

# Making Every Kilometre Count: Prioritising Road Infrastructure Spending

*Based on the Report Optimization Study for Core Road Network Planning to Link Zambia by ROM Transportation Engineering, January 2014.*

***There so many factors that influence road projects prioritisation. Considering the highly restrictive public resources at disposal and the huge cost requirements of road projects, cautious programme optimisation is essential. Projects must thus be prioritised according to their costs and net the benefit they are expected to provide. Our report presents an assessment of the relative importance of some road projects, most of them from the Link Zambia 8000 programme and the major trunk roads from Lusaka to major international destinations. In this brief we provide an alternative viewpoint project prioritisation based on transportation efficiency, accessibility and socio-economic factors. The result is a coherent projects evaluation framework that suggests the most feasible projects to invest our limited resources and thus making every kilometre count towards national development.***

## Background

Our road network is undergoing significant improvements which will increase the total length and improve the condition of some of the existing sections. Among the major projects going on are those encompassed by the Link Zambia 8000, Lusaka-Copperbelt Corridor, and Pave Lusaka 400.

The Link Zambia 8000 programme for construction and rehabilitation of road infrastructure is expected to increase access to markets, enhance social inclusion and reduce travel time and cost to the benefit of the whole economy. The Link Zambia 8000 programme has so many projects to be implemented in three phases. These projects are expected to enhance the economic growth and social development gains.

The policy brief presents an assessment of the importance of different road sections and corridors ("projects") prioritized based on their transportation efficiency, accessibility and socio-economic importance. To do that, a nation-wide travel demand model coupled with a post-processor tool for project evaluation was developed. The entire road network in Zambia was considered with special attention being given to major trunk roads that connect major urban centres and those that facilitate regional linkages.

The policy brief presents a coherent project evaluation tool for the prioritisation of road transport infrastructure projects. The evaluation tool can be upgraded, updated and used on any set of road transport projects. In our report we analysed existing and projected traffic patterns. Particular attention was given to existing roads linking Zambia to neighbouring countries. Various socio-economic and demographic datasets were also analysed.

The entire evaluation process delivers a sufficient instrument for project prioritisation. The final priority project list and its attributes might not be very precise due to data limitations, but they can be revised at any time should higher quality data be available in future.

## Population Projections

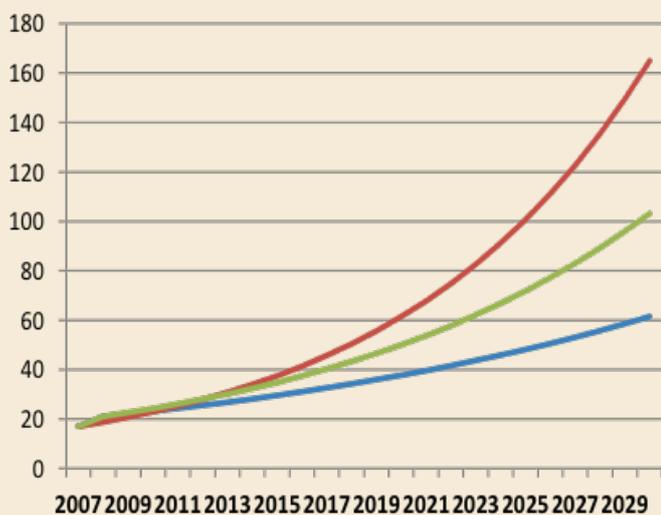
Zambia's total population is projected to grow by 78%, to 25.09 million people through 2030. Some areas are expected to more than double their population while others will grow less. Considering that transportation needs derive from human activities, places with higher projected populations are expected to have higher demand for transport services. Population projections are therefore important considerations in the development of a Travel Demand Model (TDM).

## Traffic Projections

Despite the existence of multiple major commercial and population centres, and an overall increase of 73% in road traffic between 2008 and 2013, interurban traffic volumes are still very low. This is partially a result of poor road infrastructure, causing extended travel times, increased overall transport costs and reduced traveling/freight incentives. The expected improvements in the roads network are also likely to result in increased traffic.

## Car Ownership

In 2030, car ownership is projected to increase rapidly such that the roads between Lusaka and Copperbelt will possibly be congested. The median estimate of car ownership growth by 2030 is 500%.



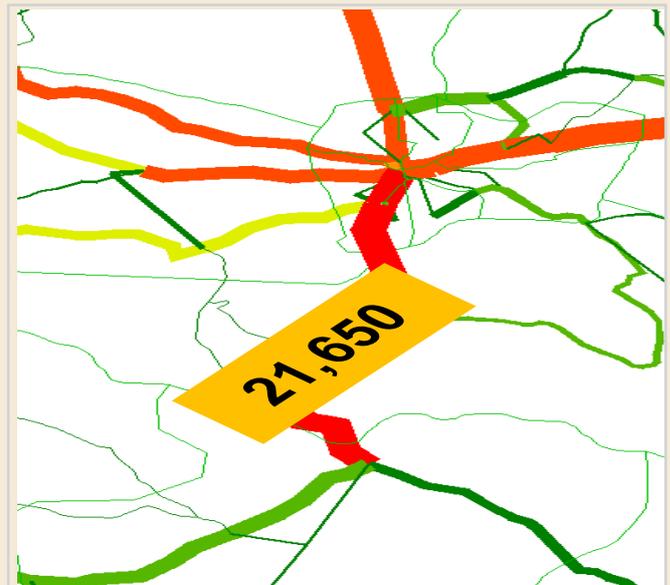
## Travel Demand Model

The resulting TDM will allow decision makers to identify major transportation relationships between areas, prioritise and compare road investments, consider benefits of new investments, consider toll roads, plan future land uses and road needs, assess ridership for intercity public transport, assess future traffic volume, and identify future national traffic volume and fuel consumption needs. However, our TDM does not include multi-modal system with public transport system, train, tolling scenario, freight model with pavement deterioration curve and peak period model to reflect real congestion but it is sufficient for the issue at hand.

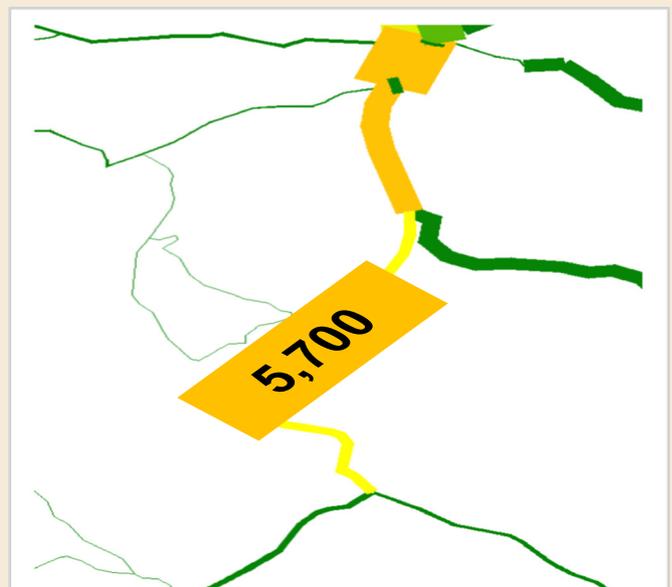
## 2030 Congestion Projections

In 2030, highways between Lusaka and Copperbelt and Lusaka and Kafue will be congested. However, a slowdown is likely along some highways such as the Lusaka - Chipata and the Lusaka – Livingstone highways.

The green, yellow and red codes on the GIS maps signify slight, moderate and great congestion respectively.



2030 Daily two-way assignment volume of traffic on Lusaka-Kafue Road



2030 daily two-way assignment volume of traffic on Lusaka-Kafue Road



2030 daily two-way assignment volume of traffic for entire road network

## Project Evaluation

The evaluation considered 38 projects in total. Most of these projects are in the Link Zambia 8000 investment plan. Other projects include major trunk roads from Lusaka to major destinations. Projects were analysed two ways; First, each project was analysed using Multi-Criteria Analysis (MCA) and was ranked according to its expected benefits. Next, each projects was analysed using the cost-benefit ratio and ranked accordingly.

Indicator	Source	Year	Assigned Weight
Volume of Private Vehicles	Traffic Assignment in TDM (calibrated to traffic counts)	2013	20%
		2030	10%
Volume of Commercial Trucks	Truck Traffic Assignment (calibrated to traffic count)	2013	20%
Time Savings for Cars	Car Traffic Assignment	2013	5%
		2030	5%
Truck Time Savings	Truck Traffic Assignment	2013	20%
Current Road Standard	RDA Work Plan	2013	5%
Socio-Economic Index	User Passenger Average Socio-Economic Status	2013	10%
Border Impact	GIS Analysis	-	5%

*Seven (7) criteria were used in the evaluation and each criteria was given a weight representing its relative importance. MCA is effective in considering which project yields the optimal benefit for the country.*



## Project Prioritisation

While the MCA ranking makes no accounting for costs, the cost-benefit ranking assigns a high value to low cost, thereby causing low cost projects to be ranked highly despite the fact that the project may have little overall value. The question for policy-makers in choosing a method of prioritisation is what policy they wish to pursue. If the benefit approach is chosen, this

would lead to the development of the projects offering the highest benefit first. Corollary this would lead to increased benefit for the nation and a higher rate of public support for projects in the longer term. However, if a cost conscious method is chosen, more of small-scale projects may get done, but the benefit realized may be minimal

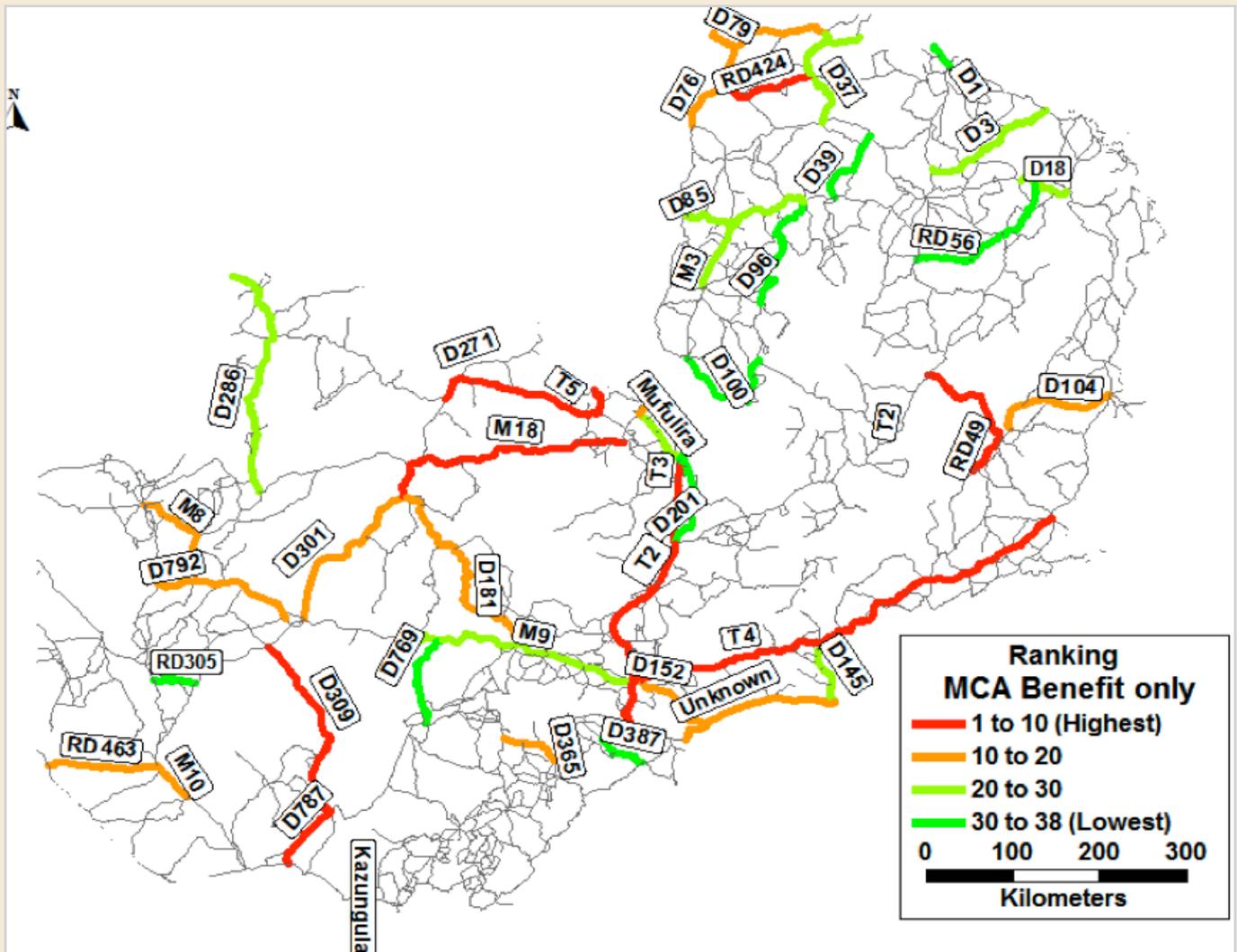
To get around the above stated problem the study selected the top ten (10) projects from the benefit analysis as a starting point and then subjected them to benefit-cost analysis. The result is a new project priority list that selects the projects with greater benefits and are at the same time cost effective.

The new project priority list for the 38 projects therefore would start with the Lusaka to Kafue (T2) which involves upgrade to dual carriageway of a 57.4km road, Mununga to Mporokoso (D36 - RD424) requiring upgrading to bituminous of a 130km road, Kalulushi to Kasempa (M18 & D181) which involves upgrading to bituminous of a 185km road, Chingola to Chililabombwe/ Kasumbalesa

(T3) which involves upgrading to dual carriageway of a 45km road,

It is important to take a moment to reflect back and see whether our investment priorities are giving us the expected value for money.

Going forward, it is inevitable that important investment decisions are cross checked on expected benefit and cost effectiveness using the various models available. The referred to report provides one of the models that can consistently be used to prioritise infrastructure projects in the road sector.



For full methods, references and sources refer to the main report: Optimization Study for Core Road Network Planning to Link Zambia.

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