-term implementation and production targets encouraged adoption of such project strategies as providing massive technical assistance or creating specialized autonomous agencies. Although such strategies improved short-term performance, they may only have delayed management problems and may even have inhibited the development of a sustainable indigenous institutional capacity. For example, heavy expatriate involvement in project management sometimes created friction and jealousies among government officials and hampered smooth project takeover by indigenous staff. Timing or scheduling problems further inhibited a smooth transfer process. Too frequently, counterpart staff members were away on long-term training during most of project implementation and thus missed valuable opportunities for on-site training and interaction with expatriate

technical advisers. Evaluations often advocated pre-project training of counterparts to overcome this timing problem. However, in practice such training has been constrained by the way USAID obligates funds. Another frequently mentioned lesson is the importance of providing counterparts with management as well as technical training, an acknowledgment of the management responsibilities typically assigned to returned participants.

B. USAID Experience with Implementing Organizations

USAID has experimented broadly with alternative organizational structures for implementing projects, ranging from government agencies to semiautonomous units, private voluntary organizations (PVOs), cooperatives, and private commercial enterprises. Experience does not show any one organizational model to be superior or even a possible choice in all circumstances. On the contrary, evaluation reports contain examples of both successful and unsuccessful project performance with most of these approaches. The appropriate choice of organization for implementing rural development projects depends on numerous factors, including the project's objectives, scale, type of activity, and potential for profitability.

Projects Managed by Government Agencies

Projects managed by centralized line ministries are most appropriate when the aim of the project is to influence political or policy objectives. For example, agricultural policy planning projects are best implemented within national ministries. Also, ministries may be most appropriate for the development and maintenance of basic infrastructure, especially large-scale, complex systems that are too costly for any but a taxing authority and too comprehensive in scope for any but a centralized bureaucracy. Also, public agencies may be necessary for projects that are collective responsibilities for the common good but that are unlikely to be provided for in the private marketplace. Theoretically, projects implemented by government agencies have reasonable prospects for financial sustainability because such agencies are able to cover recurrent project costs from their budgets. However, experience indicates that the sustainability of such projects has frequently been a problem, especially in situations of fiscal crises and competing demands for public funds or when the implementing ministry has assigned a relatively low priority to the project's maintenance and support.

Public bureaucracies as implementers of development projects have certain well-known disadvantages. For example, government bureaucratic processes and regulations (checks and balances) make flexible decision-making and action in response to changing circumstances difficult. Red tape and corruption may reduce efficiency. Moreover, low civil service salaries make it difficult to attract and keep high-quality management and technical staff. Hierarchical management structures typically discourage two-way communication flows, limiting responsiveness to beneficiary needs and perspectives and sometimes inhibiting local participation in decision-making. Projects with multi-sector components implemented by a lead line agency have had considerable difficulty achieving the required coordination with other compartmentalized public agencies.

Some projects have attempted to avoid such shortcomings by working with sub-national government units rather than with national line ministries. The advantages of using such a decentralized approach have been greater cognizance of local conditions and needs, increased opportunity for local participation, and greater ability to coordinate multi-sector activities under one authority. However, these local government units typically have lacked high-quality staff, which has resulted in project implementation delays and inefficiencies. Moreover, they have been unable to handle large-scale, complex projects. They have also lacked authority to generate and expend revenue and thus have remained heavily dependent on line ministries for funding.

Some of these shortcomings could be ameliorated through decentralization projects that emphasize the development of high-quality local government staff. These projects could also support greater local fiscal authority through the devolution of budgetary allocation and disbursement responsibilities to the district level, or genuine decentralization of authority to raise and program revenue.

Projects Managed by Semiautonomous Agencies

Some infrastructure projects, especially integrated rural development projects, have attempted to bypass some of the shortcomings of government agencies by creating special project management units with varying degrees of autonomy from regular government procedures. By gaining more direct control over project funds and staffing decisions, these units were better able to attract high-quality management and technical personnel; react to unanticipated and changing environments with quick, flexible decisions; improve coordination of multi-sector activities; and effectively meet short-term construction and production targets. Because these units had government backing but were free of undue interference, in the short term they were able to achieve project objectives expeditiously.

However, the critical shortcoming of using semiautonomous units has been the inability to achieve long-term project sustainability and replicability. Further, the establishment of semiautonomous units has sometimes hurt the regular line agencies attracting their staff, duplicating their functions, and creating underlying jealousies and competition. Frequently these units have relied mainly on expatriate staff management, which did little to develop indigenous institutional capacity. Once the external donor funding ended and the expatriate staff left, funding dried up, staff motivation and quality declined, efficiency suffered, and the autonomy of the agency typically was encroached upon by political influences. Because project management units were unable to assume recurrent costs, they quickly lost their independence after external project funding ended, and they became precariously dependent on line ministries for their survival. USAID projects rarely planned for the smooth transition of project management units into line ministries.

Projects Managed by Private Organizations

USAID has had considerable project experience in recent years working through private voluntary organizations (PVOs). While these organizations vary greatly in their capabilities, making generalizations especially difficult, they have tended to excel in community-based project activities. PVO staff is frequently dedicated to social and humanitarian goals and is experienced in grassroots, participatory approaches. They often work in multiple sectors and can coordinate complementary activities at the local level. PVOs have been effective in undertaking experimental, innovative approaches and adapting flexibly to changing local conditions. However, PVOs often lack business management and technical sophistication, and the projects they manage may experience considerable implementation problems and delays, especially in dealing with USAID reporting requirements and procedures. Furthermore, PVO projects tend to be confined to small target areas and are not easily expanded or replicated. PVOs often have little leverage or influence with the host government and thus may be particularly susceptible to policy and regulatory environments adversely affecting their performance. Also, their financial sustainability is often dependent on continued fundraising activities and external donor assistance.

Conclusion

In summary, experience does not point to a simple answer indicating the superiority of any one organizational model for implementing infrastructure activities. Instead, the answer may lie in assessing the functions required in implementing a project and then establishing an appropriate mix of organizations (or balance among them) that maximizes the advantages of each while minimizing their weaknesses. Even within single projects, a mix of organizational structures may be necessary for successful performance, although care must be taken to avoid a complexity that would result in insurmountable coordination problems. In many USAID projects, a key to success appears to have been the effective use

of a combination of organizations, including local grassroots organizations and their participation in project management decision-making.

C. Technology Issues

In evaluations of road projects, USAID, as well as recipient governments, often viewed the more expensive and less economically justifiable heavy equipment-based road construction technologies as modern, prestigious, and desirable. USAID interests in reducing management and supervisory requirements intensified this bias and moved the Agency further away from more appropriate labor-based technologies for road construction. Centralized implementing agencies tended to select the more expensive construction approaches, whereas the more decentralized institutional arrangements involving local participation in technological decisions resulted in more appropriate and economical labor-based technologies. Also, central agencies tended to favor new road construction and ignore maintenance of existing roads. Sustainable roads typically depended on the ability and willingness of local communities to do the repair work, which was facilitated in cases in which the roads had been constructed using the labor-based technology approach.

Although evaluations of rural potable water systems found that simple technologies were not always best in all situations, in general they warned against overly complex and expensive systems that were dependent on foreign parts and fuels and encouraged the choice of simple, durable systems that could be funded, operated, and maintained locally. Centralized agencies had poor track records for financing the operation and maintenance of rural water systems, whereas community-based systems with localized responsibilities for operation and maintenance achieved greater sustainability. Further, evaluations showed that incorporating the preferences and desires of the community in the choice of technology and project design greatly enhanced the appropriateness and value of the technology to the community and increased its chances for sustainability. In this context, even simple technologies sometimes failed when the intended users did not perceive them to be a significant improvement over traditional water sources. The key to appropriateness of the technology was not so much its complexity or simplicity as its perceived and actual value to the community -- enough to encourage local use, payment, and maintenance of the new water system.

There is yet another dimension to the selection of an appropriate technology that has become of increasing concern to USAID: the long-term impacts of the technology on the environment. The adverse environmental impacts of irrigation systems when drainage and watershed management are ignored are well known and documented. The longer-term environmental damage resulting from excessive pesticide and chemical fertilizer use is also of growing concern. However, while USAID has relatively extensive procedures for pre-project environmental assessments, the monitoring and evaluation of actual project impacts on the natural resource base has been sadly lacking in most cases.

Section II. Project Case Studies and Evaluations

A. Dealing with Corruption in Governance and Rural Infrastructure Projects– Nepal

The IRIS Center of the University of Maryland conducted a case study on the issue of corruption in infrastructure projects, focusing on how they have been addressed in USAID projects in Nepal in the late 1990s. Infrastructure projects, which are often implemented with host government partner agencies, are especially vulnerable to financial leakage through corruption. The IRIS case study made a number of recommendations for infrastructure project managers to minimize the risks of corruption.

Make Programs Accountable to Beneficiaries.

The Nepal program emphasized local management and “ownership” of projects. Users (those expected to reap long-term benefits from works) were vested with responsibility for identifying and achieving project goals, and assisted in developing the necessary capacities and processes for doing so openly and effectively. The program recognized early that the effectiveness of local voice and understanding is directly related to levels of corruption. Where decision-making is further away, things can be hidden. When projects are technically complex, less of the benefits accrue locally, and there are fewer people who can understand how the project should work. Concentrating on locally selected projects helped increase interest in having them work.

Locally determined norms and pay scales allowed the Nepal program resources to stretch farther, and harmonized project budget figures with a clear and familiar local entitlement – thus ensuring that corruption would directly affect the workers’ bottom line and elicit protests. Absent local norm and rate setting, there is a substantial opportunity for corruption in the local-national differentials.

Insist on Transparency of Program Information

Corruption grows in environments of secrecy, where rules and resource allocations are unclear. The USAID/Nepal project requirement that all project information (including estimates) be published, and that key activities be conducted publicly, was crucial to the integrity of the programs. This made it possible for beneficiaries to monitor and defend their entitlements.

Align Incentives

“Incentive structures” insulate programs to the extent feasible from prevailing systems of public sector corruption, and set up appropriate incentives in areas under the program’s control. These strategies tend to overlap or converge. In the Nepal example, this resulted in the delegation of project implementation to a third (non-governmental) party, accountable for expenditure and project implementation verification. The program design must minimize officials’ discretionary control of program-related resources, since these are likely to be thoroughly exploited when any opportunity arises. In situations of endemic corruption, this is likely to be crucial at least for an initial period (perhaps two years), while transparency standards and expectations are being established for the first time.

An approach called “cacooning” requires a staff of reasonably paid and accountable professionals outside the civil service structure. Although such an approach can be criticized generally as subsidizing a program enclave, or as unsustainable, it can nevertheless be valuable as a means of maximizing program benefit/cost, shaping beneficiary expectations about governance, and establishing patterns of integrity that can be applied to the public sector.

The second approach to protecting program resources from systemic corruption is sometimes called “ringfencing.” This frequently involves the establishment of project units within the government, sometimes with donor financing. The donor agency and the government may negotiate detailed rules and procedures to be followed in program. The ringfencing approach requires both a modicum of civil service professionalism as well as a serious commitment by the host government and donor agency – circumstances not always in effect in developing countries.

Donors Should Act Responsibly as Governance Institutions.

Donors should send clear signals that integrity is important. A strong donor commitment to effective program governance sends signals – of support for those struggling to strengthen governance, and of warning to those intending to engage in abuses – that can bring tangible benefits in terms of program governance. Donors should avoid reaching other goals, such as timely performance, at the price of tolerating corruption.

Develop Strategies to Confront Resistance

Methods to stop corruption in infrastructure projects will face resistance from groups who stand to lose. These include politicians desiring patronage rewards to dispense, civil servants seeking to increase their remuneration illicitly, and the brokers and rent-seekers stationed at control points between the national and local levels. Efforts should be made to forge alliances to outflank the corrupt. Both local political bodies and central agencies contain potential allies. For instance newly elected local politicians frequently make graft-fighting part of their electoral platform.

Efforts should be made to tie officials' hands in public. Relevant stakeholders are asked, cajoled, or pressured in public forums to take a stand against corruption -- in effect, to pledge support for integrity and to undertake its defense within the protected sphere. Any backtracking on this commitment, any contradictions or inconsistent behavior thus becomes a potential source of public comment and public embarrassment.

B. Rural Infrastructure Fund Project – Philippines

In 1991, USAID contracted an evaluation of a Rural Infrastructure Fund project to improve rural roads and bridges, ports and airports in order to stimulate economic expansion and growth of rural areas. The project was authorized in 1987 as a sector funding mechanism – through host country contracting by the Government of the Philippines, Department of Public and Highways; and procurement of airport navigational aids and ancillary training through USAID-direct contracting for the Department of Transportation and Communications.

The evaluators identified four major lessons derived from the project.

1. Host country contracts require almost as much attention from USAID technical project officers as direct USAID contracts, with less control over the outcome.
2. Greater attention should be paid to developing detailed cost estimates and factoring in cost escalation in future projects. Costs of this project were greatly underestimated.
3. Additional time should be factored in for “unforeseeable problems”, particularly during the start-up stage of the project.
4. Commitment rates are a more appropriate indicator of progress in infrastructure projects than actual expenditures.

Among the recommendations made by the evaluators:

1. Improve the Government of Philippines/USAID review of contractor selection under host country contracting.
2. Government of Philippines should formally define responsibilities of local authorities to implement the project.
3. Government of Philippines should promptly resolve right-of-way issues to permit contractor access to the job site.
4. Government of Philippines should resolve issues regarding exemption from duties and taxes under the project.
5. A formal procedure by USAID and Government of Philippines should be established to accelerate the resolution of issues – particularly those that involve Philippine agencies other than the implementing agency.

C. Housing Guarantee Program – Lebanon

In 1993, USAID contracted an evaluation of its Housing Guarantee Program in Lebanon. Beginning in 1977, and renewing in 1982, the program sought to repair or reconstruct dwelling units damaged during

the civil war. In 1982, the Government of Lebanon, through the Ministry of Housing and Cooperatives and the Council for Development and Reconstruction borrowed from an American investor, through USAID, \$15 million under a Housing Guaranty Program. In 1992, seven sewerage infrastructure projects were integrated to form a part of the Housing Guaranty Program and the costs thereof became eligible for reimbursement out of the \$15 million loan.

Among the strengths of the program:

1. The borrowers were not overburdened with the loans and the repayment conditions were favorable to the borrowers.
2. The program was made accessible to the population at large through the establishment of a sufficient number of regional and sub-regional offices.
3. The decision to grant loans to eligible borrowers has been entrusted with full authority to the regional offices. This decentralization proved to accelerate the lending process.
4. The application procedures as a whole were simple and devoid of any complexities.

Among the weaknesses of the program

1. The maximum amounts available for loan were not sufficient to meet the requirements of the individual borrowers.
2. The total amount of the program was not sufficient to meet the national needs.

Section III

Citations

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