Management and Financing of Roads

An Agenda for Reform

Ian G. Heggie

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Ian G. Heggie

The World Bank
Washington, D.C.

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ISSN: 0253-7494

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Library of Congress Cataloging-in-Publication Data

Heggie, Ian Graeme.
Management and financing of roads : an agenda for reform / Ian Heggie.
p. cm. — (World Bank technical paper ; no. 275)
Includes bibliographical references.
ISBN 0-8213-3143-4
1. Roads—Maintenance and repair—Government policy—Africa, Sub-Saharan. 2. Roads—Maintenance and repair—Economic aspects—Africa, Sub-Saharan. 3. Roads—Africa, Sub-Saharan—Deterioration. I. Title. II. Series.
HE367.A452H43 1995
388.1'14—dc20 95-2089
CIP

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FOREWORD

Road transport grew rapidly after the second world war. It carries 80 to 90 percent of the region's passenger and freight transport and provides the only form of access to most rural communities. To handle this traffic, African countries expanded their road networks considerably during the 1960s and 1970s and also built new roads to open up more land for development. By the end of the 1980s, there were therefore nearly two million km of roads in Sub-Saharan Africa. These roads are some of the region's largest assets, with replacement costs amounting to nearly $150 billion. In terms of assets, employment and turnover, these roads are truly *big business*.

In spite of their importance, most roads in Africa are poorly managed and badly maintained. The poor state of the road network is reflected in the large backlog of deferred maintenance. During the past 20 years African countries have spent far too little on routine and periodic maintenance and, as a result, nearly a third of the $150 billion invested in roads has been eroded through lack of maintenance. Africa has been living off its assets. To restore only those roads which are *economically-justified*, and to prevent further deterioration, will now require annual expenditures over the next ten years of at least $1.5 billion. The balance of the network requiring restoration will either have to receive minimal maintenance, or be handed over to lower levels of government.

Experience gained under the Road Maintenance Initiative (RMI), suggests that the key concept required to overcome the above problems is *commercialization*: bring roads into the market place, put them on a *fee-for-service* basis, and manage them like any other business enterprise. However, since roads are a public monopoly, and ownership of most roads will remain in government hands for some time to come, commercialization requires complementary reforms in four other important areas. These are referred to as the *four basic building blocks*. They focus on: (i) creating **ownership** by involving road users in management of roads to win public support for more road funding, to control potential monopoly power, and constrain road spending to what is affordable; (ii) stabilizing road **financing** by securing an adequate and stable flow of funds; (iii) clarifying **responsibility** by clearly establishing who is responsible for what; and (iv) strengthening **management** of roads by providing effective systems and procedures, and strengthening managerial accountability.

The RMI 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 the Africa region. SSATP papers are addressed to public and private sector policy-makers, and to managers and staff attempting to improve the performance of the transport sector in Africa. They also attempt to facilitate dialogue among the donor community to build consensus on the key policy reforms required to achieve the above objectives.

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ABSTRACT

Road transport is the dominant mode of transport in Sub-Saharan Africa (SSA), carrying close to 90 percent of the region's passenger and freight transport, and providing the only access to rural communities where over 70 percent of Africans live. Despite their importance, most of the region's nearly 2 million km of roads are poorly managed and badly maintained. By 1990, nearly a third of the $150 billion invested in roads had been eroded through lack of maintenance. To restore only those roads that are economically justified and prevent further deterioration will require annual expenditures of at least $1.5 billion over the next ten years, or more than double the requirements of regular maintenance.

To find sustainable solutions to these problems, the United Nations Economic Commission for Africa (UNECA) and the World Bank launched the Road Maintenance Initiative (RMI) as part of the Sub-Saharan Africa Transport Policy Program (SSATP). With support from a number of bilateral donors, the Initiative has spent the last six years working with African countries to identify the causes of poor road maintenance policies and to develop an agency for reforming them.

The key concept to emerge from the debate on how to strengthen financing and management of roads is *commercialization*; bring roads into the marketplace and put them on a fee for service basis. However, since roads are and will largely remain a public monopoly, commercialization requires complementary reforms in four important areas called the *four basic building blocks*: (i) create ownership by involving road users in management to win public support for adequate funding and control of the agencies; (ii) secure an adequate and stable flow of funds; (iii) clarify who is responsible for what; and (iv) strengthen management by adoption of private sector management practices.

A number of Sub-Saharan African countries are in the process of implementing reforms towards the commercial management of their roads. These reforms include involving road users in management through road management boards, securing an adequate and stable flow of funds through road tariffs/road funds, and increasingly commercializing/privatizing the execution of engineering services and road works.

ACKNOWLEDGMENT

This report was prepared by Ian G. Heggie, Principal Infrastructure Economist (Africa Technical Department) and Task Manager for the Road Maintenance Initiative (RMI), while Annex 1 was prepared by W.D.O. Paterson. The report was prepared under the overall direction of Jean H. Doyen (Division Chief) and Snorri Hallgrimsson (Infrastructure Adviser), Environmentally Sustainable Development Division. The report is based on work carried out under the RMI, which is a regional capacity-building initiative working to put road maintenance on a sustainable long-term basis. The RMI is financed by the governments of Denmark, Finland, France, Germany, Norway, Sweden and Switzerland, and by the EEC and World Bank. Substantive inputs to the report were made by current RMI staff: Gerard Paget, Thor Wetteland and Anne Balcerac de Richecour. Former RMI staff: Bernard Becq, Jukka Isotalo, Stein Lundebye and Cavelle Creightney also made important contributions to the report. Support and assistance was provided by the RMI Country Coordinators: J. Obi Eta (Cameroon), I. Kimambo (Tanzania), N. Kudenga (Zimbabwe), D. Maganda (Kenya), J. Mwedde (Uganda), A. Ntilivamunda (Rwanda), P. N. Obidike (Nigeria), and T. Sankalimba (Zambia). A number of other people also made important contributions to the report, including Anil Bhandari, Rodrigo Archando-Callao, Rachel Kranton (University of Maryland), Christina Malmberg Calvo, Gerhard Metschies (GTZ), Malcolm Mitchell (South African Roads Board), Bill Paterson, John Roome, Alan Ross (consultant) and Andreas Schliessler (ECLAC). The report was reviewed by staff from all Bank regions and was also reviewed by Professor Ken Button (Loughborough University of Technology), Professor Kenneth Small (University of California, Irvine) and Dr. Richard Robinson (consultant and former staff member, TRRL). The report was edited by Ilyse Zable and formatted by Marie-Laure Cossa.

ABBREVIATIONS

General:

AADT	=	Average annual daily traffic
GHA	=	Ghana Highway Authority
HDM III	=	Highway Design and Maintenance Model, Version Three
ICB	=	International Competitive Bidding
ILO	=	International Labor Organization
IMF	=	International Monetary Fund
IMSC	=	Inter-Ministerial Steering Committee
LCB	=	Local Competitive Bidding
MOF	=	Ministry of Finance
MOW	=	Ministry of Works
PER	=	Public Expenditure Review
PS	=	Permanent, or Principal Secretary
SATCC	=	Southern Africa Transport & Communications Commission
SLRA	=	Sierra Leone Roads Authority
SRMC	=	Short Run Marginal Costs
SSA	=	Sub-Saharan Africa
SSATP	=	Sub-Saharan Africa Transport Policy Program
UNECA	=	United Nations Economic Commission for Africa
VOCs	=	Vehicle Operating Costs

Country Abbreviations:

CAR	=	Central African Republic	RW	=	Rwanda
CM	=	Cameroon	TA	=	Tanzania
KE	=	Kenya	UG	=	Uganda
MAG	=	Madagascar	ZA	=	Zambia
UNI	=	Nigeria	ZIM	=	Zimbabwe

Units of Measurement:

$	=	US Dollars
CBR	=	California Bearing Ratio
EIRR	=	Economic Internal Rate of Return
ESAL	=	Equivalent standard axles
ESAL-km	=	Equivalent standard axles times distance traveled
GDP	=	Gross domestic product
GNP	=	Gross national product
GVW	=	Gross vehicle weight
IRI	=	International Roughness Index
km	=	Kilometer
m/km	=	Meters per kilometer
NPV	=	Net Present Value
SNC	=	Modified Structural Number
vpd	=	Vehicles per day
veh-km	=	Number of vehicles times distance traveled

OVERVIEW

Road transport grew rapidly after the second world war and is now the dominant form of transport in Sub-Saharan Africa. It carries 80 to 90 percent of the region's passenger and freight transport and provides the only form of access to most rural communities. To handle this traffic, African countries expanded their road networks considerably during the 1960s and 1970s, and they also built new roads to open up more land for development. Therefore, by the end of the 1980s, there were nearly two million km of roads in Sub-Saharan Africa, including 610,000 km of main roads. These roads are some of the region's largest assets. Their replacement costs amount to nearly $150 billion, and required annual expenditures on routine and periodic maintenance to keep them in a stable long-term condition are between $1.5 and $2.0 billion. In terms of assets, employment, and turnover, these roads are truly *big business*.

However, in spite of their importance, most roads in Africa are poorly managed and badly maintained. Almost without exception, they are managed by bureaucratic government roads departments. The poor state of the road network is reflected in the large backlog of deferred maintenance. It would take nearly $43 billion to fully restore all roads requiring immediate rehabilitation or reconstruction. African countries have spent far too little on routine and periodic maintenance during the past 20 years and, as a result, nearly a third of the $150 billion invested in roads has been eroded through lack of maintenance. Africa has been living off its assets. To restore only those roads that are *economically justified* and to prevent further deterioration will require annual expenditures over the next ten years of at least $1.5 billion. This amounts to nearly one percent of regional GDP. The balance of the network requiring rehabilitation or reconstruction will either have to receive minimal maintenance or be handed over to lower levels of government and local communities.

The economic costs of poor road maintenance are borne primarily by road users. In rural areas, where roads often become impassable during the rainy season, poor road maintenance also has a profound effect on agricultural output. When a road is not maintained — and is allowed to deteriorate from good to poor condition — each dollar *saved* on road maintenance *increases* vehicle operating costs by $2 to $3. Far from saving money, cutting back on road maintenance *increases* the costs of road transport and raises the net costs to the economy as a whole. It is estimated that the *extra* costs of insufficient maintenance in Africa amount to about $1.2 billion per year or 0.85 percent of regional GDP. About 75 percent of these costs are in the form of scarce foreign exchange. It is no wonder that road user organizations, particularly those in Tanzania, Zambia, and Zimbabwe, have expressed a willingness to pay for road maintenance *provided* the money is spent on roads and the work is done efficiently.

The Africa Road Maintenance Initiative, launched by the United Nations Economic Commission for Africa and the World Bank, has spent the past six years working with African countries to identify the underlying causes of poor road maintenance policies and develop an agenda for reforming them. What has emerged is that poor road maintenance policies are attributable to the institutional framework within which roads are managed. They are not managed as part of the market economy and this biases managerial incentives. There is no clear *price* for roads, road expenditures are financed from general tax revenues, and the road agency is not subjected to any rigorous market discipline. Roads are managed like a social service. Poor terms and conditions of employment create further difficulties, as do lack of clearly defined responsibilities, ineffective and weak management structures, and a lack of managerial accountability. Road agencies are unlikely

to operate efficiently until they are faced with some form of competition, or a competition surrogate. Competition is the primary factor that motivates managers to cut waste, improve operational performance, and allocate resources efficiently.

One of the first lessons to emerge from the Road Maintenance Initiative was that attempts to improve road maintenance policies cannot focus on maintenance alone. Poor road maintenance policies are a subset of the wider issues of managing and financing roads as a whole. This insight quickly led to a wider debate about what might be done to strengthen the management and financing of roads. The key concept that emerged from this debate was *commercialization*: bring roads into the marketplace and put them on a *fee-for-service* basis. However, since roads are a public monopoly, and ownership of most roads will remain in government hands for some time, commercialization requires complementary reforms in four other important areas. These are referred to as the *four basic building blocks*. They focus on: (i) creating **ownership** by involving road users in management of roads to win public support for more road funding, to control potential monopoly power, and constrain road spending to what is affordable; (ii) stabilizing road **financing** by securing an adequate and stable flow of funds; (iii) clarifying **responsibility** by clearly establishing who is responsible for what; and (iv) strengthening **management** of roads by providing effective systems and procedures, and strengthening managerial accountability.

These four building blocks represent the core of the reforms. They are interdependent and ideally should be implemented together. Without all four, the reforms may achieve only part of their objective. You cannot solve the financing problem without the strong support of road users. And you cannot win the support of road users without taking steps to ensure that resources are used efficiently. And you cannot improve resource use unless you control monopoly power, constrain road spending to what is affordable, and increase managerial accountability. And you cannot hold managers accountable unless they have clearly defined responsibilities. There is nevertheless scope for flexibility. The reforms can be introduced in different ways, and the content of each building block may differ, depending on country circumstances. They can move sequentially or in parallel, and both sequencing and the pace of reform can vary. Furthermore, since the *message* emerging from the Road Maintenance Initiative is still evolving, the reforms need to be monitored and the results used to modify the message as new information becomes available.

Ownership. Major policy reforms in the road sector are unlikely to succeed without the active support of road users. They are the people who use the road network and also pay for it. Given that current allocations for road maintenance are erratic and well below the levels needed to keep the road network in a stable long-term condition, the first building block thus involves winning public support for more road funding. However, support for more road funding through user charges requires that steps be taken to ensure that road agencies do not operate as public monopolies, and that no more is spent on roads than the country can afford. The key step to be taken is thus to involve road users in road management, since this is generally an essential precondition for getting them to willingly pay for roads on a fee-for-service basis. At the national and regional level, road users are generally involved in management through road management boards. These are fairly common in Africa, and there are at least eight functioning boards in Benin, Central African Republic (CAR), Mozambique, Rwanda, Sierra Leone, South Africa (the oldest, originally established in 1935), Tanzania, and Zambia. The Board of the Ghana Highway Authority, originally established in 1974 but suspended by the military government in 1981, is about to be reinstated. The Boards in Benin, Rwanda, Sierra Leone, South Africa, Tanzania, and Zambia include private sector representatives (two, one, three, three, four and seven respectively), while that

in Mozambique is currently exploring ways of including private sector representatives. Ghana intends to have three private sector representatives when the Board is reinstated.

Financing. The second reform aims at establishing an adequate and stable flow of funds. All governments in Africa are seriously short of fiscal revenues. Budget allocations for road maintenance rarely exceed 30 percent of requirements, and it is simply not feasible for governments to increase these allocations under present fiscal conditions. Improved revenue mobilization is essential. Several African countries are addressing this issue by introducing an explicit road tariff consisting of vehicle license fees and a fuel levy. The tariff is collected independently from government sales and excise taxes and, in the best examples of collection arrangements (CAR, Ghana, and Zambia), the fuel levy is collected on an agency basis and deposited directly into a Road Fund. This prevents the proceeds from being siphoned off and spent on other public programs. The intention is (i) to create a clear market signal to encourage road users to demand value for money and (ii) to link revenues and expenditures to impose a hard budget constraint on the road agency, so that more road spending means a higher tariff, while a lower tariff means less road spending. The tariff is generally set to eventually cover all costs of maintaining main roads and part of the costs of maintaining urban and rural roads. The remaining costs of maintaining urban and rural roads are financed by local taxes. Most of the countries with Road Funds have agreed procedures for allocating funds between different road agencies. Some use simple formulas (Ghana and Mozambique), others use formulas that are modified in relation to needs (Tanzania and Zambia), while others base them on a complex assessment of needs (South Africa).

Responsibility. The third building block concentrates on creating a consistent organizational structure for managing different parts of the road network. This requires two things: (i) clear assignment of responsibility among different government departments and different levels of government and (ii) clear assignment of responsibility among the individual road agencies. The arrangement needs to be based on an accurate road inventory, functional classification of roads, designation of appropriate road agencies, formal assignment of responsibility to each road agency, and clarification of the relationship between the road agency and the parent ministry. Responsibilities to be assigned include those for operation, maintenance, improvement, and development of the road network; for traffic management and for road accidents caused by the road agency's own negligence; and for the adverse environmental impacts associated with roads and road traffic.

At the community level, where roads are generally managed by village councils, higher-level road agencies may provide technical advice but usually leave the local communities to do most of the work on a self-help basis. Financial support from the center is generally limited to meeting the costs of *bought-out* materials. Rural roads under the jurisdiction of central governments are generally managed by central government feeder roads departments. Those under the jurisdiction of local governments are generally managed by district councils. Since district councils have limited technical and financial capacities, they are usually encouraged to have their roads managed under contract or to merge with other district councils to create sufficient scale economies to enable the combined network to be managed by a larger road agency. Urban roads are usually managed by urban district councils, while the main trunk road network is generally managed by a central government road agency. International transit routes are critical for Africa and sometimes deserve special treatment. They may either be managed by a dedicated section at the main road agency, as is effectively done in Zambia, or as separate toll roads, as in South Africa. The main road agency usually has responsibility for overall regulation of road traffic, including enforcing axle-weight regulations, which is sometimes done in conjunction with the road transport industry (as in Zambia).

Urban road agencies normally oversee activities that affect urban areas, for example, parking control and routing of heavy vehicles in cities. Road agencies should take charge of examining the potential environmental impacts of new road schemes.

Management. The final building block focuses on creating a more business-like road agency. Once road users are involved in management of roads, they generally press for the introduction of sound business practices to ensure that their constituents get value for money. They expect clear management objectives, competitive terms and conditions of employment, consolidated budgets, commercial costing systems, and effective management information systems. The most important issue requiring attention is the wide gap between terms and conditions of employment in the public and private sectors, and the impact that this has on staffing and staff morale. An engineer in the private sector in Cameroon normally receives a total remuneration package twice as large as his public sector counterpart (the ratio is five in Tanzania and nearly nine in Zambia). As a result, several road agencies have lost most of their staff or are being managed by expatriates earning international salaries paid by international donor agencies. You cannot manage a road agency on a sustainable basis with expatriates or with demoralized local staff who spend most of their time supplementing their incomes. Any serious reform program must address these issues. Tanzania is now trying to define a competitive remuneration package for road agency staff that can be provided within existing civil service regulations.

Once staff are adequately paid, other reforms should concentrate on giving each road agency a clear mission and effective management structures, including appropriate management information systems, good accounting systems, and more managerial autonomy so that managers can act commercially. The Ghana Highway Authority has made great progress in this direction by streamlining staffing and disciplinary procedures and introducing a road management system. It has also developed a corporate plan that forms the basis of an annual contract plan between the Authority and the government. These reforms improve market discipline, provide managers with the freedom to operate commercially, and strengthen managerial accountability. They also encourage a more objective approach to setting priorities, comparing in-house to contract work, and evaluating labor-based work methods. Finally, auditing procedures also need to be improved to ensure that the public gets value for money from road spending. The aim is to ensure that funds allocated for roads are spent on road works and that the work is carried out according to specification. Where possible, both financial and technical audits should be carried out by independent auditors. Technical and financial audits are now being used on the rural access roads program in Kenya and on road maintenance programs in Burkina Faso and Senegal. The technical audit usually covers all contract work as well as work done though force account on a sample basis.

PART I

Preliminaries

1 INTRODUCTION

This report follows up on the World Bank's policy study, *Road Deterioration in Developing Countries*, published in 1988. This study showed that, in the eighty-five countries that had received World Bank assistance for roads, allocations for road maintenance had been so low that nearly 15 percent of the capital invested in *main* roads — roughly $43 billion, or about 2 percent of GNP — had been eroded by the lack of maintenance. The specific figure for the Africa region was $5 billion, or about 3.3 percent of GNP. As a result, a quarter of the main paved road network, together with a third of the main unimproved network, needed to be reconstructed or would have to receive minimal maintenance. Reconstruction — which would cost $40 to $45 billion world-wide — could have been avoided by spending a mere $12 billion on preventive maintenance. The study also argued that if countries did not improve road management, the eventual costs of restoration would increase by two- to three times and the vehicle operating costs (VOCs) by even more.

The study listed several reasons for this sorry state of affairs. Road authorities were not directly affected by road deterioration and came under no immediate pressure to do anything about it. Road users, on the other hand, were slow to see the link between poor road conditions and higher VOCs and, even when they did, were rarely sufficiently organized to do anything about it. The cause of the problem was lack of public accountability. Additional financial resources could not, by themselves, solve the problem of road deterioration. What was needed was reform of the institutional base of the road sector. The organization, staffing, and performance of the institutions responsible for roads had to be improved.

The study offered few specific solutions but did give some direction. It pointed out that road agencies were usually public monopolies and had too many responsibilities. They were responsible for planning, controlling, *and* executing construction and maintenance programs. Furthermore, they devoted too many staff, funds, and facilities to the execution of road works. Too much work was being done through force account. In most countries it would be desirable to separate these functions and transfer the execution of road works to the private sector or to a specialized government construction agency. This would clarify responsibilities, improve incentives, and strengthen accountability. Road agencies also needed better management information systems to improve the planning of investment and maintenance programs. Finally, the study argued, every effort had to be made to increase internal accountability, perhaps by mobilizing the media and nongovernmental organizations to help politicians and the public become aware of the high costs of insufficient maintenance.

The study was an important milestone in the debate on road maintenance policies and gave impetus to a number of initiatives designed to better understand the underlying causes of poor road maintenance policies. It also encouraged road agencies to address these institutional issues through a clearly articulated reform program. The Road Maintenance Initiative (RMI), a major component of the Sub-Saharan Africa Transport Policy Program (SSATP), was one of these initiatives. The RMI dialogue has now reached the point where tentative conclusions can be drawn about the most effective way to promote road policy reforms and the broad outline of the reforms themselves. The present report therefore summarizes the lessons learned from the RMI program since its inception in 1988, and uses them to develop an agenda for reform. However, since the conclusions are tentative and the RMI *message* is still evolving, the lessons

emerging from the program need to be monitored. The results of the monitoring can then be used to modify the proposed policy reforms as new information becomes available.

The report is written for a nontechnical audience and is directed at African policy makers, Bank management, Bank staff, officials in other development agencies, and senior officials in Africa — both public and private — interested in improving the performance of the road sector in Sub-Saharan Africa (SSA).

2 BACKGROUND

This chapter examines the current state of the road sector in SSA. It looks at the economic and financial importance of roads and shows that, in spite of their importance, most roads are poorly managed and badly maintained. It then examines the economic impact of poor road maintenance policies, reviews past attempts to reform them, and concludes by outlining the scope and purpose of the RMI program.

2.1 IMPORTANCE OF ROADS AND ROAD TRANSPORT

Road transport grew rapidly after World War II and is now the dominant form of transport in SSA. Roads carry 80 to 90 percent of the region's passenger and freight transport and provide the only form of access to most rural communities. To handle this traffic, African countries expanded their road networks considerably during the 1960s and 1970s. They also built new roads to open up more land for development. The result was that, by the end of the 1980s, there were nearly two million km of roads in SSA, including 610,000 km of main roads, 938,000 km of rural roads, and 143,000 km of urban roads. These roads are some of the region's largest assets. Their replacement costs amount to over $150 billion, and required annual expenditures on routine and periodic maintenance to keep them in stable long-term condition are between $1.5 and $2.0 billion.[1] In terms of assets, employment, and turnover, particularly with maintenance fully funded, Africa's roads are truly *big business*. They are generally far larger than railways or national airlines (see Table 2.1 and Figure 2.1).

The main road network includes about 5,000 km of freeways and dual carriageways, 190,000 km of paved two-lane roads and 414,000 km of gravel roads. These roads carry modest volumes of traffic; no more than 10 percent carry over 1,000 vehicle per day (vpd). Motorization levels are low and more than 25 percent of traffic consists of heavy vehicles. Since a number of African countries are land-locked, the main road network also includes several heavily trafficked international transit corridors. Toll roads are uncommon, although ten continuous roads in South Africa are operated as toll roads under private sector management contracts (see Box 2.1). Ghana is examining the option of operating five trunk roads under private sector concession agreements. Mauritius is examining a similar arrangement for a major trunk road in Port Louis, and Mozambique is planning a build-operate-transfer (BOT) toll road between Komatipoort on the South African border and Maputo. Although tolls are collected on high-density roads in some other countries, toll revenues are generally treated as general tax revenues (as in Nigeria). Only rarely, as in Chad, Ghana, and Rwanda, are road toll revenues used to support road maintenance.

The rural road network comprises over 938,000 km of classified roads and an unknown length of unclassified roads. These roads carry light traffic, usually less than 100 vpd, and consist mainly of two-lane, all-weather gravel roads and seasonal earth tracks. They connect the main agricultural areas to local market towns and the main road network. These roads play a particularly important role in Africa, since agriculture accounts for 33 percent of Africa's GDP, 66 percent of its labor force, and 40 percent of its exports. About 70 percent of Africa's population lives in rural areas.

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[1] Replacement costs are based on road lengths included in Appendix 1. Replacement costs are assumed to be $500,000 per km for a dual carriageway, $250,000 per km for a paved road, and $50,000 per km for a gravel road. No allowance has been made for the cost of replacing structures.

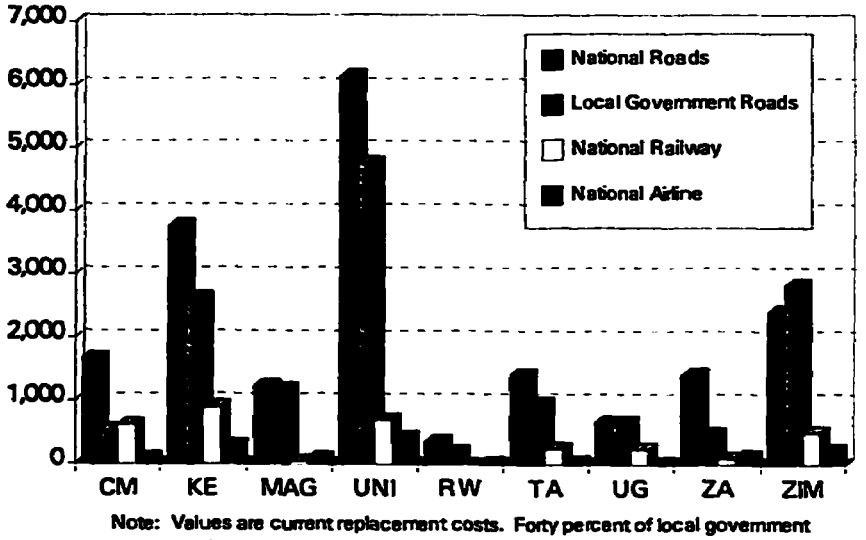
Table 2.1 Assets, Employment, and Turnover for Roads, Railways, and Airlines in Selected Countries, Early 1990
($, million and number)

	CM	*KE*	*MAG*	*UNI*	*RW*	*TA*	*UG*	*ZA*	*ZIM*
Main Road Agency									
Total assets[a]	1,850	3,766	1,228	6,205	358	1,417	666	1,426	2,410
Staff	8,683	14,931	2,531	3,580	8,488	8,479	4,515	4,261	5,815
Turnover[b]	53	107	34	191	11	46	17	48	52
National Railway									
Total assets[c]	617	900	46	700	-	250	240	350	500
Staff	4,300	21,000	4,875	26,000	-	12,000	6,357	8,500	17,654
Turnover	74	70	8	low	-	63	10	27	122
National Airline									
Total assets[c]	96	300	95	420	22	37	20	132	227
Staff	1,758	2,720	1,230	4,540	216	1,062	na	2,300	2,000
Turnover	130	168	93	118	11	32	na	172	68

Note: For country name codes, see inside front cover.
- Not applicable.
a. Based on replacement costs, less maintenance backlog.
b. Annual maintenance requirements (from Table 3-4), plus 20 percent for new investment (the figure of 20 percent was recommended as a guide for budgeting purposes during the course of the RMI Phase I seminars). Country variations are mainly due to variation in the length of roads that are paved.
c. Based on the replacement costs of total fixed assets, or the replacement costs estimated from historic costs.

Source: Appendix 1 and 2, World Bank sector and project reports, and World Bank task managers.

Figure 2.1 Replacement Costs of Transport Infrastructure in Selected African Countries, 1990
(million dollars)



Note: Values are current replacement costs. Forty percent of local government roads are assumed to be in poor condition.

Source: Table 2.1

Box 2.1 Toll Roads in South Africa

South Africa currently has 10 continuous toll roads totaling 685 km in length. The roads are either completely new, or have been significantly rebuilt. The legislation under which these roads are tolled requires, among other things, that (i) a free alternative parallel route should be available for motorists who do not wish to pay the toll and that (ii) the Ministry of Transport determine the amount of the road toll, based on recommendations submitted by the South African Roads Board. The toll rate is set at a percentage of the savings expected to accrue to motorists as a result of the road (i.e., it is generally set to capture 75 percent of the benefits), and is increased periodically to account for inflation (but is never raised higher in real terms than the initial calculated toll rate). The toll system operates on an open basis (i.e., motorists can use sections of road between toll plazas without paying the toll) to reduce the impact on local residents, and commuters who regularly use the routes enjoy substantial discounts by using frequent-user cards.

The Department of Transport, on behalf of the South African Roads Board, manages and controls the road loans and employs contractors to operate and maintain the roads on three to five year contracts. The private sector companies were set up at the invitation of the Department of Transport and there are now four companies operating the ten toll roads (one company manages five roads, one manages three roads, and the remaining two companies each manage one). None of the roads is wholly self-financing. The concept applied in designing the financing schemes is called the *loan supportable by revenue* (LSR) approach. The LSR is determined by calculating the project's present worth over a period of 30 years at a 4 percent discount rate. This determines the size of the loan that could be repaid from toll revenues over 30 years at a borrowing rate 4 percent above the rate of inflation. The balance of the capital is provided in the form of National Road Fund loans, which bear no interest until the toll road has met its commercial money market obligations. Since traffic is growing, and tolls are indexed for inflation, toll income grows faster than operating costs. Although the toll roads start off making losses, they are expected to break even after seven to nine years, pay off the accumulated deficit during the next seven to nine years, and then pay off the principal amount of the loan and make profits during the remaining twelve to sixteen years of the project's life.

There were three sources of finance: (i) the Department of Transport floated capital market loans carrying a government guarantee, with repayment periods that varied between 3 and 20 years (with a pronounced concentration on loans shorter than 10 years); (ii) potential private sector concessionaires borrowed short-term money in the form of money-market loans (responsibility for these loans was taken over by the Department of Transport in April 1991); and (iii) the National Road Fund made *soft* long-term loans on which interest was payable on a flexible basis. As of 31 March 1992, the loan portfolio included $206 million in capital market loans (on which the average financing charge during 1992 amounted to 9.8 percent), $286 million in money market loans (on which the average financing charge during 1992 was 15.6 percent), and $460 million in loans from the National Road Fund (on which the average interest paid during 1992 was 2.2 percent). The Department is currently in the process of converting short-term money market loans into long-term debt.

Overall income for all toll facilities during 1992 amounted to $53.1 million ($51.5 million in toll revenue), while overall expenditures were $101.4 million (running costs, $16.7 million; audit fees and depreciation, $6.3 million; and financing costs, $78.4 million). The overall deficit for the year was thus $48.3 million. Since the overall deficit carried forward from the previous year was $71.0 million, the overall deficit at the end of 1992 (to be carried forward into 1993) was $119.3 million.

There are also about 143,000 km of urban roads. They consist mainly of paved two-lane roads, although some of the larger urban areas contain some dual carriageways. Most countries contain less than 1,000 km of urban roads, and only Nigeria and South Africa have large urban networks (Nigeria has about 22,000 km and South Africa has 60,000 km). Traffic volumes in urban areas are higher than on the main road network and traffic congestion is a serious and growing problem in some cities (e.g., Abidjan, Accra, Cape Town, Durban, Johannesburg, Lagos, Port Elizabeth, Pretoria, and Nairobi) and is an emerging problem in others.

The importance of roads in SSA is reflected by the fact that road spending typically absorbs 5 to 10 percent of the government's recurrent budget and 10 to 20 percent of its development budget. Total road expenditures currently account for over one percent of regional

GNP. Furthermore, in many countries, a significant proportion of the central government's disbursed and outstanding debt is attributable to road loans. The road sector also absorbs a great deal of grant finance, mainly for procurement of construction and maintenance equipment. Even a relatively small national road agency often owns $25 to $50 million worth of plant and equipment.

2.2 IMPACT OF POOR ROAD MAINTENANCE

In spite of their importance, most roads in Africa are poorly managed and badly maintained. Almost without exception, they are managed by bureaucratic government roads departments. The poor state of the road network is reflected in the large backlog of deferred maintenance. It would take nearly $43 billion to fully restore all roads classified as being in poor condition (i.e., requiring immediate rehabilitation or reconstruction).[2] In other words, African countries have spent far too little on routine and periodic maintenance during the past twenty years. As a result, nearly a third of the $150 billion invested in roads has been eroded through lack of maintenance. Africa has been living off its assets. Restoring only those roads that are *economically justified* and preventing further deterioration will require additional annual expenditures over the next ten years of at least $1.5 billion. This amounts to nearly one percent of regional GDP and would increase current road spending from one percent to nearly two percent of regional GDP. The remaining roads in poor condition will have to receive minimal maintenance or be handed over to lower levels of government and local communities.

The economic costs of poor road maintenance are borne primarily by road users. In rural areas, where roads often become impassable during the rainy season, poor road maintenance also has a profound effect on agricultural output. When a road is not maintained — and is allowed to deteriorate from good to poor condition — each dollar *saved* on road maintenance *increases* VOCs by $2 to $3.[3] Far from saving money, cutting back on road maintenance *increases* the costs of road transport and raises the net cost to the economy as a whole. It is estimated that the *extra* costs of insufficient maintenance in Africa amount to about $1.2 billion per year, or 0.85 percent of regional GDP. About 75 percent of these costs must be paid with scarce foreign exchange. During preparation of the Integrated Roads Project in Tanzania, it was estimated that the annual economic costs of poor road maintenance were between $100 and $150 million. Likewise, during an RMI workshop in Kenya, it was estimated that the $40 million annual shortfall in road maintenance expenditure increased VOCs by about $150 million per year. In general, road maintenance and rehabilitation projects produce economic rates of return of over 35 percent.[4]

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2 The length of the main road network in poor condition is given in Appendix 2. It is estimated that 50 percent of the rural network and 30 percent of the urban network is in poor condition. The cost of rehabilitating/ reconstructing roads is assumed to be $230,000 for paved roads and $36,000 for gravel roads.

3 A paved road in good condition, carrying about 500 vpd, requires resealing or light overlays, costing about $23,600 per km, every seven years to keep it in good condition. This has a net percent value (NPV), discounted at 12 percent over twenty-five years, of $17,688 per km. Without maintenance, the road will deteriorate from good to poor condition. This will increase vehicle operating costs by about $5,000 per km, which has an NPV, when discounted over twenty-five years, of $39,200 per km (Thriscutt and Mason 1989, p. 29-30). The benefit/cost ratio of a fully-funded road maintenance program is thus between 2 and 3.

4 A recent analysis of the Operations Evaluation Department (OED) database, covering 341 road projects evaluated between 1961 and 1988, found that the average economic internal rate of return (EIRR) for pure road maintenance projects was 38.6 percent. The analysis was carried out for the 1994 *World Development Report.*

The impact of low road maintenance expenditures on vehicle operating costs is illustrated in Box 2.2. It compares the costs and benefits of several road maintenance strategies: patching, surface-treated reconstruction, and asphalt-concrete overlays. It then calculates their average annual cost-effectiveness and overall NPV, discounted over twenty years. It shows all maintenance strategies to be highly cost-effective, with annualized benefit/cost ratios which vary from 3.4 to 22.1. In other words, on an annualized basis, each dollar spent on patching saves at least $3 and can save as much as $22. Each dollar spent on road maintenance pays for itself several times over in reduced VOCs.

The above analysis, though based on the roughness of the road pavement, does not fully reflect pothole damage. Most vehicles are not designed to deal with the sharp and repeated shocks caused by potholes. This is particularly true of loaded freight vehicles, and trucking companies are well aware of the extra costs that poor roads impose on road transport operations (see Box 2.3). One of the trucking associations in Zambia has recently carried out a small survey to try to estimate the additional costs associated with potholes. It concluded that they added over $14,000 per year to the cost of operating a large truck and trailer combination. It is no wonder road transport associations keep pressing for better road maintenance and express a willingness to pay for it.

Poor road maintenance also raises the *long-term costs* of maintaining the road network. Maintaining a paved road for fifteen years costs about $60,000 per km. If the road is not maintained and allowed to deteriorate over the fifteen-year period, it will then cost about $200,000 per km to rehabilitate it. In other words, rehabilitating paved roads every ten to twenty years is more than three times as expensive, in cash terms, as maintaining them on a regular basis, and 35 percent more expensive in terms of NPVs discounted at 12 percent per year.

The same is true of gravel roads. Maintaining a gravel road for ten years costs between $10,000 and $20,000 per km, depending on climate and traffic volumes. On the other hand, leaving it without maintenance for ten years will require rehabilitation costing about $40,000 per km. Rehabilitating gravel roads every ten years is thus twice as expensive, in cash terms, as regular routine and periodic maintenance, and between 14 and 128 percent more expensive in terms of NPVs discounted at 12 percent per year.

Two factors have contributed to the above short-sighted policies. First, lack of market discipline has encouraged governments to minimize their own (road maintenance) expenditures, disregarding the impact that this has on total road transport costs (road maintenance costs plus VOCs). Second, maintenance is normally financed under the recurrent budget, and recurrent revenues are nearly always in short supply. Since donors have been willing in the past to finance rehabilitation under the development budget (often on a grant basis), governments had every incentive to capitalize road maintenance and charge it against the development budget. Rehabilitation, rather than recurrent maintenance, became the optimal solution. Donors quickly recognized this mistake, and most will no longer finance rehabilitation programs until sustainable road maintenance policies have been introduced.

Box 2.2 Impact of Road Maintenance on Vehicle Operating Costs (VOCs)

The following example analyzes the impact of road maintenance on VOCs. It compares a limited number of potential road maintenance strategies aganinst a base case which consists of routine maintenance only at a cost of $322 per km (i.e., off-carriageway work). The five maintenance strategies evaluated in this example include:

(1) patching;
(2) surface-treated reconstruction (flexible pavement with a crushed stone base and double bitumen surface treatment), initiated when surface roughness reaches 7 IRI (m/km), with patching;
(3) surface-treated reconstruction as above, without patching;
(4) asphalt-concrete overlay, initiated when surface roughness reaches 5 IRI, with patching;
(5) asphalt-concrete overlay, initiated when surface roughness reaches 5 IRI, without patching.

The analysis examined these strategies over a twenty-year period during which traffic was assumed to grow at 3 percent annually. The net present values of each option were calculated using a 12 percent discount rate.

The results are summarized below for roads in both *poor* and *fair* condition for initial average daily two-way traffic volumes (AADTs) of 500 and 1,000 vpd. Seventy percent of the traffic consists of trucks. To make the tables understandable to a wider audience, expenditures on maintenance and VOC savings have been expressed as annualized *cash* outlays and savings. The benefit/cost ratios likewise show the annualized cash payoff from each strategy. The tables also include the NPV for each strategy.

Road maintenance is shown to be highly cost-effective, with benefit/cost ratios varying from 3.4 to 22.1. When roads are in fair condition and there is no budget constraint, an asphalt concrete overlay produces the highest NPV. When roads are in poor condition, surface-treated reconstruction produces the highest NPV. The incremental benefit/cost ratios illustrate the optimal sequencing of maintenance strategies when the budget is constrained. Patching is always cost-effective, particularly when traffic flows are high. When roads are in fair condition, overlay strategies are more cost-effective than reconstruction strategies. When they are in poor condition, reconstruction strategies are more cost-effective than overlay strategies.

	Poor condition, AADT = 500 vpd					*Poor condition, AADT = 1,000 vpd*				
Strategy	*1*	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*
Increased maintenance [a]	568	9,278	9,276	5,978	5,977	628	9,295	9,268	6,254	6,252
VOC savings [b]	2,291	31,507	31,477	27,872	27,872	6,039	66,680	66,171	60,886	60,866
B/C ratio [c]	4.0	3.4	3.4	4.7	4.7	9.6	7.2	7.1	9.7	9.7
NPV, $ mill [d]	16.8	216.3	216.0	211.1	211.1	53.1	561.6	556.9	532.6	532.4
Incr. B/C	4.0	1.1	1.1	4.7	4.7	9.6	1.9	1.8	9.7	9.7
Sequencing [e]	1	3	-	-	2	1	3	-	2	-

	Fair condition, ADT = 500 vpd					*Fair condition, ADT = 1,000 vpd*				
Strategy	*1*	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*
Increased maintenance [a]	546	1,799	2,370	2,868	2,866	606	3,011	4,677	3,399	3,520
VOC savings [b]	3,310	8,259	9,348	13,259	13,228	13,371	31,976	36,141	40,418	40,947
Benefit/cost [c]	6.1	4.6	3.9	4.6	4.6	22.1	10.6	7.7	11.9	11.6
NPV, $ mill [d]	27.0	62.8	67.8	99.8	99.4	125.2	283.7	307.9	361.0	364.8
Incr. B/C	6.1	4.0	3.3	4.7	4.7	22.1	7.7	5.6	21.8	17.6
Sequencing f	1	2	-	3	-	1	2	-	3	-

a. Annualized expenditures in addition to routine maintenance, dollars per year.
b. Annualized savings attributable to above maintenance spending, dollars per year.
c. Item b divided by item a.
d. Per 1,000 km.
e. The preferred incremental options are going from 1 to 4 or 5, and then from the best of these to 2 or 3.
f. The preferred incremental options are going from 1 to 2 or 3, and then from the best of these to 4 or 5.

Source: Annex 1.

Box 2.3 How Potholes Affect Vehicle Operating Costs

Potholes cause immense damage to vehicles. To better understand the additional costs associated with potholes, the Federation of Zambian Road Hauliers interviewed truckers to compare the running costs of a truck and trailer combination on a road with potholes with those on a road without potholes. The vehicle considered was a combination tractor and trailer with twenty-two wheels. The costs estimated are those over and above normal running costs.

On a road with bad potholes, a driver can either pursue a defensive strategy or ignore the potholes and carry on as usual. If he follows a defensive strategy, he first slows down and changes gears. He then has to negotiate the loaded truck and trailer, weighing between 44 and 50 tons, through the potholes. This causes extra stress on the tires, wheel bearings, spring assemblies, spring hangers, chassis, cross-members, engine mountings, gear box mountings, brakes, steering assemblies, and shock absorbers. Having negotiated the potholes, he accelerates and changes gears again. On the other hand, if he ignores the potholes, he will drive through them at his regular speed, resulting in more damage to the vehicle and tires and increasing the risk of accidents. The axle pressure now increases by at least three times.

The survey resulted in the following annual expenditures over and above normal running expenditures. It ignores extra fuel consumption, damage to goods, down-time of trucks under repair, and accidents caused by potholes and sharp pavement edges.

Quantity	*Item*	*Unit price (dollars)*	*Annual cost (dollars)*
10	Extra tires and tubes	595	5,952
1	Extra clutch and pressure plate	1,071	1,071
4	Extra wheel bearing	201	803
1	Extra set of brake shoes	1,050	1,050
1	Extra set of springs	1,667	1,667
4	Extra spring hangers and bushes	113	452
-	Welding, electrodes/oxyacetylene for:		
	body, chassis and cross member damage		
	engine, gearbox, and cabin mountings	952	952
1	Extra steering assembly	1,874	1,874
4	Extra shock absorbers	128	510
	Total annual costs attributable to potholes		
14,333			

Source: Federation of Zambian Road Hauliers Ltd., February, 1992.

On the assumption that each truck travels 70,000 km per year, the above expenses raise VOCs by over $0.20 per veh-km. Since the average cost of operating a large articulated truck on a good road is about $1.20 per veh-km, potholes thus increase VOCs by at least 17 percent, since the additional costs of fuel, down-time, and damage to goods are not included. Furthermore, with virtually all the needed spare parts imported from abroad, the extra costs must be entirely foreign exchange.

2.3 PAST EFFORTS AT REFORM

During the past twenty years, the donor community has made strenuous efforts to improve the operation and maintenance of roads. To help overcome the maintenance backlog, it has supported substantial road rehabilitation programs and has attempted to reform road maintenance policies through dialogue and technical assistance. Between 1975 and 1986, external funding for road projects amounted to about $6.5 billion, and annual commitments are currently running at about $1.0 billion per year. The World Bank is providing about $350 million per year, other donors $450 million, while the remaining $200 million is coming from local budgets.

Most reform efforts concentrated on strengthening management of roads, improving user-charging policies, and increasing allocations for road maintenance. The initiatives nevertheless lacked a comprehensive vision, focused on technical rather than institutional solutions, and were generally implemented in a piecemeal fashion.

Although some attempts were made to rationalize and decentralize management of roads, little effort was made to deal comprehensively with weaknesses in the road agency's organizational structure, low pay scales, shortages of qualified staff, lack of staff motivation, and lack of managerial accountability. Instead, most initiatives concentrated on reducing force account work, introducing maintenance management systems, and restructuring government equipment pools. These initiatives were accompanied by complementary efforts to simplify government procurement procedures to facilitate the use of local contractors, strengthen the local construction industry, introduce maintenance and equipment management systems, and strengthen axle-weight enforcement to reduce damage to road pavements caused by over-loaded vehicles. The most successful initiatives dealt with reducing force account work, simplifying procurement procedures, and strengthening the local construction industry (for examples of such initiatives, see Box 9.1). The remaining initiatives had little lasting impact due to shortages of qualified staff, managerial indifference, and resistance from strong vested interests.

Efforts to reform user-charging policies focused on encouraging governments to adopt user charges based on short-run marginal costs (variable road maintenance costs, plus the costs of road congestion).[5] The aim was to encourage best use of the road network and ensure that heavy vehicles covered the costs of the damage they did to the road pavement. These efforts were partly successful. Taxes paid by heavy vehicles were often increased following studies of road user charges, but no countries proved willing to accept strict short-run marginal cost pricing for roads. Governments could not see the point of using short-run marginal cost pricing on uncongested roads, saw no reason why road users should be subsidized by other sectors of the economy, and were not persuaded that the proposed arrangements made fiscal sense.[6]

Attempts to improve financing of roads concentrated on increasing allocations for road maintenance and attempting to use earmarking to secure a stable flow of funds. The government was asked to set aside part of its general tax revenues (usually specified as a percentage of overall fuel tax revenues), deposit the money into a *Road Fund*, and use the proceeds to finance maintenance of the core road network. However, apart from pointing out the economic costs of deferred maintenance and suggesting reallocation of funds from construction to maintenance, little advice was offered on where the additional revenues might come from and how the Road Fund should function. The International Monetary Fund opposed earmarking on grounds that it undermined unified budget management and Ministries of Finance also objected to Road Funds. As a result, most Road Funds suffered from systemic problems: (i) deposits were erratic; (ii)

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5 A pricing practice in which price is made equal to short-run marginal costs (i.e., the costs of producing the last unit sold, plus a mark-up to clear the market). The rationale was that, subject to certain assumptions about production costs and other matters, such a pricing rule would maximize economic welfare. See, for example, Churchill, A., *Road User Charges in Central America*, World Bank Staff Occasional Paper No. 15, Johns Hopkins University Press, Baltimore, 1972; and Walters, A., *The Economics of Road User Charges*, Johns Hopkins University Press, Baltimore, 1968.

6 With little road congestion, such charges would be set equal to variable road maintenance costs which would only cover about half the costs of operating and maintaining the road network.

withdrawals were frequently delayed; (iii) governments borrowed money to finance other public programs; and (iv) expenditures were loosely controlled. Therefore, most Road Funds failed to provide an adequate and stable flow of funds.

2.4 THE ROAD MAINTENANCE INITIATIVE

Against this background the RMI was launched by the United Nations Economic Commission for Africa (UNECA) and the World Bank under the auspices of the Sub-Saharan African Transport Policy Program (SSATP), in an effort to identify the underlying causes of poor road maintenance policies and develop an agenda for reforming them. The program is administered by the Africa Technical Department in the World Bank and is financed by the governments of Denmark, Finland, France, Germany, Norway, Sweden, Switzerland, and the EEC. Finland, France, and Norway provide three senior staff to work on the program.[7]

The initial phase of the RMI program focused on raising awareness of the need for sound road maintenance policies and on identifying why current policies were ineffective and unsustainable. The second phase then moved on to country initiatives in nine target countries: Cameroon, Kenya, Madagascar, Nigeria, Rwanda, Tanzania, Uganda, Zambia, and Zimbabwe. The country programs initially focused only on main roads and concentrated on promoting reforms in three main areas: (a) planning, programming, and financing; (b) operational efficiency; and (c) institutional and human resource development.

During the initial stages of the policy dialogue, RMI staff urged stake-holders to identify the underlying causes of poor road maintenance, suggested possible ways of dealing with them, shared experiences from other parts of Africa and the rest of the world, and employed consultants to prepare background papers on different aspects of the road maintenance problem. This quickly led to three important insights.

First, it had always been assumed that the Ministry of Finance (MOF) would play a key role in developing sustainable road maintenance policies. So strong was this belief, some of the initial country initiatives sought to interest the MOF in road maintenance by exploring the basic financial issues through Public Expenditure Reviews (PERs). However, it quickly became apparent that the MOF did not hold the key and that the secret to success lay in involving the private sector. Futhermore, these are the people who use the roads and also pay for them. Their representative organizations — chambers of commerce, road transport associations, and farmer organizations — are strong and influential. Their support will often overcome otherwise insurmountable bureaucratic resistance, whether it comes from the Ministry of Works (MOW) or the MOF.

Second, many of the systemic problems associated with poor road maintenance policies — weak programming and budgeting, undue emphasis on force account work, and inefficient plant pools — were symptoms of a deeper problem. The real causes were weak or unsuitable institutional arrangements for managing and financing roads, and the impact this has had on staff incentives, staff motivation, and managerial accountability. Until the institutional framework is

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7 Finland withdrew from the program in mid-1993.

improved, it is almost impossible to overcome the numerous technical, organizational, and human resource problems which hamper sound road maintenance policies.

Third, it showed that attempts to improve road maintenance policies cannot focus on maintenance alone, nor can they focus only on the maintenance of main roads. Poor road maintenance policies are a sub-set of the wider issues of managing and financing roads as a whole. In fact, the problems are most acute at the regional and district levels, where institutional weaknesses are greater and finances in shorter supply.

These insights automatically caused the two-way country dialogue to evolve into a wider debate about the institutional arrangements for managing and financing all types of roads. The following chapters describe the work of the RMI program, the way it handled the process of policy reform, and the resulting agenda for reform now being implemented in the nine target countries and elsewhere.

3 THE BASIC ISSUES

This chapter concentrates on diagnosis. Why have governments in SSA been pursuing ineffective and unsustainable road maintenance policies? Although there is no simple answer, there are some common threads. The main problems are of an institutional nature and this affects incentives. They include: serious human resource constraints (as pointed out in the road deterioration policy study), inadequate financing arrangements, lack of clearly defined responsibilities, inefficient management structures, and weak management systems. These cause road agencies to be inefficient. This chapter looks at these problems and tries to understand *what went wrong* and *why*.

3.1 INSTITUTIONAL FRAMEWORK

Part of the reason for poor road maintenance policies is attributable to the institutional framework within which roads are managed. They are not managed as part of the market economy and this biases managerial incentives. There is no clear *price* for roads, road expenditures are financed from general tax revenues, and the road agency is not subjected to any rigorous market discipline. Roads are managed like a social service. Road users pay taxes and user charges, and the proceeds are nearly always treated as general tax revenues. Instead of being financed through user charges, roads are thus financed through budget allocations determined as part of the annual budgetary process. These allocations bear little relationship to underlying needs (i.e., to the cost-effectiveness of road expenditures at the margin) or to road users willingness to pay. Revenues and expenditures are completely delinked. There is no *hard budget constraint* (i.e., there is no direct link between revenues and expenditures), no price to ration demand (do we want more or less of particular road services?), and expenditures are not subjected to the rigorous tests of the market place (how much road spending can we really afford?).

The above framework biases managerial incentives and affects the way roads are managed. First, since road users do not directly pay for roads, they are not forced to choose whether and how to make the journey or to hold the road agency accountable for the way it spends its budget. Second, the absence of a firm link between revenues and expenditures encourages road users to demand more road spending *because* it is financed from general tax revenues and does not affect payments for road use. Third, without a hard budget constraint and pressure from road users, the road agency does not have to manage resources efficiently. The government rarely provides clear objectives (in practice, road agencies are often required to employ too much labor and to build roads which are uneconomic), managers face few incentives to cut costs (major cost reductions may simply lead to reduced budget allocations), there are few sanctions, staff cannot easily be disciplined, and managers are rarely penalized for poor performance.

3.2 HUMAN RESOURCE CONSTRAINTS

Human resource constraints are the single most important issue facing most road agencies. They suffer from an acute shortage of technically qualified staff and still employ far

too many unskilled workers.[8] The scale of the problem with technical staff is clearly illustrated in Table 3.1. Of the nine road agencies included in the table, one has collapsed (Zambia), two are close to collapsing (Malawi and Mozambique), and four are heavily dependent on expatriates (Botswana, Lesotho, Namibia, and Tanzania). Salaries in some road agencies are so low that daylighting has become part of the status quo.[9] Salaries are not only well below those in the private sector, but are frequently below the living wage (the minimum salary needed to feed and clothe a family). Annual median salaries vary from an adequate $10,000+ in Botswana, Lesotho, Namibia, and Swaziland to $6,000 in Zimbabwe (the road agency is just about holding its own, but 75 percent of its engineers and 60 percent of its technicians are under the age of 34), $4,000 in Malawi, $2,200 in Mozambique, $950 in Tanzania, and $650 in Zambia. This has caused "a rapid exodus ... of experienced and competent technical staff to the private sector and parastatals ... The main reason has been offers of far better compensation ... and *more generous* fringe benefits."[10]

The situation is similar, or is rapidly becoming so, in most other African countries, (see Table 3.2). This table, which covers the nine countries participating in the RMI program, shows that vacancies at the professional and managerial levels are major problems in Kenya, Uganda, and Zambia. It also shows that road agencies in Rwanda, Tanzania and Zambia are heavily dependent on expatriate engineers paid international salaries by multilateral and bilateral donors ($35,000+, plus allowances).[11] The shortage of technical staff, together with the incidence of daylighting and moonlighting, are entirely attributable to the growing disparity between civil service salaries and those for comparable positions in the private sector (see Table 3.3). An engineer working in the private sector generally earns more than twice as much as his public sector counterpart (in Tanzania and Zambia, it is five and nine times respectively). Real salaries have also declined sharply. A young engineer in Tanzania earned about $250 per month in 1970. His real salary now is a mere $20 per month. The same is true in Nigeria. Until about five years ago, a young engineer earned about $1,000 per month. This has now fallen to $150 per month.

Roads departments paying qualified technical staff a fraction of the going market wage either end up with high vacancy rates (as in Kenya, Malawi, Mozambique, Uganda, and Zambia), employing expatriate road managers paid through donor-financed technical assistance programs (as in Botswana, Lesotho, Namibia, Rwanda, Tanzania, and Zambia), or with part-time staff forced to supplement their incomes by moonlighting, daylighting, manipulating allowances, and pilfering.[12] Daylighting is now a systemic problem in Africa. Too many technical staff hold second jobs and owe their loyalty to another employer. And this problem cannot be solved through training, bonded studentships, and improved allowances. There is no point training staff who only spend a fraction of their time on the job. Likewise, bonded graduates have no interest

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8 After independence, most governments systematically expanded the civil service, often by a factor of two or three, to deliver on electoral promises and reduce unemployment. Road agencies were a key target for employment programs, and many now have two to three times the required number of laborers on their books.

9 Daylighting refers to the practice of doing another full-time job during regular working hours.

10 SATCC, (1993).

11 Some countries, like Botswana and Lesotho, also recruit regional expatriate engineers, who are paid annual salaries of about $15,000, plus allowances.

12 "We want them to come to work. We want them to work five days a week. We want them to work 40 hours a week. We don't want them to have to do something else in order to survive and we want them to keep their hand in their own pocket." Comments by E.V.K. Jaycox, Vice President, Africa Region, at a conference on *Capacity Building: The Missing Link in African Development*, Reston, Virginia, USA, May 20, 1993.

in making a career in the roads department and simply count the days to the end of their bonding period. Improved allowances are equally ineffective since they are discretionary, subject to change and are not bankable (i.e., cannot be used as security for mortgages and other loans). You cannot manage a road agency with a demoralized, part-time staff.

Table 3.1 Number of Staff and Salary Scales in SATCC Countries, 1991-92

Country	Number of staff				Road Length (km)	Kilometer per staff[c]	Annual salary range (1992/93 dollars)
	Local	Expatriates[a]	Vacant	Total[b]			
Botswana					8,328		
Engineers	6	15	15	36		231	8,076 - 18,811
Technicians	78	5	1	84		99	8,076 - 14,702
Lesotho					3,076		
Engineers	10	11	11	32		96	8,076 - 18,811
Technicians	24	0	2	26		118	8,076 - 14,702
Malawi					14,145		
Engineers	19	9	27	55		257	1,873 - 6,195
Technicians	42	0	1	43		329	132 - 2,953
Mozambique					29,175		
Engineers	10	1	34	45		648	2,070 - 2,283
Technicians	35	0	78	113		258	869 - 1,781
Namibia					39,516		
Engineers	2	10	6	18		2,195	12,440 - 21,925
Technicians	16	1	16	33		1,197	9,415 - 21,925
Swaziland					2,800		
Engineers	3	1	1	5		560	8,746 - 10,383
Technicians	18	0	4	22		127	3,905 - 6,155
Tanzania[d]					28,030		
Engineers	211	37	0	248		113	928 - 957
Technicians	270	0	0	270		104	n.a.
Zambia[d]					20,783		
Engineers	1	6	24	31		670	481 - 820
Technicians	3	1	22	26		799	305 - 596
Zimbabwe[d]					18,400		
Engineers	56	6	3	65		283	3,977 - 7,973
Technicians	65	0	0	65		283	3,850 - 7,196

a. Expatriates are foreign engineers paid international salaries by donors. Some countries also recruit regional expatriates.

b. Total refers to total number of approved posts.

c. Length of network divided by total approved posts.

d. Number of engineers in Tanzania, Zambia, and Zimbabwe from Table 3.2.

Source: SATCC, (1993)

Table 3.2 Number of Road Agency Staff by Category and Source: Selected Main Road Agencies

	CM	KE	MAG	UNI	RW	TA	UG	ZA	ZIM
Professional and managerial									
Local	203	215	51	335	44	211	72	1	56
Expatriate	5	2	2	-	14	37	5	6	6
Vacant	-	26	-	-	5	-	19	24	3
Subtotal	208	243	53	335	63	248	96	31	65
No./1,000 km	6	4	5	6	11	9	12	2	4
Technicians									
Local	693	381	287	419	86	949	225	4	250
Vacant	-	154	-	-	12	-	94	61	-
Subtotal	693	535	287	419	98	949	319	65	250
No./1,000km	21	8	20	7	17	34	40	3	14
Other regular staff									
Local	7,782	10,892	2,191	2,828	8,327	7,282	4,100	4,178	5,500
Vacant	-	3,261	-	-	-	-	-	-	-
Subtotal	7,782	14,153	2,191	2,828	8,327	7,282	4,100	4,178	5,500
No./1,000km	236	224	150	48	1,425	260	508	201	298
Grand total	8,683	14,931	2,531	3,580	8,488	8,479	4,515	4,261	5,815

- Not available

Notes: For country name codes, see inside front cover.
Other regular staff include laborers and casuals. No./1,000 km is based on number of approved positions.

Source: RMI Country Coordinators.

Table 3.3 Incomes of Public and Private Sector Engineers: Selected Countries, 1993 (dollars per month)

	CM	KE	MAG	UNI	RW	UG	TA	ZA	ZIM
Public salary	377	170	-	154	186	99	70	70	370
Private salary	777	465	-	334	661	360	350	600	600
Public/private	2.1	2.7	n.a.	2.2	3.6	3.6	5.0	8.6	1.6

- Not available.

n.a. Not applicable.

Note: Comparisons are of salaries and allowances for graduate engineers with three to four years practical experience. Conversion to dollars at January 1994 exchange rates, after CFAF devaluation.

Source: RMI Country Coordinators.

3.3 INADEQUATE FINANCING ARRANGEMENTS

Financing arrangements are crucially important. Without an adequate and stable flow of funds, road maintenance policies will not be sustainable. That is an important part of the problem in Africa. Road maintenance expenditures in virtually all countries are well below the levels needed to keep the road network in stable long-term condition. In most countries, they are less than half the estimated requirements and, in some, less than a third (see Table 3.4). Furthermore, the flow of funds is erratic. Budget allocations are often cut at short notice in response to difficult fiscal conditions, funds are rarely released on time, and actual expenditures are often well below agreed budget allocations. As a result, roads throughout the region continue to deteriorate, rural roads regularly become impassable during the rainy season, and the large backlog of road rehabilitation continues to increase. Between one quarter and one half of the main road networks included in Table 3.4 are in poor condition and need to either be rehabilitated or downgraded to roads which receive minimal maintenance.

The main reason why road maintenance is underfunded is that road users pay very little for the use of the road network (see Table 3.4). They pay the usual import duties, excise taxes and sales taxes, but so does everyone else. Road user charges — in the form of vehicle license fees, a specific surcharge added to the price of fuel (the fuel levy), and international transit fees — rarely cover more than 50 percent of expenditures on maintenance and, in some countries, barely cover 25 percent (see Box 3.1 for an explanation of how to separate road user charges from general tax revenues). Most road expenditures are still financed from general tax revenues (listed in Table 3.4 as *government grants*) and donor-financed loans and grants. This is not necessary. Roads can be commercialized, put on a fee-for-service basis, and treated like any other public enterprise.

An added complication is that funds for road maintenance are allocated as part of the annual budgetary process. Under this arrangement, each ministry must compete for funds during the annual budget negotiations and, at least in theory, funds are allocated to finance those expenditures with the highest economic return. However, if that were true, road maintenance would not be underfunded. As Table 3.4 and Box 3.1 clearly show, allocations for maintenance are well below the optimal requirements (defined as a maintenance strategy which produces an EIRR of over 12 percent), even though the economic return at the margin is frequently well over 100 percent. The budget allocation process is flawed and politicized, and funds are unfortunately not allocated to finance expenditures with the highest return. Large spending ministries, particularly those spending large sums on maintenance, nearly always lose out in the budget debate. Maintenance can always be postponed in the hope that better fiscal conditions are around the corner. They rarely are, and road maintenance continues to be cut or deferred. Given this inherent structural problem, it is no wonder that both Japan and the U.S. — both generally considered successful economies with well-developed budgetary systems — use earmarking to secure a stable flow of funds to support their road expenditure programs (see Box 3.2).

Another reason road maintenance is underfunded is that some countries still spend too much on new investments (mainly upgrading existing roads and construction of feeder roads). A review of nineteen SSA countries has shown that, between 1986 and 1988, 58 percent of road expenditures were devoted to new construction or improvement, 17 percent to reconstruction and rehabilitation, and a mere 25 percent to routine and periodic maintenance. Countries continue to upgrade existing roads and build new ones even when there are no funds to maintain them. One of the reasons for preferring construction over maintenance is that maintenance is financed under

the recurrent budget, while investment is financed under the development budget. Since donors are willing to support the development budget, development funds are less constrained than recurrent funds, which are mainly financed from domestic revenue sources. However, a more important reason for favoring new construction is that contracts tend to be larger (hence offering greater opportunities for gratification payments) and are politically more visible and glamorous.

Table 3.4 Main Road Expenditures, Financing, and Actual and Required Maintenance in Selected Countries

	CM	*KE*	*MAG*	*UNI*	*RW*	*TA*	*UG*	*ZA*	*ZIM*
	1991/92	*1991/92*	*1991/92*	*1991/92*	*1991/92*	*1991/93*	*1991/92*	*1991*	*1990/91*
	CFAF	*K£*	*FMG*	*Naira*	*FRW*	*TSh*	*USh*	*Kwacha*	*Z$*
	(bill)	*(mill)*	*(bill)*	*(mill)*	*(mill)*	*(bill)*	*(bill)*	*(mill)*	*(mill)*
Road expenditures[a]	16.5	112.4	100.0	750.0	1,000.0	11.3	32.0	935.0	247.0
Financed by									
Road users[b]	0.6	23.0	20.0	24.0	500.0	2.8	5.3	105.0	45.0
Government Grants	12.2	40.5	10.0	656.0	n.a.	5.0	21.0	522.0	187.0
Donors	3.7	48.9	70.0	70.0	n.a.	3.5	5.7	308.0	15.0
Maintenance expenditures									
Required[c]	12.0	132.9	52.3	2,167.8	1,137.8	11.6	13.5	2,468.0	123.6
Actual	7.5	29.1	15.0	570.0	550.0	4.8	4.4	305.0	89.7
Maintenance shortfall	4.5	103.8	37.3	1,597.8	587.8	6.8	9.1	2,163.0	33.9
Actual/required (percent)	63	22	29	26	48	41	33	12	73

n.a. Not applicable

Note:

a. Road expenditures are generally below requirements because of shortfalls in regular road maintenance allocations.
b. Includes license fees, international transit fees, and fuel levies (where applicable).
c. Maintenance requirements based on: paved = $4,000 per km; gravel = $1,000 per km.

Source: World Bank Sector and Project reports and World Bank Task Managers.

3.4 LACK OF CLEAR RESPONSIBILITIES

A lack of clearly defined responsibilities adds to the above problems. It is often unclear which agency is responsible for managing different parts of the road network, controlling overloading, managing urban traffic, intervening to improve road safety, or intervening to reduce the adverse environmental impacts associated with road traffic.

Responsibility for roads is often spread among half a dozen central government ministries and a whole range of local government agencies. For example, in Ghana during the early 1970s, construction and maintenance of trunk roads was handled by the Public Works Department; feeder roads construction fell under the Department of Social Welfare and Community Development (maintenance was left to regional organizations); the Cocoa Marketing Board, Volta River Authority and timber companies constructed roads to serve their own needs; and city and municipal councils dealt with city and town roads. The departments of agriculture,

tourism and wild life, and lands also build roads in Botswana, Kenya, Tanzania, Zambia, and Zimbabwe. Moreover, traffic regulation and enforcement, is often handled by a separate transport ministry and the police. The fragmentation of responsibility, together with the separation of responsibility for construction from that of maintenance, leads to duplication, confusion, and a lack of coherent management policies.

Box 3.1 Separating Road User Charges from General Tax Revenues

The taxes and charges paid by road users are either: (i) clearly identifiable as specific charges for use of the road network (e.g., tolls, fuel levies paid into a road fund, and vehicle license fees); (ii) clearly identifiable as general revenue taxes (e.g., value added taxes, corporate income taxes, and trade protection taxes); or (iii) may be used to both collect user charges and general tax revenues (e.g., import duties, excise taxes, and sales taxes). Since it is fairly easy to identify the taxes/charges which fall into categories (i) and (ii), this box concentrates on ways of dealing with category (iii).

When road user charges are combined with other general taxes, they are added to existing indirect taxes (e.g., taxes on goods and services and import duties). Indirect taxes generally differentiate between consumer luxuries, other consumer goods, intermediate goods (including raw materials), and capital goods. Within each category, items are treated in a fairly consistent way, although there are exceptions since tax rates also reflect other fiscal objectives (e.g., promoting domestic vehicle assembly, energy conservation, and protection of local industry). The following four-step procedure is suggested as a means of separating road user charges from general revenue taxes.

- First, examine the tax code to see whether transport services are exempted from general taxation. The tax code usually states how services are to be treated and will usually list exempted items. If not, examine the various revenue headings to see whether transport is *de facto* exempted. For example, if aviation kerosene and aircraft spare parts bear general taxes, then the presumption is that transport is not exempted.

- Second, there will usually be prior information available to show how the overall tax rate has been built up and, within the overall rate, how much represents the road user charge. For example, in China, the purchase tax on new vehicles includes an *added vehicle purchase fee*, which is credited to a special fund to support road construction. Such prior information often enables road user charges to be separated from general revenue taxes.

- Third, when there is no prior information, examine the tax code to see how the taxes levied on road users compare with the taxes levied on other goods and services. For example, trucks are usually classified as *plant and equipment*. If the tax schedule levies the same tax rate on trucks as it does on all other plant and equipment, then there is no road user charge added to the tax rate. On the other hand, if the rate is clearly higher than on other plant and equipment, the difference may represent a road user charge (the difference represents the *maximum* amount which can be considered a road user charge since the additional element may reflect other fiscal objectives).

- Fourth, when it is not possible to identify the tax rate applicable to road users, the analysis has to rely on the average tax rate for all similar goods. For example, the rates applicable to individual items of plant and equipment may vary widely, and in such cases there may be no alternative but to use the average rate to represent the rate applicable to that category. This is calculated by dividing the tax revenue collected from that group (e.g., general sales taxes, excise taxes, and import duties on plant and equipment) by the base value of these items. The difference between the tax levied on road users and the average tax rate on the group as a whole can then be treated as the user charge (again, the amount represents the *maximum* amount which can be considered a road user charge).

A recent study has applied the above method to eight countries (Argentina, Bangladesh, Bolivia, China, Indonesia, Mexico, Tanzania, and Turkey) and showed that import duties, sales taxes, and excise taxes rarely include an additional element representing a road user charge. Indirect taxes are nearly always general revenue taxes and play no part in mobilizing revenues to support spending on roads.

Box 3.2 Earmarking in Japan and United States

Japan introduced a special funding system for roads in 1954, and the United States did so in 1956. Both involved earmarking certain road-related taxes and depositing them into a special account, or road fund. The Japanese special funding system was introduced to meet the needs of the post-war road improvement program and was "based on the concept that road users who enjoy the benefits of improved roads should bear the burden for their improvement." The United States special account was introduced to finance construction of the interstate highway network and was based on the user-pay concept. The concept involves two elements: first, the user pays, and second, the government credits the user fees directly to a highway special account.

Earmarking in Japan:

Japan has an elaborate system of earmarking *national* and *local* taxes to finance the maintenance, improvement and construction of roads. At the national level, earmarked tax revenues consist of all the gasoline tax and half of the tax on liquid petroleum gas (LPG). One quarter of the gasoline tax is paid directly into the Road Improvement Special Account, while the remainder passes through the government's General Account before being deposited into the Special Account. At the local level, earmarked tax revenues consist of: (i) tax revenues collected by the national government and then passed on to the local government and (ii) tax revenues collected by the local government itself.

Item (i) includes the other half of the tax on LPG (spent on roads in the Tokyo Metropolitan Area, Hokkaido, prefectures, and designated cities), one quarter of the motor vehicle tonnage tax (spent on roads in cities, towns, and villages), and a local gasoline tax (43 percent spent on roads in the Tokyo Metropolitan Area, Hokkaido, prefectures, and designated cities; 57 percent spent on roads in cities, towns, and villages). Item (ii) includes a local diesel fuel tax (spent on roads in the Tokyo Metropolitan Area, Hokkaido, prefectures, and designated cities) and the motor vehicle purchase tax (30 percent spent on roads in the Tokyo Metropolitan Area, Hokkaido, and prefectures, 70 percent spent on roads in cities, towns, and villages). Earmarked revenues at both the national and local levels are supplemented by general tax revenues and in the case of the national government, are also deposited into the Road Improvement Special Account to ensure comprehensive management of the funds.

The tax rates are set during the preparation of the Five Year Road Improvement Programs. The Ministry of Construction prepares the programs in consultation with the local government and then submits them to the Ministry of Finance for approval. After consultations, new tax rates are agreed upon and these are then written into a new *proper tax law*, which remains in force for the next five years.

Earmarking in the United States:

The US Federal Highway Trust Fund exists only as an accounting mechanism. The taxes earmarked for the Trust Fund are deposited into the general fund of the US Treasury and a paper transfer of these taxes is made to the Trust Fund as needed. Earmarked tax revenues in excess of those required to meet current expenditures are invested in public debt and interest earned is credited to the Trust Fund. The Trust Fund finances the federal-aid highway program, administered by the Federal Highway Administration (since 1982 a portion of the Fund has also been used to finance mass transit projects administered by the Urban Mass Transportation Administration). Revenues from the highway portion of the Trust Fund are used to reimburse states for expenditures on *approved* projects. These include periodic maintenance, road improvement, new construction, road safety programs, studies, and other highway related expenditures. The Trust Fund does not finance routine maintenance.

Trust Fund revenues are derived from a variety of highway user taxes, including: (i) motor fuel taxes on gasoline, diesel, and gasohol; (ii) a graduated tax on tires weighing 40 lbs or more; (iii) a 12 percent retail tax on selected new trucks and trailers; and (iv) a heavy-vehicle use tax on all trucks with a gross vehicle weight (GVW) over 55,000 lbs. Tax rates are adjusted as part of the regular budgetary process.

The user-pay concept is well established in the United States. All but six states and the District of Columbia now dedicate their user-fee revenues to special highway or transportation accounts.

In addition, individual road agencies rarely have clearly defined responsibilities. For example, it is often unclear whether trunk roads in urban areas are a responsibility of the main road agency or the urban municipality. In the latter case, it may also be unclear which agency is meant to pay for the maintenance of these roads. This has created problems in Zambia, where such roads are under the jurisdiction of local authorities but are meant to be financed through the central government budget. The lack of clearly defined responsibilities is even more acute in rural areas. Few rural roads built during the past twenty years have been formally assigned to a legally-constituted highway authority. Many were financed on a grant basis by multilateral and bilateral donors, using funds channeled through central government departments dealing with agriculture, fisheries, and tourism. In many cases, there were no set arrangements for transferring managerial responsibility to an established road agency and clarifying responsibility for maintenance. Local road agencies may therefore not know which roads they are supposed to maintain, and a significant number of rural roads thus go unclaimed and unmaintained. The reverse is also true. Some gazetted[13] roads have reverted to bush and the designated road agency *can no longer find them*! This has happened in both Uganda and Zambia.

Most road agencies are likewise unclear about what their responsibilities are regarding axle-weight enforcement (this usually being left to the police). Should they actively intervene to manage urban traffic (and enforce parking and other traffic regulations)? Should they willingly accept civil liability for accidents caused by defective design and maintenance policies? Should they seek compensation from third parties for damage done to road infrastructure (usually by road accidents)? Do they have a responsibility to identify and mitigate the environmental impacts associated with roads and road traffic? Although many of these problems are aggravated by a shortage of technical staff and underdeveloped legal and administrative systems, the core problem is the lack of clearly defined responsibilities. Which ministry is responsible and to which agency has it assigned that responsibility?

3.5 INEFFECTIVE MANAGEMENT STRUCTURES

These problems are worsened by the curious management structures under which most roads are managed (they are not really managed, but administered). At the central government level, the main road network is usually managed in one of three ways. It is either managed: (i) as part of a combined Ministry of Works, Transport and Communications (Botswana, Uganda, and Tanzania); (ii) as part of a more narrowly focused Ministry of Works or Transport (Madagascar, Rwanda, Sierra Leone, Zambia, and Zimbabwe); or (iii) under a sharply focused Ministry of Roads and Highways (Ghana). Local government roads may either be handled directly through a central road agency (Sierra Leone), through a separate department forming part of a central road ministry (Ghana), or through a ministry of local government, which usually delegates most day-to-day operations to the local authorities themselves. The typical structure for a combined ministry is illustrated in Figure 3.1. A more focused ministry is similar, but simpler, while a special-purpose ministry provides the simplest model of all.

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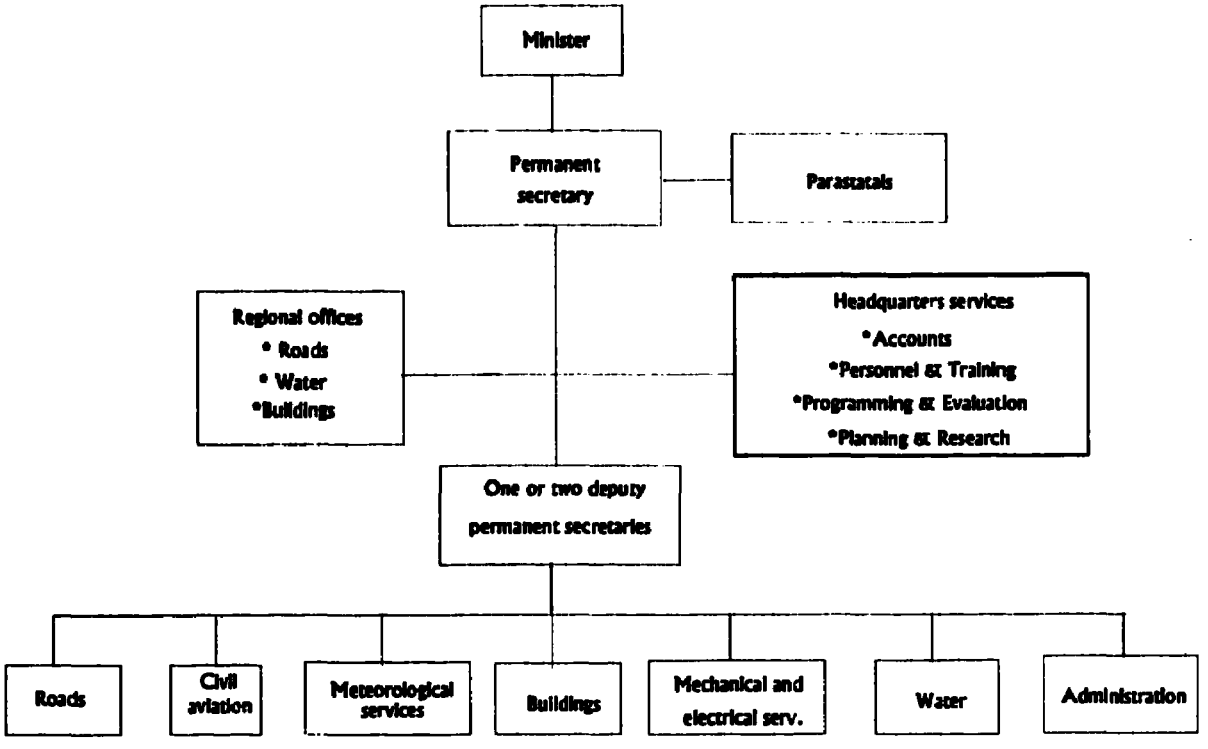
[13] The process of gazetting assigns responsibility for operating and maintaining the road to a legally constituted highway authority.

Figure 3.1 Typical Management Structure of a Ministry of Works and Transport



The model illustrated in Figure 3.1 is cumbersome and largely ineffective as a framework for promoting a more commercial approach to the management of roads. Reporting lines are long and tortuous, regional engineers often report directly to the permanent secretary (PS) (instead of through the director of roads), numerous support services are shared (and hence suffer from conflicting priorities), and the entire structure is lopsided. The road function typically accounts for about 70 percent of the ministry's budget (particularly with maintenance fully-funded), and yet the roads department is usually placed alongside other functions which are small (meteorological services) or in the process of being contracted out (mechanical services). This distracts the attention of the deputy PS, through which roads must report. The director of roads is also way down in the hierarchy, occupying the position of a line manager rather than chief executive of a large and important department.[14] This contrasts with the position of parastatals which have a board, chief executive, and several line managers. The parastatals report directly to the PS. The present management structure is thus an anachronism and dates back to the time when expenditures on roads were roughly the same as they were on public buildings and government plant and equipment.

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14 In Tanzania, the total remuneration package (including all allowances) of the director of roads is two-thirds that of the managing director of Air Tanzania and 40 percent that of the managing director of Tanzania Railways. In Zimbabwe, the ratios are 70 percent and 50 percent, respectively. The managing directors of the airline and railways also have more tax-free allowances and other perks. Even more inconsistent, in Tanzania, the head of the former Ministry of Works plant pool now receives a total remuneration package 10 times higher than the drector of roads.

The more focused ministry overcomes some of the above problems, since reporting lines are more direct. Furthermore, in a more narrowly focused transport ministry, there is better intermodal coordination, but the ministry remains lopsided, the management structure remains weak, and the director of roads remains a line manager. The special purpose ministry in Ghana provides the simplest model, although the same objective could be achieved by restructuring a larger, heterogeneous ministry. Roads in Ghana are managed through three line agencies which all report directly to the permanent secretary. The Ghana Highway Authority, which has a commercial management structure, manages main roads, and the Departments of Urban Roads and Feeder Roads manage urban and rural roads respectively.

Finally, there is the question of the local government ministries which handle local authority roads. They vary enormously. At one extreme, there are large force account agencies like the District Development Fund (DDF) in Zimbabwe, which manages a large road network on behalf of local councils (the DDF is part of the Ministry of Local Government), while at the other extreme there may be a few people in the Ministry of Local Government who liase with local authority roads departments, but do very little for them. At the local authority level, it tends to be even more confused. There is often no such thing as a roads department (new roads often fall under the Development Committee and road maintenance under the Finance Committee), making it difficult to identify who is responsible for what. At the local level, management structures are therefore weak or nonexistent.

3.6 WEAK MANAGEMENT SYSTEMS

The above confusion and poor management structures provide managers with little incentive to introduce and develop effective financial accounting systems and management information systems. Current financial accounting systems provide little information to support informed management decisions. There is no revenue account (hence no cash flow statement), accounts are kept on a cash basis, investments are written off as a cash expense as soon as they are incurred (i.e., road agencies do not depreciate assets or keep a balance sheet), and the accounting system uses very broad cost headings which involve a great deal of aggregation. Items like *Administration* and *Electrical and Mechanical* frequently cover several functions, and there is no simple way of identifying the specific expenditures attributable to roads. Most road agencies therefore cannot tell how much they spend on routine and periodic maintenance costs (some periodic maintenance costs being charged to the recurrent budget and some to the development budget); the breakdown of costs between overheads, labor, and equipment; and the unit costs of shoulder repairs, regraveling and cleaning drains. Such poor accounting systems make it difficult, if not impossible, for managers to establish consistent spending priorities

Likewise, there is a dearth of effective management information systems. Numerous attempts have been made to introduce such systems, but with little success. Many fail as soon as the consultants who have installed them leave. A recent review has shown that a mere 10 percent of countries in Africa compile basic traffic count and road inventory data, while data on pavement condition, surface roughness, and pavement strength are virtually nonexistent.[15] No more than 10 percent of African countries have functioning routine-maintenance management systems and pavement management systems to determine network-wide maintenance priorities.

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[15] This is based on a sample of eleven countries. Of these, only one kept valid and complete inventory data, one had a functioning maintenance management system, and one had a functioning pavement management system.

Even fewer supplement such physical planning tools with performance budgeting systems. The remaining countries have neither the data nor the mechanisms and staff needed for analysis. You cannot manage a large road network efficiently without some form of management information system.

3.7 INEFFICIENT WORK METHODS

These problems all lead in the same direction: toward road agencies which do not operate efficiently. Few road agencies in Africa manage resources aggressively enough to achieve maximum value for money. Instead, they deliver poor quality services based on their (usually inadequate) annual budget allocations. This is clearly exhibited in the undue emphasis on force account work, inefficient operation of government plant pools, and lack of interest in labor-based work methods. These are characteristics of agencies which face no market discipline and have poorly motivated managers who are not held accountable for results.

A great deal of maintenance, particularly routine maintenance, is still carried out by force account. This continues in spite of its variable quality and (usually) higher cost. Although cost comparisons are often inconclusive, in-house work exposed to private sector competition nearly always results in dramatic increases in efficiency, with costs falling by as much as 30 percent. Contract maintenance can also improve quality. It is easier to control and helps to develop the local construction industry. However, it will only work effectively when procurement procedures are straight-forward, and there is a healthy local construction industry and a stable flow of funds to pay the contractors. The road agency must also have enough qualified staff to process contracts, supervise the work, and deal with arbitration issues. Contract maintenance is not a panacea.

Inefficient government plant pools are another symptom a of lack of market discipline. Most road agencies own millions of dollars worth of heavy plant and equipment, much of it procured under World Bank loans or furnished on a grant basis by well-meaning bilateral donors. Even a relatively small road agency may own plant and equipment worth $50 million or more. Utilization rates for this equipment rarely exceed 20 to 30 percent, compared with 80 to 90 percent in the private sector, and the economic losses associated with these low utilization rates can amount to over $23 million per year.[16] The superficial reasons for such low utilization rates include poor management systems, lack of standardization, shortages of fuel and spare parts (or shortage of foreign exchange to purchase them), and shortage of trained equipment operators and mechanics (mainly due to poor terms and conditions of employment). However, the real reasons are related to lack of a stable work load (i.e., inadequate road maintenance allocations and an erratic flow of funds), lack of transparent management systems (i.e., costing systems which clearly spell out the costs of low utilization levels) and lack of managerial accountability. No one knows, or cares, that equipment is underutilized.

Lack of interest in labor-based work methods is also symptomatic of lack of market discipline. Not only are labor-based methods often much cheaper (in Tanzania and Ghana labor-

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[16] The calculation is based on a plant pool worth $50 million, with an average utilization rate of 25 percent instead of 85 percent. The equipment is depreciated over 8 years, using straight line depreciation, a 12 percent interest rate, and maximum utilization of 1,250 hrs per year.

based contracts are coming in at about 30 percent below traditional contract prices),[17] they are often more reliable because government plant pools are in such disarray. Labor-based work methods nevertheless face some genuine difficulties. Government procurement procedures often discourage the letting of small contracts, particularly to one-man contractors who cannot be expected to follow standard bidding procedures. Donor policies, with their emphasis on international competitive bidding (ICB) and preference for financing foreign exchange expenditures, add to the bias against labor-based work methods. However, there are other reasons: labor-based work methods offer less scope for gratification payments (equipment and workshops offer ample scope for supplementing incomes), and management is under no direct pressure to find the cheapest and most effective way of getting the work done.

Road agencies are unlikely to operate efficiently until they are faced with some form of competition or a competition surrogate (i.e., until they are subjected to some form of market discipline). Competition is the primary factor which motivates managers to cut waste, improve operational performance, and allocate resources efficiently.[18]

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17 Accurate cost comparisons are difficult since they are dependent on the costing system used, market conditions and the government's reputation as a reliable payer. Contractors often add a surcharge to contract prices to cover expected late payments.

18 Shirley. (1989).

4 APPROACH TO REFORM

This chapter focuses on the way the RMI program set about identifying the causes of poor road maintenance policies and how it developed an agenda for reforming them. In other words, it is about the *process* of policy reform, specifically, how to promote major policy reforms when the answers are neither straight-forward nor known in advance. The chapter examines the regional approach adopted during RMI Phase I, the lessons learned from the country approach adopted during Phase II, the value of sharing experiences between participating partners and the role of the donor community in facilitating the process of policy reform.

4.1 REGIONAL APPROACH

During Phase I, the RMI held regional seminars in six main centers (Harare, Accra, Addis Ababa, Dakar, Libreville, and Antananarivo) to discuss the importance of road maintenance, the main problems contributing to poor road maintenance policies, and possible solutions to these problems. All countries in SSA participated, and each sent a small government delegation, consisting of civil servants and ministers, to participate in the seminars. A great deal of effort went into securing participation by ministries of finance. Nearly all the key resource papers were presented by non-African authors, each country delegation presented a country issues paper, all seminars were moderated by African personalities, and African specialists participated as resource persons. Each seminar concluded with discussion sessions facilitated with the aid of the Policy Action Planning (PAP) method developed by a German training institute.[19] The PAP method was used to help participants prepare action plans for reforming road maintenance policies in their own countries.

An evaluation of Phase I showed that it succeeded in raising awareness of the need for better road maintenance policies. It also helped to develop a consensus among donors of the need to radically rethink their approach to road rehabilitation programs. On the other hand, Phase I led to few, if any, concrete actions on the ground. This came as no surprise. It takes time to develop a realistic agenda for reform and even longer to build a broad-based consensus on the need for such reforms. In this context, the PAP methodology led to action plans which emphasized clear technical solutions but vague and unconvincing financial and institutional reforms. For example, they argued convincingly in favor of network-based planning and programming, introducing performance budgeting systems, reducing force account work, increasing the use of local contractors, increasing the use of labor-based work methods, and reducing publicly-owned equipment fleets. However, on the important issues of financing and institutional and human resource development, they simply repeated the need to deal with these issues without saving how. In many respects, they fell into the traps outlined in Boxes 4.1 and 4.2. They started dealing with systems and procedures before reforming the institutional framework and incentive systems.

Part of the problem was attributable to the PAP methodology itself. It can be a useful device for facilitating discussion and developing a consensus on action plans when there are *known solutions*. However, when there are no obvious solutions, it simply forces participants to

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[19] Carl Duisberg Gesellschaft, Cologne, Germany.

agree to impractical solutions which carry no conviction or commitment. This applied both to the financing issue and to institutional and human resource development issues. Discussions of financing sometimes led to absurd suggestions — for example, that vehicle insurance companies should pay for road maintenance — and to consistent pressure to establish autonomous road agencies, with little idea of what that meant and what benefits it might produce. Nevertheless, experience with Phase I was sufficiently encouraging to persuade the donor community to design a second phase based on individual country initiatives.

Box 4.1 Sequencing Institutional Development Strategies

Recent case studies in Africa have shown that institutional development of government transport agencies needs to follow a logical hierarchy, starting with overall strategic goals and moving toward more specific reform of management systems and procedures. Unless the reforms follow a natural progression, they will conflict with each other and be ineffective. The case studies arrived at the following hierarchy of interventions:

- Define the role of the organization;
- Develop commitment to the new role;
- Develop an appropriate policy framework;
- Undertake strategic reforms and restructure the relationship with government;
- Strengthen leadership by improving top management;
- Ensure that sufficient resources are available;
- Reorganize staffing structures and improve management control;
- Strengthen management systems, processes, and procedures.

The disappointing results of many institutional development programs are largely attributable to the fact that they deal with lower level issues before, or instead of, attending to those at the top of the list. This leads to predictable problems:

- Improved systems and procedures have a negligible impact unless better organizational structures and adequate management controls are in place;
- Organizational structures and controls will only be effective if sufficient resources are available;
- Improved resources will have little impact unless top management is improved;
- Improved management depends on strategic reform and restructuring the relationship with government;
- Commitment to change will only develop if both government and the road agency have a clear conception of the new role, which must generate more benefits than costs.

The above hierarchy can only serve as a conceptual framework since many of the issues are interrelated and may require simultaneous interventions at several levels.

Source: P. Moeller (1993).

4.2 COUNTRY INITIATIVES

The switch from a regional to an individual country approach had a dramatic effect on the process of policy reform. For the first time, the initiative started to generate a genuine policy dialogue. It turned out that the regional seminars lacked an important dimension as did the initial country dialogue. Participants were predominantly from ministries expecting to benefit from increased road spending. Their attitude was thus one of actively supporting increased road spending and creation of an autonomous road authority (which would enable them to raise their salaries), while showing little enthusiasm for the types of reform which might cause them inconvenience: contract maintenance, labor-based work methods, and reform of government plant pools. The dialogue focused on getting *more money* to continue doing *business-as-usual.*

Nor was the ministry of finance much help. All sectors asked for more money, and the ministry of finance simply turned a deaf ear, even when the issue of road financing was explored in the context of a PER, which dealt with the issues from their point of view. Genuine policy dialogue requires at least two parties: one party must want something, and the other must have something to give.

Box 4.2 Sequencing Human Resource Development Strategies

Recent case studies in SSA have pointed to the importance of human resource development and have also shown that reforms designed to improve human resources will be ineffective unless properly sequenced. As with institutional development, the reforms should start by setting the overall strategic framework and then progress to lower objectives in an orderly fashion. The case studies suggested the following general hierarchy:

- Define the human resource strategy;
- Improve the terms and conditions of employment and the quality of management;
- Adjust employment to needs;
- Strengthen accountability, incentives, and sanctions;
- Improve manpower utilization and job resources;
- Develop managerial and supervisory skills;
- Improve personnel systems;
- Improve training.

Successful reform at one level is generally dependent on the success of reforms carried out at other levels. For example:

- Without adequate terms and conditions of employment and competent management, no human resource development strategies will work;
- Most transport sector organizations need to adjust current manpower levels to those required to run an efficient organization;
- To run an efficient organization, staff need to be well paid and motivated; their motivation depends on strengthening incentives, accountability, and sanctions;
- Manpower utilization needs to be improved to support staff motivation, but this cannot usually be done until managerial and supervisory skills have been upgraded;
- Accountability cannot be strengthened without improved manpower utilization and sufficient resources;
- Improved personnel systems and procedures are needed to support manpower planning, manpower utilization, and performance evaluation;
- With the above reforms in place, training will have greater impact, and more attention will need to be given to the planning and programming of training.

The above ordering of human resource development strategies only represents a conceptual guide to action. Many of the above interventions are interrelated and may need to be implemented simultaneously. Human resource development strategies will only be effective if they address all of these needs in a comprehensive and properly sequenced manner.

Source: P. Moeller (1993).

The real breakthroughs came unexpectedly during country seminars and workshops in Zimbabwe, Zambia, and Tanzania. The breakthrough consisted of involving the private sector in discussions on road maintenance (the private sector consisted of participants from the chamber of commerce, consultant organizations, road transport associations, and the farming community). Their participation changed the entire chemistry of the discussions. For once, there were two sides to the dialogue. Road users expressed willingness to pay for roads (over and above all preexisting taxes), provided the proceeds were spent on roads and the work was done efficiently. The road agency, on the other hand, saw a genuine opportunity to improve its position, provided it was willing, in return, to reform the way it did business. Bringing the two sides together,

however, was not always easy. Except in Zambia and Zimbabwe, civil servants distrusted the private sector, and the private sector couldn't see the point of talking to the road agency. However, once the ice was broken, the relationship became instantly beneficial, with the private sector offering help and support, and the public sector showing surprising willingness to listen and respond.

Three other important insights emerged from the country initiatives. First, it became clear that solutions had to be home-grown. Studies on improving management and financing of roads turned out to be more effective when prepared by African resource persons than by outsiders. Local consultants somehow have more credibility, are available for follow-up action and have a better understanding of what does and does not work in the local country context. Furthermore, since local consultants tend to be leaders of opinion in their own countries, their ideas spread quickly and soon become part of the local conventional wisdom. On topics like financing, it was also found expedient to involve staff from the ministry of finance. This helped to make the studies more insightful and also helped to internalize the results. The best example was a paper on financing prepared for a seminar in Zambia. It was jointly authored by a senior official from the ministry of finance and led to a heated debate within the ministry before the paper was released.

Second, it was found that several small studies were usually more effective at achieving a consensus on major policy reforms than were large, integrated studies. Most organizations in Africa, whether government departments or local business associations, have limited capacity to think through the potential consequences of major policy reforms. A large, comprehensive study simply over-taxes their limited technical capacity. This is why so many studies end up on the shelf. Given the limited absorptive capacity available in Africa, it is much better to divide the problem into its component parts, and then to use individual consultants to tackle each part separately over a two- to three-year time horizon. This turns the wrenching change of direction implied by a large, comprehensive policy study into a series of smaller, sequential changes which can be more easily understood and absorbed by key policy makers.

Third, major policy reforms take time and cannot be rushed. It takes time for people to reorient their mind-set and absorb a new way of thinking. Gradualism is of the essence. Incremental change is more easily absorbed than root and branch transformation of existing institutions. It is thus better to work within existing institutions and the framework of existing laws and legislation until major changes in the institutional structure are unavoidable. This minimizes bureaucratic resistance, allows time for testing and adaptation, and provides a sounder basis for preparation of the final legislation, which then consolidates reforms that are already *de facto* in place. The other consequence of gradualism is that major policy reforms cannot be directly linked to donor operations. Policy reform programs can work in parallel with donor operations but cannot be tied to them since, to be successful, the reform process must move at its own pace.

4.3 SHARING EXPERIENCE

During the course of Phase II, the RMI found that *sharing experience* was one of the most successful ways of introducing new ideas and building consensus. This is particularly true in the African context. Africans consider their problems unique and are unimpressed by textbook solutions or experience gained in industrialized countries. They are more interested in

African solutions, developed and tested in an African context. RMI Phase II therefore placed great emphasis on sharing experience among the nine participating target countries. This was partly achieved through visits by RMI staff, who gave regular presentations on experience gained under the RMI program in other countries. This process turned out to be so successful that the sharing of experience is now in the process of being formalized through the establishment of a Sub-Saharan Africa Road Information Network (SSARIN). This is a fax-based network designed to facilitate exchange of information among RMI countries, associated countries that have expressed a desire to share in the RMI *message*, and selected resource countries outside the RMI family which have noteworthy lessons to share (see Box 4.3). The sharing of experience has also been supported through the preparation of regular newsletters and reports[20] and annual meetings between RMI staff, RMI Country Coordinators, and those members of the donor community interested in roads. The annual meetings have been a particularly effective way of sharing experience and have encouraged a healthy element of competition among the nine target countries: if you can do it, so can we.[21]

Box 4.3 The Sub-Saharan Africa Road Information Network (SSARIN)

During the final stages of RMI Phase II, it became clear that the sharing of experience on the various initiatives taken to improve the management and financing of roads would benefit from being formalized. It was not cost-effective for the RMI staff to spend too much time acting as channels of communication between the different RMI countries. It would be better if these countries spoke to each other directly. For example, instead of Zambia asking the RMI Unit in Washington how Tanzania opened their Road Fund, the Zambians should be encouraged to ask the Tanzan' · directly about such matters. This was the incentive which led to establishment of SSARIN.

The network has three types of members: (i) RMI *core* countries, (ii) other *resource* countries, and (iii) *associate* countries. The RMI core countries all have some experience to share and are connected to each other by fax through the respective RMI Country Coordinators. However, there are also countries outside the RMI network which also have valuable experience to share. At the present time, they include Sierra Leone, Ghana, and Botswana. They are included in the network to ensure their experience is readily accessible to the rest of the network. Finally, there are a group of countries wishing to participate in the RMI program but cannot be accommodated due to shortage of resources. They include Malawi and Mozambique, and this group is likely to increase substantially during the course of the next few years. They participate in the network to share in the experience already gained by the core and resource countries.

The network is simple and unpretentious. Each participating country must have two things: a working fax connection and a formally designated Country Coordinator. The RMI Unit in the World Bank has prepared the initial network directory, which lists the contact person, fax address, alternative contact arrangements when the fax link is inoperative, and the list of noteworthy features which other countries might be interested in. The first formal meeting of Country Coordinators is due to take place in October 1994. It is expected that the meeting will elect a Secretary from among their number, and that SSARIN will thereafter be an African affair with its own African agenda.

The other instrument used to share experience has been the guided study tour. The format has been for 6 to 8 selected individuals, including both civil servants and representatives of the road transport industry, to visit other countries to study how they deal with the

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20 These include the SSATP Newsletter published twice a year (carrying articles about the RMI), the RMI annual work program, reports from the Country Coordinators prepared for the annual meeting, and a recent paper, *Commercializing Africa's Roads: Transforming the Role of the Public Sector*, which summarizes the initial experience gained under the RMI program.

21 The RMI makes an annual award to its Country Coordinators for "outstanding services in the field." Awards have so far been made to Country Coordinators in Cameroon, Tanzania, and Uganda. A special award has also been made to the Executive Officer of Fedhaul, Zambia, in recognition of the outstanding contribution it made to controlling over-loading and improving collection of international transit fees.

management and financing of roads. Although some visits have been made to Malaysia and Korea, those to other African countries — mainly Ghana and Sierra Leone — have had the greatest impact. The study teams are usually accompanied by a local consultant who makes notes on subjects studied and prepares a report on the study team's conclusions. On return to their home country, the study team's report is discussed at a workshop in order to share experience with others and agree on what to do next. These reports have turned out to be surprisingly insightful and have been an important catalyst for new ideas.

4.4 ROLE OF THE DONOR COMMUNITY

The development assistance strategies pursued by individual donors also have an important impact on the overall policy reform process. They support the policy reform process when donor strategies are coordinated, but tend to undermine it when donors support contradictory policies, mainly serving their own narrow national interests. For example, the best laid plans to reform government plant pools can be completely undone when one individual donor decides to donate a large amount of new equipment. Coordination is thus at the heart of effective policy reform programs.

The RMI, and indeed the whole of the SSATP, has played an important role in donor coordination. The ten bilateral, multilateral, and regional organizations supporting the RMI program started off sharing a common vision about the need for sound road maintenance policies but did not know how to establish them. The initial regional seminars and subsequent country initiatives served as a learning experience and led to a broad measure of agreement between donors on a number of key policy issues. Regular consultations between RMI staff and donors, supplemented by regular annual meetings between RMI staff, donors, and Country Coordinators, served to reinforce this consensus. That does not mean there were no disagreements. Coordination invariably involves some give and take. Donors accept some restrictions on their development assistance strategies in return for a more effective country development program as a whole. Indeed, the RMI donors are so serious about coordination that, following the 1991 Conference on Road Maintenance in Africa held in Brussels and organized by the EEC, they invited the EEC to draft a *Code of Conduct* to guide future donor involvement in the road sector (see Box 4.4). The Code is now in the process of being signed by all members of the development community.

Another important function of the donor community is to collectively support policy reform programs like the RMI. Such programs are always more effective when supported by a coalition of development institutions, rather than by a single institution with its own traditions, outlook, and vested interests. The policy reform programs nevertheless have to operate at arm's-length to avoid the impression of *ganging up*, to ensure that they can move at their own pace (rather than that of the donor processing cycle), and to ensure the independence of their staff. Independence is particularly important. Policy dialogue is built on trust and understanding. It is difficult to diagnose the real reasons for poor road maintenance policies unless people are willing to talk openly about their problems. It took the RMI about three missions, spread over at least a year, before the RMI staff were fully accepted as trusted friends, working wholly in the interests of the target countries (and often disagreeing with the donors themselves). The arm's-length relationship has encouraged more openness and candor and has resulted in a more deep-seated understanding of the underlying issues affecting road maintenance.

Box 4.4 Donor Code of Conduct for Promoting Sound Road Maintenance Policies

The Donor Code of Conduct emerged from the technical conference on maintenance and rehabilitation of roads in Sub-Saharan Africa held in Brussels on 25-26 November 1991. The conference resulted in a number of conclusions which were unanimously approved by participants. They included the following objectives:

- To introduce an appropriate legislative and administrative framework;
- To redefine the role of the private sector, increase private sector involvement, and increase decentralization of responsibilities;
- To rationalize programming and budgeting procedures;
- To introduce coherent taxation and cost recovery policies;
- To increase efficiency by promoting contract maintenance, reducing state-owned equipment pools, and increasing labor-based work methods;
- To promote development of the local construction industry;
- To strengthen road sector administration and human resource development policies.

The Code itself is a two-page document which, after a preamble, declares the full consent of the signatories to:

1. Apply in a rigorous and concerted manner the principles which were jointly developed and approved in the framework of the RMI, in accordance with the recommendations of the Second UN and Communications Decade (UNTACDA II).
2. Reinforce consultation and coordination between donors, development agencies, and beneficiary states through:

- Exchanging general information at the central level and at the local level;
- Informing and coordinating before each financing decision and holding regular meetings at the local level with the aim of:
  - assessing the potential of using local resources and employment-intensive methods for road rehabilitation and maintenance;
  - developing a joint analysis of priorities concerning road maintenance in each country and of capacities of the countries in question to organize and manage the relevant support services;
  - informing each other of the implementation of current road programs;
  - evaluating the application of the principles and recommendations of UNTACDA II/RMI;
  - making an annual report to the relevant authorities of the RMI project.

3. Undertake the necessary steps, whether individually or through the inter-African regional organizations, to invite all the countries of Sub-Saharan Africa to subscribe to these principles and recommendations, and to implement them in terms of resources and legal measures.
4. Contribute actively to the preparation of a restructuring and investment program for the road sector and, whenever possible, to the adoption of Transport Sector Reform Programs.