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Mitigating Road Traffic Congestion in the Nairobi Metropolitan Region

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Policy Issue

Traffic congestion is one of the key concerns affecting the performance of the transport system in Nairobi. In 2008, the economic cost of traffic jams in Nairobi Metropolitan Region (NMR) was estimated at Ksh 1.9 billion annually, on account of cost of additional time spent on travel due to congestion. The situation is probably getting worse.

Introduction

A transport system should facilitate the movement of people, goods and services as efficiently as possible from origins to destinations that are separated in time and space, and thus reduce the effects of distance as an inhibiting factor in people's ability to realize their economic and social aspirations. The type of traffic congestion being witnessed in Nairobi is leading to increased costs, longer travel times, constrained economic productivity, and adverse health and environmental externalities.

Population growth in Nairobi will most certainly continue to have adverse implications on the transport system and traffic congestion. In 2009, the population of the Nairobi Metro was around 6,658,000; it is estimated that under a "business as usual scenario", the population of Nairobi will grow to approximately 14 million by the year 2030. While population pressure has been one of the key contributing factors to transport challenges, other factors include:

- Increased vehicle ownership;
- Inefficient spatial distribution of land uses, among others;
- Inadequate transport infrastructure;
- Lack of proper traffic control and management; and
- Lack of proper transport planning.

Nationally, the registration rate of new motor vehicles has increased from 63,486 vehicles in 2011 to 84,017 vehicles in 2013. Motor cars have increased at a faster rate of 7% than buses and mini-buses (5%), which implies that personal vehicles are becoming more popular as a mode of transport in the country and especially in Nairobi. This could be explained by the lack of appropriate alternatives to private car use for daily commuting. It is anticipated that in a "business as usual scenario", the rate of car ownership will increase in tandem with growth in per capita GDP. It is estimated that out of the approximately 2 million registered motor vehicles in Kenya in 2013, about 60% were located in the Nairobi Metro.

The spatial-economic structure of Nairobi has also contributed to the problem of traffic congestion through the almost exclusive focus on access to the Central Business District (CBD). For instance, most commuters try to access jobs and socio-economic opportunities at the same time on an 8:00 a.m.–5:00 p.m. daily schedule, which exacerbates the problem. Moreover, land use changes have also occurred along the main transport corridors within the city, with commercial land uses creating more demand on the transport network in Nairobi.

Various efforts have been put in place by the public and private sectors to address the problem of traffic congestion in the NMR. Among

them is the road infrastructure expansion aimed at increasing capacity. Despite these efforts, traffic congestion still afflicts the NMR and its residents.

Traffic control in the Nairobi Metro has been wanting, and it is now believed that some of the traffic interventions, such as installation of traffic lights in most of the CBD, have not worked despite enormous resources being put into this. Intervention by traffic officers often leads to even more confusion and more congestion.

The Issues

It is recognized that fully eradicating traffic congestion is not affordable and possible, especially in economically dynamic urban areas such as Nairobi.

Moreover, expansion of road infrastructure is expensive and has wide-ranging economic, social and environmental effects and may therefore not be the ultimate solution.

Solutions to traffic congestion must be based on a careful selection of a strategic "mix" of measures that have been rigorously tested, because some measures may not be effective if implemented separately and hence require joint application.

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Given the traffic challenges in the NMR, answers to the following questions are necessary:

- What is the "best mix" of road traffic congestion mitigation measures for Nairobi?
- Will the traffic congestion mitigation measures reduce road traffic congestion?
- By how much will the traffic congestion be reduced?
- Are the mitigation measures sustainable and cost-effective now and into the future?

Findings from research

Evidence shows that the various strategies for traffic congestion mitigation vary in the magnitude of effect. The table below highlights the results from a study conducted to evaluate the effect of five traffic congestion mitigation measures in the NMR.

- Increasing road capacity would reduce overall traffic congestion in the interim. However, this result should be treated with caution given that increasing capacity of all roads by 50% may not be economically feasible.
- Strategies to promote a modal shift from private car to public transport and increasing the vehicle carrying capacity would reduce the overall traffic congestion by 41%.
- Building the bypass roads would reduce traffic congestion by 11%, while decentralizing the CBD by creating multiple

Summary of the effects of traffic congestion mitigation measures on reduction of the volume to road capacity ratio

Scenario	Average V/C	% Increase in congestion
Base year 2010	3.70	
Forecast 2030 - Do nothing scenario	10.82	198.76
Mitigation measures		% Reduction in congestion
Supply slide:		
Increased road capacity	5.41	50.00
Building the bypass roads	9.72	10.86
Demand side :		
Shift to public transport and higher vehicle capacity	6.93	40.91
Development of multiple centres in Nairobi Metro Region	9.31	10.70
Cocktail of all measures	2.48	76.24

Source: Gachanja, J. N. (2011), *Evaluating the Impact of Road Traffic Congestion Mitigation Measures Nairobi Metropolitan Region.* KIPPRA Discussion paper No. 128, Nairobi: Kenya Institute for Public Policy Research and Analysis

centres of attraction in the NMR would have the least effect on reducing traffic congestion (10.7%).

- However, if all the mitigation measures were implemented in a combined strategy addressing the demand and supply side, overall traffic congestion would be reduced by 76%.

In order to interpret the table above, it should be noted that the volume-to-capacity (V/C) ratio of the transport system–that is the amount of traffic/passenger car units on a road against the designed capacity of the road–is an indicator used by transport planners to monitor the performance of transport systems. A V/C less than 0.85 is considered under-capacity, 0.85 to 0.95 is considered near capacity, 0.95 to 1.0 is considered at capacity, and over 1.0 is considered over-capacity.

The results also indicate that time-oriented mitigation measures such as flexible working schedules (flexi-time) have the potential to reduce traffic congestion because of the temporal behaviour of peak traffic. The concept of flexi-time is based on the assumption that in many work situations, rigid arrival and departure times are not necessary and could be adapted into a more flexible system. For instance, a business may be open from 7:00 a.m. to 6:00 p.m., with all employees present from 9:00 a.m. to 3:00 p.m arriving between 7:00 am and 9:00 a.m. and departing between 3:00 p.m. and 6:00 p.m.

Policy recommendations

The following are possible measures aimed at addressing the problem of road traffic congestion in Nairobi:

Demand side measures

- The government should implement transport policies that promote development of multiple centres in Nairobi. This can be done by applying **smart growth land use development strategies** in the major towns surrounding Nairobi. These entail mixed use, compact and high density settlements based on the concept that homes are in close proximity to working places, social services and recreation facilities. This would reduce the need to travel and minimize car use. The outlying centres in the NMR should be made attractive by providing world class infrastructure and economic services.
- The amount of automobile travel generated, irrespective of roadway capacity, should be adopted as a new indicator to measure transport system performance in order to capture the demand side.
- Public and private sector employers should undertake feasibility studies on time-oriented strategies such as flexi-time to gauge the estimated impact on workplace productivity and reduction of traffic congestion.

Supply side measures

- Increasing the capacity of roads, construction of bypass roads and missing link roads should be implemented together with policies that increase the share of mass public transport and non-motorized and intermediate (motor cycle) transport. Strategies for managing road intersections should be implemented for existing and newly constructed roads.

- The public transport system should be re-engineered to achieve enhanced levels of service by focusing on sustainable urban transport principles that are nationally appropriate, such as bus rapid transit. Incentives such as right of way, priority access, pedestrianized streets, as well as tax incentives for non-motorized transport and public transport users to further encourage reduced car dependency, as has been applied in the US, Australia, among other countries. The non-motorized transport system should be integrated with other systems in a comprehensive multi-modal network. Enhanced development of rail commuter services should also be pursued.

- Policies should focus on providing reliable and predictable travel times as well as efficient travel speeds. To achieve this, public transport should be segregated from private transport modes by creating dedicated public transport lanes on the roads. These would enable the implementation and adherence to public transport time schedules, which would then ensure reliability and predictability of public transport services. In addition, constant surveillance of the road system and prompt response to incidents that interfere with traffic flow will be necessary. Intelligent Transport Systems that combine information and communication technology with transport infrastructure should be adopted to avail travel-related data to help in travel planning.

Integrated measures

- Traffic congestion mitigation measures should be implemented in an integrated demand and supply side strategy. The mitigation measures should vary depending on the prevailing traffic dynamics of a particular road or traffic zone. Consequently, institutions charged with the responsibility of physical, road and transport planning should integrate their activities and adopt a coordinated approach in execution of their functions. These institutions should adopt a common policy and strategy aimed at mitigation of traffic congestion. A special agency such as the Nairobi Metropolitan Transport Authority can be charged with the responsibility of coordinating integration of land use and transport planning.

Further research

Further research is recommended to comprehensively investigate the actual economic, social and environmental impacts of road traffic congestion in the Nairobi Metropolitan Region. In particular, focus should be placed on computing the economic cost of congestion, the impact of congestion on health and welfare, and the contribution of congestion to climate change through emission of green house gases.

About KIPPRA Policy Briefs

KIPPRA Policy Briefs are aimed at a wide dissemination of the Institute's policy research findings. The findings are expected to stimulate discussion and also build capacity in the public policy making process in Kenya.

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