

Economic Growth through Effective Rural Road Asset Management

Robert Geddes
Civil Design Solutions

Abstract— The Africa Community Access Partnership (AFCAP) is providing technical assistance and capacity building initiatives to foster sustainable improvements in asset management performance in selected rural road agencies in Zambia, Uganda, Sierra Leone and the Western Cape region of South Africa.

This paper outlines the methodologies and tools that have been developed to assess performance in rural road asset management and achieve improvements in performance over time. The paper summarises progress that has been in the first two years since the project's inception. Central to the research methodology is a self-assessment framework which is being used by the road agencies to compare their management performance against the other participating organisations, and to identify and prioritise areas of asset management which are in need of attention.

Measurements of the condition of the project road networks are being taken periodically to assess the effectiveness of and improvements in asset management. Socio-economic data are being collected in rural communities to assess the impact of road condition on community well-being. Metrics resulting from the analysis of the data are being used by the roads agencies to determine gaps in their performance and to consider measures for addressing them. They are also being used to lobby for more support from rural roads from the government. The initial findings of the research show that gaps in pre-requisites for sustainable road preservation exist in three project countries: Sierra Leone, Zambia and Uganda. The Western Cape's situation is in a more advanced state.

Keywords—Asset Management; Maintenance; Performance Indicators

I. INTRODUCTION

A. Background to the Project

The United Kingdom (UK) Department for International Development (DFID) is supporting a research programme for the rural transport sector in Africa and Asia. The programme is known as ReCAP (Research for Community Access Partnership) and is currently active in 12 countries in Africa and five countries in Asia. The focus of the partnership is on strengthening the evidence base for more cost effective and reliable low volume roads and transport services, thereby influencing policy and practice in the participating countries.

ReCAP is building on a long history of UKAid-funded research initiatives in the rural transport sector.

ReCAP is supporting several regional research projects in Africa and Asia. One of the regional projects is known as "Economic Growth through Effective Road Asset Management" (GEM). Sierra Leone, Uganda, Zambia and the Western Cape Province of South Africa (RSA) are participating in the project, but the research process and outcomes are being shared with other ReCAP-participating countries. The Implementation Phase of the GEM project commenced in July 2016 and is expected to end in 2019. The project is being managed by the consulting firm Civil Design Solutions, which has provided a team of advisers known as the GEM Advisory Team (GAT).

B. Purpose of the Project

The purpose of the GEM project is to achieve economic and social benefits for local communities as a result of improved performance in road asset management. The focus of the project is on the management of low traffic rural road networks under the responsibility of sub-national roads agencies.

C. Objectives of the Project

The objectives of the project are as follows:

1. Review literature and reports on existing and recent road management and maintenance programmes and identify 'what works' and 'what doesn't work' in the type of environment encountered in the project areas;
2. Develop a framework for measuring performance in road asset management appropriate to sub-national rural road networks and apply it in selected project areas;
3. Develop simple and appropriate tools for monitoring road condition and apply them in the project areas;
4. Develop simple indicators of economic and social impact of rural roads and monitor them in the project areas; and
5. Achieve incremental (and measurable) improvements to asset management performance in the project areas.

D. Approach

The approach to the project is intended to foster self-reliance in road agencies and encourage greater accountability to road users and other sector stakeholders. The participating roads agencies are being assisted through technical assistance

to identify weak areas in the management of their road network and to address the weak areas using the available resources.

E. Project Process

The development process adopted by the GEM project is as follows:

Step 1: Preparation of the data collection instruments.

Step 2: Collection of baseline data by the participating roads agencies.

Step 3: Review and analysis of the data by the road agencies with support from the GEM Advisory Team (GAT).

Step 4: Identification of gaps and weak areas in road asset management performance by the roads agencies.

Step 5: Preparation of asset management action plans with support from the GAT.

Step 6: Technical assistance and training provided by the GAT.

Step 7: Update of baseline data to monitor changes in asset management performance; and

Step 8: Repeat of Steps 3 to 7.

Representatives of the participating roads agencies meet annually in the Project Implementation Team (PIT). The purpose of the PIT meeting is to enable the agencies to present the analysis of the data they have collected and their Asset Management Action Plans. Openness in the sharing of information is an important component of the capacity development process.

F. Participating Agencies

The roads agencies that are participating in the project are:

- Tonkolili District of Sierra Leone;
- Chongwe Municipality of Zambia;
- Kamuli District of Uganda;
- The Uganda National Roads Authority - UNRA (as a rural road agency); and
- The Department of Transport and Public Works of the Western Cape (RSA).

The three local authority road agencies (Tonkilili, Chongwe and Kamuli) preside over similar networks of rural roads. Some for the roads have a gravel wearing course but many are earth roads. Parts of the network are not accessible at all times of the year, particularly in Tonkilili, which experiences very high rainfall. All three local authorities have low capacity for road asset management and may go for long periods of time with no funding for road maintenance.

UNRA is responsible for the primary trunk road network in Uganda, secondary roads and a network of unpaved tertiary roads. The rural road network under UNRA is generally at a higher level than the network managed by Kamuli District. UNRA operates an effective GIS-based network management system from the Head Office in Kampala. The UNRA asset

management systems are far more advanced than the systems used at the district level.

The Western Cape Province of South Africa is responsible for a road network of about 32,000km, of which about 6,700km is paved. Responsibility for roads is delegated to the Department of Transport and Public Works which implements sophisticated road management systems within its Road Asset Management Plan. Roads in the Western Cape receive political support and the Department is generally well funded. The Western Cape is participating in the GEM project as an example of good practice in rural road asset management.

II. LITERATURE REVIEW

A desk study of relevant literature was carried out during the Inception Phase of the GEM project. Key findings of the literature review are as follows:

- Many African countries gained independence in the late 1950s and 1960s. This resulted in a shift in policy from the provision of roads mainly for strategic and military reasons to the provision of roads for national development. There was a marked increase in road construction and by the end of 1980 over 2 million kilometres of roads had been constructed in Sub Saharan Africa with an estimated asset value of US\$150 billion [1]. Unfortunately, this expansion of the network did not consider the limitation of national governments to sustain the recurrent maintenance requirements. By 2000 over 33% of the asset value had been lost due to lack of routine and periodic maintenance.
- Institutional reforms implemented under the Road Management Initiative (RMI), which started in the mid-1990s, resulted in the establishment of road maintenance funds in many countries and semi-autonomous roads authorities. This resulted in improved the maintenance of national roads but less impact at a sub-national level on rural road networks.
- There are very few examples of sustainable rural road asset management programmes currently operational in sub-Sahara Africa; systems tend to be focussed on preparing and implementing an annual work programme rather than any longer term strategic development plan for the rural road network.
- Governments still tend to pay more attention to construction of roads than maintenance; many countries have not yet developed a culture for maintenance.
- Funding for maintenance has improved in recent years with the establishment of road funds, but priority tends to be given to maintenance of the national trunk road networks. There is still a general lack of political will to provide funding for road maintenance.
- The improvement of funding is not always reflected in improved maintenance. This is due to inefficiencies in the organisations responsible for organising maintenance, failure to utilise available resources in the most effective way, and lack of accountability.

- Political interference is common in the roads sector and invariably undermines the efficiency and effectiveness of sector organisations. Corruption is a significant factor affecting performance.
- Governments are grappling with their policies on decentralisation of road maintenance. Most countries are now following a policy of decentralisation of service delivery in key sectors, but the most effective rural roads maintenance programmes have been those that are managed centrally. The lack of clear policy on decentralisation results in unclear roles and responsibilities for sector institutions.
- Contracting out of road maintenance has not led to capacity development in the private sector. The small size of contracts is not attractive to bigger players and small firms cannot invest in staff development. The most effective rural roads maintenance programmes have been those that are implemented through force account.
- Where examples of good practice exist, they tend to be on donor-funded programmes with high levels of technical assistance, but these initiatives tend to flounder when the donor support is withdrawn.

III. FRAMEWORK FOR MEASURING PERFORMANCE IN ROAD ASSET MANAGEMENT

A. Purpose of the Performance Monitoring Framework

The GEM project has developed a framework for directly measuring the performance of roads agencies. The GEM project is focused on the management of rural roads, but the framework may be applied to any roads agency.

The purpose of the performance monitoring framework is to enable roads agencies to assess their overall performance. Agencies are then able compare their performance with a minimum benchmark of expected performance and with the performance of other agencies in the same country or in the region. Roads agencies can use the framework to monitor changes in their performance over time and to identify specific weak areas in their road asset management.

B. Questionnaire

The development and performance of road agencies is reliant on a set of inter-dependent external factors, internal institutional arrangements and the technical capacity of the organisation. Performance is not linked only, for example to the existence of an efficient asset management system in the roads agency or to the availability of sufficient and predictable funding. The GEM project therefore has developed a questionnaire which enables any roads agency to assess its performance in six key areas, or building blocks, which are considered necessary for effective asset management [2]. These are:

- External factors, including political support for roads;
- Institutional arrangements for the road sector;
- Financing of roads;

- Management arrangements in the roads agencies;
- Technical aspects of road agency operations; and
- Operations of the road agencies.

The GEM framework assesses the performance of a road agency via a set of questions associated with each of the above 6 building blocks to determine the performance (on a scale of 0 to 4) of an agency with respect to that building block. The questions were designed to be pertinent to a rural road agency, simple to understand and easy to answer. Each question requires a “yes” or “no” answer.

The questions under the **External** building block assess the existence of an asset management policy that is relevant to the rural transport sector, supported by senior decision makers and adopted at the highest level in government. Stakeholder engagement by the roads agency is assessed in terms of the level of informed consultation and open communications in order to understand stakeholder needs and expectations. The level of engagement by the roads agency with other ministries and sector agencies is assessed.

The questions under the **Institutional** building block assess a range of issues contributing to the performance of the agency. These include whether:

- the agency has a corporate vision and mission statement which considers stakeholder needs and expectations;
- the basic levels of service for roads been defined;
- emergency responses are in place and understood by key members of staff;
- the agency’s organisational structure identifies roles, responsibilities and competencies of key staff and is aligned with its AM policy, strategies, objectives and plans;
- the agency provides training opportunities for staff; and
- district engineer salaries are comparable with private sector positions.

The questions under the **Financial** building block assess the existence of stable, adequate and sustainable funding for road maintenance. This includes whether an annual valuation is carried out of road infrastructure assets, a costing framework is in place for determining unit costs of works, a budgeting and programming processes is in place for a prioritised maintenance and investment plan, and whether there are adequate financial accounting and auditing procedures in place.

The questions under the **Management** building block assess the existence of an appropriate asset management system that contains network definition (road and bridge inventory information) and network condition data and facilitates the preparation of prioritised annual, medium and long-term maintenance and development plans.

The questions under the **Technical** building block assess the existence of:

- an adequate road referencing system and inventory;

- a system for systematic and documented data collection for all principal road assets;
- annual visual condition assessment surveys;
- annual gravel loss surveys;
- asset utilization estimates and forecasts, including the existence of bottlenecks on the network.

The questions under the **Operational** building block assess the efficiency of operations at road agency including planning and scheduling of maintenance, procurement of service providers and technical compliance. Procurement of services is assessed in terms of appropriate type of contract, outsourcing of non-core activities, scheduling of maintenance works and technical auditing.

C. Analysis of the Questionnaire Results

The structure of the questionnaire includes four questions under each topic included under each of the six building blocks. The maximum score for each topic is therefore four. Each building block typically includes about seven topics. The average of the scores for each topic gives a score (out of four) for each building block.

The building blocks are weighted according to their perceived importance towards sustainable road asset management. Each road agency may determine its own weightings. The weighted average of the scores achieved under each building block provides a single score covering all six building blocks. This score is divided by four to give the Road Sector Sustainability Index (RSSI) applicable to the road agency. The derivation of the RSSI for a typical rural roads agency is shown in Fig. 1.

A comparison of the RSSI measured in the participating roads agency is included in Table 1. There are some significant improvements in the reported indicator values since the baseline of 2016. In some cases, this is related to misunderstanding of the roads agencies of the meaning of some of the questions in the self-assessment. The 2018 self-

assessment, which will be carried out in October 2018, is expected to provide a more accurate picture of the actual agency performance.

D. Road Agency Action Plans

The analysis of the questionnaire scores has enabled each participating road agency to identify specific actions required to identify shortcomings in their road asset management. Action Plans have been prepared which are being monitored and supported by the GEM advisory team during their routine visits to the project areas.

IV. MONITORING OF ROAD CONDITION AND ASSET VALUATION

A. Approach

From the desk-study review it was concluded that examples of sustainable rural road asset management currently operational in Sub-Saharan Africa are almost non-existent. An innovative approach focussed on building a maintenance culture was therefore necessary to yield any meaningful results. The participating road agencies were encouraged to own the process, approaching it in a gradual step by step manner that takes into account political realities and financial and human resource constraints.

B. Road Condition Monitoring

Road condition is a key variable for the measurement of social and economic impacts of access provision in rural communities. Improvement in rural roads asset management is expected to translate into improved road condition. This will result in lower transport costs and improved availability of transport.

The objective of undertaking road condition surveys is to identify structural and functional defects on roads in a simple, sustainable and affordable manner. The data generated must be of an appropriate quality and reflect, as far as possible, the actual situation on the ground.

Building Block	#	Item Assessed	2016	2017
External	1.1	National policy for rural roads		3
	1.2	Existence of rural road maintenance strategy		0
	1.3	Stakeholder consultation	0	3
	1.4	Tabling of budgets		4
	1.5	Reporting back to stakeholders		1
	1.6	Involvement in programmes at local level	2	2
Institutional	2.1	AM policy development	2	2
	2.2	Level of service - existence	0	0
	2.3	Level of service - use	0	1
	2.4	Emergency response plan	2	2
	2.5	Staff roles and responsibilities	1	3
	2.6	Staff training and capacity building	1	1
	2.7	Staff salaries	1	1
Financial	3.1	Provision of road maintenance funding	0	1
	3.2	Budget funding against perceived need	0	1
	3.3	Asset valuation	1	1
	3.4	Budget funding - asset value	0	0
	3.5	Financial forecasting	0	0
	3.6	Accounting system	1	2
Managerial	4.1	AM system	0	0
	4.2	Maintenance intervention levels	0	0
	4.3	Maintenance plans - existence	1	1
	4.4	Maintenance plans - methods used	1	2
	4.5	Maintenance backlog	0	0
	4.6	Traffic forecasting	0	0
	4.7	Capital expenditure - basis for	1	1
Technical	5.1	Road referencing system - existence	1	2
	5.2	Road inventory - existence	2	2
	5.3	Road inventory data	2	3
	5.4	Road condition assessment	2	2
	5.5	Asset utilisation	0	1
Operational	6.1	Service delivery mechanisms	3	3
	6.2	Maintenance planning	4	4
	6.3	Reporting		1
	6.4	Auditing	0	1

Assessment Scoring Criteria:	Ranking	Building Block	Max. Possible Score	2016	2017	Weighting
<0 Very Poor	1	External	4	1.0	2.2	0.29
0-1 Poor	2	Institutional	4	1.0	1.4	0.24
1-2 Fair	3	Financial	4	0.3	0.8	0.19
2-3 Good	4	Managerial	4	0.4	0.6	0.14
3-4 Very Good	5	Technical	4	1.4	2.0	0.10
	6	Operational	4	2.3	2.3	0.05
Road Sector Sustainability Assessment Score				0.9	1.5	
Road Sector Sustainability Rating				Poor	Fair	
Road Sector Sustainability Index (RSSI)				0.22	0.37	

(Scale: 0 - 1)

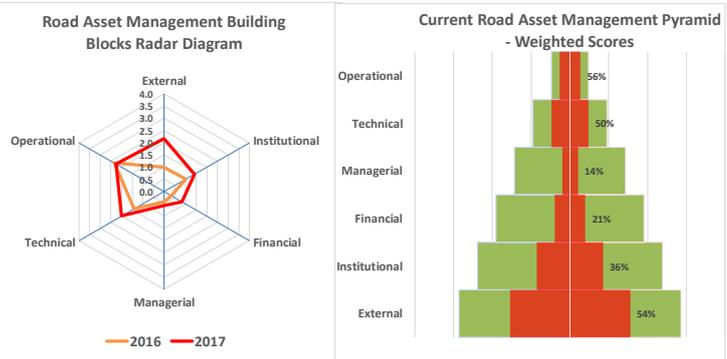


Fig 1: Analysis of Asset Management Self-Assessment Scores

TABLE 1: Sustainability Indices for GEM Participating Roads Agencies

AM Building Block	Sustainability Indices									
	Tonkolili Sierra Leone		Chongwe Zambia		Kamuli Uganda		UNRA Uganda		Western Cape	
	2017	Change since baseline	2017	Change since baseline	2017	Change since baseline	2017	Change since baseline	2017	Change since baseline
External	0.58	-22%	0.54	117%	0.71	-6%	0.58	0.56	0.42	-17%
Institutional	0.18	0%	0.36	43%	0.21	50%	0.57	0.23	0.54	15%
Funding	0.29	75%	0.21	150%	0.29	40%	0.54	0.44	0.75	20%
Managerial	0.14	33%	0.14	33%	0.18	0%	0.61	0.89	0.61	0%
Technical	0.25	25%	0.50	43%	0.50	25%	0.70	0.40	0.80	23%
Operations	0.19	-25%	0.56	-4%	0.25	0%	0.63	0.00	0.67	0%
Road Sector Sustainability Index (RSSI)	0.32	-5%	0.37	68%	0.39	8%	0.59	43%	0.58	6%

An inventory of roads and drainage structures was prepared by each participating road agency as part of their baseline studies in 2016. The inventory data is held in paper form, but the agencies have set up simple Excel databases that hold the inventory data as well as condition monitoring data and analysis results.

Road condition surveys under the GEM project are undertaken annually by the participating roads agencies. The method adopted is based on the conventional visual inspection of roads whereby defects observed on 5km road segments are rated on a scale of 1 to 5 according to their “degree” and “extent”. This method is described in the Technical Methods for Highways (TMH) 9 from South Africa [3]. The defects that are assessed include gravel loss, usable road width, erosion of the carriageway, erosion of the side drains, potholes, corrugations, rutting and impassability.

The scores for each defect are given weightings depending on the perceived importance of a particular defect and combined into a single score representing road condition. This is known as the Road Condition Index (RCI). The RCI can be aggregated to a network level to give the Network Condition Index (NCI).

The standard method for collecting the RCI is given in TMH 22 “Road Asset Management Manual” [4]. TMH 22 defines additional indices of road condition, which has also been adopted for the GEM project. These are:

- The “Road Functionality Index (RFI)”, which is an appraisal of the road in terms of functional characteristics that affect the quality of use, notably comfort (convenience) safety, congestion and operating cost;
- The “Condition Index – Pavement (CI_P)”, which is the numerical rating of the road pavement and gravel layer depending on its structural integrity or condition, remaining layer thickness and usable width; and
- The “Condition Index – Formation(CI_F)”, which is the numerical rating of the road formation depending on

remaining usable width, integrity of the formation and erosion of the side drains.

These indicators are derived from the condition survey data by considering selected defects that are relevant to the index. For example, the RF_I is obtained from the degree and extent of potholes, rutting and corrugations. All three indices can be aggregated to determine a value for the network level. They are then known as the “Network Functionality Index (NF_I)”, “Network Condition Index – Pavement (NCI_P)” and “Network Condition Index – Formation (NCI_F).”

The values of the road condition indices for the rural road networks that that being studied under the GEM project are summarised in Table 2.

TABLE 2: Road Condition Indices^a

Index		Tonkolili (Sierra Leone)	Chongwe (Zambia)	Kamuli (Uganda)	Uganda National Roads Authority
Length of road network (km) ^b	Gravel	154	136	133	380
	Earth	84	114	0	0
NRCI		0.33	0.58	0.54	0.60
NFI		0.38	0.59	0.60	0.68
NCI _P		0.64	0.71	0.66	0.77
NCI _F		0.57	0.91 ^c	0.90 ^c	0.71

^a. Comparable data from the Western Cape were not available at the time of preparation of this paper.

^b. Each roads agency selected a network of roads to study under the GEM project. This is a part of the total network under the responsibility of the agency.

^c. High values reported for the NCI_F in Zambia and Uganda are subject to verification.

The road condition indices are rated as “very good”, “good”, “fair”, “poor” or “very poor” based on the criteria in Table 3.

Most of the rural road network in the GEM participating areas is in fair or poor condition. The rural road network managed centrally by UNRA is generally in better condition than the networks managed by the district roads agencies.

TABLE 3: Rating of condition indices

Value	Rating
> 0.85	Very Good
70 – 85	Good
50 – 70	Fair
30 – 50	Poor
< 30	Very Poor

TABLE 4: Road Asset Value, Preservation and Funding Indices^d

Index		Tonkolili (Sierra Leone)	Chongwe (Zambia)	Kamuli (Uganda)	Uganda National Roads Authority
Length of road network (km)	Gravel	154	136	133	380
	Earth	84	114	0	0
CRV (USD millions)		7.4	6.3	4.3	11.7
CAV (USD millions) ^b		4.6	5.0	3.7	10.1
RAPI		0.62	0.79	0.85	0.86
RAFI		0.18	0	0	0.12

^d. Comparable data from the Western Cape were not available at the time of preparation of this paper.

^e. 2017 values

C. Road Asset Valuation

Road asset valuation is being used under the GEM project to calculate the current and future value of the road asset portfolio in each agency. The process for estimating the asset value is as follows:

- A structured inventory is established indicating the type and length of each road in the selected network;
- The expected useful life of the road formation and pavement are determined (typically 50 years for the road formation and 7 years for the gravel wearing course);
- The condition of the pavement and road formation are established through the condition surveys;
- The remaining useful life of the pavement and formation are determined based on the current condition;
- Unit rates are set for the calculation of replacement cost of the formation and the pavement; and, finally
- The Current Replacement Value (CRV) and Current Asset Value (CAV) of each road are calculated.

Two indices based on the road asset valuation have been identified under the GEM project to monitor performance of a road agency in the preservation of their road assets. These are:

- The “Road Asset Preservation Index (RAPI)”, which is defined as the ratio of the road network Current Asset Value (CAV) divided by the road network Current Replacement Value (CRV).
- The “Road Asset Funding Index (RAFI)”, which is the capital funds provided for road network asset renewal (periodic maintenance, rehabilitation and reconstruction) divided by the quantified needs of the agency for the same.

The values of the CRV, CAV, RAPI and RAFI for the rural road networks that that being studied under the GEM project are summarised in Table 4.

From the CRV values it can be seen that the rural road networks represent a major asset to the local authorities. It is unlikely that either Tonkolili, Chongwe or Kamuli possess any other asset worth more than the road network. It is therefore of significant concern that funding for maintenance and renewal, as measured by the RAFI, is very small. No funding was allocated to roads in Chongwe or Kamuli in 2017.

D. Economic and social impact of rural roads

A basic assumption of the GEM project is that that improved rural road asset management will result in improved road conditions and thereby contribute towards a general improvement of the socio-economic condition in rural communities. Road improvements are expected to result in reduced transport costs and improved access to local services, economic administrative centres and employment opportunities. To demonstrate this, a set of socio-economic data is being collected in the participating areas. A baseline of data was collected in 2016 and will be repeated annually for the duration of the project.

Ten villages or trading centres were identified in each of the project areas. The road agency organised teams to collect the required data using a form prepared by the GEM advisory team. The indicators that are being collected include:

- Distance of the Trading Centre (TC) from the District Center (DC);
- Average travel time to the District Center;
- Number of transport operators from the DC to the TC;
- Fares on public transport – light vehicles and bus/combi;
- Cost of freight transport – trucks and light vehicles;
- Number of available trips to the DC per day on a normal day;
- Road Safety – Number of accidents on the road serving the TC for the past year;
- Prices of basic goods exported from the TC;
- Prices of basic goods imported into the TC; and
- Number of shops/kiosks in the TC.

The initial analysis of the social and economic data has drawn some relationships between geographical location of the trading centres, the condition of the road and the availability and cost of transport (see [5]). However, these comparisons are currently constrained by the lack of maintenance on the project roads, which will result in improvements to the condition of

some roads, and the short time frame since the start of the project.

A key objective of the socio/economic component of the GEM project is to increase awareness within the roads agency and the local authority of the direct relationship between road condition and the well-being of rural communities. The collection of quantitative data in the trading centres is being supported by qualitative information obtained from local residents on how their livelihoods depend on the availability of reliable road access. It is intended that these data will be fed into communications activities carried out by the local authorities as part of their stakeholder consultation processes. Mechanisms are also being investigated under the GEM project for using the data to convince high level decision makers at the national level to give more attention to the importance of rural roads.

V. CONCLUSIONS: ACHIEVING IMPROVEMENTS TO ASSET MANAGEMENT PERFORMANCE

The GEM project has devised a series of tools that can be used to measure and monitor the performance of roads agencies in the management of their road assets. These tools are designed to function with relatively little data input and detailed analysis. The GEM performance indicators can be used by a roads agency to track changes in its performance over time. They can also be used to compare the performance of roads agencies within the same country or region. Roads agencies are able to identify specific actions that need to be taken to improve their performance.

It is evident from the data collected that centralised roads agencies (e.g. UNRA and the Western Cape) are better equipped to manage rural road networks than decentralised agencies (local authorities). Centralised roads agencies tend to have more technical and management capacity and more direct access to funding. Nevertheless, UNRA's funding for rural road maintenance currently falls well short of the requirements.

Local authority roads agencies have limited internal capacity for road asset management. This includes difficulty in retaining qualified staff due to the low salary scales. However, by far the biggest challenge facing local authorities in the establishment of sustainable road asset management is the lack of funding for maintenance. The lack of funding not only constrains the amount of maintenance work that can be carried out, but also constrains the development of more effective asset management systems in the roads agencies. Agency staff are not able to implement improved systems without funding for the works.

The institutional reforms implemented under the Road Management Initiative (RMI) in the 1990s and 2000s resulted in improvements to the policy and institutional environment for roads in Africa. The establishment of road maintenance funds resulted in improvements to the funding of road maintenance. However, until road user charges are truly ringfenced for maintenance and allocated fairly between national and local roads agencies, these reforms will continue to have a minimal impact on rural road networks and the local economy.

ACKNOWLEDGEMENTS

The author would like to acknowledge the contribution of other members of the GEM advisory team to the content of this paper. They are Charles Bopoto, Kingstone Gongera, Michael Pinard and Camilla Lema. The significant contribution of the participating roads agencies is also acknowledged, as this is often provided under difficult circumstances. The GEM advisory team is funded by UK Aid under ReCAP, and thanks go to the ReCAP management team and the Department for International Development for their support.

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