

# The Role of the Government in Sustaining Mobility and Accessibility in Rwanda

Jit Bajpai<sup>a</sup>

<sup>a</sup> Earth Institute, Columbia University (jitbajpai@gmail.com)

Working  
Paper

June 2014

**International  
Growth Centre**

London School of Economics  
and Political Science  
4th Floor,  
32 Lincoln's Inn Fields  
Houghton Street  
London WC2A 2AE  
United Kingdom

For media or  
communications  
enquiries, please  
contact mail@theigc.org

Directed and Organised by



# The Role of the Government in Sustaining Mobility and Accessibility in Rwanda

## 1. Introduction

The Government of Rwanda intends to guide Rwanda towards middle income country status by 2020 as articulated in “Vision 2020” (Ministry of Finance & Economy 2000). The Economic Development and Poverty Reduction Strategy (EDPRS) serves as the strategic plan to advance the goals of Vision 2020, identifying the priority investments and actions for the government, and outlining a framework for the mobilization of resources and support to realise these objectives.

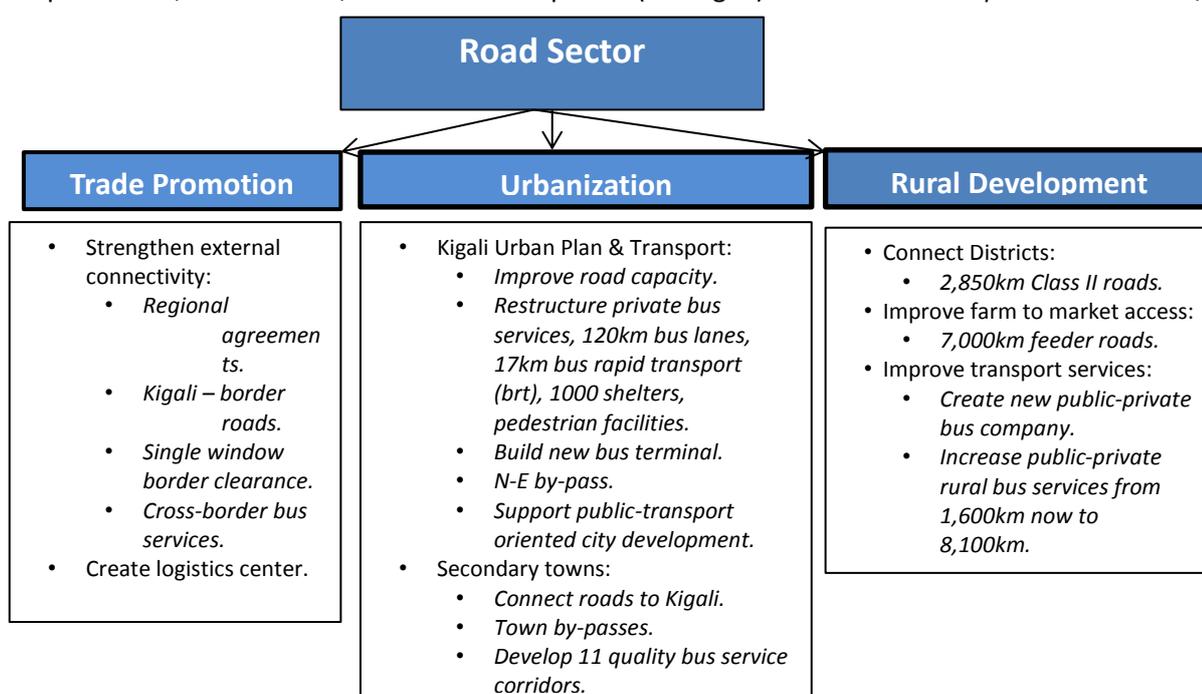
To accelerate growth and restructure the national economy the EDPRS2 (2013-2018) stresses the importance of *transport sector* in promoting trade, nurturing healthy urban economies, and improving the accessibility of rural settlements. The plan emphasises the need to improve the domestic and external connectivity of Rwandan economy and travel mobility within its rural and urban settlements, and to enhance the role of private sector in the provision of freight and public transport services.

This paper reviews the EDPRS 2 policies for the road sector, and suggests ways to make planned road sector investments and policies more responsive to the EDPRS objectives based on the lessons learnt from international best practices. The paper identifies appropriate approaches to the prioritisation and sequencing of investments and actions; promotion of the private sector in financing and delivery of public transport services; and management of mobility and accessibility in urban areas, with an emphasis on Kigali, the fast growing capital city.

## 2. Executive Summary: Key challenges and solutions for the road sector

### 2.1 The role of road transport sector under EDPRS2

The road sector will play a pivotal role under the three strategic themes of EDPRS2: trade promotion, urbanisation, and rural development (see Fig. 1). Under the *trade promotion* theme, the



**Figure 1. EDPRS2 Ambitions for the Road Sector**

government aims to overcome high transport costs for exports and imports (mainly resulting from

the country's land locked status), through the improvement of road corridors leading to borders with neighbouring countries, cross-country bus services, single window customs clearances, and development of a freight logistics centre in the vicinity of Kigali. Under *urbanisation*, the main focus will be to improve mobility of Kigali city residents by easing traffic congestion, reorganizing existing private bus operators to expand coverage and quality of their services, and promoting transit-oriented development in the city. EDPRS2 recognizes the importance of secondary cities and thus includes plans to improve roads and public transport services connecting them to Kigali. For *rural development* it aims to improve farm-to-market connectivity and basic access to community services in order to enhance farm productivity and facilitate the marketing of agriculture surpluses.

## 2.2 Connecting settlements and markets

Four factors will be crucial to securing Rwanda's internal and external connectivity for trade and personal travel:

### 1. Good quality roads connecting Kigali, land borders, secondary cities, and other economic nodes.

In recent years Rwanda Transport Development Agency (RTDA) has made progress in improving the condition of national roads (African Development Bank 2012) particularly those connecting Kigali to strategic towns and borders with Uganda, Tanzania, Congo and Burundi. But to sustain the conditions of road assets and traffic safety the government needs to *better enforce regulations* such as axle load controls, driver training, and vehicle inspections. Secondly, all future investment decisions for road network capacity expansion- including city bypasses- should be based on *calculations of expected economic merit* and *robust traffic growth forecasts*.

2. Effective national and district institutions. The current capacity of the institutions belonging to the Ministry of Infrastructure (MININFRA) is limited, severely affecting the execution of already committed large investments in the transport and energy sectors. The disbursement rate has declined to 6%, according to one ministry official.<sup>1</sup> The government has acknowledged the pressing need to strengthen project design, management, and execution skills at both the national and district level offices, and to meet immediate needs is considering the appointment of private project management firms to accelerate the implementation of the committed programs and assist MININFRA in building its staff capacity.

3. Adequate resources for road maintenance. Rwanda's Road Management Fund (RMF) has been in place since 1998, managed largely by the MININFRA, and funded almost entirely by a petrol and diesel levy (70% of fund revenues) and a road toll for foreign heavy vehicles (30% of fund revenues).<sup>2</sup> The fund in its current form, however, will not suffice to finance even the annual routine maintenance expected in coming years (African Development Bank 2012). New sources of revenue must be explored, and the RMF should consider broadening its mandate to expand its sources of finance, especially examining the potential for private financing in road development and maintenance. To borrow from the experience of regional partners, Kenya has tried to impose fees for: roadside advertisements, use of road corridors by utilities, leasing of equipment to contractors, and road material testing, etc, to raise operation and maintenance (O&M) revenue.

4. Reliable and affordable inter-city public transport. The Ministry of Infrastructure plans to provide eleven high quality bus service corridors connecting Rwanda's district centres and secondary cities.

---

<sup>1</sup> Author's own conversations, March 2014.

<sup>2</sup> <http://www.fer.gov.rw/index.php?id=52>

These services will be provided by a newly formed public-private company and regulated by the Rwanda Utilities Regulation Authority (RURA). These corridor services hold promise for improved inter- and intra-district mobility if complemented by private or public feeder services and improved district roads.

### **2.3 Managing urban mobility and accessibility**

The urbanization pillar of the EDPRS2 recognizes the necessity of a healthy and well-functioning Kigali for the planned economic transformation and growth of Rwanda. The city is already undergoing major transformation: an increasing population, many new developments, and a sharp rise in motorization. Travel conditions are slowly deteriorating, with peak hour congestion along certain corridors leading to the central city, and at several other locations. Congestion and related pollution levels are highly likely to deteriorate with the increased concentration of economic activities, arrival of new migrant populations, and increased personal vehicle (cars and motorcycle) ownership over coming years. The options for widening existing roads are limited due to non-availability of land, hilly topography, and high construction costs, and although the city has implemented some traffic management measures, they are inadequate to address the emerging conditions (Bajpai et al 2012). A recent reorganization of privately run public transport services has improved service coverage, but the reliability and level of service remains inadequate due to the peak hour congestion, shortage of vehicles, and inadequate service provision by operators; furthermore, bus transport is still not affordable for all, since persons travelling between bus service zones must pay two fares, and the regulated fare of a single ride (Rwf 250) is high for many (over 10% of average household income for a monthly commute of forty rides). As a result of such challenges, the share of walked trips in Kigali has reached 60-70%. High rents and lack of affordable housing supply are also forcing people to live in outer areas, manifesting urban sprawl; accompanied by population increase, this is steadily increasing the time and cost of trips, with a disproportionate impact on the lives of the majority who are poor. Global experience suggests that the provision of public transport services preceding development of new housing areas has been the most effective way to sustain the mobility of newly developed areas.

The future state of mobility *in Kigali* will primarily depend on: i) improvements in the operating efficiency of the road network through the adoption of effective *traffic engineering and management* measures, with greater emphasis on the provision of safe *sidewalks and walk paths*, and bicycle facilities where appropriate; ii) the availability of *affordable and regular public transport services* (and *price signals to balance demand across modes of transport*); iii) effective national and Kigali city level *institutions* with primary responsibility for urban transport planning and policy making; iv) the *promotion of transit-oriented development* in the city;<sup>3</sup> and iv) greater participation of the *private sector* in transport service provision (e.g. bus, para-transit, freight, road construction and maintenance) under an *effective regulatory regime*.

EDPRS2 and transport sector strategies for Kigali (City of Kigali 2013, Ministry of Infrastructure 2012) recognize the need for all the above. The question is how to move forward prudently in tune with the evolving reality of *fiscal and institutional constraints*.

---

<sup>3</sup> Targeted infrastructure facilities such as walkways, bikeways, and bus/minibus stops within 500m of residences should be considered an integral part of any area upgrading schemes, especially for poor areas.

## 2.4. Enhancing rural accessibility

Rural populations of Rwanda suffer from poor accessibility due to unpaved and ill-maintained roads and a lack of public and private transport services. Under EDPRS2, the government recognizes the importance of enhancing rural productivity and agriculture diversification by improving farm-to-market road access. However, the resources required for upgrading district and village roads are enormous, and hence the need is to maximize the impact of committed investments by adopting good practices for their planning, prioritization, and execution as elucidated in Figure 2. A review of the recent planning studies suggests that the government (ADB 2012) has already used these

**Figure 2. Strategies for Enhancing Rural Mobility and Productivity**

1. Planning:
  - Plan under a national rural roads strategy, in coordination with main road planning and agriculture development.
  - Connect rural settlements to market, schools, and health centres.
  - Enhance settlement accessibility and resource use through network based planning and programming.
  - Consider maintenance needs along with investment planning.
  - Address reliability and durability in technology and design rather than speed and width of roads.
  - Ensure community and local participation including women.
2. Prioritisation criteria:
  - Prioritise development of rural transport according to the population served, poverty levels, agricultural potential in the catchment area, existing road condition, traffic level (if known), costs of improvement, network synergy between main road and rural roads, and road density.
3. Sustainability considerations:
  - Before embarking on any project, make sure to also have the human and financial resources required for proper maintenance.
  - Nurture community ownership and contribution (e.g. labour, resources), as seen in Rwanda's *umuganda*.
  - Chose road design and standards according to sustainability needs (e.g. paths, tracks, sealed or unsealed road surface, geometrics).
  - Promote informal transport (bicycles, head loading, wheel barrow), and access to public transport and para-transit (motorcycle, small trucks) to move goods and people.
  - Upfront technical assistance and training and use labour intensive methods.
4. Resource mobilization:
  - Central government should support rural transportation, complemented by enhanced mobilisation of local resources.
5. Organisation:
  - Place planning, funding, and coordination in a central rural roads unit in the main road agency of the Ministry of Infrastructure/ Transport.
  - Involve local communities (including women) and agriculture officers at the planning stage.

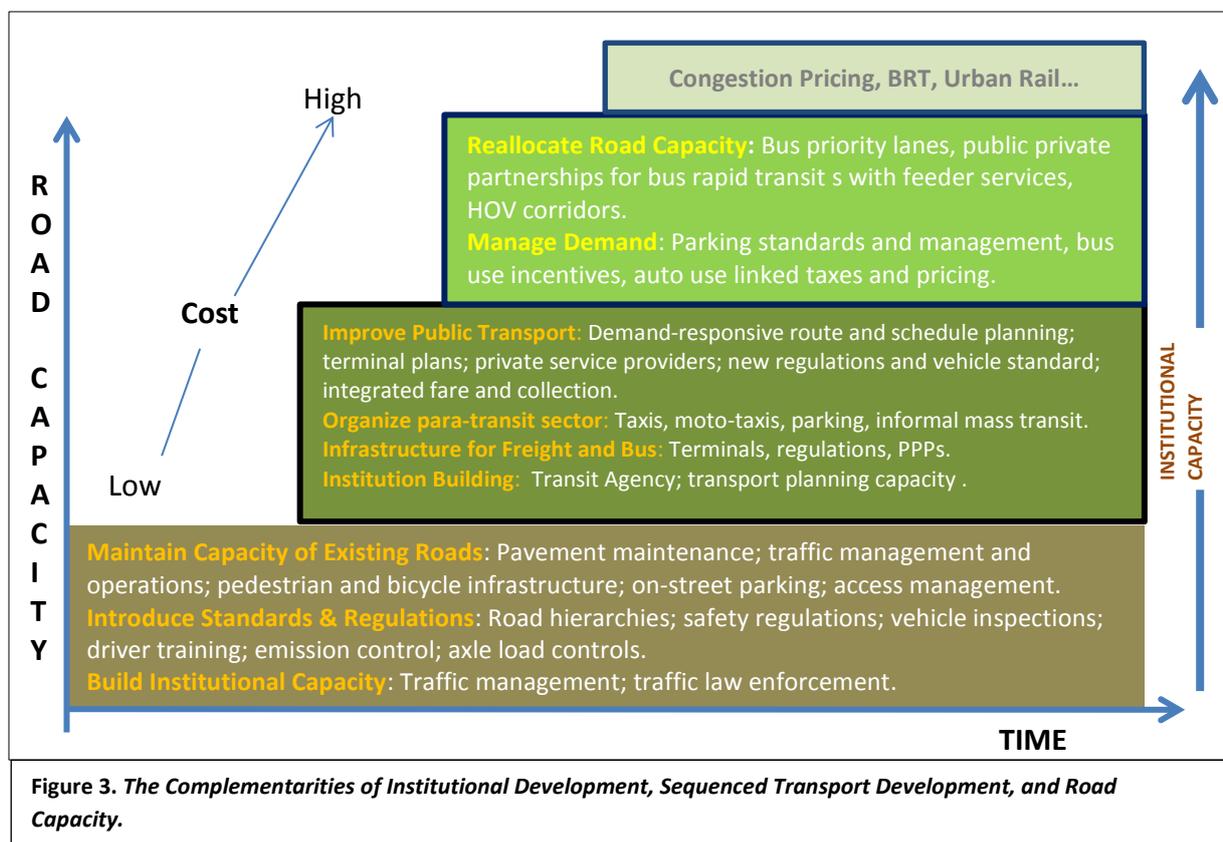
practices to prioritize districts deserving road investments. Moreover, these studies have recommended the adoption of well-tested best practices such as labour-based construction methods; active participation of the community, women, and agriculture officers; and strengthening the coordination and capacity of local and national agencies responsible for rural roads programmes. The planned investment will rely heavily on donor and government support since no means of cost recovery are feasible at the current income level of the rural population (other than seeking some form of "in kind" contribution from the willing communities, e.g., in the form of labour). A collaborative culture between the central agency primarily responsible for rural transport in the Ministry of Transport and the Ministry of Agriculture will be essential to effectively deliver the rural development strategy under the EDPRS2.

## 3. Optimizing use of road network capacity

The national and Kigali city specific transport strategies (Ministry of Infrastructure 2012) have identified key interventions to improve road capacity in terms required investments, policies, and roles of various sector institutions. But the effectiveness of the overall strategy largely depends

upon the way synergies between the planned interventions will be achieved within given resources and time frames. During an early stage of development when motorization is low and resources are limited, cities adopt *low cost measures* such as *traffic engineering and management* to get the best out of the existing road network. This approach helps to *build local government's capacity* to manage future demand for motorized travel, by using new design and planning practices, regulatory controls, and policies. The success of these measures serves as the foundation for next phases of more complex and higher cost strategies that promote roads to serve more 'person trips' instead of 'vehicle trips'. Under such evolving strategies, cities begin to deliver efficient public transport infrastructure and services, and begin to restrain car and motorcycle use, building on the success of preceding measures while maintaining consistency over time and adequate flexibility for mid-course changes and corrections as illustrated in Figure 3. The adopted approaches have to be context specific, since the pace at which new practices and measures are in fact adopted by people, businesses, and city officials will vary between cities.

Kigali city is making progress in the utilization of its road space. It has improved major roads, and recently, private bus services have been reorganized to better serve city residents. But there is room for further improvement before undertaking high cost interventions. Under the EDPRS2, city and government are planning to improve congested intersections and bus terminals, introduce bus priority schemes, and build strategic road links. It is thus an opportune time to *seek synergy across planned interventions* in tune with the available resources and capacity of local and national institutions. For instance, successful traffic management measures (e.g., signalization, parking controls, pedestrian and bicycle facilities, etc.) will be critical to improve the reliability and efficiency of current bus services. By building synergy between the two city will pave the way for introducing future bus priority schemes (bus lanes, BRT), transit oriented city expansion and other travel demand measures such as parking supply and pricing policies.



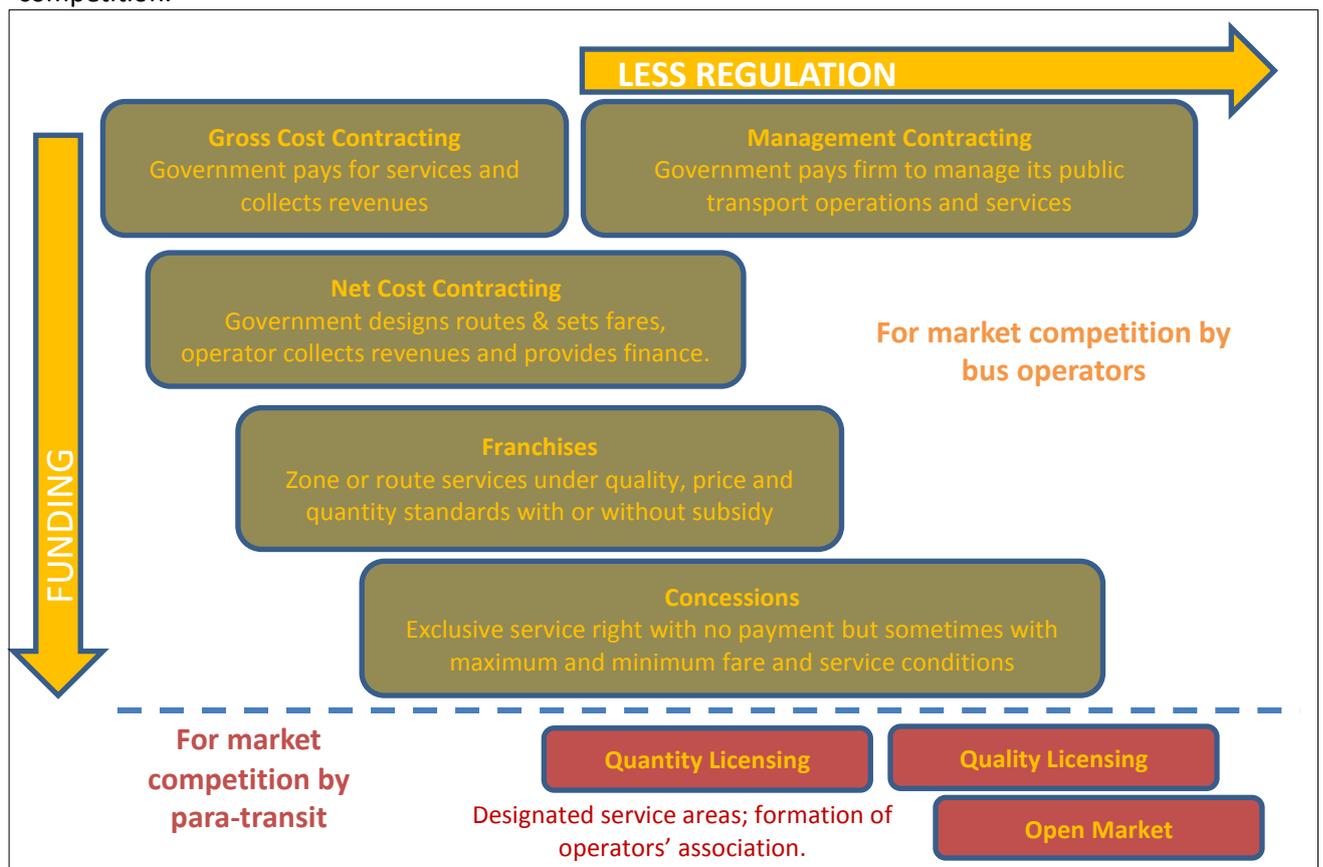
#### 4. Contracting private bus services

To attract finance and expertise, the Government of Rwanda intends to increase the role of the private sector in transport service delivery and infrastructure construction and maintenance. In most countries, bus, para-transit (taxis, non-motorised transport feeders, etc.) and trucking services are usually the most attractive areas for private sector involvement. However, to nurture responsive public transport services for either urban or inter-urban markets, governments use *competitive procurement of private operators*. To meet safety, service quality, affordability, and environmental objectives, the selected service operators are governed by a *regulatory regime*, while *competitive pressures in the selection of operators* reduce the cost of services.

Competition can be either “for the market” or “in the market”. Under a “for the market” approach operators are allowed to compete for a route between two locations or for services within a geographic area. The contract structure may take several forms as shown in Figure 4, such as gross cost, management contract, net cost, franchise, and concessions. Public authorities use one or several of these forms for contracting their services according to the nature of the market to be served, desired quality of service, and the type of conditions that they wish to impose on operators in terms of fare policy, subsidy provision, revenue collection, and assigned responsibility to determine quantity and quality of services. Under a “gross cost” system, fare revenues are collected by the authority, and if they fall below the cost of the service, the gap is closed by a government subsidy. In the case of “management contracts”, the government pays the private firm for the management of entire bus system, within a set of agreed parameters. As one moves down the list of contracting methods shown in Figure 4, the financial support from the government usually declines due to the transfer of revenue and market risks to private operators. For instance, under a “net cost” contracting system, no subsidy may be provided, since operators collect revenues according to the agreed cost of service and fare policy.

Competition “in the market” permits suppliers the greatest degree of freedom to respond to market demand in an area, while the consumer enjoys freedom to determine his/her willingness to pay for the service. This form of competition is commonly permitted for para-transit services (e.g., rickshaws, taxis, motor-bike taxis, etc.) and in many developing countries even for bus or mini-bus services. But to manage such an “open market” service and at the same time safeguard public interest, authorities impose general laws of good business practices in the form of “*quality licencing*”, by *prescribing specifications for vehicle, environmental performance, and maintenance standards*, and under the “*quantity licencing*”, by *restricting the number of vehicles allowed in a service area*. The later approach is commonly applied for regulated fare taxi services, mainly to ensure that operators earn reasonable financial returns under a fare regime.

Kigali city has recently adopted a net cost contracting method to procure privately delivered bus services from three firms to serve four zones and its central business district (CBD). The restructured bus services have definitely improved service coverage and quality of vehicles, but service schedules, fares, and customer care are failing to meet the performance standards of the contracts. International experiences suggest that *the success of “for the market” methods of procurement depend upon the participation of multiple suppliers in the bidding process, and independent roles played by various public institutions in planning, execution, and regulation.* For instance, there should be *separation between the agency responsible for franchising and policy making, the operations planning agencies, and between regulator and the service contracting agency.* The intent should be to maximize competitive pressure on bidding firms to reduce cost of service while eliminating the potential for conflicts of interest between agencies responsible for managing the competition.



**Figure 4. Options for Public-Private Partnerships in Bus and Para-Transit Delivery.**

Finally, for the adoption of an effective net cost contracting system, local and national agencies must have *staff with skills in service planning, procurement, design, enforcement of regulation, monitoring of performance parameters, and revenue collection and payment management.* Moreover, contracting is not a one-time event, but a dynamic process of negotiation and re-negotiation: as fares increase, new taxes are disputed, oil prices fluctuate, competing services are introduced, and the profitability of each contract changes due to the multitude of unforeseen reasons. *Civil servants must be able to handle such negotiations with expertise* in order to provide an affordable and good quality public transport for the majority of city residents.

As mentioned before, under a net cost service contracting system, the government transfers the responsibility and risk of fare collection to operators and in most cases avoids any subsidy payment. But such contracts require strong public oversight, due to incentives for an operator to maximize its

profit by cutting service level and/or quality, or by overcharging bus users. A monitoring report of the Rwanda Utilities Regulation Authority (RURA), the regulator in Rwanda, has already indicated the occurrence of such phenomenon in the case of Kigali bus operations (RURA 2012). According to one operator,<sup>4</sup> the main cause for missing scheduled services is the peak hour traffic congestion- though delays in the arrival of imported vehicles are also a factor. According to a government official,<sup>5</sup> some contracted firms, despite being *cooperatives* of many bus operators, continue to behave like independent individual operators. In the absence of a well-established service schedule and unified fare revenue collection system, their incentive is to maximize fare revenue by cutting unproductive service runs or delaying departures until vehicles are full of passengers. The remedy to this problem seems to lie in *changing the internal ownership structure of each contracted cooperative so that each cooperative member 'leases' the vehicle(s) he/she own to the cooperative company* (for example, on a per diem payment basis, *and the cooperative company holds sole responsibility for operating them according to the agreed service schedule, and for collecting all fare revenues using an unified collection system*. Many public bus companies in cities around the world employ private vehicle operators in this way (for example Calcutta, and even some US cities). Given the differential quality of Kigali's buses, cooperative companies may, in future, consider offering vehicle owners shares based on their 'capital contribution' (the value of their bus), rather than a simple per diem, but this system is considerably more complex.

In many countries private bus services have performed poorly as a result of regulatory capture by certain interest groups. For instance, in Sri Lanka, the government consistently resisted fare increases despite high inflation, causing the steady deterioration of bus services in Colombo and thus the collapse of the private bus services (Gomez-Ibanez 1999). On the other hand, if bus operators capture the regulator and succeed in obtaining an undesired fare level, subsidy, or tax remission, then passengers and the government suffer. These cases underscore the importance of having an *independent and competent regulator who monitors the dynamics of contract conditions, and a separate city agency responsible for planning and contracting* while ensuring that the contractor meets the agreed performance parameters and responds to passenger market needs.

## **5. Building blocks for Kigali's bus reform**

Kigali's bus reform has been the most desired initiative to bring order to the chaotic private bus and mini-bus services in the city. The formation of operators' cooperatives such as the Rwandan Federation of Transport Cooperatives (RFTC), has served well in bringing many of the existing local operators under a company structure while minimizing any negative impact of the bus reform on earlier bus and mini-bus operators. At its early stage of implementation, there is also definitely room for improvement in overall performance of the new bus industry structure.

The Kigali bus system can be made more effective in several ways. Firstly, as above, the government can work with each cooperative of operators to *ensure that they adhere to a scheduled service plan*. To do so all three cooperatives may have to *review the roles and incentives that they have currently assigned to their members*. The intent should be to attain *firm or cooperative level responsibility for fare revenue collection and operation* even though vehicle ownership remains with members. In parallel, the city authorities need to *address the causes of traffic congestion*, which is affecting on-time service performance.

---

<sup>4</sup> Author's own conversations, March 2014.

<sup>5</sup> Author's own conversations, March 2014.

Secondly, at the national level, MININFRA should retain responsibility for defining public transport competition policy, RURA that for regulation, and the Ministry of Interior (police) for traffic enforcement. *The city-specific functions related to transport (including public transport) planning and procurement and traffic management should be housed within the City of Kigali, or assisted by the national agencies in the near-term but with responsibility for implementation of local plans and actions resting with the Mayor.* In this way, a city government remains accountable for meeting the needs of its citizens.

Thirdly, Kigali may consider promoting an *integrated bus fare system across all zones*, in order to end the present situation whereby one pays twice when travelling from one zone to another. Over time it may explore options for *differentiating fares* according to distance, time, service quality, and special social needs. A well-designed differentiated fare system helps to improve the efficiency of system operation, increase revenue without loss of ridership, and meet targeted social objectives.

Other important measures worth considering include assistance to operators' capacities in financial and organisation management, addressing the shortage of buses (e.g., through the recently revised import duties), and improving customer care, traffic regulation enforcement, and vehicle standards.

## **6. Urban transport and land use planning**

Being the largest node of the national urban system, Kigali's role as the economic engine of Rwanda is undeniable. It is already accommodating one third of national employment and almost one fifth of the population, and is expected to grow to over 4 million in the next twenty five to thirty years.

Given the topographical constraints, the city has to limit geographical expansion of the city; overconsumption of land will have negative consequences on the infrastructure services, mobility, and ecology of the city. In light of this, the master plan of Kigali and its transport strategy (City of Kigali 2013) aims to promote a compact, vibrant, and transit oriented city. The question is, how can the city pursue an integrated land use and transport strategy to turn the vision of this plan into (an affordable) reality?

It is an immense fiscal and institutional challenge, given the magnitude of backlog and future demands for infrastructure and affordable housing for the majority. Almost 70% of current residents live in informal settlements and given the affordable housing backlog future migrants are likely to add to the growth of such settlements. The true challenge for local authorities would be to *guide a market-driven city expansion that protects environmental assets and provides affordable access to homes, and economic and social opportunities.*

Many *developed* world cities had faced similar challenges in the past and offer interesting lessons for Rwanda. For instance, in 1807, just forty thousand people lived in southern tip of the Manhattan, New York. The experienced rapid trade-led economic growth after the opening of the Erie Canal, which connected the mid-west region and Manhattan, and population growth due to the influx of migrants from Europe. To accommodate the population increase, city managers zoned the entire island for urban development and created a road grid to support the future land development (see Figure 6). The new areas were filled with new arrivals and businesses much faster than the city had anticipated, and the boundary of the city expanded across the river; similar road grids and supporting zoning rules were thus applied to develop the areas of Queens and Brooklyn. As we observe today's developing world cities, the migrants arriving in New York were poor and lived in overcrowded and unhealthy conditions; the city structure and form evolved over decades, amid rises

and falls in the city's growth, and huge changes in its economic structure, as continue today. Throughout all this, the road grid system created over hundred years ago continues to be one of the structuring elements of urban development, and facilitates efficient circulation of traffic within the city.

By contrast, we can consider the Al Munira district of Cairo, where a high density area (of over 1500 persons/ha, and houses of four to six floors), is served by only four metre wide access streets and eight metre wide collector streets that were at one time the village roads (see Figure 7). The result is that urban services like garbage collection, fire trucks, ambulance services, and police patrols face difficulty in serving the millions who live in this area.



Fig. 6. New York City Master Plan. 1807



Fig. 5. Informal Settlements Built on Hillsides in Brazil



Fig. 7. Informal Settlements in Egypt



Fig. 8. Bangkok Road Network



Fig. 9 Informal Settlement in Kabul



Fig. 10. Informal housing in Bangkok, before and after upgrading

In Bangkok (Figure 8), the absence of secondary road networks not only limits access to many houses, but causes severe congestion in arterial roads due to a lack of travel alternatives.

A case from Kabul (Figure 9) illustrates how informal settlements may expand into agricultural areas following the pattern of agriculture plot ownership.

At the neighbourhood scale, researchers have found that five “Ds” - density of residents and activities, diversity in terms mix of land uses, design that meets human scale, destinations for accessing jobs, and distance to the transit services (Figure 11), are critical to minimizing travel distances and promoting use of public transport, walking, and cycling. Research conducted across one hundred US cities (Figure 12) showed that the combined effect of the four “Ds” reflecting *neighbourhood characteristics* reduced the distance travelled by the average resident almost as much as the proximity of residents to their job destinations. This is because a well-designed neighbourhood, with social amenities like schools, clinics, markets, parks, etc, reduces the distance travelled for non-work purposes and encourages walk and bicycle use. In Ahmedabad, India, residents living in areas with smaller blocks (1.2 ha) took 23% more walking trips than those living in large blocks (4 ha). Similarly, walk paths built for the informal settlements of La Vega Barrio in Caracas significantly improved access to jobs, schools and clinics for its residents.

**Fig. 11. The Five Ds**

1. *Density*: Increasing the proximity of people and activities is particularly effective at reducing journey times in the cities with low initial density (Kenworthy and Laube, 1999).
2. *Diversity*: Balancing a mix of land uses significantly reduces the need to use vehicles, increases mobility of women, children and the elderly, and reduces pressure on roads especially at peak demand times.
3. *Design*: Planning neighborhoods to have a human scale (walkability) and orientation, which also reduces use of vehicles and increases mobility along women, children and the elderly. Thirty pathways built through the steep hills of La Vega Barrio informal settlement of Caracas have improved access to jobs, schools, and clinics. Ahmedabad residents living in smaller blocks of 1.2 hectares took 23% more walking trips than those living in large blocks of 4 hectares. Furthermore, compactness can be combined with attractiveness through attention to detail.
4. *Destinations*: Good access to activities and workplaces outside of one’s own neighborhood results in reduced journey times or distances to central-destination jobs, and fewer overall kilometres of vehicular travel in the city.
5. *Distance to transit*: In cities around the world, houses and land within walking distance of good transport corridors (such as bus and tram stops) have much higher value. Thusly, transit lines help to organise the development of the entire city.

All the above examples illustrate the importance of providing a hierarchy of road and street systems to sustain the mobility of rapidly growing cities. The master plan of Kigali (City of Kigali 2013) also aims to promote mixed-use, high density, neighbourhoods with access to public transport.

To promote transit oriented development, the plan has even identified several corridors that will be served by Bus Rapid Transit (BRT) systems. This raises a question as to how BRT will shape the urban form: an integrated and well developed transit system increases the accessibility of areas served by it, also attracting development that raises the value of land and properties in that area.

International experiences have indicated that the land value response to transit investments takes time, and varies largely across and within cities depending upon the location-specific market pressure for development within a city, and the overall growth trend in a city. Changes in land use and the intensity of development in Curitiba, Brazil following the installation of its BRT corridor, and

in Arlington, Va, following its new subway line, occurred only two to three decades *after* the initial installation (See Figure 13). Moreover, in many cases, transit investment-led growth failed to occur at all, due to the poor choice of facility location and speculative decision with disregard for a thorough understanding of market needs.

## 7. Managing city expansion

International experiences offer three major lessons that are worthwhile for city authorities to consider in managing city expansion. First, cities must preserve right-of-ways for primary and secondary roads in areas identified for future development. *The growth trend in new areas should set the pace for building paved roads, neighbourhood streets, public transport services, and bike and walk paths.* Second, *the land use and density related regulations (permitted use, federal acquisition regulations- FAR-, plot size, setbacks, etc.) should be regularly reviewed in light of the observed changes in land prices, rent, construction costs, affordability, and preferences of local populations.* Lastly, the city must *improve both the accessibility (public transport services, bicycle, and walk paths, etc.) and provision of community services in existing settlements.* By improving the living quality and productivity of residents, the existing settlements will experience a virtuous cycle of housing stock upgrading, which will in return generate additional revenue for local government services.

	Elasticity	Per cent change in VKT from a doubling of value of the 'D' variable
Density (intensity of use)	-0.05	-5%
Diversity (mix of use)	-0.07	-7%
Design (walkability)	-0.08	-8%
Destination (accessibility)	-0.20	-20%
Distance (to transit)	-0.05	-5%

**Fig. 12. The Effect of the 'Five Ds' on vehicular kilometres in transit**

## 8. Concluding Remarks

I have reviewed the planned road sector interventions under the EDPRS2, and emphasized the importance of proper *sequencing* and *synergy-building* among the high priority investments, particularly within Kigali and in rural areas. In Kigali, the priority should be to first *optimize the use of existing road capacity* by implementing proper traffic engineering and management measures and in parallel, taking actions to improve the service reliability of buses operated by private firms. The success of these two initiatives will serve as the foundation for promoting bus priority schemes and parking supply management. To manage the Kigali city expansion the paper recommends *preservation of right-of-way for primary and secondary road networks in areas designated for city expansion and experiencing development pressures.* The land regulations influencing both new market and new government led developments must take into consideration affordability and the preferences of population groups and businesses. *Compact,*



**Fig. 13. The Curitiba corridor, Brazil, in 1974 (above) and today (below)**

*mixed use neighbourhoods with adequate walk and bicycle facilities* hold promise to reduce travel demand and increase propensity to use buses or non-motorized modes. Acknowledging that BRT-led development may take time, the desirable approach could be to first nurture an effective and matured private bus services and then consider BRT options in areas or corridors *exhibiting demand* for development.

The progress made so far, and that planned, to improve the connectivity between Kigali, secondary cities, and cross-border points, needs to be effectively managed and maintained by strong institutions and an adequately resourced Road Management Fund (RMF). Farm-to-market and village roads providing access to basic services (clinics, schools etc) deserve special consideration in areas with high potential for productivity gains and poverty reduction. Due to the resource constraints, a multi-criteria prioritization framework (as proposed by various studies) should be used, and planned closely in consultation with agriculture officers and local communities.

The limitation of institutional capacity at local and national levels is affecting the pace of project implementation, adoption of new practices, and enforcement of regulations. The roles and capacities of key institutions should be reviewed to avoid prevailing functional overlaps and conflicts between existing institutions, and new institutions or specialized units dedicated to handling high priority interventions such as public transport planning, rural roads programmes, and transport regulations should also be built.

## **Bibliography**

African Development Bank, Rwanda Transport Sector Review and Action Plan, 2012

Bajpai J., Ottelenghi R., Berlanda T., Sustainable Urbanization in Support of Economic Transformation – A Rwanda Study, IGC, London, Aug. 2012

City of Kigali, Master Plan Report, May 2013

Gomez-Ibanez J. A., Regulating Infrastructure, Harvard University Press, July 1999

Republic of Rwanda, Shaping Our Development, Economic Development and Poverty Reduction Strategy, 2013-2017, 2012

Ministry Finance and Economy, Vision 2020, July 2000

Ministry of Infrastructure, Public Transport Policy and Strategy for Rwanda, Oct. 2012

Ministry of Infrastructure, Urbanization and Rural Settlement Sector, Strategic Plan 2013-18, 2012

Ministry of Infrastructure, National Human Settlement Policy (Draft), Jan. 2013

RURA, Strategic Plan 2013-2018, June 2013

RURA, Annual Report 2012-13