# CHALLENGES IN FINANCING ROAD MAINTENANCE IN SUB-SAHARA AFRICA

F. Y. Addo-Abedi, Ph D

*In Sub-Sahara Africa where road transport accounts for over 75 per cent of passenger and freight traffic, roads are fundamental to economic growth and poverty reduction. This has been realized by most decision-makers.*

*Despite this realization, roads in Sub-Sahara Africa continue to be under-funded, in particular maintenance.*

*With the setting up of dedicated Road Funds for maintenance in most countries, the situation has improved to a degree. However, challenges still exist in the funding of road maintenance in most Sub-Sahara African countries. In general, the Road Funds raise much less than the desired amounts for adequately maintaining the networks. With very little or no additional funding from other sources, the result is that, at best, the rate of deterioration of the networks has been reduced.*

*Essential links in the networks have, therefore, deteriorated to the point where rehabilitation or reconstruction may be necessary.*

*This paper uses the Tanzania example to illustrate the challenges faced in funding the maintenance of roads in Sub-Sahara Africa and suggests strategies for increasing maintenance funding.*

## 1. Introduction

Transport infrastructure is essential for socio-economic development. It provides the necessary links between markets and the centres of production for the economic sectors such as agriculture, mining and industry.

It provides access to employment, education, health, recreational and social facilities.

It also facilitates the movement of goods along trade corridors, and between coastal ports and land-locked countries for regional development.

Transport is a key factor in determining the price of goods and services. An efficient transport system can help minimize transport costs and, therefore, support growth directly or indirectly by promoting trade and higher productivity. This can, in turn, enhance competitiveness in the economic sectors. The transport sector also directly contributes, on the average, between 5 and 6 per cent to the Gross Domestic Product (GDP) in Sub-Saharan Africa. There is also increasing evidence that improved rural access can help reduce poverty.

With roads in most Sub-Sahara African countries accounting for over 75% of passenger and freight traffic, the road network of the countries in the region have significant roles to play in the socio-economic development of the region. The development and maintenance of appropriate road infrastructure is, therefore, fundamental to economic growth and poverty reduction in Sub-Sahara Africa.

Unfortunately, as a result of the inadequate funding of maintenance, roads in the region have deteriorated to the point where rehabilitation and in some cases reconstruction may be necessary. The road networks in Sub-Sahara Africa have therefore become bottlenecks to socio-economic development.

## 2. Why maintain roads?

Road infrastructure is any country's single most expensive asset. For example the replacement cost of only the National Roads in Tanzania mainland is estimated at around TShs.2.6 trillion (approximately US$ 2.5 billion). Heggie [1] indicates that the asset value of the road network in Sub-Sahara Africa is in the order of US$ 150 billion. This is a huge asset by any standards and requires adequate routine and periodic maintenance to keep it in a stable long-term condition to enable it play its role as a catalyst for socio-economic development

Without adequate and timely maintenance, road infrastructure deteriorates. This leads to higher vehicle operating costs. Travel time increases and the number of accidents also increases. There is also reduced reliability of road transport services. The result is that transport costs become high and suppress socio-economic development.

There is evidence according to Robinson [2], that each dollar saved on required road maintenance increases vehicle operating costs by up to US$10 over the life of the road. Further, the cost of rehabilitation or reconstruction can also be up to 20 times more expensive than the cost of sustained maintenance over the life of the road. Nevertheless, despite the growing awareness that maintenance is necessary for the optimal performance of road infrastructure, maintenance has not always received the attention it deserves.

This has largely been attributable to inadequate financing and deficiencies in the management of the road sub-sector. The road sub-sector has not always been managed as part of the market economy but usually as a social service.

Expenditures for maintaining roads have usually come from general revenues and are the first to be cut during difficult periods. Zietlow and Bull [3] indicate that experience from nearly all developing countries and most developed countries show that it is virtually impossible to secure adequate and stable flow of funds for road maintenance through general government budget financing procedures, especially if allocations depend on the annual political budget debate. Heggie [4] estimates that generally less than half of the required funds to prevent further deterioration of the road networks in Sub-Sahara Africa was being made available during the 1980s.

The result was that substantial portions of the road networks were in poor condition. The consequence of this was that vehicle operating costs were high and travel times longer. The lack of adequate funds, more often than not, was exacerbated by inadequate institutional frameworks within which roads were managed.

## 3. Reforms in the Road Sub-sector in Sub-Sahara Africa

In order for the road sub-Sector to be able to support economic development in Sub-Sahara Africa, a number of countries in the region have embarked on reforms over the last two or so decades.

The reforms were a result of sustained discussions with Development Partners. The reforms were meant to address the large backlogs of deferred maintenance, an acute shortage of funds and ineffective institutional arrangements for the management of the sub-sector. The main thrust of the reforms have been aimed at managing roads more like a business and bringing roads into the market place by charging for road use on a fee-for-service basis.

The required change was to be supported by four building blocks of ownership, financing, responsibility and management.

Ownership entails the involvement of road users in the management of roads while financing would ensure there is a stable flow of funds for adequate road maintenance. Responsibility means ensuring all parties know their roles and are given corresponding authority; with management encompassing the introduction of sound business practices and managerial accountability.

By far the most significant outcomes of the reforms have been the establishment of independent "2nd generation" road funds and autonomous or semi-autonomous road agencies. It must be pointed out that road funds were not new in Sub-Sahara Africa. The performance of such "1st generation" funds had however not always been as expected. The problems of these earlier funds included poor financial management, the absence of independent audits, the use of funds for unauthorized expenditures, diversion of funds and weak oversight.

According to Brushett [5], the key characteristics of a "2nd generation" Road Fund are:

- A sound legal basis ensuring a separate road fund administration with clear rules and regulations.
- Strong oversight with a broad based management board, the members of which are from both the private and public sectors.
- Sound financial management systems and lean, efficient administrative structure

- An agency which is a purchaser not a provider of road maintenance services.
- Regular technical and financial audits
- Revenues are incremental to the budget and are derived from charges related to road use.

The setting up of the dedicated funds was regarded as earmarking and received some resistance from various ministries of finance and the International Monetary Fund. There was the general belief that such earmarked funds was a means of avoiding strict budgetary discipline. With revenues largely from charges related to road use and the fact that they did not take away revenues from other sectors, the setting up of the funds was seen as "benign" earmarking

Most of the road funds set up in Sub-Sahara Africa derive more than 95% of their revenues from levy on fuel. The remaining five or so percent flow from other charges such as vehicle registration fees, transit fees and overloading fees. The creation of these funds have by and large led to a predictable flow of funds for road maintenance. Gwillan and Kumar [6] indicate that with the setting up of road funds, the budgets for maintenance have increased from between 15 to 20% in the early1990s to between 30 to 80% of the required needs. The benefits of such improvements in the financing of maintenance has also been recognized by road users.

With only 30 to 80% of maintenance needs being met through existing road funds the sustainability of maintenance funding in Sub-Sahara Africa remains questionable.

The setting up of the road funds was not intended to exclude some level of government budgetary support. This does not seem to have happened in almost all the Sub-Sahara African countries where road funds have been established. Moreover the fuel levy which is the main source of income for the funds does not appear to have robust mechanisms for adjustment in relation to inflation and needs.

There is therefore the need to look at ways of making road maintenance financing sustainable if the decline of the road infrastructure is to be halted in Sub-Sahara Africa for socio-economic growth.

Tanzania set up a second generation roads fund in 1999. Tanzania's road fund is seen as one of the better performing funds. Nevertheless, the inflow to the fund is assessed as meeting only about 50% of the country's maintenance needs. The challenges in road maintenance funding in Tanzania typify the problem in Sub-Sahara Africa. Using the Tanzania example the challenges of funding road maintenance in the region are discussed and suggestions are made for making maintenance funding sustainable.

## 4. The Tanzania Example

### 4.1 Road infrastructure in Tanzania

The road sub-sector in Tanzania currently comprises:

- A road network of approximately 85,000 km of which about 5 per cent is paved. 29,000 km of the network are classified as National Roads and has since 2000 been managed by the Tanzania National Roads Agency (TANROADS), a semi-autonomous body under the Ministry of Infrastructure Development. Of the 29,000 km of national roads approximately 10,000 km are trunk roads while 19,000 km are regional roads.

The remaining approximately 56,000 km are district, feeder and community roads and are managed by the various municipalities and districts under the Prime Minister's Office, Regional Administration and Local Government (PMO-RALG).

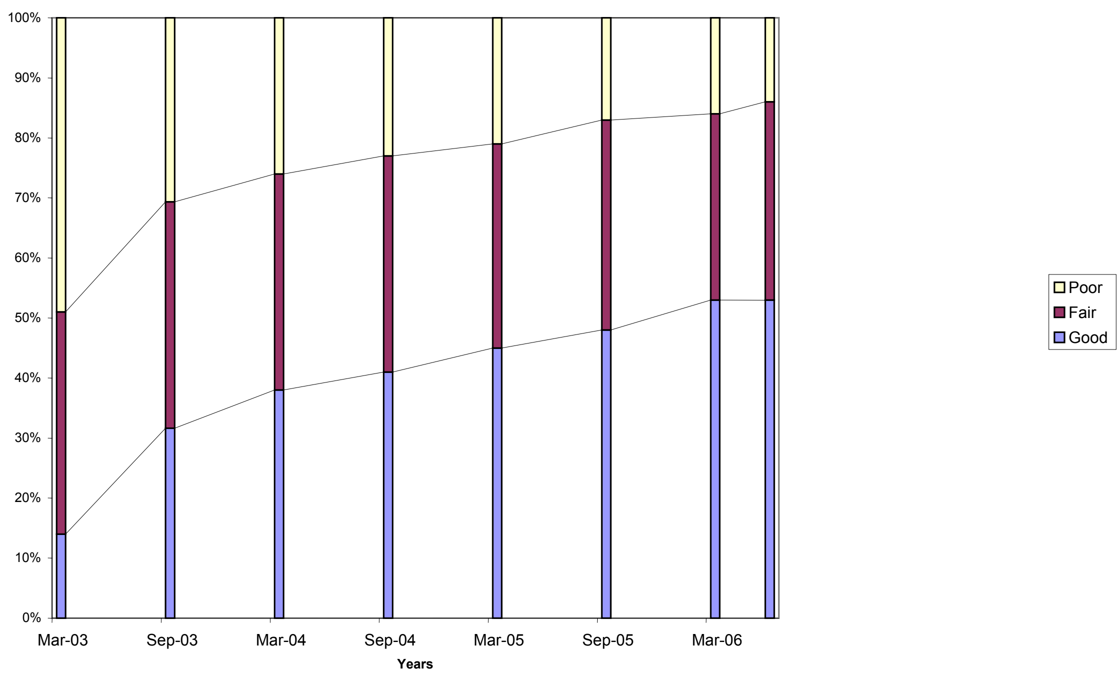
Road transport is the dominant mode in Tanzania and carries over 80% passengers and over 75% of freight traffic.

## 4.2 Road Sub-sector Maintenance Needs in Tanzania

An assessment of the condition of the national network under TANROADS as at the end of June 2006, indicated that 53 per cent of the network was in good condition, 33 per cent in fair condition with about 14 per cent in poor condition. The condition of the network since March 2003 has been summarised in Figure 1.

**Figure 1**

**CONDITION OF THE NATIONAL ROAD NETWORK IN TANZANIA**




A number of analyses have been carried out by TANROADS to determine the maintenance needs of the National Road Network (Trunk and Regional Roads) based on the assumptions that:

(i) The remaining 5,238 km of trunk roads would be upgraded by 2015 (approximately 500km/yr).

(ii) 1,000 km of regional roads would be upgraded by 2015.

(iii) Roads in poor condition totalling 4,177 km would be rehabilitated by 2015.

(iv) All roads would be in a maintainable condition and, therefore, would only require routine and periodic maintenance.

The maintenance requirements of the national network have been summarised in Table 1.

**Table 1: Maintenance Needs from Year 2006/07 to Year 2015/07 for the National Road Network (T.Shs million)**

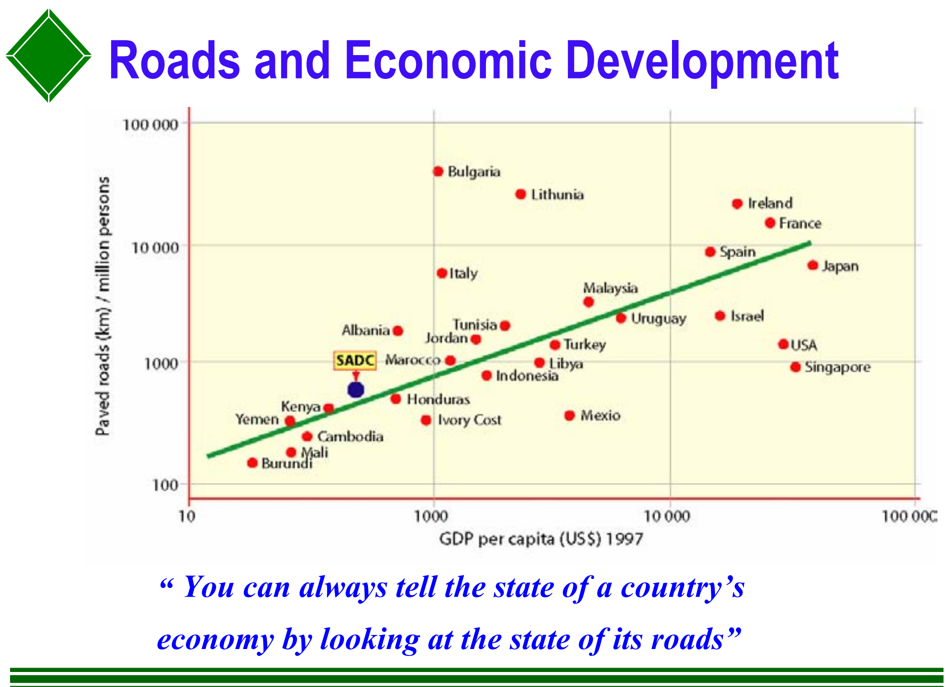
| Year | Routine | Periodic Paved | Periodic Unpaved | Total |
|---|---|---|---|---|
| 2006/07 | 28,864 | 98,343 | 117,855 | 245,062 |
| 2007/08 | 29,846 | 67,778 | 15,671 | 113,295 |
| 2008/09 | 30,827 | 33,292 | 21,374 | 85,494 |
| 2009/10 | 31,809 | 36,886 | 20,178 | 88,873 |
| 2010/11 | 32,790 | 74,657 | 22,358 | 129,805 |
| 2011/12 | 33,772 | 77,326 | 23,572 | 134,669 |
| 2012/13 | 34,753 | 76,045 | 29,362 | 140,160 |
| 2013/14 | 35,735 | 29,322 | 35,575 | 100,632 |
| 2014/15 | 36,716 | 16,798 | 39,999 | 93,513 |
| 2015/16 | 37,698 | 9,735 | 41,515 | 88,948 |
| **Total** | **332,808** | **520,183** | **367,461** | **1,220,452** |

The figure for 2006/07 is relatively higher than for the subsequent years. This is because the analyses have looked at the requirements based on the needs of the network arising from the current condition of the network while the requirements for the subsequent years assume that the current needs would have been met.

This is unlikely to happen and it may be prudent to look at eliminating the current backlog or deferred maintenance over say a five-year period. This would require the reduction of the current year's requirement while those for the subsequent years are increased up to 2010/11. It should be noted that further deferring maintenance would lead to increased cost in their elimination later. However, the analyses assume that all roads would be in a maintainable condition by 2015. Whereas this may be desirable, it may not easily be achievable and planning with say about 10 per cent of the network in poor condition (which receives spot improvement) is not unusual.

In assessing the maintenance needs of the national road network, it is assumed that about 500 km of roads would be upgraded annually to paved standards. This is in line with government's policy to pave the entire trunk road network by 2015. This policy is supported by a strong relationship between per capita Gross Domestic Product (GDP) and the length of paved roads as shown in Fig.2.

**Figure 2**




(After World Bank)

With only about 5 per cent of Tanzania's network paved, this is regarded as low and would need to be increased if Tanzania is to attain middle-income status and reduce poverty by 2015/16. Taking the foregoing into consideration and the total budget for maintenance of TShs.90 million for the 2006/07 financial year into account, a realistic assessment of the maintenance requirements over the ten year period to 2015/16 for the national network are given in Table 2.

**Table 2: Realistic Maintenance Needs – 2006/07 to 2015/16**
**For the National Road Network**

| Year | Realistic Maintenance Requirement | |
|---|---|---|
| | TSHS. MILLION | US$ MILLION* |
| 2006/07 | 90 | 68 |
| 2007/08 | 145 | 110 |
| 2008/09 | 145 | 110 |
| 2009/10 | 145 | 110 |
| 2010/11 | 140 | 106 |
| 2011/12 | 135 | 102 |
| 2012/13 | 140 | 106 |
| 2013/14 | 101 | 76 |
| 2014/15 | 94 | 71 |
| 2015/16 | 89 | 67 |

*1US$ = TShs.1,325.00

Under the Local Roads Investment and Maintenance Programme prepared by the Prime Minister's Office, Regional Administration and Local Government (PMO-RALG), the maintenance needs of the urban, district and feeder roads are estimated as T.Shs 62.12 billion ≈ US$ 48 million in 2007/08 rising to T.Shs 71.67 billion ≈ US$ 55 million in 2012/13.

Nevertheless, with the current structures and the Local Councils expending approximately USD20 million from the Roads Fund and about US$ 10 million from development partners for maintenance per annum, it would be unrealistic to assume that the levels of funding could be substantially increased without improvements in the capacity of the Councils.

It would, therefore, be reasonable to assume an initial increase of about 30% while the funds are increased slowly to about US$60 million in year 2015/16 as shown in Table 3 with the concurrent capacity improvements in the Councils.

**Table 3: Local Government Roads Maintenance Requirements (2006/07 – 2015/16)**

| Year | Maintenance Requirements: US$ Million |
|---|---|
| 2006/07 | 30 |
| 2007/08 | 40 |
| 2008/09 | 43 |
| 2009/10 | 45 |
| 2010/11 | 48 |
| 2011/12 | 50 |
| 2012/13 | 53 |
| 2013/14 | 55 |
| 2014/15 | 57 |
| 2015/16 | 60 |

### 4.3 Expected Maintenance Funding in Tanzania

A Roads Fund was set up in 1991 to provide financing for road maintenance. The main source of income to the fund was levy on fuel. Other sources included transit charges and overloading fees. It appears that despite the setting up of the fund, maintenance budgets were inadequate to cover needs. Releases were not always timely or in exceptional cases not all collections were channeled into road maintenance.

In 1999, a second generation fund was set up by an Act of Parliament to ensure that the funds were available when needed. The fuel levy has also increased over the years but has not always kept pace with devaluation of the Tanzanian Shilling. For example the levy was increased from TShs.80 to TShs.90 in 2003. By June 2006, it was still TShs.90. In real terms the levy declined from US9 cents to US 6.8 cents. In June 2006, the Government increased the levy to TShs.100 currently equivalent to US7.5 cents. There are indications that Government would gradually increase the levy to US10 cents.

Figure 3 shows the inflows to the Roads Fund since 1991. Between 1999/2000 and 2004/2005 the fund's revenue increased at an average of 3 per cent from US$50 million to US$65 million. FY 2005/06 saw a decline in revenues. This may be attributable to the more than the 30 per cent increase in the price of fuel between January and June 2006. There is normally a tendency for drivers to limit travel to the most essential when fuel prices rise much higher than usual.  Over time there is adjustment and fuel consumption increases along normal trends.

With Government's commitment to increase the fuel levy over time to US10 cents, it may be realistic to assume that the fund's revenue would increase at around 3 per cent annually from the US$61 million collected in FY 2005/06 based on the current instruments.

The projected annual income to the fund for the 10-year period, 2006/07 – 2015/16 is, therefore, summarised in Table 4.

**Figure 3:  Roads Fund Revenue**

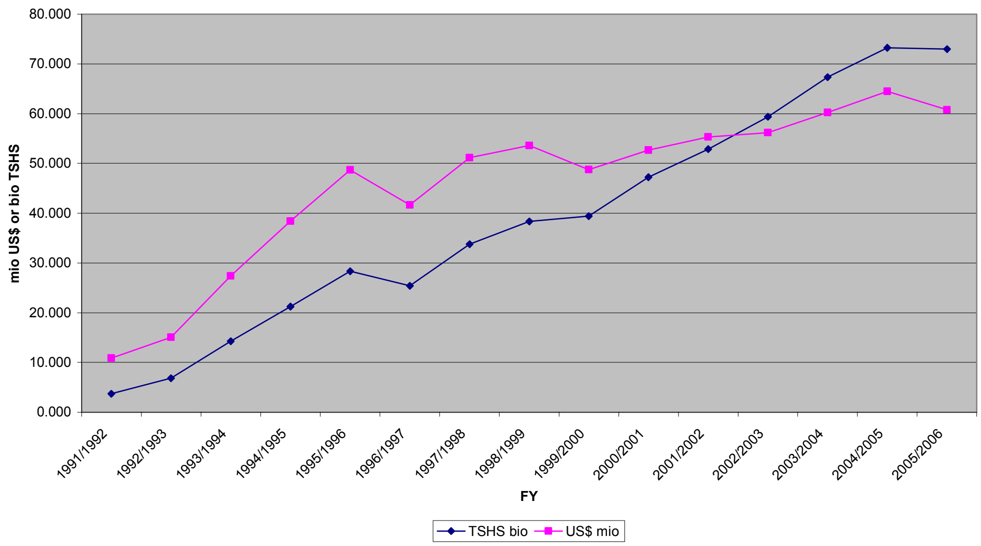



**Table 4: Expected Roads Fund Revenue – 2006/07 – 2015/16**

| Year | Expected Roads Fund Revenue (USD Million) |
|---|---|
| 2006/07 | 61 |
| 2007/08 | 63 |
| 2008/09 | 65 |
| 2009/10 | 67 |
| 2010/11 | 69 |
| 2011/12 | 71 |
| 2012/13 | 73 |
| 2013/14 | 75 |
| 2014/15 | 77 |
| 2015/16 | 80 |

With the current agreements between various Development Partners and the Government of Tanzania it would be reasonable to assume that there would be additional annual maintenance funding of approximately US$30 million for National Roads and US$10 million for and Local government roads over the next four (4) years.

Taking the foregoing into account, the estimated annual maintenance gap for the road sub-sector is summarised in Table 5.

**Table 5: Maintenance Gap for the Road Sub-Sector**

| Year | Requirements Total US$ | Available Funds (US$ m) | Maintenance Gap (US$ m) |
|---|---|---|---|
| 2006/07 | 98 | 98 | 0 |
| 2007/08 | 150 | 103 | 47 |
| 2008/09 | 153 | 105 | 48 |
| 2009/10 | 155 | 107 | 48 |
| 2010/11 | 154 | 109 | 45 |
| 2011/12 | 152 | 71 | 81 |
| 2012/13 | 159 | 73 | 86 |
| 2013/14 | 131 | 75 | 56 |
| 2014/15 | 128 | 77 | 51 |
| 2015/16 | 127 | 80 | 47 |

The figures for the maintenance gap for the road sub-sector given in Table 5 should be regarded as a 1$^{st}$ order estimation of the annual funding gap over the next ten years. They nevertheless give a fairly realistic assessment of the funding gap.

### 4.4 Strategies for Bridging Funding Gap

The funding gaps that have been identified vary from US$47 million in 2007/08 and increase to US$85.5million in 2012/13 and reduce to US$47 million in 2015/16. The strategies that would have to be put in place to ensure sustained maintenance would need to address these gaps.

Financing road maintenance from general revenues have not yielded satisfactory results in the past and it would be dangerous to think that this will change for the better in the short to medium term. There is therefore a very low likelihood that general budgetary support for maintenance over a long period would be sustained.

Whereas it may be tempting to try and increase the fuel levy to bridge the maintenance funding gap, it may not be prudent to do so. A fuel levy of US10 cents/litre is regarded as optimal, since increasing the levy beyond this value could push general inflation up and impede economic growth especially for the fragile economies of Sub-Sahara African countries. Moreover, it must be recognised that taxes and duties on fuel are already high and are important contributors to general revenues in almost all these countries.

The other instruments contribute less than 5 per cent of the total income of the Roads Fund and it would be difficult to increase these substantially to cover the funding gap.

The other levies include:

- Transit fees paid by buses which currently contribute approximately TShs.0.3 billion annually.
- Transit charges paid by haulage trucks – contribute TShs.1.88 billion annually.
- Overloading fees – contribute TShs.1.2 billion annually.

Overloading fees should not be used for planning purposes since the desire is to eliminate overloading.

Forkenbrock [7] suggests that any charge for road use should have a low cost of collection for both the user and the agency. It should also create a stable revenue stream. He also notes that there should be equity in that users who cause higher costs to the road administration such as through road damage should pay more. He further indicates that there should be a low evasion rate and the charge should not be affected by the method of propulsion.

With the concerted push for alternatives to hydrocarbon fuels for use in vehicles, it may be necessary to start looking for other sources of income for the road funds even though the pervasive use of such new technologies may not be wide-spread in a Sub-Sahara Africa in the short to medium term.

It is suggested that a new levy called "Annual Access Fee" be charged for all vehicles. The fees could range from US$50 for a saloon car to about US$250 for a 7-axle articulated vehicle. This would replace the flat annual vehicle licensing fee of TShs.20,000 for all vehicles which is currently held by the Tanzania Revenue Authority. The advantage of the "Access Fee" is that the rate reflects the relative damage done to the road network by various classes of vehicles. It would also be difficult, if not impossible, to evade and meets the criteria put forward by Forkenbrock [7].

With about 500,000 vehicles in Tanzania currently and at an average annual access fee of US$100, this new provision could generate US$50 million per annum and grow at the rate the vehicle population is growing. The revenue generated from this fee could help cover a substantial portion of the gap in the sub-sector.

The gap could be further narrowed by introducing the principle of "fee for service" to generate additional funds for maintenance where economically feasible.

For example, road corridors with reasonable traffic of say more than 1,000 vehicles per day should be studied for the Maintain, Operate and Transfer (MOT) scheme to allow the funds from traditional sources for maintenance to be used on other less trafficked but seemingly important roads.

The revenues generated from this scheme could probably take the burden of maintenance of the Tanzam Highway, the North-Eastern Corridor and the Central Corridor from the Roads Fund budget.

The introduction of tolling roads with relatively low traffic volumes usually raises a lot of debate as it is felt that the cost of collection could be disproportionately high. However, innovative collection systems are being devised and tolling is effectively contributing to maintenance funding in Ghana, Benin and some South American countries like Chile and Argentina.

In the interim while these schemes are being instituted, Government may have to bridge the gap through additional budgetary allocations from the consolidated fund.

These initiatives could be further strengthened by:

- ❖ Instituting a sound investment policy and ensuring proper investment decisions in the sub-sector since any new investments ultimately put pressure on the maintenance budget.
- ❖ Putting in place systems to ensure better use of available resources.
- ❖ Designing appropriate and cost-effective maintenance interventions.
- ❖ Developing more innovative and cheaper ways of maintaining road infrastructure by the road sub-sector agencies.

To raise additional funds for maintenance and even for upgrading of transport infrastructure, Government may introduce a levy of say one per cent of CIF on all imports.

Alternatively, infrastructure development bonds could be floated by Government to cover gaps in infrastructure maintenance funding and also for upgrading transport infrastructure in the country. This is however a medium to long term option.

## 5. Summary

Despite the importance of road infrastructure in socio-economic development, roads in Sub-Sahara Africa hardly receive adequate funding. Road maintenance seen by governments as a non-high priority activity, has always suffered most. The lack of maintenance not only leads to the erosion of the value of the most important single asset in the countries in Sub-Sahara Africa, it also leads to high transport costs which retard socio-economic growth.

With the setting up of road funds in some countries in Sub-Sahara Africa, financing of road infrastructure in the region has improved. However, hardly any of the countries is able to meet the required funding for maintenance through the revenues from the road funds.

Though the setting up of the funds was not meant to exclude budgetary support from central governments, there does not appear to be additional financing for maintenance from governments in countries which have road funds.

Thus the chances that budgetary support would be available to support road maintenance on a sustained basis are minimal.

Almost all the funds rely heavily on fuel levy which typically contributes over 90% of the income.

The levy on fuel has no robust mechanism for adjustment for inflation, exchange rate depreciation or for needs. In any case, it is unlikely that a levy exceeding US 10 cents could be sustained by the fragile economies of the countries. The reason is that fuel usually already has high taxes which are important contributors to general revenues.

There is evidence that the funds are able to meet only about 30 to 80% of road maintenance requirements of the countries in the region. It is therefore important that other instruments are found to provide additional income to the road funds.

It must be recognized that the situation in individual countries may vary, the challenges facing maintenance funding appear to be generic. Looking at the case of Tanzania, it is recommended that the maintenance funding gap be reduced by increasing the fuel levy to US10 cents and instituting a robust mechanism for keeping it at US 10 cents in real terms.

It is also recommended that an annual fee be charged for all vehicles. The fee would be graduated to take account of the damaging effect various classes of vehicles have on the roads. Such a fee would not be easy to evade and would provide a stable stream of income to the road fund.

It is further recommended that the major corridors in the country which have reasonably high traffic are studied to assess their suitability for the Maintain Operate and Transfer (MOT) scheme. This will allow the use of money accruing to the road fund to be used on other roads on the network. The MOT scheme should be designed to introduce innovative revenue collection systems to reduce the cost of collection.

It is also suggested that consideration be given to additional funds being raised through other instruments for infrastructure maintenance and development through the charging of say 1% of the cost of freight and insurance (CIF) on all imports. Another medium to long term option could be the floating of road bonds for providing funds for maintenance and development of the road infrastructure.

It must be pointed out that increasing financing for road maintenance may not be sufficient in itself in bringing the networks in Sub-Sahara Africa to the desired level. Other actions would be necessary. These actions include:-

- Instituting sound investment policies and ensuring proper investment decisions
- designing appropriate cost-effective maintenance interventions
- developing more innovate ways of maintaining roads, and
- providing improved institutional set-ups for the management of roads in the region.

**References**


(1) Heggie, I, 1994. Management and Financing of Roads: An Agenda for Reform. Sub-Sahara African Transport Policy Program (SSATP) Working Paper No. 8 World Bank and Economic Commission for Africa. Washington DC, USA.

(2) Robinson, R, 1986 Road Maintenance Planning and Management for Developing Countries. The Journal of the Institution of Highway and Transportation, pp 8-13.

(3) Zietlow, G J and Bull, Alberto, 1999. Reform of Financing and Management of Road maintenance. A New Generation of Road Funds in Latin America. XXI World Road Congress, 3-9 October, Kuala Lumpur, Malaysia.

(4) Heggie, I G, 2003. Commercialising Road Management and Financing of Roads in Developing and Transition Countries. Transport Reviews 2003, Vol 23 No 2, 139 – 160.

(5) Brushett, Stephen, 2005. Management and Financing of Road Transport Infrastructure in Africa. SSATP Discussion paper No. 4 World Bank. Washington DC, USA.

(6) Gwillan, Ken and Kumar, Ajay, 2003. How Effective are Second Generation Road Funds? A Preliminary Appraisal. World Bank Research Observer Vol 18 No. 1, 113- 128

(7) Forkenbrock, D J, 2004. Transportation Finance – What Will the Future Bring? Mississipi Valley Conference of State Highway and Transportation officials Chicago, IL, USA.