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Road maintenance and repair: a review of USAID, IADB, and World Bank experience
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USAID

PD-ABK-664 Final Evaluation Report(24) Rec_no=85004

Final evaluation study : strengthening road maintenance project

Morrison Knudsen Corp. Mining Group

Wilbur Smith and Associates, Inc.

Sheladia Associates, Inc.

USAID. Mission to Chad (Sponsor)

8 Sep 1994, v.p. [124 p.] : ill., statistical tables

Project No: 6770050

9400001

PCE-0001-I-00-3013-00

PD-ABK-927 Final Contractor/Grantee Report(35) Rec_no=85476

End of project report : strengthening road maintenance project (SRMP) -- USAID project 677-0050, Republic of Chad

Gendarme, Georges F.

Louis Berger International, Inc.

USAID. Mission to Chad (Sponsor)

30 Sep 1993, 70 p. + 4 annexes [87 p.] : charts, statistical tables

Cover title: Strengthening road maintenance project, contract no. 677-0050-C-00-0010-00 : final project report

Project No: 6770050

677-0050-C-00-0010-00

*PD-ABF-713 Audit Report(23) Rec_no=73692

Audit of AID's grant to OFNAR [Office National des Routes/National Roads Office] under the Chad agriculture strengthening road maintenance project (no. 677-0050), January 1, 1986 through June 30, 1991

USAID. Ofc. of the Inspector General. Regional Inspector General for Audit. Dakar

1 Apr 1993, 38 p. + 12 appendices [58 p.] : statistical tables, Audit report no. 7-677-93-05-N

Project No: 6770050

*Availability: available only to authorized USAID personnel

PN-ABN-123 Other USAID Supported Study/Document(54) Rec_no=72391

El Comite pro-mantenimiento del camino(The [community] road maintenance committee)

Urizar, T. S. Rosa Ercely Molina

Guatemala. Ministry of Communication, Transportation and Public Works. Directorate General of Roads. Rural Roads Program

USAID. Mission to Guatemala (Sponsor)

Cuaderno ambiental, no. 5

Oct 1992, 15 p. [18 p.] : ill., MA-EAP-007

English series title: Environmental notebook

Project No: 5200332

PD-ABK-795 Design/Implementation Workplan(16) Rec_no=85265

Chad strengthening road maintenance project, contract no. 677-0050-C-00-0010-00 : detailed work plan, April 1, 1991 to March 31, 1992

Louis Berger International, Inc.

USAID. Mission to Chad (Sponsor)

28 May 1992, [14] p. [17 p.] : charts

Title supplied by cataloger

Project No: 6770050

677-0050-C-00-0010-00

PD-ABJ-692 Special Evaluation(22) Rec_no=82694
Second evaluation study : strengthening road maintenance project (project no. 677-0050)
De Leuw, Cather International, Inc.
USAID. Mission to Chad (Sponsor)
Mar 1992, ix, 46 p. + 12 appendices [90 p.] : statistical tables
Project No: 6770050
PDC-0249-I-00-0019-00

PD-ABD-346 Project/Program/Activity Design Doc(12) Rec_no=66400
Strengthenin [i.e. strengthening] road maintenance : amendment no. 2
USAID. Mission to Chad
14 Jun 1991, [7] p. [7 p.]
Project No: 6770050

PD-ABK-816 Design/Implementation Workplan(16) Rec_no=85266
[Chad] Strengthening road maintenance project, contract no. 677-0050-C-00-0010-00 : work plan for the technical assistance team, October 91-September 92
Louis Berger International, Inc.
USAID. Mission to Chad (Sponsor)
[1991], [17] p. [21 p.] : charts
Project No: 6770050
677-0050-C-00-0010-00

PD-ABC-061 Final Contractor/Grantee Report(35) Rec_no=61630
Phase I final report : strengthening road maintenance project, Chad
Gannett Fleming Engineers and Planners
USAID. Mission to Chad (Sponsor)
Oct 1990, v.p. [94 p.]
Project No: 6770050
677-0050-C-00-6004-00

Final contractor report on Phase I (1985-90) of a project to strengthen road maintenance in Chad.

Phase I was a bold and ambitious undertaking considering the circumstances that existed at its inception -- destruction following the civil war, economic crisis, and political instability. The Office National des Routes's (OFNAR) administrative buildings and the central workshops were rehabilitated, and approximately 50 pieces of equipment were retrieved from the countryside and reconstructed. The N'Djamena Subdivision became an organized, functioning road maintenance unit. The major part of the project's planned offshore procurement was completed, including the purchase of 13 Mercedes trucks with spare parts, 6 pieces of Caterpillar road building equipment with spare parts, compactors, an office trailer, and \$400,000 worth of shop tools. The Maintenance Training Brigade was established, training 77 personnel and completing 1,763 km of road rehabilitation and maintenance in 2.5 years. Local procurement was a major facet of the project, but problems resulted from OFNAR's overly complex and slow procurement system and the lack of an adequate system for inventory control. Recent modifications to the system are remedying the situation. The reconstruction of the Djermaya-Dandi Road is about 80% completed, though the actual final cost is unclear. The World Bank has decided to add the money needed to construct an asphalt paved roadway.

Through close cooperation among A.I.D., OFNAR, the Ministry of Public Works, and the TA Team, the project goals and objectives were largely achieved. The project successfully helped restore previously unserviceable equipment, rehabilitated central administrative and workshop facilities, and procured the necessary equipment and tools for their operation. It also established and equipped a maintenance training brigade, and trained supervisors, administrative personnel, equipment operators and mechanics. Further, the project initiated systems and procedures to develop OFNAR's institutional capability to plan and manage road and equipment maintenance operations. These achievements have increased OFNAR's physical capability to maintain roads and equipment. Thus, the framework is in place for OFNAR to be a technically competent and financially responsible road maintenance organization.

With the advent of other donor agencies, particularly the World Bank, future TA in the Phase I Extension of the project will concentrate on strengthening institutional development within OFNAR, installing management information systems, establishing structured training procedures, and developing the N'Djamena Subdivision into a technically competent, financially responsible road maintenance unit capable of maintaining 750 km of road annually. (Author abstract)

PD-ABB-383 Final Evaluation Report(24) Rec_no=60028
Project assistance completion report : southern road maintenance and rehabilitation project (650-0043)
USAID. Mission to Sudan
25 Jun 1990, 7 p. [7 p.]
Title supplied by cataloger
Project No: 6500043

PACR of a project (8/83-2/90) to rehabilitate 209 km and maintain 1,469 km of primary roads in southern Sudan, and to strengthen Sudan's Roads and Bridges Public Corporation (RBPC).

The deteriorating security situation in southern Sudan severely affected project activities. In 12/86, the project scope of work was reduced to providing local and overseas training and maintaining Juba town roads, the Juba workshop and compound housing, and the project fleet. Major accomplishments included: rehabilitation of 150 km of Juba/Torit road; maintenance of 190 km of the Juba/Numili road and of 55 km of Juba town roads; provision of vehicles, loaders, bulldozers, graders, and generators; and training of technicians (mechanics, welders, operators, electricians) to perform maintenance and rehabilitation. Although the RBPC's capability to carry out maintenance and rehabilitation was improved, additional programs in this area are recommended.

Major lessons learned were as follows. (1) Security conditions should be given proper consideration before starting a project. (2) Depending on security conditions, alternate work programs should be allowed. (3) Once procurement programs are started, they should be completed for the economic benefit of both the donor and the recipient country. (4) Local currency funds must be obligated and earmarked at least six months ahead of project execution. At the start of this project, monthly local currency releases hindered the work program severely.

PN-ACB-393 Other USAID Supported Study/Document(54) Rec_no=95345
Managing and financing rural road maintenance in developing countries
Schroeder, Larry
Associates in Rural Development, Inc. (ARD)
USAID. Bur. for Science and Technology. Ofc. of Rural and Institutional Development (Sponsor)
May 1990, vii, 47 p. [51 p.]
Related document: PN-ABF-992
Contract number is listed incorrectly in the document as DJR-5446-Z-00-7033-00
Project No: 9365446
DHR-5446-Z-00-7033-00

PN-ABU-305 Reference Document(61) Rec_no=84910
District council road maintenance budgets : contract maintenance
Construction Control Services Corp.
USAID. Mission to Pakistan (Sponsor)
Apr 1990, ca. [100] p. [84 p.] : charts, statistical tables
Project No: 3910480
391-0480-C-00-8246-00

PN-ABR-049 Handbook/Manual(63) Rec_no=78500
LD [local development] II program : road maintenance management system operations manual
Wilbur Smith and Associates, Inc.
USAID. Mission to Egypt (Sponsor)
[1990], 23 p. [25 p.]

Project No: 2630182
263-0182-C-00-3001-00
263-0182-C-00-8017-00

PN-ABR-050 Other USAID Supported Study/Document(54) Rec_no=78501
LD [local development]-II urban project : issues and economics of road maintenance in Egypt
Wilbur Smith and Associates, Inc.
USAID. Mission to Egypt (Sponsor)
[1990], 18 p. [23 p.] : charts, statistical tables
Project No: 2630182
263-0182-C-00-3001-00
263-0182-C-00-8017-00

World Bank

Transport: Roads and Highways: Construction & Maintenance
<http://www.worldbank.org/transport/roads/con&main.htm>

The topic of construction broadly encompasses the issues relevant to the process of road construction and maintenance, including the design, contracting, implementation, supervision, and maintenance of roads and related structures, such as bridges and interchanges. For purposes of the knowledge base presented here, the topic covered includes public works, private contracting of civil works, and labor-based construction techniques. With respect to the process of maintenance, this includes road maintenance in general, as well as the private contracting of maintenance activities. In addition, issues related to the area of construction and the environment are also included, such as construction and maintenance environmental impacts and mitigation, and construction site safety.

Key Issues

The knowledge base is divided into three main topic areas with key issues under these topics, as follows:

Construction

Public Works | Contracting of Civil Works | Labor-based Construction & Maintenance Methods for Road Works | Construction Safety | Unit Costs of Construction & Maintenance Works

Maintenance

Road Maintenance | Maintenance by Contract | Monitoring, Implementation and Evaluation of Roads.

Environment

Roads & the Environment | Construction & the Environment | Maintenance & the Environment

Construction

Public Works

While adoption of competitive bidding for road and other civil works has been the norm in most countries of the world, some countries do not have a sufficient industry of independent contractors and road works are mostly done by force account or awarded to state construction agencies on a negotiated basis. In many of these countries, not only are cost high and quality low, it is common for suppliers of construction materials and services to have monopoly power, further increasing inefficiency and lowering quality. In these situations, it is a combination of transferring work from the public to private sector and the introduction of competition into operations that is often the best way to decrease inefficiency and improve quality. Introducing competitive bidding into public works contracts is also often an important first step to this goal. Secondly, the contracting out of the works function requires the introduction of competition into the operation of road agencies themselves, either by the greater use of existing private contractors, or by allowing public sector agencies to compete with the private sector.

Contracting of Civil Works

Where the private sector is relied on for the construction of roads, it is the bidding and contracting documents which are the foundation of the construction process. In recent years, as the process of contracting has quickly evolved, and contractors have experimented with new ways of acquiring new business and enhancing profit, there is an awareness of the need to refine these basic documents, particularly in the areas of risks and incentives. The construction industry has historically not dealt well with risk, leading to many failed contractors through poor planning, poor budgeting, and poor resource management. On the owner's side, the push to minimize costs is often an absolute goal, regardless of market realities, resulting in impossibly low prices being accepted as part of bids and contracts which give owners all the rights and contractors all of the obligations. To overcome these problems during road construction, risks must be properly defined and the remedies associated with these risks spelled out in a way that eliminates the incentive of the contractor to bid other than at his best price. The owner must also be protected against irresponsibly low bids that later result in excess claims and controversy. Apart from insisting on clarity of contract terms, the owner should also carry out close scrutiny of the bidder's credentials and the responsiveness of his bid, and they should also be linked to awarding to the lowest responsive, responsible bidder. New approaches, ranging from management contracts to BOOT, should be considered as valid options, together with the more traditional methods of bidding on the basis of existing designs and specifications.

There are options for creating an enabling environment for the construction industry, thus leading to more involvement of private contractors and consultants in improved management of road assets. The process, which is of particular importance for economies in transition, begins with separating the functions of planning and management from implementation of road works. Different forms of contract have several implications on the risk allocation between client and contractor; the risks to the highway agency tend to decrease as the agency shifts from force account (or direct labor) to short- and long-term forms of contract with the private sector, including concessions.

Labor-Based Construction and Maintenance Methods for Road Works

Using labor-based methods for road works has been an important part of the strategy to improve rural transport infrastructure in Africa over the past twenty-five years. These methods not only produce gravel roads of equal quality to those produced using equipment-based methods, but they also generate rural employment in a cost-effective manner. Although labor-based methods have proved to be a cost-effective alternative to equipment-based methods in many low-wage Sub-Saharan African countries, these methods have not been applied on a large scale.

The Rural Travel and Transport Program (RTTP) - a component of the Sub-Saharan Africa Transport Policy Program (SSATP) - launched a study to find sustainable solutions to this problem. An example of one labor-based road maintenance scheme used in Kenya is attached. The RTTP, with the support of a number of bilateral donors, has over the last two years examined experiences in Africa to identify why labor-based programs have not been adopted on a large scale and to develop appropriate reforms.

Experience gained under the RTTP identifies two key reforms that are necessary to mainstream labor-based programs, but which have not received the attention they require. These are improved financial management, to ensure that funds flow adequately and laborers are paid on time, and decentralization, to streamline payment procedures and strengthen stakeholders' support of these programs. These two reforms, together with government commitment, effective labor laws, appropriate design standards, and training, should facilitate the mainstreaming of labor-based programs in countries where such methods are feasible. While addressing these reforms, program designers can begin to establish a suitable delivery mechanism. To learn more about a technical paper on expanding labor-based methods for road works in Africa, [click here](#).

Construction Safety

The safe and efficient flow of traffic through work zones is a major concern to transportation officials, industry, the public, businesses, and commercial motor carriers. The following illustrates the programs some highway agencies are developing:

Maintenance

Road Maintenance

Proper road maintenance contributes to reliable transport at reduced cost, as there is a direct link between road condition and vehicle operating costs (VOC). An improperly maintained road can also represent an increased safety hazard to the user, leading to more accidents, with their associated human and property costs. Examples of ways in which different countries contract road maintenance services. In general, road maintenance activities can be broken into four categories:

Routine works. These are works that are undertaken each year that are funded from the recurrent budget. Activities can be grouped into cyclic and reactive works types. Cyclic works are those undertaken where the maintenance standard indicates the frequency at which activities should be undertaken. Examples are verge cutting and culvert cleaning, both of which are dependent on environmental effects rather than on traffic levels. Reactive works are those where intervention levels, defined in the maintenance standard, are used to determine when maintenance is needed. An example is patching, which is carried out in response to the appearance of cracks or pot-holes.

Periodic works. These include activities undertaken at intervals of several years to preserve the structural integrity of the road, or to enable the road to carry increased axle loadings. The category normally excludes those works that change the geometry of a road by widening or realignment. Works can be grouped into the works types of preventive, resurfacing, overlay and pavement reconstruction. Examples are resealing and overlay works, which are carried out in response to measured deterioration in road conditions. Periodic works are expected at regular, but relatively long, intervals. As such, they can be budgeted for on a regular basis and can be included in the recurrent budget. However, many countries consider these activities as discrete projects and fund them from the capital budget.

Special works. These are activities whose need cannot be estimated with any certainty in advance. The activities include emergency works to repair landslides and washouts that result in the road being cut or made impassable. Winter maintenance works of snow removal or salting are also included under this heading. A contingency allowance is normally included within the recurrent budget to fund these works, although separate special contingency funds may also be provided.

Development. These are construction works that are identified as part of the national development planning activity. As such, they are funded from the capital budget. Examples are the construction of by-passes, or the paving of unpaved roads in villages.

Maintenance by Contract

Contracting for specific items of maintenance work, such as the resealing, overlay or reconstruction of a specific length of pavement are widely used and there is considerable experience of this. However, particularly for road maintenance works, there is often a need for contracts to cover a wider scope of work. For example: Algeria, Belgium, Brazil's DNER, British Columbia, Chile, Kenya, Malaysia and Pakistan use standard contract documents which may be different for major and minor maintenance works. Routine and periodic maintenance operations are sometimes contracted separately. This practice is used mostly in Chile, Kenya and Pakistan, and is applied frequently in other countries to more complex periodic activities, such as pavement or bridge repair work. In Algeria and Brazil, maintenance contracts for specific road sections combine execution of routine and minor periodic maintenance.

Some countries, including Canada (British Columbia), the United Kingdom and Malaysia have experience of including all maintenance activities on specific routes, or within entire geographic areas, in comprehensive maintenance contracts combining both periodic and routine works. Learn more about the experience of British Columbia in privatizing its road and bridge maintenance function. Contractors additionally are responsible for managing the maintenance and operations programmes, including performing routine patrols and detailed inspections to identify needs, setting priorities, scheduling the work, and public relations. The contracts used by British Columbia now have a five-year duration, whilst the United Kingdom is using three-year contracts. Malaysia uses contracts of two-year duration. Contractors in these countries indicated that they consider five years is appropriate to provide them with sufficient incentive to invest in costly, specialized equipment.

To address internal inefficiency and accountability issues, a number of Latin American countries have, over the last decade, moved decisively and successfully from force-account (direct labor) to contract maintenance. There has also been considerable progress in the region to transfer to the private sector, through concessions, the responsibility of improving, maintaining, and operating high-traffic volume roads, the cost of which is recovered from tolls. Among the most advanced countries in this respect are Argentina, Brazil and Chile. More recently, some countries, particularly Argentina, have switched from the traditional quantities and unit price-based short-term maintenance contracts to long-term performance-type or results-based contracts. The new approach encompasses either routine maintenance activities alone, or integrated contracts involving both the rehabilitation and routine maintenance of road networks (such as the Contrato de Recuperación y Mantenimiento (CREMA) system in Argentina). A paper, "Areawide Performance-Based Rehabilitation and Maintenance Contracts for Low-Volume Roads," presents a framework for extending the CREMA concept to cover both the paving and future maintenance of low-volume roads.

Cutting the cost of road maintenance and improving road conditions are the main reasons why several Latin American countries have started to look for new ways of contracting out road maintenance. With technical assistance from the International Road Federation and German Aid, Colombia, Brazil, Guatemala, Peru and Uruguay have initiated so called Performance Specified Road Maintenance Contracts on a pilot basis. In addition, Argentina and Chile have let several such contracts recently. In this scheme the Road Authority serves as the owner, but out-sources both the management and production of the maintenance work to a single contractor. Most of these contracts have been operating for more than a year and cover routine maintenance and, in some cases, periodic maintenance and road rehabilitation as well. Extension of the road network, road surfaces and conditions, and the time period vary in each pilot project and will provide a wide basis for evaluation and improvements.

This article provides an overview of the different pilot projects, giving special attention to the performance specifications and control procedures, how these contracts have been implemented, and what lessons can be learned so far. "Performance Specified Road Maintenance Contracts - The Road to the Future: The Latin American Perspective."

Monitoring, Implementation and Evaluation of Roads

Construction, especially with respect to the contracting and bidding for civil works, requires the effective evaluation and supervision of contractors and their bids. Without this ability at tender, marginal or unacceptable bidders can distort the bidding process by excessive underbidding for contracts or future inability to complete. At the point of construction, poor contractors can raise owner's supervision and staffing costs substantially. Management of the road network requires different information, at different levels of the decision-making process, for example, for planning, for programming, for design, and for implementation. The data to be collected by an inspection system, and where, and how it should be collected, depend largely on the use of the data. Senior managers in road administrations may also be required to make decisions about the choice of computerised road management systems that are to be implemented within their organizations. The consequences of such decisions can be very costly, not only in terms of the cost of initial system procurement, but also because of the on-going costs of system management and data collection. The implementation of systems can have far-reaching effects on all aspects of the operation of the road administration. Hence, it is important that managers are aware of the need for an effective approach to system implementation, and of the pitfalls of making inappropriate decisions in this area.

Environment

Roads and the Environment

Roads have significant impacts on both nearby communities and the natural environment. People and properties may be in the direct path of road works and affected in a major way. People may also be indirectly affected by construction, through the disruption of livelihood, loss of accustomed travel paths and community linkages, increases in noise and pollution, and more road accidents. Disturbances to the natural environment may include soil erosion, changes to streams and underground water, and interference with animal and plant life. New roads may bring development to previously underdeveloped areas, sometimes causing significant effects on sensitive environments and the lifestyles of indigenous people.

Construction and the Environment

The construction process has particular environmental impacts and mitigation options at each level of work: site establishment and setup; construction work activities; and, site restoration after the completion of work. During site establishment it is the location of work facilities and resources that is the key environmental issue. During construction, on the other hand, erosion is a major risk and can be prevented by prompt planting and control of runoff water. Traffic, noise, waste disposal, and work practices are other important factors which need to be managed by road contractors. Restoration of work areas, especially quarries, borrow pits, work depots, and material storage sites, is an important aspect of contractor responsibility. Provision is also often required for follow up maintenance of restored vegetation.

Maintenance and the Environment

Environment is seldom taken into account in the design and implementation of road maintenance tasks. While impact might be gradual because of the limited size of maintenance works, it is noticeable throughout the road network. The frequency of road maintenance operations can facilitate the implementation of standard good practices. Environmental consideration should be included in road maintenance programs and should be looked at from methodological, technical, economical and institutional/contractual points of view.

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Guade J. and H. Watzlawick. 1992. "Employment Creation and Poverty Alleviation through Labor-intensive Public Works in Least Developed Countries." International Labor Review 131(1):3-18.

Nilsson, C. 1993. "Labour-based Contracting." ASIST Bulletin 2. Geneva: International Labour Organization. December.

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Lantran, Jean-Marie. 1990. "Developing Domestic Contractors for Road Maintenance in Africa." SSATP Paper, Contracting Out Series, Volume 1.

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Publications Available From the Transport Help Desk

Sergio, M. 1991. "Assessment of Road Maintenance by Contract." World Bank, Report No. INU-91, Washington, DC.

Transport: Roads and Highways: Institutional and Management Structures for Roads

<http://www.worldbank.org/transport/roads/inst&sm.htm>

Overview

This knowledge base deals with the way institutional responsibilities are assigned for managing different parts of the road network and how each part of the network is managed. Areas covered under institutional responsibility include establishing the legal status of roads and the assignment of responsibility for designated and undesignated roads. Under management arrangements, areas of discussion include restructuring existing road agencies, centralizing management of small road networks, contracting out planning and management of roads, and dealing with undesignated roads.

Key Issues

The following are the key issues related to institutional and management structures for roads. Topics are divided into two areas, institutional responsibility and management structures.

Institutional Responsibility

1. Establishing Legal Ownership

The formal way of establishing ownership - and hence assigning primary responsibility for management to a particular road authority - is by designating the road. The notice which does this cites the Act under which the road is to be designated, the location of the road, the responsible highway authority, and the functions to be delegated to the road agency. In this way, responsibility for certain roads may be assigned to central government, local government, or to a private entity (for example, as in the case of private sector toll roads).

The functional class of the road may also raise the need to reclassify selected roads and transfer them from one highway authority to another. As far as possible, this process should avoid splitting responsibility. Trunk roads should ideally only be managed by one agency or, when delegation is considered desirable, arrangements for delegating and paying for the delegated responsibilities (e.g., maintenance) should be clearly spelled out. Furthermore, when roads are constructed or upgraded as part of programs in other sectors (for example, agriculture and forestry), they should be planned in collaboration with the potential road agency and then designated and assigned to them once construction is complete.

2. Responsibility for Designated Roads

In some countries, central government is the highway authority for all designated roads, although the central government may delegate some of these responsibilities to local government agencies, or to other competent bodies (as in Ghana, where some responsibilities have been delegated to selected municipalities). However, it is more usual for central government to only take responsibility for the main road network (in Federal countries like Australia, Canada and U.S.A., the main road network often falls under the jurisdiction of the Provincial government). Urban district councils (municipalities) are then designated as highway authorities for urban roads, and rural district councils as highway authorities for all designated rural roads.

3. Responsibility for Undesignated Roads

The remaining roads which have not been designated and assigned to a legally constituted highway authority, are regarded as private roads and generally receive no public support for construction or maintenance. These roads belong to logging companies, commercial farmers, and local villages. Since the roads are undesignated, it is more difficult to establish who owns these roads, and who should be responsible for maintaining them. That is why some countries have introduced procedures which encourage the owners of undesignated roads to register their interest in a specific road in return for support with construction and/or maintenance. For example, in Finland, adjoining land owners are encouraged to form themselves into road cooperatives for purposes of managing private roads, while in Ontario, Canada, they are encouraged to form local roads boards, or even to register as individual owners of a road, for purposes of managing undesignated roads. Over two-thirds of Sweden's roads are managed by private road associations established in law, which may benefit from some technical and financial support from the national road authority. In all cases, there are financial incentives to encourage participation in the schemes. One of the keys to the success of the cooperative roads program, is the strong legal basis which clearly defines who owns the road, how it will be managed and how government will finance part of their costs.

Management Structures

4. Restructuring Existing Road Agencies

A lot of restructuring is currently going on. It varies from the kind of mild restructuring going on in Australia and Zambia, to the kind of radical restructuring which has taken place in Colombia, Finland, Namibia, New Zealand, South Africa, Sweden, Ghana and Malawi. The objective is nearly always the same. To introduce a more commercial approach to management of roads, by creating: (i) more autonomous and accountable management; (ii) a more market-based approach to setting priorities; (iii) better staff incentives; (iv) a more flexible staffing structure; and (v) better accounting systems combined with tighter financial discipline.

Management boards are becoming increasingly common. The best examples have independent chairmen and include members representing road users and the business community. In some cases, there are independent chairmen and members. The board may perform an advisory role (as with the Japan Road Council and the Highways Agency Advisory Board in England), or they may be non-executive boards having full "control of the management, property, business, funds and any other matters relating to the [highway authority]" (as in New Zealand, Finland, South Africa and Ghana). The boards normally

delegate day-to-day management of the road agency to a Chief Executive, who is assisted by several line managers responsible for functions such as maintenance, development, finance, and administration.

The road agency still reports to a parent ministry, as do other transport enterprises (the airline, railways, etc.). The relationship between the board and the ministry can often be a source of conflict, particularly when someone from the ministry is chairman of the board. The best arrangements appear to be where the chairman of the board is independent, the road agency prepares a rolling corporate plan and then uses that to negotiate an annual performance contract with the parent ministry (the Minister). Transit New Zealand, the UK Highways Agency and the Ghana Highway Authority all do this.

Other reforms tend to focus on reducing staff by contracting out most design, supervision and implementation work, improving terms and conditions of employment, strengthening other staff incentives (for example, through payment of bonuses, provision of training, etc.), and permitting the board to hire and fire staff on a normal competitive basis. Redundant staff are offered redundancy packages, and generally receive other forms of support to help them become small-scale contractors.

Complementary reforms generally focus on financing arrangements, introduction of modern management information systems, commercial accounting systems (including a balance sheet to record assets), and independent technical and financial auditing.

5. Centralizing Management of Small Road Networks

Small towns and rural districts often have quite small road networks which cannot support an effective road agency. In such cases, government often takes back the responsibility for roads and assigns it to a central government agency which manages the road networks on behalf of the small urban and rural districts. There are two general cases: (i) responsibility is assigned to an existing ministry, usually the Ministry of Works or Local Government; or (ii) responsibility is assigned to a newly formed special-purpose department within an existing road agency, or ministry.

The first case is often associated with donor-financed projects. Donors wish to finance construction and rehabilitation of rural roads, they cannot find any competent local-level road agencies, so they agree to channel their funds through a central government ministry which appears to have some responsibility for local roads. Although such arrangements ensure that donor funds get disbursed, they do so at the expense of long-term sustainability. The central government is normally happy to handle the donor-financed program, but fails to: (i) adequately consult local communities on priorities; (ii) makes little or no effort to persuade the local communities to accept responsibility for maintenance; and (iii) often makes no effort to legally classify the roads and have them assigned to a competent road agency. Since the local highway authority is by-passed, the above arrangement further weakens its capacity. When the donor program comes to an end, the roads are simply abandoned. It is no surprise that about a third of the road networks in many developing countries have no legal owners. They are unclaimed and unmaintained; they belong to no one. This strategy should be avoided.

The second case is better, but still represents an interim or short-term solution. It is used extensively in Ghana where they have created two special purpose departments within the Ministry of Roads & Highways. One (Department of Urban Roads, DUR) manages urban roads on behalf of municipalities, while the other (Department of Feeder Roads, DFR) manages the rural road network on behalf of the rural district councils. DUR was created in 1988 to take over management of 2,801 km of urban roads in Accra (partly), Tema, Secondi/Takoradi and Kumasi. The intention is to transfer responsibility back to the urban municipalities as soon as they have developed the capacity to manage their own networks. The arrangement is reasonably satisfactory, although there is a lot of friction between DUR and the municipalities. DFR is often held up as an example of best practice for managing feeder roads. Bangladesh also manages its rural road network through a similar central government agency.

6. Contracting Out Planning and Management of Roads

This is an increasingly popular option. It is being done by existing road agencies who are contracting out planning and management of selected roads to consultants and contractors, is being done for entire road

networks, and is also being done for donor-financed small infrastructure projects (through the so-called AGETIP model).

The first model is being used in UK, Argentina, Australia and New Zealand. In the UK, the process started in 1986 when the UK Department of Transport decided to package parts of the motorway network into commissions and then invited bids from consultants to take on the responsibility for maintaining all roads and related structures within the commission to a prescribed standard. The winning consultant then organizes a competitive Term Contract between the owner (Department of Transport) and the contractor who then carries out all work on instruction from the consultant. In one of the largest commissions (West Yorkshire, with 330 lane-km, 305 bridges, 420 km of drains, 950 road signs and 3,400 lighting columns) costs fell by well over 15 percent, 29 of the 34 DOT staff who were made redundant were taken on by the consultant (one moved to another job and 4 took early retirement), and quality and flexibility of the maintenance regime increased.

The second model involves contracting out the management function for the whole network under the jurisdiction of a selected road agency. In industrialized countries this is generally being done to increase efficiency and as part of the redefinition of the role of government. In developing countries, it is mainly being done to ensure that small urban and district roads are managed by a competent body which remains answerable to the local district council. This model is being used in some small municipalities in the US at the County Council and District level in UK (where it is called externalization), and, in some other cases, is also being used for both urban and rural district councils. These arrangements offer great potential for dealing with small road networks.

The third model is being used extensively in francophone Africa. The AGETIP is a contract executing agency (like a private sector project implementation unit), set up to execute donor-financed infrastructure projects. The agency generally has a board composed of well known figures (which does not include government representatives), a general manager appointed by the board, other line managers (administrative & financial manager, and technical manager), and staff hired under private sector terms & conditions of service who are paid competitive salaries. The agency is set up as a private, non-profit association and pays no taxes. The agency works on behalf of local authorities who delegate certain functions to the agency. The local government usually reserves the right to select the projects and the agency then: (i) recruits consultants to carry out detailed engineering; (ii) invites bids and awards contracts for supervision and works, manages the contracts, and pays the contractors directly from a special account opened in its own name. The agency is subject to bi-monthly management and financial audits, and an annual technical audit. The overhead cost of the AGETIP in Senegal (excluding the fees paid to consultants for designing and supervising works) has worked out to be about 5 percent on a turnover of \$55 million (330 projects).

The advantages of the AGETIP are that it: (i) gets around cumbersome government procurement regulations; (ii) streamlines payment procedures; and (iii) pays high salaries and therefore attracts well motivated, high quality staff. The disadvantages are that: (i) the arrangement is not subject to competitive bidding; (ii) it is almost entirely dependent on continued donor funding; and (iii) it probably hampers development of the local consulting industry (by creaming off staff and monopolizing all contract execution work for itself under a tax-free operating environment). AGETIP nevertheless has a role, particularly as an interim solution in economies where the local consulting industry is relatively undeveloped, but should eventually evolve towards a contractual arrangement awarded on the basis of competitive bidding.

7. Dealing With Undesignated Roads

The main objective in the case of undesignated roads is to persuade people - either individuals, villages, or groups of villages - to take over responsibility for managing their own roads, or as many of these roads as possible. This usually requires three things: (i) an incentive system to persuade them to adopt selected roads; (ii) access to advice and technical assistance to help them carry out the road management function effectively; and (iii) a technical and financial oversight mechanism to provide accountability for use of public (or road fund) resources.

The incentives usually take the form of cost-sharing arrangements. Government, or the road fund, pays part of the costs of construction and maintenance, and the adoptive owners of the road agree to pay the balance. However, to participate in the cost-sharing agreement, the individual or group must formally apply to join the agreement and to abide by its rules. In Finland, they do so by forming themselves into a road cooperative, in Ontario they form themselves into a local roads board, in Zambia under the Social Recovery Project, communities form road maintenance committees to get access to donor and road fund cost sharing funding (75 percent for construction from the former, 25 percent for maintenance from the latter), while in Lesotho they form a Village Development Committee. The cost-sharing agreements with these groups usually use different cost-sharing formulas for new roads, upgrading, and maintenance, and will usually differentiate between roads which serve a limited number of people and those which serve local communities.

In developing countries, local communities - particularly those in rural areas - need to be able to pay their contributions in kind. Most rural communities are at the fringe of the market economy and do not earn enough money income to make cash payments feasible. The payment in kind could either take the form of volunteer labor or provision of local materials. However, it is best to avoid asking for contributions of free labor, since local villagers do not always appreciate the impact of deferred maintenance, particularly on drainage structures. It is generally better to either: (i) pay the laborers a proportion of the wage - perhaps 25 to 50 percent - to provide them with an appropriate incentive, and to treat the remainder of the wage as the community's contribution in kind; or (ii) the community could alternatively be paid to carry out certain essential tasks (e.g., clearing drains), in return for undertaking other tasks on a voluntary basis (e.g., grass cutting); or (iii) the available funds could be used to pay a full-time supervisor (all other labor being provided on a voluntary basis) and to cover miscellaneous expenses (either purchase of tools or food for the voluntary workers).

There is an obvious need for advice and technical assistance at the local level. Local villagers need advice on planning matters, training in how to undertake road works, and advice on how to deal with unexpected problems during implementation. This is usually provided through a local level planning agency and through the agency responsible for managing rural district roads. For example, in Lesotho, villagers acquire planning skills by attending courses at the office of rural development which teach them how to prepare and prioritize road projects and other local infrastructure. Skills needed to implement road works are provided through on-the-job training while working with the agency responsible for rural district roads.

Finally, there is the question of oversight. There is a need to ensure that road works are carried out to an agreed standard, particularly when the agency responsible for district roads may eventually have to take over the road. There is also a need to ensure that funds provided by the government, the road fund, or the local authority are properly accounted for. Technical supervision is usually provided by the agency responsible for district roads. There is generally no need for financial oversight when the local contribution takes the form of volunteer labor. When cash is involved, as might be the case with some urban district roads, there needs to be an oversight arrangement like the one used in Finland (each cooperative must appoint a trustee to manage the funds and the accounts must be audited every year). The system used in Finland is quite well developed and might be used as the basis for developing a model for use in developing countries.

The remaining undesignated roads in Finland and Ontario are regarded as private roads. They receive no public funds for construction or maintenance, and are simply left in the care of the adjoining land owners who are expected to maintain the roads from their own resources. They receive no public funds and have no access to the advice and technical assistance available from an established road agency.

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Transport: Roads and Highways: Overview

http://www.worldbank.org/transport/roads_ss.htm

What are the general trends in the road sector?

- Management of national and state/provincial roads is being increasingly entrusted to a more autonomous agency operating at arms length from the parent ministry, often under an explicit annual performance agreement.
- Steps are being taken to strengthen local government road agencies to ensure that all roads are brought under regular maintenance. The idea of setting up a central agency to manage these roads on behalf of local governments, is increasingly giving way to decentralized solutions, involving contracting out planning and management to consultants, and combining local government road agencies to acquire greater scale (e.g., joint services committees).
- Roads carrying high volumes of traffic (generally over 10,000 to 15,000 vpd) are increasingly being tolled to generate additional revenues. Some are operated as free-standing toll roads, while others are operated as an integrated toll road network. These roads may be managed by the regular road agency, by a separate toll road authority, by a private concessionaire, or may be owned and managed by a private concessionaire. Tolloed roads rarely account for more than about 2 percent of the overall road network in a country.
- Scarcity of government tax revenues is encouraging countries to seek alternative road financing mechanisms. Although toll roads generate extra revenues, particularly on the national road network, they cannot meet the needs of the entire road network. A number of countries have therefore decided to put their roads on a fee-for-service basis. Under this arrangement, road users pay for any extra spending on roads (generally by way of a surcharge added to the price of fuel) and the proceeds from the surcharge are managed through a commercially managed road fund overseen by a board made up primarily of road users and representatives of the business community.
- Planning and management of roads is increasingly being separated from the implementation of road works, either by contracting out all design and civil works to the private sector, or by moving them into two separate organizations which deal with each other under a formal contractual agreement.
- More attention is being paid to the views of road users, either through surveys, regular consultations with them, or by establishing a public-private oversight board. Such boards may advise the Minister on management of roads, or may manage the road network in an executive capacity (usually the national network or equivalent).
- More attention is being paid to the adverse impacts of roads and road traffic, particularly road accidents and adverse environmental impacts. In the case of road accidents, the trend is to establish a national coordinating agency (i.e., a directorate within a ministry), or road safety council supported with an effective secretariat. Efforts are also underway to mobilize private finance for road safety interventions (from insurance companies) and to set up accident reporting systems to enable road safety interventions to be planned and implemented.

Environmental impact analysis is now obligatory for all projects with potentially significant adverse impacts (including resettlement) and is usually tied in to some form of public consultation.

- There is a gradual move away from maintenance contracts based on procedural specifications towards use of performance (or end product) specifications. At the same time, different types of maintenance (e.g., routine and periodic) are being combined into one contract, which may apply to several roads (e.g., they may be area contracts covering a discrete part of the road network) and the contract may be let for an extended period of time (often 5-10 years).
- Road agencies are becoming more business like and are employing better management systems and procedures (road management systems, equipment management systems, etc.) and are improving their financial management and cost accounting systems (among other things, by explicitly accounting for capital items, rather than writing them off as a cash expense as soon as they are incurred).
- There is growing interest in Total Quality Management (TQM) and the standards which have been developed by the International Standards Organization (the ISO 9000 family of standards). TQM seeks to place responsibility for quality assurance with the designers and implementers of works. This requires these persons to develop their own quality assurance procedures which are then certified by an independent third party. Implementation of the procedures is monitored by the client (the road agency) and supervising consultant. Partnering offers a slightly different approach to TQM and is more concerned with the quality of design and implementation, particularly when projects are expected to have adverse impacts on third parties.

Outstanding issues requiring further attention

- Many of the toll roads and maintenance concessions with tolls, are in serious financial difficulty. This seems to be largely due to unrealistic expectations on behalf of government regarding which costs can reasonable be financed through tolls when traffic volumes are below 15,000 vpd. The public-private partnerships, where government clearly accepts that some costs will have to be borne by government, appear to be working better.
- Some countries have a clear strategy and policy towards toll roads. They aim to develop a network of toll roads, revenues are partly or completely pooled to permit cross-subsidization, and toll levels are set to maximize revenues. The private sector participates in these networks within the framework set by government. Other countries do not have such a clear strategy and nor do they have a policy on toll levels. As a result, they are ending up with a fragmented toll road network, only covering roads with high volumes of traffic and with wide variations in toll levels.
- There is concern that long term, area wide maintenance concessions will lead to consolidation of the road construction industry. Small contractors may be put out of business and the industry may consolidate into a small number of large road operating companies. This may reduce competition and, in the long term, this could lead to an increase in costs.
- It is still unclear how the commercially managed road funds will evolve. A few have been set up in the form of public enterprise (i.e., as a separate road fund administration under a board with powers to set the road tariff subject only to a Ministerial "no objection"). However, this is a very new development and it is not yet clear how it will work in practice.

IADB

Road Concessions: Lessons Learned from the Experience of Four Countries

Best Practice Study

by Paulina Beato

<http://www.iadb.org/sds/doc/1205eng.pdf>

Infrastructure: Maintenance of Rural Roads

(Report of Evaluation RE-205/August 1995)

<http://www.iadb.org/cont/evo/ovedocs.htm>

The Bank has a continuing presence in helping its member countries construct and maintain their transportation networks. An important component of this has been supporting the development of rural roads, with the hope of stimulating economic development, incorporating remote areas and helping alleviate rural poverty. The Bank reviewed 8 road projects in the late 1970s and produced a sector summary (GN-1349). The sector summary provided a synthesis of the lessons learned from the Bank's experience with roads, as well as that of other partners in development such as the U.S. Agency for International Development and the World Bank. It also provided recommendations for improving Bank operations.

Report Methodology

The Bank has recently completed seven case studies of rural road projects funded during the 1980s in Colombia, Brazil, Ecuador, Jamaica, Honduras, Uruguay and Panama. The seven cases were global multiple works projects, and provide the specific examples presented in this paper. The cases were chosen as part of the Bank's on-going evaluation program, and were intended to generate lessons learned, rather than evaluate the Bank's performance in the sector. It should be noted that the projects were executed during a difficult period of time for the entire region, consequently their results reflect the impact of the larger forces at work at the time. The *objective* is to provide a concise summary of the relevant issues and findings of these case studies, framed within the context of project rationale, impact, efficiency, sustainability, and alternatives. Maintenance, beneficiaries and environment are presented as key areas of concern for rural road project sustainability.

Major Findings and Some Lessons Learned

With the benefit of hindsight, all seven projects could have benefited from a more ordered, structured framework for design and execution. A strong problem/objective tree, placed within the cause-and-effect hierarchy offered by the logical framework, might have readily identified the implicit assumption of a competitive passenger transportation sector in Panama, that was expected to result in savings for the passengers rather than the transportation operators. Beneficiaries Analysis: The three cases were not based on an analysis of all the stakeholders who would be affected, either positively or negatively, by the rural road programs. The Panama case is illustrative of this need. Only 10% to 27% of the land area in project areas was owned by small farmers, indicating a smaller potential impact of changes in land use. Three of the sample roads were not rural roads at time of ex-ante analysis, based on agricultural employment. Most of the produce is for household or local consumption, so small-scale farmers did not incur significant transportation costs. Other, significant income was generated off-farm through wage labor, or by raising farm animals. The ability to capture road-related savings appeared to be more closely related to farm size, since owners of larger cattle ranches could negotiate better freight rates, their production technologies gained more from centralized collection, and they had greater access to credit in order to expand.

Consistent Development Strategy, Programs and Projects: Based on the Bank's experience, the range of stakeholders is likely to be broad, and it is likely that rural road projects, in themselves, will not be able to address all of their needs and concerns. Rural road projects must be imbedded in a larger development strategy and program in order to play an effective role in meeting the larger economic, social and environmental goals. Road improvements often assume that concomitant investments will be made in schools and education, water, sewers, agricultural extension and credit, and environmental protection that may or may not occur.

A better understanding of the limitations to agricultural development can serve as an effective bridge between the mix of programs needed to meet development goals and the more focused purpose of the road and transportation investment program or project. Road conditions do not appear to be the limiting factor for agricultural production in the three case studies. In the case of Jamaica, 40% of the farmers interviewed felt that lack of credit was the primary bottleneck to production, while only 18% felt that transportation costs were limiting. Farmers were also facing distorted farm gate prices at the time. In Panama, there was limited availability of agricultural credit, with both private sector credit and public sector credit falling between 1982 and 1991 (IICA, 1992). Agricultural development was least affected by transportation costs, and was more affected by commodity markets and government pricing and support policies. Consequently, alternatives to the global multiple works road program might have more effectively addressed the concerns of agricultural development.

Spatial Targeting: One means to improve the linkage between development efforts that include rural roads is by concentrating and coordinating efforts in particular geographic areas. The 8th Replenishment emphasizes spatial

targeting of resources for social sector projects (IDB, 1994). The head count method used in the three cases indicated that the road projects did, indeed, pass through areas of relatively higher poverty, even though the road-related benefits did not clearly pass through to the low income population.

Coordinated Environmental Protection: As illustrated by the three cases presented, direct environmental damage can be effectively minimized within rural road projects through improved design, construction and, above all, maintenance. The secondary impacts are more problematic, however.

Alternative Modalities and Transportation Planning: The Bank has recently adopted alternative modalities for rural road projects, notably time-slice operations, as in the case of Honduras and Panama. Both of these approaches attempt to actively address the maintenance and specific project selection issues within the context of the overall road transportation network. The effectiveness of rural roads projects can be improved by a better understanding of the transportation needs and actual barriers to rural mobility. For example, in the Jamaican case the significant barriers to rural mobility were not directly related to infrastructure, and included a shortage or high cost of vehicles and rural transportation services due to macroeconomic policies. The Jamaican experience also highlights the need to include a network perspective before selecting individual construction projects, in order to avoid the resulting collection of short, unconnected stretches that are difficult to maintain and do not improve the transportation system.

Bank projects are also supporting decentralization and privatization as means to improve the maintenance capabilities for countries. While this represents a positive step by the Bank in its efforts to help borrowers increase the efficiency of delivering public services, the extent to which it will enable extended coverage of the transportation network is unclear. Decentralization is resulting in removing some portions of the road network from central authority and placing them under municipal control. Municipalities may not have the capacity to fulfill their responsibility. While the private sector may find maintenance contracts for high volume, urban or inter-urban highways attractive, it is not clear what incentives exist for private maintenance of low-volume, dispersed rural roads. These questions about the effectiveness of new institutional arrangements and lending modalities suggest that further attention and evaluation of these specific aspects are warranted.

Alternative Construction Standards: Road engineering and construction standards, as well as justification methods, must be matched to project purpose and realities. As presented earlier, roads serve many purposes, and for most roads rational choices for construction standards can be based on expected traffic and savings in vehicle operating costs. The real challenge are those roads with low levels of traffic in remote areas. Two linked problems arise regarding low volume roads, and revolve around maintenance and environmental protection.

Alternative Project Development Tools: Rural road projects have suffered from a multiplicity of objectives, often rooted in the variety of ways in which rural roads contribute to development under different circumstances. Many of the alternatives suggested above can help to untangle this web. In addition, other tools for project conceptualization and appraisal can provide a structured framework for weaving together the various other components mentioned above into a coherent rural road project.

Recommendations

In August 1995, the Board approved three recommendations dealing with maintenance, bottlenecks and reporting requirements in future loan documents.