PERFORMANCE-BASED CONTRACTS WITH MICRO-AND SMALL ENTERPRISES: AN OPTION FOR SUSTAINABLE RURAL TRANSPORT INFRASTRUCTURE

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ABSTRACT

The outsourcing of road maintenance to micro- and small enterprises under performance based contracts (PBCs) has been recognized as an effective approach to rural road maintenance in many developing countries. This type of contacts link payments for the management and/or maintenance of pavements with the contractor successfully meeting or exceeding certain clearly defined minimum performance standards. If structured correctly, road maintenance PBC programs can effectively maintain pavements contributing to the sustainability of the local road networks, while at the same time, contributing to improved social welfare and local economic conditions.

This paper presents the main findings a study that reviewed PBC models for the maintenance of sub-national networks in Latin America. The main conclusions of the study are that (1) small and micro-enterprises are a viable option for providing an effective approach for maintaining roads and creating local contracting capacity and (2) PBC contracts are a practical mechanism for contracting the maintenance of sub-national rural road networks to small and micro-enterprises.

1. INTRODUCTION

The outsourcing of road maintenance to micro- and small enterprises under performance based contracts (PBC) has proven to be an effective approach to rural road maintenance in the Latin American region. The practice provides an effective mechanism for keeping the rehabilitated road in good condition and ensuring the continuation of benefits from improved access. In addition to regularly maintaining roads, the practice also generates long-term direct and indirect employment at the community level.

This paper presents the results of a study that reviewed PBC models for the maintenance of sub-national networks in Latin America. The purpose of the study was to provide guidance to other countries interested in building capacities of small contractors and using them with small-scale PBCs to maintain sub-national roads. Those interested in further details should refer to the main report for the project (1).

2. ROAD MAINTENANCE OUTSOURCING

The appropriate management and maintenance of roads has significant economic and social impacts. Well maintained roads support sustainable development, improve timely and affordable access to hospitals, schools, and needed supplies; enhance the competitiveness of local products and services by facilitating their transport to the consumer markets; and promote economic growth through increased trade (2).

Routine maintenance includes localized maintenance activities that allow the maintenance of minimum levels of access and safety and prevent premature deterioration of the road. Historically, road maintenance has been one of the business functions that most road agencies have conducted by force account (in-house units). However, since it is not a very visible activity, many agencies have placed more emphasis on the construction of new roads that allow them to 'cut ribbons' and gain more visibility and have neglected to assign the appropriate resources to maintenance.

Contracting road maintenance to private contractors emerged in Latin America in the 1970's as a practical alternative for assuring that these activities are actually conducted and that the work is done efficiently and effectively (3). Maintenance by contract was implemented using contractors of various sizes and different types of contracts: contracts using unit prices (admeasure) or lump sum payments, PBCs and hybrid contracts that combine quantity-based and performance based items.

Performance Based Contracts: One of the most popular road maintenance contracting practices has been the use of PBCs. In the PBC, payments are linked to the contractor meeting or exceeding certain performance indicators (or results). This type of contracting transfers some of the risks associated with managing and maintaining the road to the contractor. The scope of a PBC may vary significantly in coverage (e.g., only individual assets or all road assets), number of services included (one service to all maintenance activities), and length of the contract (from a few months to many years).

The World Bank Transport Note TN-27 (4) provides a very detailed overview of this contracting method and reviews the worldwide experience with the PBC approach focusing on large-scale networks that require outsourcing to large- or at least medium-scale contractors.

Micro-enterprises for Road Maintenance: The generic term micro-enterprise has emerged in Latin America to denote a new type of small enterprise with low capital and emphasis on labor-intensive practices created for the maintenance of rural roads or urban streets. While most are cooperative endeavors, the term also includes small single- or multiple-owner businesses. Colombia started using cooperative micro-enterprises for road maintenance in 1984. The types of contracts used to include those based on unit prices and PBCs, with the latter becoming more popular.

Small Enterprises for Road Maintenance: Another practice that has been implemented with mixed success is the contracting of road maintenance to small enterprises established to provide these types of services. Some of these enterprises, as in the case of Uruguay, were formed by former employees of highway agencies who took advantage of early-retirement packages aimed at the reduction of the government workforce. They generally invested at least part of the incentives to fund the entrepreneurial endeavor. While there is no formal difference between the micro and small enterprises, in general the latter refer to contractors with more engineering technical expertise, equipment and financial capacity.

Rehabilitation and Maintenance Contracts: The third practice that has been implemented with good success is PBCs with the private sector that includes rehabilitation and maintenance (CReMa). In Latin America this practice was pioneered by the Argentinean government, which used it for creating capacity and incentives for the maintenance of its non-concessioned national road network. Contractors are paid equal monthly installments for specified services as long as the quality of outputs complies with the technical specifications (5).

3. SUB-NATIONAL PERFORMANCE BASED CONTRACTS IN LATIN AMERICA

The implementation of PBCs at the sub-national level has been slower than at the national level, but it seems to be gaining momentum thanks to successful efforts at the city and county level. For example, several local governments in Peru and Ecuador use road maintenance PBC with micro-enterprises for managing rural and access roads. Furthermore, the distinction between national and local jurisdictions may be irrelevant since the denomination of the various road networks has changed due to many decentralization (or centralization) efforts occurring in the region. However, there are significant differences between the typical PBC programs for rural national road networks and those used by the sub-national programs. Some of the main differences are summarized in Table 1.

Table 1: Comparison of Typical Routine Maintenance PBC Programs

Type of Program	National	Rural Local
Types of roads	Mostly high-traffic routes with good (or reasonable) geometrical standards	Access roads, many of which were built over ancient walking paths with poor geometric standards
Main network function	Connectivity	Access
Main objective(s) of the program	Reduce transportation costs Promote development	Provide access to basic services and markets Provide employment Promote development
Type of performance indicators	Objective, measurable performance parameters	Subjective, fairly general road condition indicators (e.g., passable road, no potholes)
Type of contractors	Medium or large contractor	Micro- and small enterprises
Type of work included under the PBC	Routine and emergency maintenance (and often rehabilitation) using heavy construction equipment when required	Routine maintenance only using mostly labor-intensive methods

3.1. Implementation Rationale

The development of the road maintenance PBC programs in general have been promoted and encouraged by international organizations. In the case of the rural road maintenance programs using micro-enterprises, these agencies have provided support and partial funding for the initial development of the program, pilot implementation, and for the first cycle of operation. This has been instrumental because it ensures/guarantees a commitment to the program, helps demonstrate its effectiveness, and creates a culture of maintenance. In general, the programs have a double objective of improving road maintenance to preserve the value of the road infrastructure and providing employment to alleviate poverty.

In several cases, the practice has also been accompanied by the establishment of Road Funds that also help secure the resources for financing the activities. The flow chart presented in Figure 1 summarizes the criteria that can be considered to decide if the use of labor-intensive routine maintenance PBC with micro or small enterprises is the best approach for any particular case and organizes the decision-making process.

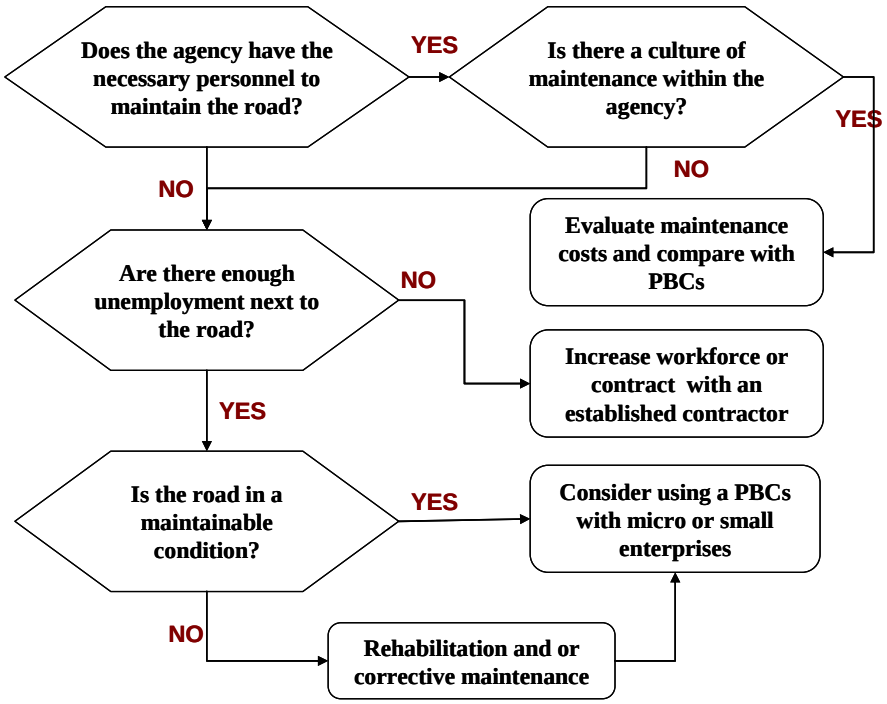

Figure 1. Decision-making process

3.2. Scope of the PBC Programs

Based on a review of over 45,000 km of roads in Latin America being maintained through PBCs, it is clear that the programs implemented include a wide range of approaches, types of road networks, and geographic distributions. In general the sub-national road maintenance PBC programs can be grouped in two main areas:

- Projects with a significant social component in economically depressed areas that use mostly cooperative micro-enterprises; and
- Projects focused almost exclusively on improving the service of the roads that also utilize small, medium, and large contractors.

While the first group relies heavily on external funding for the initial development, the second group includes several examples of programs funded with municipal resources as is the case for those implemented by the cities of Buenos Aires, Guatemala, and Montevideo. Key differences between the two groups of programs include the level of technical expertise of the contractors and the type of performance indicators used. While the projects in the latter group include objective and measurable performance indicators, such as minimum International Roughness Index (IRI), the first group of PBCs utilizes very general and often subjective indicators, such as a clean or passable road. This paper focuses on the first group --projects with a significant social component in economically depressed areas.

4. ORGANIZATION OF THE PERFORMANCE-BASED CONTRACTS

Table 2 lists the various rural road maintenance programs studied. Although the World Bank study (1) included road maintenance PBC in urban areas, only the rural programs are included in the paper.

Table 2: Type and Number of Enterprises

Country	Started	Number
Bolivia	2001	1402
Colombia	1984	~350
Ecuador	2002	36
Guatemala (Emergency)	2002	40
Honduras	1999	70
Nicaragua	1997	37
Peru (1st ph. 95-01)	1995	>295
Peru (2nd ph. 02-)	2002	>363

Schemes for composition of Micro-enterprises: In general there are two schemes for the constitution of micro-enterprises. These differ mostly in the degree of participation from the community in the selection of members:

- Micro-enterprises generated with significant input from the community. In some cases there is a core group of workers that are permanent and other positions (temporary workers) that are rotated among other members of the community.
- Micro-enterprises generated with minimum input from the community. In this case the community helps identify people in need, but a promotion group selects the micro-entrepreneurs based on pre-established criteria.

Types of Enterprises: there are also different types of micro-enterprises based on the type of judicial framework used for their creation. The models used include non-profit cooperatives, associate work cooperatives, associate work enterprises, multi-active cooperatives, and small single- or multiple-owner businesses among others. In general, true corporate models or enterprises (e.g., limiter responsibility corporations) appear to work better than non-profit entities because they allow for the capitalization of the micro-enterprises and the development of additional productive endeavors.

Micro-enterprise Promotion: A significant component of implementing micro-enterprise road maintenance programs focuses on the creation and formalization of the micro-enterprises themselves. This is usually done through a process of promotion. This phase for the generation of the micro-enterprises has been identified as a critical step by most of the programs studied. Details of the various promotion processes used in Andean region can be found elsewhere in references (6) and (7).

Micro-entrepreneurs Selection Requirements: The requirements for the micro-entrepreneurs that would constitute the enterprises are variable; however, in general they include economic need and gender equity. On the other hand, no educational requirements are included in most of the micro-enterprise programs.

Number of Workers: The minimum number of workers per kilometer is usually specified. While some agencies use the same number for the entire network, some of the more mature programs have established different work loads based on the geographic and climatic factors. For example, the program for the national roads in Colombia uses a differential scale that ranges from 5 km/worker in flat land with low vegetation to 2.5 km/worker in mountainous terrain.

5. TECHNICAL ASPECTS

In addition to the differences summarized in Table 1, there are significant differences between the scope, objectives, and performance standards of PBCs aimed at the contractors with a relative basic training typically used for the maintenance of sub-national networks and the established and experienced contractors used for the principal national roads.

Table 3 presents the basic characteristics of typical PBCs for maintenance of rural sub-national roads in Latin America. These include small PBCs with micro-enterprises and larger PBCs with established contactors.

Table 3: Typical Road Maintenance PBCs

Country	Number of Workers	Length		Amount of the Contract (U$S)	Approximate Cost ($/km-yr)
		(km)	(months)		
Bolivia	6-10	25-50	10-12	20,000	800
Colombia	10	41	12-21	60,000	1,000
Ecuador	8	15	12	15,000	800-1,200
Guatemala (Emergency)	N/A	1-5	1.5	variable	N/A
Honduras	14	46	12-18	38,000	1,192
Nicaragua	14	65	N/A	N/A	N/A
Peru (1st phase 1995-01)	15	20-50	12	24,000-28,000	1,200
Peru (2nd phase 2002-)			12		600-1,275

5.1. Contract Characteristics

Most of the micro-enterprise contracts are result- or outcome-based and include only routine and, occasionally, minor emergency maintenance (Table 4).

Table 4: Typical Road Maintenance Contracts

Country	Scope(1)	Technique(2)	Type
Bolivia	R	L	PBC
Colombia	R	L	PBC
Ecuador	R	L	PBC
Guatemala (Emerg.)	R E	L	Hybrid
Honduras	R	L	PBC
Nicaragua	R E	L SE	PBC
Peru (1st ph. 95-01)	R	L	PBC
Peru (2nd ph. 02-)	R	L	PBC

(1) R = Routine, E = Emergency, P = Preventive maintenance
(2) L = Labor-intensive manual work, SE = Activities requiring small equipment, HE = Activities requiring heavy equipment

Performance vs. Output-Based: It is important to note that many of the rural PBCs with micro-enterprises are not strictly fully performance based because the decision of which tasks to conduct each week (or month) is taken by the inspectors, monitors, or supervisors who indicate what must be done and then check that the work has been done. However, the contracts are *output-based* because the inspectors do not in fact measure any

quantities but rather look that the assets selected for cleaning are clean, that the section of road that he or she requested to be maintained is in good condition, etc., and the contracts decide how to do it and when to do it within the specified timeframe.

Tools, Materials and Safety Gear: In some cases the government provides tools, materials, safety gear, or uniforms for the micro-enterprises. This is often a good practice because it ensures that the micro-enterprises have access to appropriate tools in good condition, which helps improve productivity. In cases where the micro-enterprise had to buy the tools themselves, it was noticed that some of the tools were in very bad condition because it is hard for the workers to invest part of the already small payment to replace the tools. The same problem was observed with the safety gear and uniforms; these items are very important to improving the safety of the workers and the visibility of the program, but they may not be considered a priority by the micro-entrepreneurs, who generally face severe financial difficulties.

5.2. Types of Asset and Performance Indicators

Most of the contracts studied include the maintenance or control of following assets: pavement surface, shoulders, ditches, culverts, right-of-way vegetation, and slopes. Contracts include signs (60% of the programs surveyed), bridges and other structures (50%), and pavement markings (30%).

Performance Criteria: The supervision effort, and thus the complexity of the performance indicators, should be commensurable with the cost and scope of the contract. In the case of the rural road maintenance contracts with micro-enterprises, the standards are very general, simple, and often somewhat subjective.

Supervision: Most of the programs control the work through government inspectors, administrators, or road managers that work in close cooperation with the local authorities. One exception is Peru, which worked first with consultants and more recently with road monitors, junior professionals who spend one year supervising the micro-enterprises as part of their professional practice. These monitors work under the supervision of a regional (provincial) engineer from the program. The experience has been very positive.

5.3. Costs and Payments

As expected, the cost of the routine maintenance contracts varies significantly depending on the type of road being maintained, traffic, geographical region, etc.

A typical micro-enterprise PBC for maintenance of rural roads (Figure 2) includes between 15 and 50 km maintained by 10 to 15 workers at a cost of roughly $1,000/km. In general, the costs of maintenance PBCs with micro-enterprises are computed based on typical wages (and need), defined productivity rates (workers/km), and estimates of the various indirect costs. Several agencies use differential costs based on the geography, usage of the road, and vegetation.

Although most contracts include a penalty for maintenance work that does not meet the contractual requirements (normally 5–20% of the monthly payment), some use warranty clauses. However, various agencies indicated that these penalties are seldom enforced; instead, the inspectors usually indicate the problems and the micro-enterprises correct them before the next visit.

(a)

(b)

Figure 2. Example of Micro-enterprise work on Rural Roads in the Province of Cusco.

5.4. Key Implementation Issues

The payment reliability appears to be the most important factor; the micro-entrepreneurs selected are among the poorest in very impoverished areas, so they depend heavily on these payments for their subsistence. Other very important factors identified are enterprise personnel selection, training, and qualifications of the inspectors, followed closely by selection of the performance indicators and then the possibility of renewal of the contracts (labor stability). The main problems encountered during the implementation of the programs are related to the lack of technical and managerial skill of the maintenance workers and difficulties in securing resources for the program in the long term. These problems can be mitigated through training and strengthening of the municipal institutions.

6. RESULTS

In general, the study showed that the contracting of road maintenance activities through PBCs is an effective practice for providing a sustainable local road infrastructure. In particular, the practice of using micro-enterprises has proven very useful because of the double direct effect of improving road conditions and providing employment, in addition to many indirect effects that enhance economic development and quality of life. An example of the effect of the work performed is presented in Figure 3.

(e) Before Maintenance

(f) After Maintenance

Figure 3. Example of before and after conditions in the province of Manabi, Ecuador.

6.1. Benefits

The main benefits of implementing road maintenance PBCs using micro or small enterprises are the following: (1) better service to the users; (2) cost savings; (3) employment generation; (4) increased road management efficiency, and (5) secure maintenance funding.

In addition, the practice can also help meet peak demands, increase flexibility in work programming and execution, enhance the worker's access to services, enhance the profits margins of some of the local products, and enhance general access to services. For example, the evaluation of the micro-enterprise programs in Peru identified a significant impact in the transportation conditions and access to basic services and a small positive impact on production, employment, and poverty alleviation. The analysis also showed a positive impact on access to schools, administration of justice, and health services. There was also a small increase in the size of agricultural land and land values; a small reduction in the unemployment rate, poverty, and migrations rate; and an increase in average wages. The studies also found a very positive perception by the population of the road conditions (5).

6.2. Potential Challenges

Although in general the studied programs have been successful, there have been roadblocks that have required changes and adjustments over the years:

- Determining the best judicial and organizational model for the micro or small enterprises. For example, Peru initially used non-profit enterprises, which created a serious problem when the contracts were later subjected to a tendering process. Peruvian authorities strongly recommended the use of true enterprises or business (e.g., limited liability companies).
- Securing enough sustained resources for maintenance is difficult because maintenance activities lack the visibility of new construction or rehabilitation projects and consequently do not generally provide a high political payoff. Furthermore, the local government's lack of technical, administrative, and financial resources to properly administer the program has often resulted in delays in payments and other problems.
- Determination of fair costs per kilometer. When the programs are started, there is commonly not enough experience, and consequently no good historical records about production rates in different areas. Thus, the contract costs are approximate at best. For example, Peru adopted a flat rate in the first phase and then established differential costs as more information became available. In addition, several agencies originally failed to consider indirect cost such as taxes, social security contributions, and insurance. These costs have a significant impact on the functioning and productivity of the enterprises.
- Developing TORs, contracts, and manuals that include all the required information and standards requirements but are consistent with the education and skill levels of the maintenance workers. The materials should be very clear on the fact that the entrepreneurs are not government employees but rather their own bosses.
- Building the technical, administrative, and financial expertise so that the enterprise can do the work effectively and efficiently and is able to successfully compete once the contracts are subject to tendering.

- The process of promotion, formation, and legalization of the enterprises is critical for the process. Careful selection and proper training of the micro-entrepreneurs to develop their technical, financial, and managerial skills is important.
- If the responsibility of managing the road is transferred to the local communities, it is very important that there is an agency that provides technical, administrative, and financial management training and support to the local governments. Local governments typically lack the necessary expertise and institutional resources to effectively implement and manage these types of programs.

- Minimizing the potential risk that the worker selection is used to pay political favors.
- Breaking social and cultural prejudices against the participation of women in road maintenance activities.
- Building credibility of the programs among a population that is used to abandonment of the roads and institutionally debilitated road agencies.
- Selecting appropriate candidate road sections in areas where there are enough workers living in the proximity of the road to maintain it.
- Finding an appropriate balance between permanent and rotated positions (when needed) in the enterprises to ensure appropriate quality of the work and continuity in the administration while providing opportunities to the larger segment of the population in need as possible.
- Finding an appropriate balance of risks and responsibilities between the various agents involved in the process by optimizing the collaboration between the entrepreneurs, supervisors, and communities.
- Obtaining appropriate legislative changes if necessary. A common problem faced by several programs is that the thresholds for direct contracting are low and in many cases have not allowed contracts that are long enough to consolidate the enterprises. In other cases agencies were able to sign the contracts under the agreements with the international organizations but not once the programs had been transferred to the municipal governments. These direct contracts are generally necessary in the first stages of the programs to create the entrepreneurial expertise that will later allow the micro or small enterprises to successfully compete for the maintenance contacts when they are subjected to a tendering process.

7. CONCLUSIONS

Small and micro-enterprises are a viable option for providing an effective approach for ensuring the sustainability of the local road infrastructure and creating local contracting capacity, especially in remote areas. This practice: (1) improves road maintenance with the consequent increase in service life and improvement in transportation efficiency and in the quality of service to the users; (2) generally results in cost of the routine maintenance somewhat lower than that of conducting the work by force account, (3) directly and indirectly generates attractive jobs in the rural areas, which has resulted in an improvement in the quality of life; (4) help secure maintenance funding; (5) rewards initiative; and (5) creates a sense of ownership of the road in the communities adjacent to the road.

Performance-based contracts are a practical mechanism for contracting the maintenance of sub-national rural road networks to micro-enterprises. Although many of the benefits and positive impacts of the various programs investigated can be attributed mostly to the contracting of the maintenance activities, all the agencies investigated agreed that the use of PBCs is probably the most practical approach, especially for rural road and remote areas. The type of work performed and the remote location of the road segment under consideration make it difficult to measure and control quantities. In these rural programs, it is important that the selected performance indicators match the technical level of the work force. Furthermore, road management and planning of the maintenance activities is generally a collaborative effort between the micro-enterprises, the supervisor, and the local communities served by the road. The use of road management units such as the ones implemented in Ecuador and Peru appeared to be an effective practice.

Because of these reasons, PBCs are a common practice for contracting the maintenance of sub-national road networks in Latin America. The following list summarizes the lessons learned from the experiences reviewed:

- There are significant differences between the scope, objectives, and performance standards of PBCs aimed at the contractors with a relative basic training typically used for the maintenance of local rural networks and those used for the high volume streets and principal national roads.
- The use of micro- and small enterprises for road maintenance has resulted in a successful practice for the maintenance of both national and sub-national networks. The practice provides employment in impoverished regions, helps control emigration, and has often changed the face of rural roads where it has been implemented.
- One key factor that contributed to the success of the practice is that the entrepreneurs get a double benefit from the contracts: they not only receive a secure job but also contribute to bettering the road that they use to get their product to the market and thus increase their competitiveness and profits.
- The measurement of the work performed using results, outcomes, or performance appears to be the most practical way to control the execution of the maintenance works because it is difficult to measure executed quantities. This is consistent with previous studies that have also suggested that performance based measures produce better results than unit price measures contracts.
- Securing sufficient and timely financing is crucial, especially in the case of micro-enterprises. Maintaining a regular and timely pay schedule is very important since the workers cannot afford delays in the payments. Furthermore, long-term funding is essential for program sustainability.
- There has to be some enforcement of the required performance standards, including penalties when appropriate, to prevent workers from becoming used to relaxed responsibilities. A gradual program in which the inspector first issues a warning and then starts using increasingly higher penalties appears to be working in many countries.
- Micro-enterprises have provided good opportunities for road agency staff to start businesses and for the local population to improve their business knowledge and entrepreneurial skill. In many of the countries studied, the creation of the road maintenance enterprises has allowed the micro-entrepreneurs to engage in parallel productive endeavors.

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