The Problems Facing Labor-based Road Programs and What to Do About Them: Evidence from Ghana

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Environmentally Sustainable Development Division
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Foreword

Poverty in Africa is essentially a rural phenomenon, with around 70 percent of the poor living in rural areas and engaged in agricultural activities. Improving rural transport infrastructure is, therefore, an essential component of agricultural development and poverty reduction. The World Bank has been working with other bilateral donors and African governments to address these issues through the Rural Travel and Transport Program (RTTP). This program is a component of the Sub-Saharan Africa Transport Policy Program (SSATP), which is a collaborative framework set up to improve transport policies and strengthen institutional capacity in Africa.

The use of labor-based methods for road works has been an important aspect of the strategy to improve rural transport infrastructure in Africa for the past 25 years. These methods not only produce gravel roads of quality equal to roads made by equipment-based methods, but can be used to generate rural employment in a cost-effective manner. In addition, labor-based methods save on foreign exchange, inject cash into the local economy, transfer knowledge of road works to the local community—a knowledge that will be useful for later maintenance—and reduce damage to the environment.

Although the benefits of labor-based methods are now widely recognized, contractors have been reluctant to use them. The work presented in this report was motivated by an interest in understanding why. The answer to this question is critical for the future rural development of Sub-Saharan Africa: utilizing local resources to improve rural transport infrastructure is essential for developing strong rural economies, increasing incomes, and facilitating access to markets and social services. This study challenges conventional wisdom in this area and shows that the success of labor-based programs hinges on the existence of a conducive market structure, targeting small contractors for training and paying them on time. Unless these requirements are addressed, the use of labor-based methods is likely to be unsustainable.

This report is being issued as a Sub-Saharan Africa Transport Policy Program (SSATP) Working Paper since its findings are relevant to many African countries. SSATP papers are addressed to policy-makers and to managers and planners attempting to improve the performance of the transport sector in Africa. They are also intended to facilitate consensus building among the donor community and key policy-makers in Sub-Saharan Africa.

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<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>AGETIP</td>
<td>Agence d’exécution des Travaux d’intérêt Public Contre le sous-emploi</td>
</tr>
<tr>
<td>ASIST</td>
<td>Advisory Support Information Services and Training for Labour-Based Road Programmes</td>
</tr>
<tr>
<td>BHC</td>
<td>Bank for Housing and Construction</td>
</tr>
<tr>
<td>COSATU</td>
<td>Congress of South African Trade Unions</td>
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<tr>
<td>DANIDA</td>
<td>Danish International Development Agency</td>
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<tr>
<td>DFR</td>
<td>Department of Feeder Roads</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GTZ</td>
<td>Deutsche Gesellschaft für Technische Zusammenarbeit</td>
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<tr>
<td>ILO</td>
<td>International Labour Organization</td>
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<td>RTTP</td>
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<td>Sub-Saharan Africa Transport Policy Program</td>
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<td>UNDP</td>
<td>United Nations Development Program</td>
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Executive Summary

Since the 1970s donors and international organizations have promoted labor-based methods for road rehabilitation as one means of mitigating rural unemployment in developing countries. Labor-based methods create around 15 times more employment per km than equipment-based methods. Unlike other employment-generating programs, labor-based road rehabilitation programs can be justified on financial grounds and, therefore, appear to combine the employment-generating benefits of public works with the efficiency benefits of private sector delivery. Why, then, do private contractors continue to prefer equipment-based methods? This study offers an explanation by drawing on the experiences of a labor-based road program in Ghana.

The literature gives two explanations for contractors' reluctance to adopt labor-based methods. First, contractors believe the cost of learning this new technology is high. Programs designed to promote labor-based methods have always included subsidized training to address this problem. This study argues that focusing on training often diverts attention away from more substantive problems inherent in adopting labor-based methods. Second, and more fundamental, some have argued that the cost of managing large labor forces, which is difficult to quantify in unit-cost comparisons, makes labor-based methods less competitive than equipment-based methods. This study shows that although labor-based methods can be financially more attractive to Ghanaian contractors, market-structure conditions thwart their use. Unit-rate cost comparisons of labor-based and equipment-based methods, therefore, cannot predict firm behavior. In particular, there is a very important distinction between small and large contractors.

Labor-based methods are more attractive to small firms than to large firms. Small firms, because they are small, can supervise their sites themselves and thus find it easier to develop strategies to increase worker productivity and control truancy. Moreover, unlike large firms, small firms who wish to use equipment-based methods face high variable costs: they either own older, less-efficient equipment—with high maintenance costs—or must rent equipment at a high cost. Large firms, in contrast, find labor-based methods much less attractive. Large firms have high monitoring costs because of their size and because they often undertake many projects simultaneously. In addition, large firms have lower variable costs than labor-based firms which must make wage payments of up to 40 percent of their total costs. Thus, if large firms experience a lull, they can underbid small firms for small contracts (“fill in” work) and use their otherwise idle equipment. Thus, while small firms have the incentive to supervise their sites closely and learn to manage large labor forces, large firms have little incentive to do so. Market structure clearly has a strong influence on the adoption of labor-based methods.

The other factor that makes firms resist using labor-based methods is the government’s habitual delay in payments. If payments are late, small labor-based firms are unable to pay their laborers and strikes ensue. Although donors often create mechanisms to ensure timely payments during the pilot phase, these mechanisms are often temporary; and delayed payments once again become common in the program phase. Prompt payments are less critical for large equipment-based firms because their wage bill is lower and because they undertake many
projects at once and can thus "swap" payments from one project to another to help fill the gap. Prompt payments, surprisingly, are also less critical for small equipment-based firms because, in Ghana, contractors are able to obtain supplies on credit (without paying interest in some cases) and can pay suppliers late if they are paid late. Thus, payment delays in Ghana make labor-based methods less competitive than equipment-based methods for both large and small firms.

Although Ghana's experience with labor-based methods is recent, it provides important lessons. Labor-based rehabilitation programs can be useful for generating rural employment and promoting private sector delivery. However, the previous framework for comparing labor-and equipment-based methods—using unit rates—is not sufficient for determining the competitiveness of labor-based methods in the private sector. Instead, this study proposes a framework based on market structure and also emphasizes the importance of timely payments to contractors. The findings indicate that although program designers focus predominantly on training, the success of labor-based programs actually hinges on paying contractors promptly and addressing problems in market structure.
1. Introduction

Employment in Sub-Saharan Africa has become an ever-increasing concern for African
governments and international organizations. For the last five years the population in Sub-
Saharan Africa has grown at an annual average rate of 3.2 percent, while the economy's ability
to absorb labor has grown at only 2.2 percent (Gaude and Watzlawick 1992). Since the early
1970s the World Bank and the International Labour Organization (ILO) have proposed labor-
based road rehabilitation as one method to deal with the growing unemployment problem. For
example, in Ghana labor-based methods employ more than 150 laborers a day to produce 1.4 km
of rehabilitated gravel road per month, which is 15 times more labor than is needed for
equipment-based methods. In addition, studies have shown that labor-based methods not only
produce gravel roads of equal quality than those produced with equipment-based methods, but in
most developing countries, they are economically and financially less costly. Why then have
labor-based programs been so difficult to expand?

1.1 A Brief History of Labor-based Methods

The World Bank and the ILO were among the first international agencies to encourage
developing countries to adopt a labor-based technology in the road sector. Although labor-based
methods were used in the colonial era, by the 1960s most government officials and private firms
in developing countries had a distinct capital-intensive bias. This had occurred even though these
countries were labor-abundant and capital-scarce. The ILO and the World Bank blamed this
bias on government policies that subsidized the cost of imported equipment and set wages above
the marginal productivity of labor (Sadli 1974:368). These policies, they explained, made
equipment-based methods appear cheaper than labor-based methods. The ILO and the World
Bank argued that labor-based methods were justified on social and economic grounds and, later,
that under certain conditions they were actually more competitive financially.

Economic and Social Justification

Labor-based methods were justified socially because they would reduce rural unemployment by
providing jobs on the road sites. The need to address unemployment had become critical in the
1960s and 1970s. In 1971 widespread unemployment in Sri Lanka was linked to an eruption of
violence; in Tanzania urban migration caused social unrest, leading the government to forcefully
remove unemployed workers from the cities. Researchers blamed this unrest on the migration of
the rural underemployed to the cities, which were not capable of absorbing them into the labor
force (Edwards 1974:4). Two factors made rural areas less attractive than urban areas: the
increasing population growth in rural areas and the tendency of government to concentrate
infrastructure and industry in cities. Labor-based road rehabilitation was one means of resolving
both the need for rural employment and the urban bias in infrastructure investment. In Kenya,
for example, between 1986 and 1993 the Minor Roads Program rehabilitated 3,240 kms of gravel roads and in fiscal 1990 alone, employed 20,300 casual laborers.¹

Labor-based methods were economically justified because, when the financial prices for labor and imported equipment were replaced with their shadow prices, labor-based methods were shown to be less costly than equipment-based methods.² Shadow prices were used during the early 1970s because distortions in wages, caused by minimum wage legislation and in equipment costs caused by artificially low foreign exchange rates, made labor-based methods appear more costly than equipment-based methods. In addition, labor-based methods reduced a country’s expenditures on imported equipment, therefore reducing dependence on scarce foreign exchange (Department of Feeder Roads 1989), and avoided delays in procuring imported spare parts (World Bank 1991).

Based on these social and economic justifications, the World Bank and the ILO designed labor-based programs for public sector force account units. These organizations initially focused on the public sector rather than the private sector because distorted factor prices in the economy made equipment-based methods financially cheaper than labor-based methods for private sector firms, and many African countries had not yet developed local private sector capacity for contracting road works. For example, in Botswana, Kenya, Lesotho, and Malawi the government road agencies carried out all aspects of construction, rehabilitation, and maintenance themselves.

**Resistance to Labor-based Programs**

Despite World Bank and ILO arguments that these methods had both social and economic benefits, few governments showed interest in introducing labor-based methods into their road programs. Initially, most government officials and engineers held the common misconception that labor-based methods were a “backward” technological alternative that used no equipment. But the ILO did not propose that African roads be built using no equipment. Rather, it encouraged governments to use the most cost-effective combination of labor and equipment for gravel road rehabilitation. In most countries, this advice translated into using labor and light equipment principally for haulage and compaction.

Yet even after these misconceptions were corrected, developing countries still resisted adopting labor-based methods. A review of the experience in countries such as Bangladesh, Botswana, Brazil, Colombia, Guatemala, Haiti, Kenya, Mexico, and Thailand reveals many reasons why government officials might prefer equipment-based methods to labor-based methods. To begin with, gravel road rehabilitation is comparatively faster using equipment-based methods than using labor-based methods. For example, in Ghana equipment-based rehabilitation is

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¹ The 3,240 km of gravel roads represent 5 percent of the total kilometers of classified road network based on figures from the Republic of Kenya Roads 2000 Program Objective Brochure (1994). The 20,300 casual laborers is based on figures from the Kenyan Rural Access Roads Program and Minor Roads Program Progress Report No. 11 (November 1991). The 20,300 casual laborers represent 0.18 percent of the total labor force based on figures from the *World Development Report* 1994. The total labor force is the “economically active” population, including the armed forces and the unemployed.

² See Coukis (1983:33-34) for an example.
approximately 1.5 times faster than labor-based rehabilitation (Ashong 1994). Equipment-based methods, when properly executed, also are capable of achieving a better riding surface than labor-based methods, which is important for heavily trafficked roads.

Equipment-based methods minimize labor management problems because these methods typically require about ten permanent laborers per gravel road while labor-based methods require more than 100 casual laborers per gravel road (Edwards 1974; Edmonds and Miles 1984:30). Experiences with labor-based programs in Asia have shown them to be plagued by problems of poor supervision, corruption, and low worker motivation (Riverson and others. 1991). Government officials who supervise the sites have added phantom workers to the payroll in some cases, and many projects have been referred to as “make-work” projects because worker productivity has been so low (Gaude and Watzlawick 1992; Bruton 1974).

Equipment-based methods may also have political benefits because government officials can quickly mobilize equipment to do work for their supporters, whereas labor is more difficult to mobilize. Before elections, top government officials in one Southern African country used government tractors to plow farmers' fields and thus garner votes. In addition, equipment-based methods offer more opportunities for rent-seeking since engineers and other civil servants have more contact with established contractors and can gain the benefits of such a relationship. Equipment-based methods also require less working capital, which is a concern for most cash-poor governments. Finally, equipment-based methods can command more funding than labor-based methods if donors will only finance the foreign exchange costs of a project (Tendler 1979a). Therefore, governments that are aiming to maximize donor contributions will find labor-based projects less attractive than equipment-based projects.

**Promoting Labor-based Methods**

To develop stronger arguments for using labor-based methods, the World Bank and the ILO evaluated a number of projects to examine their costs. Whereas labor-based methods had earlier appeared more expensive in cost per kilometer than equipment-based methods, extensive studies based on unit rates for equipment and labor showed the reverse to be true in low-wage countries (less than US$2.50 a day). For example, in the mid-1970s the World Bank used a unit-rate analysis to reevaluate a road construction project that had been completed using equipment-based methods in Kenya, a low-wage country. This analysis showed that the roads could have been built more cheaply using labor-based methods (Tendler 1979a). Because this framework demonstrated that labor-based methods were cheaper than equipment-based methods in most of Sub-Saharan Africa, the World Bank and the ILO began to justify using labor-based methods on financial and not just economic grounds.

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3 The comparative speed of labor- and equipment-based methods depends upon the quantity of work to be executed. The longer the length of road to be rehabilitated, the faster equipment-based methods will be relative to labor-based methods.

4 In contrast to force account units, contractors using equipment-based methods often require a longer mobilization period than contractors using labor-based methods.
Suprisingly, even though labor-based methods were shown to be financially cheaper, private firms in Africa continued to use equipment-based methods. The literature suggests two reasons for this behavior. Contractors accustomed to using equipment-based methods assigned a cost to learning labor-based methods. Although this cost was not quantified, they viewed it as prohibitive (Tendler 1979a). Also, the contractors saw the cost of managing a large labor force (that is, supervision to increase labor productivity and reduce worker truancy) as making labor-based methods uncompetitive with equipment-based methods. Although the competitiveness of labor-based works depends critically on labor productivity, the cost of managing labor is difficult to calculate (Sadli 1974; Hirschman 1958; de Veen 1994).

The ILO used targeted program interventions to address the problems stated above. They trained contractors, thus subsidizing their cost of adopting this new technology, and the ILO promoted the task-rate payment system—a system that pays laborers according to output rather than time—to increase worker productivity. Studies have shown that laborers are motivated to work harder when their wages are tied to output rather than to time. In some developing countries, instituting such a system is difficult because labor unions view it as exploitative. For example, in South Africa in the early 1990s, the Congress of South African Trade Unions (COSATU) initially opposed the use of a task-rate system which tied wages to productivity.

Introduction in Ghana

In 1986 Ghana became the first Sub-Saharan African country to launch a program introducing labor-based methods in the local road contracting industry. The government established a labor-based road rehabilitation pilot project in the Sefwi Wiawso district of the Western region. The World Bank and the United Nations Development Program (UNDP) provided financial assistance for the project; the ILO provided technical assistance. The program designers decided to target contractors rather than government force account units because, at that time, Ghana appeared to have an ideal environment for introducing labor-based methods into the local contracting industry.

Unlike many other African countries, a private road-contracting industry had existed in Ghana since the late 1950s, after independence. By 1986 Ghana's local road-contracting industry was already well developed with private firms capable of executing road works of more than US$2 million and the public sector capable of administering the contracts. In addition, the Ghanaian wage rate was less than US$1 a day—below the World Bank and the ILO’s stated threshold. Because the program targets private firms, it subsidizes the cost of learning labor-based methods by training contractors, and it introduces a task-rate system for paying labor. In addition, until 1994 the program allowed only program participants to execute labor-based contracts, which

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5 Unit-rate build-ups account for the cost of managing large labor forces through a provision in overheads or through an increase in the number of supervisory personnel.


7 In June 1993, COSATU finally agreed to using a task-rate system as part of a framework agreement between three major actors: COSATU, the South African Federation for Civil Engineering Contractors, and the South African National Civic Organization. The agreement says that public works projects will in future, wherever possible, employ people, using a "task rate" system, instead of machines for construction work.
were awarded based on engineers' fixed rates, and not tendered bids. In this way the program protected its contractors from equipment-based contractors outside the program and placed them in a "cost-based" market.

At first glance the program seems to have been very successful: between 1986 and 1994 the program created about 2.6 million person-days of employment, paid US$1.4 million in wages, and rehabilitated 1,190 km of gravel roads. In addition—and most importantly—labor-based methods were shown to cost approximately US$12,035/km with an average rate of completion of 1.4 km/month while equipment-based methods cost approximately US$19,463/km with an average rate of completion of 2.1 km/month (DANIDA 1995). Thus, not only are labor-based methods one third as expensive as equipment-based methods, but they are more profitable in a cost-based market, even though equipment-based methods are faster. This can be demonstrated by calculating and comparing the theoretical monthly profit for both types of contractors assuming they are both paid the equivalent sum of US $21,000/km. In this case a small contractor using labor-based methods will make approximately three times more profit per month than a small contractor using equipment-based methods (Table 1).

Table 1: Monthly Profit for Equipment-Based and Labor-Based Contractors

<table>
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<th>Measure</th>
<th>Equipment-based</th>
<th>Labor-based</th>
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<tr>
<td>payment / km (US$/km)</td>
<td>19,500</td>
<td>19,500</td>
</tr>
<tr>
<td>cost / km (US$/km)</td>
<td>17,694</td>
<td>10,941</td>
</tr>
<tr>
<td>profit / km (US$/km)</td>
<td>1,806</td>
<td>8,559</td>
</tr>
<tr>
<td>speed (km/month)</td>
<td>2.1</td>
<td>1.4</td>
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<tr>
<td>monthly profit (US$/month)</td>
<td>3,793</td>
<td>11,983</td>
</tr>
<tr>
<td>Monthly profit ratio</td>
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a. The cost for equipment-based contractors was calculated by assuming that they tender for works with a 10 percent profit margin. The cost for the labor-based contractor was calculated the fixed rate of US $13,500, which includes a 10 percent profit margin.

Yet although the labor-based methods appear to be more competitive, many contractors were still averse to using labor-based methods. For example, by 1994 many of the labor-based contractors wanted to leave the program or use equipment-based methods on their sites if they were allowed. This paper attempts to answer why.

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8 The cost per km of labor-based rehabilitation is based on contracts from 1987 to 1994. The cost per km of equipment-based rehabilitation is based on contracts awarded in July 1993 and July 1994.

9 In reality, both types of contractors do not receive the same payment per km. Labor-based contractors are paid at a rate calculated by the government while equipment-based contractors tender their rates. No labor-based contractors have been paid US $21,000.
1.2 Principal Findings

Although managing large labor forces is a substantial problem for large firms (as was thought), it is not for small firms. The key to understanding why lies in the market structure for civil contractors. Although donors often use unit-rate cost comparisons of labor-based and equipment-based methods to persuade governments to initiate labor-based programs, these comparisons do not predict firm behavior. In particular, there is a very important behavioral distinction between large and small firms: large firms do not find labor-based methods attractive while small firms do. Large firms have high monitoring costs because of their size and because they often undertake many projects simultaneously. In addition, large equipment-based firms have high fixed costs and low variable costs. They would sooner underbid a labor-based firm and keep their equipment employed, than switch to labor-based methods and leave their equipment idle. Although large firms would only be able to underbid labor-based firms for a short time (or they would be unable to replace their equipment stock), this behavior is not unusual when there is a reduction in the work available in the sector. Thus, large contractors have little incentive to use labor-based methods and learn to manage large labor forces well.

Small firms, on the other hand, can supervise their sites themselves, and so find it easier to develop strategies to increase worker productivity and control truancy. Moreover, unlike large firms, small firms that want to use equipment-based methods still face high variable costs: they either own older, less-efficient equipment—with high maintenance costs—or must rent equipment at a high monthly rate. Thus, small contractors not only have the ability to learn how to manage labor well, they also have the incentive to do so.

Small Ghanaian contractors have successfully managed their labor forces as demonstrated by the strategies they have developed to increase labor productivity and control truancy. For example, contractors found that group work raises productivity because camaraderie encourages the laborers to work harder. Although the Western ideal of employment is often contractual (for example, defining set conditions of service), the relationship between contractors and workers in Ghana is influenced more by trust than by a concrete contractual payment system. With respect to truancy, contractors have had more difficulty with supervisors than with laborers. Contractors, however, have developed strategies to monitor supervisors by either visiting the site themselves (top-down monitoring) or developing a group of informers (bottom-up monitoring).

The second principal finding is that it is the government’s habitual late payments—frequent in so many developing countries—and not contractors’ inability to manage large labor forces, that causes small contractors to favor equipment-based methods. Although program designers often create mechanisms to ensure timely payments during the pilot phase, these mechanisms are often temporary, and delayed payments become common in the program phase. Prompt payments are less critical for large equipment-based firms because their wage bills are lower and because they undertake many projects at once and can thus “swap” payments from one project to another to help fill the gap.

10 “Small” and “large” are defined according to turnover, assets, and number of permanent employees. They do not refer to the number of casual employees.
Prompt payments, surprisingly, are also less critical for small equipment-based firms because Ghanaian contractors operate in a “buyer’s” market which enables them to obtain supplies on credit (without paying interest in some cases) and to pay suppliers late if they are paid late. For small labor-based contractors, in contrast, payment delays often result in strikes. Thus, when payment delays occur, equipment-based sites continue to operate (albeit, often with lower productivity), while labor-based sites often come to a complete standstill. Although the literature on labor-based road rehabilitation recognizes that payment delays are a major problem, it does not recognize how they can affect a small contractor’s decision to use labor-based or equipment-based methods.

1.3 The Labor-based Road Rehabilitation Program in Ghana

Ghana’s road network was originally constructed during the 1950s using capital-intensive methods. The British colonial administration viewed unskilled labor as relatively unproductive, and began constructing roads using the equipment-based methods practiced in Britain. After independence Ghana began developing its local road contracting capacity which, together with government force account units and timber and gold companies, continued to use equipment-based methods to construct the road network. By 1991 there were 146 contractors registered for equipment-based paved and unpaved road construction, rehabilitation, and maintenance. Of these, ten could tender up to about US$2 million and four could complete works of any value. In addition, Ghana had 310 contractors registered for bridges and culverts. Of these, 15 could complete works up to about US$0.8 million, and five could complete works of any value.

The Program’s Emergence

During the late 1970s and early 1980s, the Ghanaian economy declined because of poor economic policies and a deterioration in the external terms of trade. Import volumes fell by one-third, real export earnings by 52 percent, and domestic savings and investment from 12 percent of GDP to insignificant levels. In addition, the repatriation of over one million Ghanaians from Nigeria in 1982/83, together with a prolonged drought, caused unemployment to rise to well over 20 percent. Because the government lacked foreign exchange to import spare parts, it did not maintain its 17,000 km of feeder roads; and by 1984 more than half of this feeder road network had deteriorated and needed rehabilitation. Poor road quality greatly increased the costs of transporting agricultural goods and therefore discouraged production (Department of Feeder Roads 1994). In some fertile farming areas, transportation costs, normally accounting for 15 to 20 percent of marketing costs, rose to as much as 70 percent of marketing costs. The deterioration of rural roads in other areas halted all movement of cocoa to the market (World Bank 1991).

11 Although many of the comments on this paper have pointed out that this condition may be unique to Ghana and not common in the rest of Africa, a study by Taylor (1995) indicates that the same conditions exist in Zambia. Further research should be done to ascertain the prevalence of this condition throughout Africa.

12 Economic figures are from World Bank (1994a).
In 1981—during this economic crisis—the Department of Feeder Roads (DFR) was established as the focal institution for feeder road development. Prior to its establishment, feeder roads were the responsibility of various agencies, including the Ghana Highways Authority and the Ghana Cocoa Board. The DFR operated at four levels: the head office located in Accra; the regional offices located in the regional capitals; road area offices (responsible for 3 to 4 districts); and district offices. At the head office, the DFR planned and integrated feeder road rehabilitation and maintenance within the priorities of the Ghana Highway Authority and the Ministry of Agriculture. At the regional level DFR engineers served as advisors to the regional secretaries and coordinated the distribution of resources among the road area offices. At the district level DFR engineers provided the District Secretary and District Assembly with technical assistance for setting priorities and estimating the cost of rural road maintenance.

In 1984 while on a government-sponsored educational leave in Europe, Bashiru Sakibu, Director of the DFR, learned that the ILO and the World Bank had introduced labor-based methods in such African countries as Botswana, Kenya, Lesotho, and Malawi. Heretofore these methods had only been executed by force account in Africa. Upon returning to Ghana, Sakibu championed the use of these new methods because he believed that labor-based rehabilitation could upgrade the quality of Ghana's rural roads and provide much needed employment in the rural areas. In addition, because labor-based methods could be justified financially, the private sector (Ghana's already well-developed contracting industry) could be used to deliver these services.

**Main Characteristics of the Program**

Although the Ghanaian labor-based program was the first of its kind in Africa (not executed by force account), it shares many characteristics with programs in other African countries. The ILO designed the project so that the main beneficiaries would be the rural casual laborers living near the road works. The ILO and the DFR encouraged contractors to have a casual labor quota whereby at least 70 percent of the casual labor force was local laborers—"new hands"—and fewer than 30 were "old hands"—casual laborers who lived outside the vicinity but had worked with the firm before. This quota was intended to create more rural employment and reduce the contractors' cost of transporting laborers. Furthermore, the ILO and DFR designed the project so that laborers could be paid using a task-rate system. Although this system of payment is normally considered illegal in Ghana—because it does not allow for overtime pay or for paid holidays—the Trades Union Congress did not object to its use, most likely because the casual laborers in the rural areas are not unionized, and therefore not represented by Trades Union Congress.

The ILO also trained participants in labor management, both in the classroom and the field. And, finally, the ILO encouraged the government to reduce the width of rural roads to six meters or less. The government agreed to this change in design specifications because it was in line with the category and purpose of the road as well as the expected traffic levels.

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13 District Assemblies and Secretaries were not yet established at the time the labor-based program began.
The Ghanaian labor-based program is uniquely innovative in providing incentives for contractors to join. The program includes a subsidized training course for contractors and their supervisors. Supervisors complete six weeks of full-time classroom work, using mainly ILO training manuals. Contractors must send four supervisors to attend the course and pay for their living expenses. Unlike ILO programs in other African countries, the program in Ghana trains participants in financial management and tendering procedures. After completing the classroom work, contractors begin 14 weeks of practical field work involving the rehabilitation of a 10km model road. Then, the contractors are given a trial contract to rehabilitate a 5km road. If they perform well, they are awarded a standard contract of approximately 20km.

The program also helps contractors secure commercial bank loans of up to US$160,000 for the necessary light equipment: three tractors (60 HP), six trailers (3m3), one towed water bowser (2,250 liters), one water pump, two vibratory pedestrian rollers, one chainsaw machine, one tipper truck (5m3), one pick-up, and one set of hand tools (cutlasses, pick-axes, rakes, and so on). This loan was designed as a hire-purchase agreement through the Bank for Housing and Construction (BHC): the Ministry of Roads and Highways issues cheques jointly in the names of the contractor and the BHC. The BHC then makes deductions for the equipment leased to the contractor.

The program intentionally reduces the bias against small contractors by creating a special class in which labor-based contractors may be registered to compete for works, and reducing contract sizes in this class to US$350,000 or less to enable small labor-based contractors to bid. Finally, and crucial to this study, during the pilot phase, contractors were provided immediate payments for labor, thereby ensuring an adequate cash flow. These labor payments accounted for as much as 40 percent of the invoice value. At the conclusion of the pilot phase, the DFR stopped providing immediate payments for labor and centralized the payment system. Although centralization was intended to allow the BHC to administer the hire-purchase arrangement from its central branch in Accra, this change had a negative effect on the competitiveness of labor-based methods.

1.4 Methodology

The findings in this study are based on two months of fieldwork during the summer of 1994. This work included interviews with labor-based contractors, their supervisors, and their laborers in five regions of Ghana where labor-based firms were equipped: Western, Brong-Ahafo,

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14 The DFR reduced the amount contractors had to pay to support their trainee supervisors by paying them for their working time on the Model Roads.

15 The loans had a repayment period of four years and an interest rate of 20 percent if they were made in US dollars and 30 percent if they were made in Cedis. The Bank for Housing and Construction protected itself against default by requiring that contractors have collateral to participate in the hire-purchase agreement. The set of equipment and size of the loan varied slightly once DANIDA and USAID came in as donors.

16 The first six contractors who participated in the pilot project submitted labor bills at the end of the month for vetting by the project engineer. The project engineer then inspected the work and issued a check for labor costs so that the contractors could pay their workers on the third day of every month. Payments for work completed (minus the labor advance) were endorsed by the district and regional administrations, and final certificate payments were made at the DFR head office in Accra.
Northern, Ashanti, and Eastern. The interviews focused on labor-based firms that were already equipped because these firms were the first to finish the training course and thus had the greatest experience with labor-based rehabilitation.

Of the 26 equipped firms, 13 were interviewed. Of these 13, two had been prominent equipment-based firms building bitumen and gravel roads before participating in the program; six had been small building contracting firms; three had been small road contracting firms building small culverts before the program; one was an ammunition selling firm and one had undertaken only one contract before the program. This last contractor had been a permanent employee of one of the largest civil engineering firms in Ghana and created his own firm to participate in the labor-based program.

In addition to the equipped labor-based contractors, two unequipped road contractors and one prominent building contractor were interviewed as well as DFR officials, an opinion leader at the district level, and inhabitants in three villages whose gravel roads had been rehabilitated under the pilot phase of the program in the mid-1980s. All interviewees have been assigned pseudonyms to protect their identities.

For the remainder of this paper, “labor-based road contractors” refers to those road contractors who have completed the DFR labor-based course. “Equipment-based road contractors” refers to all those domestic contractors who, whether they have completed the DFR labor-based course or not, continue to construct and rehabilitate roads using the conventional capital-intensive methods—working with graders, excavators, rollers, and tipper trucks.
2. Are Smaller Firms Better at Managing Labor Than Large Firms?

Labor-based methods can only be competitive with equipment-based methods if labor is managed well. As one Indonesian government official concluded, “reasonable levels of labor productivity” are crucial to the success of labor-based programs (Sadli 1974:369). An ILO technical advisor warns that if planners believe such skills to be lacking in a country, they may choose equipment-based methods, for which they can draw on international expertise (Hussain 1993:8).

Statements tying the competitiveness of labor-based methods to labor productivity are not new. Hirschman was one of the earliest theorists to raise this point. He argued that African managers viewed their supervisory role as “new, unfamiliar, and perhaps somewhat uncongenial” and, therefore, were incapable of motivating workers (1958:146). Thus, he concluded that developing countries would have a comparative advantage in industries that do not require well-trained managers to motivate workers. For example, these countries will be better at smelting than at construction, because, in smelting, the machine can play the role of the manager in motivating the workers to keep a steady pace. Hirschman’s conclusion implies that managers in developing countries are incapable of motivating workers to be productive. Is this so?

In their efforts to demonstrate the competitiveness of labor-based methods, the ILO and World Bank have focused on the issue of labor management. Their approach to increasing labor productivity has been two-pronged: institute a payment system that will motivate labor and increase productivity, and train site managers.

Changes in the payment system

Kilby (1961) was one of the first researchers to attribute low labor productivity to lack of financial incentives. In his work he implies that if managers changed the payment structures, African workers would become motivated, and productivity would rise. One such payment system is the task-rate system, whereby laborers are paid a daily wage for completing one task. Several studies conducted in the 1960s and 1970s suggest that a task- or piece-rate system increases worker motivation, and hence worker productivity. For example, a study of Indian road construction workers, found that piece-work payment was associated with production levels 24 to 69 percent higher than work that was remunerated on a time-rate basis; that is, with daily wages (World Bank 1974). Another study by the ILO in Nigeria and Tanzania confirms this result (Horton and King 1981 cite ILO 1963).

These studies have led the ILO to support the task-rate system as the payment system of choice for labor-based programs. Although the ILO cannot dictate what payment system contractors must use after they have completed training, the ILO required contractors to employ laborers on a daily task-work basis and to agree with a training supervisory officer on a task level during training (Osei-Bonsu 1992).

17 Task-work is slightly different than piece-work because in a task-work system the size of the task is calculated so that a laborer can complete only one in a day. In a piece-rate system, the pieces may be small and hence many pieces may be completed in one day.
Training in Labor Management

Organizing and controlling labor is crucial to the success of labor-based programs. Past experiences with labor-based methods have been disappointing because they have been plagued by poor supervision and theft (Riverson and others. 1991). The ILO attempts to address these problems by providing specialized training in site organization and labor allocation. Managing large labor forces on a labor-based road site requires skills that are much different than those needed for equipment-based operations. These skills include leadership ability—a manager will need to organize, motivate, and control large groups of workers. Thus, the ILO argues that time and money must be spent on “substantial programs of managerial training” (Hussain 1993:8).

The Effectiveness of the Two-Pronged Approach

Although the task-rate payment system and management training have helped contractors manage their labor forces, the primary indicator of labor-based contractors’ performance is the amount of time they spend supervising their sites and learning how to manage their labor forces after the training program. While large contractors provide little supervision themselves on their sites, which results in poor management, small contractors provide a great deal of supervision on their sites and learn to manage their labor force well. In fact, unlike the large contractors, these small labor-based contractors have developed their own strategies to increase the productivity of their work forces. For certain tasks, they amend the task-rate system used in the training course and raise production by substituting either group work or a flexible task rate. These small contractors have also developed strategies to mitigate truancy problems.

2.1 Why Large Contractors are Not as Successful at Managing Large Labor Forces as Small Contractors

The Ghanaian labor-based program has accepted many different types of participants: small house-building contractors, former civil servants, entrepreneurs from other sectors, and some small and large equipment-based road contractors. Of all the participants in the labor-based program, the large equipment-based road contractors have the poorest record for speed and quality, while the small contractors have been able to manage their sites well. The reasons for this distinction are twofold: large equipment-based contractors undertake many active projects simultaneously, and large equipment-based contractors have little incentive to learn how to manage labor well.

A large equipment-based contractor, for example, may have a bridge project in one district, a rehabilitation project 30 km away, and a maintenance project somewhere else. Large equipment-based contractors work this way because it helps them cope with the common problem of getting paid late. If a payment is delayed for one project, they can transfer, or “swap,” payments from another project. This strategy works well when all the ongoing projects are equipment-based because the sites employ only a handful of permanent laborers to operate the machines. This strategy does not work as well, however, when one of the many ongoing projects is labor-based
because labor-based sites, with their hundreds of casual workers, require a great deal of supervision. By working on several projects at once, the contractor may be forced to neglect the labor-based road site. Moreover, if a contractor wins a large equipment-based contract while executing a small labor-based contract, his focus will turn to the equipment-based site because larger losses or larger gains will be made there. Small firms, in contrast, execute only one project at a time and can thus provide high levels of supervision; some contractors visit their sites almost every day, and some, three times a week. The contractor who had the highest speed for rehabilitation visited his site every day, even though it was difficult to reach from his home.

This important aspect of comparing labor-based and equipment-based methods is overlooked by the current analysis.

Large equipment-based contractors have little incentive to learn how to manage labor well because their equipment holdings make them eligible to tender for large contracts that are barred to small contractors and when there are no large contracts available, they can still use their equipment to underbid smaller contractors as long as the project site is not too remote. Although, the ILO demonstrated that labor-based methods were 25 percent cheaper than equipment-based methods during the pilot project, this figure does not differentiate between fixed and variable costs. Large equipment-based contractors have high fixed costs and low variable costs, while small labor-based contractors have low fixed costs and high variable costs; for small contractors wage payments often account for 40 percent or more of total costs. Thus, even if labor-based methods are cheaper than equipment-based methods overall, large contractors using equipment-based methods can tender a lower price for a small rehabilitation project than can labor-based contractors. As long as large equipment-based contractors can at least cover their variable costs (that is, costs for fuel, oil, tires, maintenance of equipment, spare parts, and equipment mobilization), they will tender for the project rather than sit idle. Although large firms would only be able to underbid labor-based firms for a short time (or they will be unable to replace their equipment stock), this behavior is not unusual when there is a reduction of work available in the sector. Thus, because large contractors can be competitive for most small contracts using their equipment, at least on a short-term basis, they have little incentive to learn how to manage labor well. It is this fear of larger equipment-based firms underbidding labor-based contractors that has caused the DFR to continue to protect the labor-based firms from competing with equipment-based firms.

If large contractors can compete for small projects using their equipment, why are they signing up to learn labor-based methods as part of the labor-based program? Large contractors have shown and continue to show interest in the labor-based program because it assures them continuous work for four years (the duration of the hire-purchase repayment schedule) at a time when both large and small equipment-based contracts have become extremely competitive. For example, 17 equipment-based contractors tendered for a contract in the Western region to fill bridge approaches for only US$30,000. But large contractors’ interest in the labor-based program is only temporary; they see small labor-based contracts as only secure “fill in” work and plan to return to equipment-based methods once more equipment-based contracts become

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18 A contractor can make more profit on the larger equipment-based contract even if it has a lower profit margins than the smaller labor-based contract. For example, a contractor will make more profit working on a US$3 million equipment-based contract with a 2 percent profit margin (profit=US$60,000), than on a US$300 thousand labor-based contract with a 15 percent profit margin (profit=US$45,000).

19 The only time this contractor does not visit his site is when he is “chasing” a payment certificate.
available. For these reasons the DFR started to exclude prominent equipment-based contractors from the program in 1988.

For small contractors, unlike their larger counterparts, labor-based methods are more competitive. Small contractors either own no equipment and must rent from the market at high rates or own old, poorly-maintained equipment that frequently breaks down. For these contractors the variable costs of using equipment will be greater than the cost of using labor so long as they can manage labor well. Thus small contractors have an incentive to learn to manage labor well.

2.2 Small Contractors’ Strategies for Raising Worker Productivity

The success of small Ghanaian contractors in managing large labor forces is shown by the strategies they have developed to increase worker productivity and reduce truancy problems. These strategies are often improvements on what the contractors learned during the training course and are fine-tuned through experimentation and innovation.

In the training course, contractors are taught that for certain activities, such as excavation and building scour checks, laborers should be assigned individual tasks to avoid freeloading and hence lower site productivity. Many contractors, however, have found the reverse to be true—their laborers are more productive when they work in groups for certain tasks. For example, rather than assign each individual laborer the task rate of excavating $3\text{m}^3$/day, one contractor assigns a group of six laborers the task of excavating $20\text{m}^3$/day. A second contractor assigns a group of workers the task of excavating enough gravel to load the tractor-trailer 1.5 times. This assignment makes supervision easier because it is much easier to count how many times the tractor-trailer has been loaded than to measure out $3\text{m}^3$ of gravel for each laborer (Acheampong, head supervisor).

When building scour-checks in the drains to prevent erosion, some contractors assign four laborers the task of building four scour-checks per day rather than assign each laborer one because “when they work together as a team, they work harder” (Ofori, supervisor). Although the World Bank frowns on group work because it encourages freeloading (Coukis 1983:164), contractors have avoided this problem by allowing laborers to form their own groups. “If [one laborer] is lazy, the group will sack [him] or they will prefer to select someone else” (Acheampong, head supervisor). This finding supports other findings in the literature comparing individual and group work. Marriott’s (1971) study of two car factories found that small groups of workers (two or three) who could choose their colleagues had higher productivity than individual piece workers.

Although, the ILO defines an exact task rate for each activity based upon soil and terrain conditions, contractors make the task rate flexible so that the laborers feel they are being treated fairly. For example, contractors will reduce the size of the daily task one set of laborers must complete if the group is being delayed by another set of laborers. In some cases, contractors reduce the quantity of gravel the gravel spreaders must spread if the gravel pit laborers are

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20 Experiences in other countries suggest that counting trailer loads may not always make supervision easier because it may be difficult to determine whether the trailer is fully loaded.
excavating very slowly. Making laborers feel that they are being treated fairly is important for raising labor productivity.

The practice of making task rates flexible conflicts with earlier attempts by the World Bank to define an exact task rate for each activity. For example, in his guide to labor-based construction programs, Coukis presents a sample calculation for setting the rate for task work (1983:162). This calculation is based on the average measurements of the person-day output of daily-paid workers and is not meant to be changed by the site managers. Rather, Coukis recommends placing the authority to change task rates at the central level.

Contractors prefer to employ women for certain tasks. This preference is surprising given that many other development programs have had to make special allowances to employ women or have had to convince private sector firms to hire women against their wishes. In Ghana, however, labor-based contractors report that women are better than men at removing topsoil with a hoe because “women can bend down and work continuously for one hour without getting up [while] men will try to do [the grubbing] quickly so they can stand up and stretch” (Ofotir, supervisor). Some speculate that women's wider hips allow them to better tolerate a bent position. Women are also better than men at camber formation—building up the road's profile so that rainwater will run off the road surface into the drains—because “women are more careful and have more patience” (Tentkorang, contractor). Some contractors have also assigned women to unload gravel onto the road surface because that task requires little physical strength.

These findings call for a new way of analyzing women's participation in labor-based works. In the past researchers and donors spent a great deal of energy trying to prove that there is little or no difference between the performance of men and women (Howe and Bryceson 1993 cite Brudfors 1989 and Scheinman and others 1989). This defensive posture implies that Africans view male labor as superior to female labor for all activities. But evidence from labor-based road projects demonstrates that this is not the case. Future research should identify the tasks that women perform better than men and then ensure that women are paid fairly for their work.

Although in the training course only men were assigned to the activities that required considerable physical strength, some contractors have developed innovative ways to use both men and women for these activities. For example, one Ghanaian contractor had men do the more physically demanding task of excavating ditches and women do the less difficult task of removing the excavated material. When the task of ditching is divided in this manner, seven men can excavate 140 meters—twice the distance normally assigned—and only two women are needed to remove the excavated material.

Although equipment is often thought of as replacing labor, a few contractors argued that by using more equipment than provided in the hire-purchase arrangement they could actually increase the number of laborers they hire. For example, one contractor said he could hire more men to work in the gravel pit if he had another tractor trailer to haul the increased quantity of gravel. In addition, contractors have experimented with combining labor and the different machines provided by the purchase-hire arrangement to increase productivity. For example, although contractors are expected to treat the tractors and trailers as separate pieces—using six trailers for

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21 Akessiem’s supervisor says during gravelling they will sometimes hire another tipper, especially when the gravel is far from the road site.
loading and three tractors for hauling—some contractors have found that their sites function better if they treat the tractor-trailer combination as one piece and never unhitch the trailer. One contractor states that the tractor driver takes better care of the trailer if it is permanently hitched to his tractor because then he develops a sense of ownership, viewing both the tractor and trailer as his equipment (Obeng, contractor). These innovations may argue for greater care in determining the original set of equipment provided through the hire-purchase arrangement.

Although the task-rate approach is built on the Western ideal of employment being contractual and based on set conditions of service, many contractors increase worker motivation by drawing on cultural traditions. For example, many contractors bring food to share with the laborers each time they visit the site and give bonuses to their supervisors, such as cloth or money. Some contractors will even offer to help the workers with their jobs. These responses likely arise from the traditional African setting, where hired labor was used especially for planting and harvesting.

The hired worker was made to feel like a guest who, apart from his wage, was often entertained with food and drink. The farm owner and his family worked with the hired man and showed him gratitude since, as far as the two parties were concerned, the hired man was working for the benefit of the owner. The agreed cash wage was thus only part of the unwritten bargain, gratitude and 'return favors' being an important part of the laborer's remuneration (Onyemelukwe 1973:115).

The fact that small Ghanaian contractors have developed strategies that improve upon the original concept of the labor-based program demonstrates that labor management is not a principal constraint for small contractors.

2.3 Small Contractors' Strategies to Control Truancy

Of the many difficulties contractors experience in controlling workers on their sites, some are specific to supervisors, such as putting nonexistent laborers on the payroll, favoring a laborer by reducing his or her workload, or quitting. Others are specific to local laborers, such as the reluctance of local villagers to work on the road because the work appears too physically demanding. And finally, some difficulties, such as stealing, arise for both supervisors and laborers alike.

Difficulties Specific to Supervisors

Despite the attention given to controlling laborers in the labor-based literature, contractors have had the most difficulty controlling their supervisors—not their laborers. Labor-based supervisors are extremely important employees because many contractors live and have offices in the cities, often far from their work sites and employees. Thus supervisors, the highest level employee on site every day, must oversee as many as 150 employees at once. For equipment-based contractors supervisors are not as important because the contractor can identify which of the ten machine operators is causing a problem or shirking, even without visiting the site. The supervisor's ability can have a huge effect on the productivity of a labor-based site. World Bank (1975) studies of road construction in India found that "good" compared with "fair" supervision could account for a 33 to 125 percent productivity difference, and "good" compared with "poor"
for a 91 percent difference. This study supports the work of Argyle and others (1958) who found that the type of supervision (general, democratic, or nonpunitive) had a greater effect on the productivity in departments where an incentive payment scheme did not operate and work was not machine-paced.

Contractors have experienced three types of cheating problems with supervisors. In the first case supervisors put nonexistent causal laborers on the payroll— "ghost names"— and then pocket their pay checks. Supervisors try to disguise ghost names from the contractor by increasing the tasks of those laborers who cannot measure. For example, on most sites, the daily task rate for ditching is 10 meters per day. If a supervisor knows that five of his laborers cannot measure, he can give each of them 12 meters of ditching per day, without their noticing. These five laborers will now complete 60 meters of ditching each day leaving 10 meters unaccounted for. This amount then becomes the output of the fictitious sixth laborer.

Contractors use three different strategies to reduce this problem. First, they visit the site and pay laborers themselves. Many contractors described their anger the first time they went to the site, called out the name of each laborer on the payroll, and discovered that many of the names were fictitious. Second, contractors mix old hands with new hands so that the old hands can teach the new hands how to protect themselves from being cheated by the supervisor. For example, the old hands teach the new hands that the shovels and pick-axes are 1 meter long and can be used to measure task rates.

Third, contractors have created a special tier of casual laborers—headmen— to control "ghost names." Most contractors train their headmen to know how to do certain tasks as well, if not better than, their supervisors. Headmen then lead one group of workers (for example, ten men excavating in the gravel pit) while continuing to do the same work as the laborers. Supervisors, in contrast, do not do the same work as the laborers because they are responsible for a number of tasks in different locations. Thus, if a supervisor increases the workers' tasks in order to add ghost names to the payroll, the headman's task will also be increased. If the contractor has developed an open line of communication with the headmen, the headman will report the supervisor. This practice is a form of bottom-up monitoring. Mr. Yeboah, a contractor who developed this strategy, maintains "a relationship with the laborers so they feel free to report incidents [by] chatting" with them. Thus talking with laborers informally develops worker loyalty and makes workers less afraid to approach the contractor to report incidents.

Contractors face a second difficulty if their supervisors favor laborers by reducing their workload. For example, a male supervisor may ask one of the women laborers to be his girlfriend and reduce her task at the work site. This behavior adversely affects workers' morale and lowers the firm's productivity. To combat this behavior, the contractor will calculate exactly what should be accomplished and know which supervisor is supervising each task. If the amount of work accomplished falls short of the calculations, the contractor can punish the supervisor who is responsible. But supervisors have found other means of favoring workers that are acceptable to the contractor. For example, supervisors will give their girlfriends easier tasks, such as carrying water. Although this may affect the morale of the women laborers, contractors have found that it does not affect the productivity of the site substantially because this type of favoritism is culturally more acceptable.
The third difficulty contractors face is their supervisors' leaving the firm because they have either found better paying jobs or do not want to live on site in a rural area. Although this is a problem for all contractors, the loss of a supervisor is a larger financial loss for labor-based contractors because they, unlike their equipment-based counterparts, have directly financed their supervisors' living expenses during the training program. The two strategies contractors use to keep supervisors from quitting are selecting supervisors who are from small villages and do not mind living in a rural area and trying to avoid letting their supervisors remain idle. Boakye, a contractor in the Brong-Ahafo region, found that when supervisors are idle, even though they are being paid, they start to feel insecure and begin "shopping for a better-paid job."

Difficulties Specific to Laborers

Although labor-based programs are often initiated to create employment in the areas surrounding the road site, contractors sometimes have difficulty attracting local laborers at the outset of the project. Based on the experience of the labor-based road program in Ghana, contractors predominantly draw their labor from the agriculture sector, filling their payrolls with by-day farm laborers—laborers who are hired by farmers to work the land for one day's pay. By-day farm laborers earn approximately US$1/day, while contractors pay only US$0.80 per task, which is designed to take one working day to complete (See Appendix 1 for a comparison of casual wage rates across Africa). Laborers initially prefer farmwork, not because the pay is higher, but because they feel the road work looks too physically demanding; they consider excavating gravel a much harder physical activity than weeding. But eventually laborers prefer road work to working by day as farm laborers.

Contractors have developed four strategies to make road work more attractive at the outset of a project. One contractor reduces the size of the daily task each laborer must complete so the local villagers gain confidence in their ability to do the work. He then slowly increases it (Nimako, contractor). Some contractors encourage old hands to socialize with the villagers to convince them that the job is not so difficult (Yeboah, contractor). Another contractor initially brings food to the site as an extra incentive. He states, "if [a laborer] comes six days in a row, [he] gets two cups of rice." Once the villagers begin coming to ask for work, this contractor stops bringing rice (Ansah, contractor). Yet another contractor persuades the village chief and villagers that the result of the work "belongs to them" and not to the contractor or to the government. He explains, "we must know how to persuade people to do work...so that the person feels the work he is doing belongs to him" (Owusu, contractor). This particular contractor had worked as a community developer and felt that his past experience in organizing people to do self-help projects helped him attract labor for labor-based road rehabilitation.

Villagers eventually prefer road works to working by day as farm laborers for several reasons. Villagers prefer continuous work with lower pay to intermittent work with higher pay: employment on the road site lasts at least a few months and as long as one year, while by-day work is unpredictable. In addition, villagers prefer getting paid monthly rather than daily because it forces them to save (Ababio, laborer). Laborers who are paid each day find it difficult

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22 The duration of employment on the road site for a laborer is dependent upon his or her performance and relationship with the contractor. Laborers who are old hands will be employed throughout the duration of the project while new hands will be employed for a few months depending on their performance.
to avoid family pressure to spend the money as soon as it is made. One laborer stated, “if you earn money at the end of the month in bulk, you can save something. If you’re paid daily, then you cannot save” (Ababio, laborer). This same laborer used his savings to build a small mud house. In preferring monthly payments to daily payments, laborers do not consider the foregone interest on their accrued earnings because most informal credit schemes available to them in the villages (for example, susu) do not accrue interest. Moreover, if villagers work on the road, which is a regular paid job as long as their performance remains high, they may be able to qualify for consumer credit from the Social Security Bank. If they work by day, however, they cannot do so. Being paid a monthly wage has additional social benefits. Laborers working on the road site, which is considered a somewhat permanent job, gain respect in their villages. One laborer commented that “people in the village regarded [him] better” once he began working on the road site (Addo, laborer).

**Difficulties Common to Both Laborers and Supervisors**

The primary difficulty contractors face with both laborers and supervisors is stealing. This problem is not unusual for labor-intensive activities (for example, restaurants). How have road contractors confronted this problem? They have developed two strategies to ensure that a supervisor does not steal materials from the site, both of which play the laborers off the supervisors. First, some contractors let the laborers know that they can move up in the company if they work hard and prove their loyalty to the firm. Those laborers who want to move up in the company, for example, old hands, will prove their loyalty to the contractor by reporting stealing (Yeboah, contractor). In one case, a permanent employee stole cement, and three laborers approached a contractor individually to report the incident. Second, some contractors tell their laborers that if materials are stolen, the laborers will be blamed and dismissed immediately. Thus, if a supervisor steals material, the laborer will have nothing to lose by reporting the supervisor.

Contractors have also developed a strategy to prevent casual laborers from stealing tools (cutlasses, pick-axes, shovels, head pans, and rubber boots): laborers are required to show their tools before they are paid (Tenkorang, contractor). Obetsebi, a contractor in the Brong-Ahafo region, allows his laborers to keep their tools even when they go home; but when they come for their pay at the end of each month, they must “deliver the tool.” Contractors have also developed a number of strategies to make the site run more smoothly in general. Contractors will hire one supervisor who is responsible for overseeing the other supervisors. Contractors will also hire their relatives who are loyal to the firm and do not feel too intimidated to report supervisors who are cheating.
3. Do Delayed Payments Favor Labor-Based Methods Over Equipment-Based Methods?

If pay were prompter, I would use the labor because a grader is more expensive (maintenance, fuel consumption, spare parts). If they don't pay promptly, I'd rather use the grader because it would reduce my headaches with labor (Yeboah, contractor).

If small Ghanaian contractors can successfully raise labor productivity, why did many of them want to leave the labor-based program or use equipment-based methods on their labor-based sites? Evaluations of past projects offer few answers to this question. Before 1986 government road agencies were responsible for all aspects of rehabilitation and management in Africa; hence the literature on private contractors using labor-based road methods Africa is scant. One of the few articles found evaluates ILO experience with small-scale contractors in Ghana, Madagascar, and the Philippines. This article argues that the major constraints to small contractors using labor-based methods, have to do "with the general problems faced by [all] small-scale contractors"—namely, obtaining credit, operating within very demanding contractual regulations, and being paid on time (Edmonds and de Veen 1992:102). Evidence from Ghana demonstrates that this is not the case for two reasons — the first being specific to the Ghana program, and the second being more universal.

The first reason why Ghanaian labor-based contractors do not face the same problems as other small-scale contractors is because labor-based contractors are provided with equipment loans — something unique to the Ghanaian program. This provision of equipment loans puts an enormous strain on the DFR which must try to create a competitive environment while at the same time providing contractors with continuous work to service their loans. To provide continuous work, the DFR is forced to tender the same number of contacts as there are contractors in any given region. This led to collusion when contracts were tendered in the Ashanti region. The response to this collusion was to delay the awarding of the contracts until appropriate rates could be set, thereby leaving the contractors idle for over one year. This experience is often blamed for causing contractors to want to leave the program. Although this event did have an effect, the remainder of this chapter focuses on a second reason why many labor-based contractors expressed interest in leaving the labor-based program or using equipment on their sites—a reason much more universal and beyond the scope of the program. Labor-based contractors are affected more severely by delays in payment than equipment-based contractors.

Late payments are an inherent part of the road construction industry because many road building agencies in Africa award contracts without ensuring that the required funds will be available and have highly centralized and bureaucratic payment procedures (Edmonds and Miles 1984:47; Ofori 1991). In Ghana, for example, central government payments have been delayed for as long as six months. Edmonds and de Veen state that the problems facing contractors, including the problem of delayed payments, "remain the same whatever the technology" (1992:102).

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23 Contractors participating in labor-based programs in Kenya, Tanzania, Lesotho, and South Africa must either find their own sources of credit in the open market or purchase their equipment with savings.
This study found that delayed payments do not affect labor-based contractors and equipment-based contractors equally because in Ghana small contractors can obtain credit from suppliers and can pay suppliers late. Thus, payment delays cause small contractors to favor equipment-based methods over labor-based methods, and hence undermine the objective of labor-based programs. When payments are timely, as they were during the pilot phase of the program, labor-based methods proved cheaper per km and more competitive than equipment-based methods for small firms (Appendix 2). When payments are delayed, however, labor-based firms are unable to pay their laborers and strikes result. Equipment-based firms, on the other hand, are able to pay their machine operators and suppliers late if they themselves are paid late.

Small labor-based firms are more sensitive to delayed payments because the obligations they face are different than those faced by an equipment-based firm. Thus this section addresses the following questions: What happens when delayed payments occur on a labor-intensive road site? What strategies have labor-based contractors adopted to mitigate the effects of delayed payments? In addition, the differences in payment procedures used by the central government and regional-level government are discussed; unlike the central government, the regional-level governments pay contractors on time.

3.1 Why Small Labor-Based Contractors are More Sensitive To Delayed Payments Than Small Equipment-Based Contractors

Although both types of contractors have similar obligations to suppliers and permanent laborers, only labor-based contractors have obligations to casual laborers, and this difference makes them more sensitive to delayed payments.

The literature often states that “suppliers will only consider credit arrangements for well-established firms” (Edmonds and Miles 1984:69). But evidence from Ghana contradicts this statement. In Ghana, suppliers operate in a “buyer’s” market, meaning that a large number of Ghanaian sellers compete for the patronage of a few buyers. Suppliers compete with one another by offering contractors special rates, credit without interest, and “understanding” when contractors’ payments are delayed. Thus, both large and small road contractors can get credit from suppliers of machinery, cement, and fuel even if they have limited access to formal credit. For example, in Kumasi a small labor-based road contractor can buy as many as 200 bags of cement on credit (Tenkorang, contractor). Mrs. Akessiem, the wife of another small labor-based contractor, says she and her husband buy everything on credit from suppliers including “the tires for the tipper trucks.” She attributes their ability to get credit from suppliers to their having “built a trusting relationship” with the suppliers.

Not only will suppliers provide contractors with materials on credit, they will also accept late payments if the contractors' payments are delayed. For example, one contractor merely had to go to his suppliers and explain, and if he had known the supplier for a long time, he could just send a note (Mrs. Akessiem, supervisor). Even if the suppliers are not sure if they should trust the contractor, they can always verify the contractor's statements. For example, if a contractor rents a machine from a plant pool, the pool supervisor can check around the DFR to see if it is indeed true that the contractor has not yet been paid (Yeboah, contractor).
If both labor-based and equipment-based contractors can delay payments to suppliers when government payments are delayed, why are labor-based contractors more sensitive to late payments? The primary factor distinguishing the effects of delayed payments on the two types of contractors is the differences in the types and quantity of labor these contractors employ.

Labor-based contractors employ mostly casual laborers, who demand timely monthly payments because they do not trust the contractor. Equipment-based contractors, in contrast, employ permanent laborers who will accept delayed payments, even for as long as one month because they trust the contractor. This trust is developed because the contractor provides his permanent laborers with health insurance and, often, loans. In Ghana a permanent employee expects to remain with the firm as long as it survives. This relationship discourages permanent laborers from leaving their jobs when their payments are delayed. As one contractor explained, when laborers are permanent, “they’re not as demanding that you pay on time. Permanent laborers know you more” (Obetsebi, contractor).

Unlike a supplier, neither a permanent nor a casual laborer can verify the contractor’s claim that the payment from the government is delayed. As one contractor explains, “The laborers cannot come to Accra to see if you haven’t been paid” (Yeboah, contractor). But the difference between a permanent and casual laborer is that a permanent laborer will trust the contractor’s claim, while a casual laborer will “feel you’ve stolen the money” (Yeboah, contractor). In one case, a small labor-based contractor who had not been paid was able to pay his casual laborers by raising outside funds (by borrowing large sums of money from his family). This action made the laborers who were working for other small contractors grow suspicious of their contractors, thinking that they had been paid and had pocketed the money.

Labor-based contractors also differ from equipment-based contractors in the number of laborers they employ. Labor-based contractors employ as many as 150 laborers per gravel road, compared with about ten for equipment-based contractors. These large numbers increase the problem for labor-based contractors, who must pay approximately six times as much in wages as equipment-based contractors. In addition, because equipment-based contractors employ few workers, in times of emergency they are able to get enough funds to pay each worker something. For example, the overdraft limit for both small equipment-based and small labor-based contractors at the Sunyani Bank for Housing and Construction is US$100. If both contractors received an overdraft for US$100, the equipment-based contractor could then pay each employee US$10 for the month (approximately 30 percent of their monthly salary). But the labor-based contractor could pay each laborer only about US$0.65—not even one day’s wage!

When labor-based contractors’ payments are delayed and they cannot pay their causal laborers, the laborers either stop coming to the site or strike. When payments are timely, labor-based contractors construct one km of gravel road at three-fourths the speed and two-thirds the cost of

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24 Labor-based contractors pay out an average of three million Cedis per month to all their employees, while equipment-based contractors pay only an average of 0.5 million per month to their employees.
25 Sunyani Bank for Housing and Construction’s overdraft limit is 100,000 Cedis and, at the time this research was conducted, 1000 cedis could buy US$1. The National Investment Bank’s overdraft limit is 60,000 Cedis. To borrow more money than allowed in the overdraft, one needs securities and needs to file six months in advance. Thus, one cannot get a loan fast (Tenkorang, contractor).
26 Although a grader operator (one of the highest paid employees in an equipment-based firm) would normally receive around US$35 per month, US$10 should be enough to tide him over until the contractor is paid.
an equipment-based contractor. Presently, equipment-based contractors are paid on average US$19,463 per km (tendered prices) while labor-based contractors are paid US$12,035 per km (fixed prices) for the same quality of output. If both contractors were paid the same amount per km, a labor-based contractor would make approximately three times as much profit per month than an equipment-based contractor given the rate of completion and the cost of labor-based compared with equipment-based works (Appendix 2). But if payments are delayed and the speed of labor-based rehabilitation falls, the net present value of the contractor's profit will fall. If the speed of rehabilitation at the labor-based site falls below a certain threshold, equipment-based methods becomes more profitable than labor-based methods.

In addition, it is more difficult for a labor-based contractor to recover from delays or stoppages because delayed payments damage the tenuous trust between the contractor and the casual laborers. “Once you have cash flow problems....the laborers don't have confidence anymore so they won't come back to work for you” (DFR engineer). In contrast, delays or stoppages for equipment-based contractors are primarily a result of machine breakdowns, a problem a contractor can repair without having to rebuild confidence.

3.2 Contractors' Strategies for Coping with Payment Problems

Labor-based contractors have developed a number of strategies to confront payment problems. These strategies help contractors to speed up government payments, keep the site moving when payments are delayed, reduce worker discontent, and handle strikes.

Speeding up Government Payments

Contractors use two strategies to speed up government payments. First, they “chase” their invoice certificates to accelerate the payment process. In other words, contractors personally bring the certificate to each of the required 13 government officials to sign rather than rely on the mail. Second, they use their association to press the Ministry of Finance to release the money so strikes do not result (Mrs. Akessiem, supervisor). In one case, the labor-based contractors association sent a delegation to the Ministry of Finance to complain about delays in payment and the ministry released the money to avoid labor problems.

Keeping the Site Moving when Payments are Delayed

Contractors have developed two strategies to keep the site moving when payments are delayed: hiring several old hands and trying to build trust with the new hands. Contractors hire old hands because they will work despite delayed payments. When payments are late, the new hands stop coming to the site, while the old hands, who can make up as much as 30 percent of the casual labor force, continue to come. This formation of a permanent class of casual laborers is only

27 Profit per month is substituted for a discounted cash flow analysis. Calculations assume this payment equals the cost of building one km of road using equipment-based methods plus 10 percent profit.

28 The ILO encouraged contractors to form an association for labor-based contractors during the pilot project.
seen among labor-based workers. Although most labor-based contractors have completed no more than three contracts, old hands have become a very important tradition.

Why are old hands willing to accept late payments? They do so either because they want to learn a trade or because they are trying to obtain a more permanent position, such as headman, supervisor, or machine operator (Yeboah, contractor). If an old hand is trying to learn a trade, such as masonry, he will follow the contractor from site to site so he can continually work with the concrete gang. If the old hand is trying to be promoted, he typically moves first to headman (US$19/month), then to roller operator (US$19/month), tractor operator (US$24/month), and finally supervisor (US$35/month). In one firm one of the supervisors and all of the machine operators (excluding the tipper operator) started as laborers.

The drive to be promoted makes old hands so loyal to the firm that when local laborers stop working, fresh old hands will migrate to the area to take their place (Yeboah, contractor). These fresh old hands are often laborers who missed the initial opportunity to follow the contractor to his new site. Even though they often have no relatives or support network around the contractor’s new site, they will accept delayed payments from the contractor and make ends meet by working as day laborers on the weekends or by getting contracts to weed someone’s farm. Some old hands are so important to the firm that the contractor will pay for their transportation to the new site and for their accommodations. This reciprocal relationship between old hands and the contractor is crucial to the firm’s survival.

Contractors also try to build trust with the new hands by attempting to appear honest to local laborers. Old hands help create this perception by assuring the new hands that the contractor is a good man. Contractors create this perception themselves by allowing casual laborers to keep the firm’s tools until they are paid. As two contractors said, “we allow them to keep the tools with them while they are doing a task. If we are not paying, then we have no right to collect the tools” (Tenkorang, contractor; Obetsebi, contractor).

In addition, contractors change the payment incentive structure if the laborers feel that it is working to their disadvantage. For example, contractors in the Ashanti region discarded the bonus system that they learned in the training course because the workers felt that it cheated them. Under the bonus system if laborers work continuously for six (working) days and accomplish their tasks, they will be paid eight days’ wages. If they work for four weeks and complete their task each day, they earn an extra six days’ wages. Thus, a worker can attain a maximum bonus of 45 percent of the monthly wage (Osei-Bonsu 1992). The laborers in the Ashanti region did not see why one laborer should receive a bonus when another did not. This behavior supports the work of Davison (cited in Horton and King 1981) who found that incentive payments increase tension in social relations because they underscore the differences in workers’ earnings and foster ill feelings.

### Paying Laborers in a Particular Order

Contractors have also developed a strategy to reduce worker discontent when the contractor does not have enough money to pay all workers in full: they pay the casual laborers first, headmen second, supervisors third, and suppliers last. When paying off debts, contractors first pay the
people with whom they have the least trusting relationship, moving across the spectrum toward the people with whom they have the strongest (Yeboah, contractor).

**Handling Strikes**

Contractors have developed strategies to handle strikes. For example, they promote the laborers' natural leaders to management positions. One contractor found that his laborers organized around the natural leaders. When payments were delayed, these leaders called a strike. The contractor stripped the leaders of their power by promoting them to salaried positions where they could obtain advances and would receive bonuses based on the firm's profits. Once promoted, the leaders "realized that they were different from the other laborers" (Tenkorang, contractor). Contractors have also encouraged old hands to talk with new hands and end the strike or report the strike leaders.

**Having a Last Resort**

Contractors have a last-resort strategy to deal with delayed payments—leave the labor-based program entirely. Many contractors expressed an interest in leaving the program if payments continued to be delayed or if they were left idle for a long period again. But recently, many contractors began feeling enthusiastic because Denmark is planning to fund some labor-based roads. Contractors feel that payments will be timely when a donor is involved in funding labor-based rehabilitation (as during the pilot phase of the program), rather than when the financing comes from the general budget.

3.3 Central Versus Regional Government and Timely Payments

When all financing comes from the general budget, regional branches of the DFR are more likely than the DFR central office to pay contractors on time. Several forces are behind this. First, the regional branches tender contracts after receiving financing while the central office tenders contracts before receiving financing. The central DFR office produces annual estimates of the amount of work to be done and the Ministry of Finance allocates a portion of the fiscal budget based upon that estimate. The central DFR office then tenders contracts based upon this allocation and later, often does not receive the money it was promised because this money is often diverted to other public programs. This creates a situation in the DFR where invoices cannot be paid. Contractors have to wait until the Ministry of Finance disburses its next quarterly disbursement to the DFR before the DFR can begin to meet its obligations. The DFR can either pay 50 percent of all invoices received and ask the contractors to wait for the balance or it can pay out the invoices in full in the order in which they were received.

The DFR’s regional offices, unlike the head office, receive funds from the head office before tendering work. After the regional offices prepare detailed cost estimates for all maintainable feeder roads in their region, the central office transfers funds to regional accounts. These accounts are audited ex-post by the DFR central office. Thus, in contrast to the DFR head office, the regional office tenders work after receiving the money necessary to pay the invoices.
Second, the contracts administered by regions have a more streamlined payment method than those administered at the central level. The close proximity of the regional administration to the actual road work means contractor’s interim payment certificates must pass through only two levels of vetting before they are paid. The central government, in contrast, will pay a contractor only after the interim payment certificate is vetted and signed by at least twelve government officials: two at the local level, three at the regional level, four at the DFR’s central office, and three at the Ministry of Roads and Highways. This process can delay payment for as long as three to four months (Nti, contractor).

These cumbersome procedures arise because of the central government’s distrust of local government officials—the complex web of vetting is intended to discourage regional government officials from overpaying contractors (Edmonds and Miles 1984:47; Gaude and Watzlawick 1992). But the results are just the opposite: rather than building accountability into the system, these procedures provide greater opportunities for bribes or “dashes”—gifts. Dashing also exists at the regional and local government level, but the dashes are less expensive because payment certificates require fewer endorsements.
4. Lessons for Future Labor-Based Programs

Although labor-based programs have the potential to create employment in rural areas and can be financially competitive with equipment-based methods, both governments and private contractors have been averse to using them. Government officials have preferred equipment-based methods because they appear to be more “advanced,” rehabilitate gravel roads faster, meet higher engineering standards, minimize labor management problems, offer greater political benefits in an election year, offer more opportunities for rent-seeking, require less working capital, and command more funding when donors finance only the foreign exchange costs of a project.

The reasons why private contractors have been reluctant to use labor-based methods, on the other hand, have remained elusive. Some have suggested that the difficulty of managing large labor forces is to blame. This study challenges this explanation and demonstrates that market structure and institutional mechanisms are key factors. Unit-rate cost comparisons, therefore, while an important tool for comparing labor-based and equipment-based methods, are insufficient for predicting firm behavior. Instead, a new market-based framework should be used to examine this issue.

This study attempts to demonstrate that the financial competitiveness of labor-based compared with equipment-based methods varies with two factors. First, it varies with the size of the firm. Small contractors tend to execute only one project at a time, and are able to directly supervise their sites. Moreover, for small contractors, labor-based methods avoid the high costs of renting equipment or repairing their own old or poorly maintained equipment. Large equipment-based firms, in contrast, undertake many active projects simultaneously, and are incapable of providing their labor-based sites with much supervision. Moreover, large equipment-based firms have little incentive to use labor-based methods; if there is a lull in large contracts, they can use their equipment to underbid their counterparts who are using more labor-intensive technologies for less-remote rehabilitation contracts. Large contractors have access to efficient equipment and thus have lower variable costs than labor-based contractors, who pay 40 percent or more of their total costs in monthly wages.

The second factor affecting the competitiveness of labor-based methods is the promptness of government payments. When government payments are prompt, labor-based methods are cheaper per km and can be more profitable than equipment-based methods. If government payments are late, however, labor-based methods become more costly, even in countries like Ghana with low casual wage rates (below US$1/day). Late government payments fall more heavily on labor-based contractors because they delay payments to workers, which cannot be postponed, as opposed to a delay of payment to suppliers. Thus, when payment delays occur, equipment-based sites continue to operate (albeit, often with lower productivity), while labor-based sites often come to a complete standstill.

This research therefore adds a new dimension to the literature on small- and medium-size enterprise development. Although the literature posits that for the promotion of small firms, labor-based methods “make sense” because they require low capital investment (Lantran 1990), the findings here turn this statement around. To promote labor-based methods, small firms make sense because only they have the motivation to provide a great deal of supervision to their sites.
These findings suggest three lessons that can be applied to labor-based programs in other countries. First, program designers should use a market-based framework to predict whether contractors will adopt labor-based methods rather than comparing labor-based and equipment-based methods using unit-rates. Before launching a labor-based program, program designers should determine the quantity and quality of the equipment stock in the sector, as well as the competitiveness among contractors. This analysis should help determine whether equipment-based contractors will underbid labor-based contractors for small, less-remote rehabilitation works. If there is a reduction in available work in the sector and large contractors own efficient equipment, they will underbid labor-based contractors, at least in the short term, to cover their variable costs. Training labor-based contractors for entry into the market at a time when there is little work available for well-equipped contractors may be unwise; labor-based contractors will only survive if they are protected from equipment-based contractors. If the reduction in the quantity of work in the sector only represents a lull, starting a labor-based program may be justified since graduates of the program will not be ready to compete in the market for a number of years. If the sector is expected to remain highly competitive for some time, graduates of the labor-based program will be unable to compete and the road agency will need to protect them from competition. This protection will result in a higher cost per km of rehabilitated road for the road agency, thus "promoting" the use of labor-based methods at the taxpayers' expense. Whether the socio-economic benefits of promoting labor-based rehabilitation outweigh the increase in cost per km of road is a question only policy makers can answer and is outside the scope of this study.

Second, program designers should develop an enabling environment in which small contractors can operate; that is, alter minimum wage requirements to reflect the market wage, win acceptance for task-rate payment schemes, reduce the bias against small contractors by slicing works into many small contracts, and give small firms access to working capital and equipment loans. How program designers go about equipping contractors is of great importance. The provision of equipment loans can make it almost impossible to set up a competitive environment for tendering. For example, in Ghana, the DFR quickly discovered how difficult it was to set up a competitive environment among the contractors while still assuring them four years of continuous work to repay their loans.

Third, program designers should find alternative institutional arrangements for paying contractors in those countries where government payments are habitually late. In the past, donors have addressed the issue of late government payments only in the pilot project: they have enabled the project engineer to release funds directly from a special account and sometimes even provided advance payments for labor. Failure to institute such mechanisms on a permanent basis disregards one of the main difficulties facing small contractors who use labor-based methods.

Institutional arrangements for paying contractors on time must satisfy two requirements. First, financing for road works must be provided to the department administering the contracts before works are tendered, and be protected from being diverted to other public programs. Special accounts have become one means of satisfying this requirement. Special accounts are usually set up in a commercial bank in the name of the agency supplying the road services and is, therefore, kept separate from the general government budget. For example, in 1994, after the research for this paper was completed, the United States and Denmark set up a special account for the DFR in Ghana to pay labor-based contractors. This arrangement has enabled the DFR to pay contractors
more promptly. Donors protect special accounts from being usurped by the Ministry of Finance through financial audits and other means of managing the accounts.

Second, payment procedures for contractors must be streamlined. In many developing countries, existing payment procedures require considerable paperwork, signatures, and vetting, taking weeks to complete. This study has found that contracts can be streamlined if they are administered at a local level and paid out of a local account. For example, when they had funds on hand, DFR regional offices paid contractors much more promptly than the head office. Contractor's invoices only had to pass through two levels of vetting before they were paid, while at the central level, invoices must be vetted and signed by at least twelve government officials. Another institutional arrangement for streamlining payments to contractors is the AGETIP (Agence d'exécution des travaux d'intérêt public contre le sous-emploi), a contract management agency run by a nonprofit organization. This type of agency, which was first created in Senegal and has since been replicated in many Francophone countries, has a streamlined administration and a special account to ensure the timely flow of donor funds to local contractors (Lantran 1991).

In conclusion, this study demonstrates that labor-based programs can be a successful device for rehabilitating gravel roads and generating employment. Their success, however, hinges on the existence of a conducive market structure. In countries with a large supply of equipment and a highly competitive market, labor-based contractors may have difficulty competing with equipment-based contractors. Successful use of labor-based methods also requires targeting small contractors for training and paying them on time. Since small firms are most likely to use labor-based methods, they should be targeted for training. Small firms, however, have limited access to working capital and thus timely payments must be ensured. If payments are delayed, labor-based sites are likely to come to a standstill because casual laborers will not accept late payments. Unless these requirements are addressed, labor-based methods are unlikely to be sustainable.
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Ashong, K. 1993. "The Use of Small-Scale Contractors in Labour-Based Road Rehabilitation and Maintenance in Ghana: Evolution from 1986 to Date." Ministry of Roads and Highways, Department of Feeder Roads, Accra.


Appendix 1: Wage Rates for Casual Labor

<table>
<thead>
<tr>
<th>Country</th>
<th>Wage rate (US$/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigeria, Tanzania</td>
<td>0.30 - 0.50</td>
</tr>
<tr>
<td>Uganda</td>
<td>0.35 - 0.50</td>
</tr>
<tr>
<td>Zaire</td>
<td>0.50 - 0.80</td>
</tr>
<tr>
<td>Mozambique</td>
<td>0.80 - 0.90</td>
</tr>
<tr>
<td>Rwanda</td>
<td>0.90 - 1.50</td>
</tr>
<tr>
<td>Eritrea</td>
<td>2.00 - 3.00</td>
</tr>
<tr>
<td>Namibia</td>
<td>4.00 - 7.00</td>
</tr>
</tbody>
</table>

Source: Rausch (1994: 25)
Appendix 2: Comparing Equipment-Based and Labor-Based Contractors

Table 2.1: Comparison Using Current Data

<table>
<thead>
<tr>
<th>Measure</th>
<th>Equipment-based</th>
<th>Labor-based</th>
</tr>
</thead>
<tbody>
<tr>
<td>payment (US$/km)</td>
<td>19,463</td>
<td>12,035</td>
</tr>
<tr>
<td>cost (US$/km)</td>
<td>17,694</td>
<td>10,941</td>
</tr>
<tr>
<td>profit (US$/km)</td>
<td>1,769</td>
<td>1,094</td>
</tr>
<tr>
<td>speed (km/month)</td>
<td>2.1</td>
<td>1.4</td>
</tr>
<tr>
<td>monthly payments (US$/month)</td>
<td>40,872</td>
<td>16,849</td>
</tr>
<tr>
<td>monthly costs (US$/month)</td>
<td>37,157</td>
<td>15,317</td>
</tr>
<tr>
<td>avg. labor payment (US$/month)</td>
<td>500</td>
<td>3,000</td>
</tr>
<tr>
<td>monthly profit (US$/month)</td>
<td>3,715</td>
<td>1,532</td>
</tr>
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</table>

Table 2.2: Comparison Assuming That All Contractors are Paid the Same Per Km

<table>
<thead>
<tr>
<th>Measure</th>
<th>Equipment-based</th>
<th>Labor-based</th>
</tr>
</thead>
<tbody>
<tr>
<td>payment / km (US$/month)</td>
<td>p</td>
<td>p</td>
</tr>
<tr>
<td>cost / km (US$/km)</td>
<td>19,463</td>
<td>12,035</td>
</tr>
<tr>
<td>profit / km (US$/km)</td>
<td>p–19,463</td>
<td>p–12,035</td>
</tr>
<tr>
<td>speed (km/month)</td>
<td>2.1</td>
<td>1.4</td>
</tr>
<tr>
<td>monthly profit (US$/month)</td>
<td>2.1(p–19,463)</td>
<td>1.2(p–12,035)</td>
</tr>
</tbody>
</table>

29 The figures for payment, or cost to the client, are from DANIDA (1995).
30 This number was calculated by assuming that, on average, equipment-based contractors tender with a 10 percent profit margin.
31 Labor-based contractors can rehabilitate 1.4 km/month. Equipment-based contractors can rehabilitate 2.1 km/month. (Osei-Bonsu, personal communication)
32 An equipment-based contractor hires at most ten people a month and pays out 500,000 cedis in wages, while a labor-based pays out around 3 million cedis a month. (Boakye, contractor).

36
**Table 2.3: Comparison of Monthly Profits Using Current Data**

<table>
<thead>
<tr>
<th>payment (US$/km)</th>
<th>Equipment-based monthly profit (US$/month)</th>
<th>Labor-based monthly profit (US$/month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18,400</td>
<td>1,483</td>
<td>10,443</td>
</tr>
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<td>18,600</td>
<td>1,903</td>
<td>10,723</td>
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<td>11,283</td>
</tr>
<tr>
<td>19,200</td>
<td>3,163</td>
<td>11,563</td>
</tr>
<tr>
<td>19,400</td>
<td>3,583</td>
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