

## URBAN TRANSPORTATION PLANNING ISSUES IN KENYA (CASE STUDY-NAIROBI).

Josphat K. Z. MWATELAH\*,

Hiroshi TSUKAGUCHI\*\* and Yasunori IIDA\*\*\*.

### Abstract

This paper presents urban transportation planning issues in Kenya using information for Nairobi Metropolitan Region. It discusses the development trend in the region relative to the rest of Kenya, and tries to bring a relationship between this development trend and the impact it has had on the Nairobi road network in terms of efficiency. It is seen that there has not been matching of the economic development with the capacity of the road network and/or decentralization of functional nodes which would have eased traffic congestion problem. Recommendations are given on the best way to deal with this problem for both short and long term planning horizons.

### 1 Introduction

The Republic of Kenya is a developing country, lying on the East Coast of Africa, flanked by Ethiopia and Sudan in the north, Somalia and the Indian Ocean in the east, Uganda in the west and Tanzania in the south (fig. 1). Kenya has an area of 582,646 km<sup>2</sup> and the population was recorded as 21.4 million in the 1989 population census by the Central Bureau of Statistics (CBS) of Kenya. The national annual population growth rate between the 1979 census and the census 1989 was 3.34%. In 1983 the Kenya Government introduced the District Development Committee whose aim was to give mandate to the local community to initiate development projects that would create employment to the residents in their local areas. In spite of this move, the urban population has continued to rise, and the annual growth rate stood at 4.8% between the two previous census dates.

By its geographical position, Kenya has four types of transport systems, namely, airways, railways, roadways and waterways. Each one of these has a considerable contribution to the economy of the country, however, the road transport system dominates all at both urban and rural levels. This makes it essential to study adverse issues affecting the smooth running of the road transport system especially in the urban areas, and subsequently come out with recommendations to solve those problems. In fact it is desirable at all levels to develop transport infrastructure in harmony with the country's economic development. This can only be possible after a



Fig.1 Map of Africa

careful study has been done to find out the causes and effects of such issues on the transportation system, hence propose solutions to those problems.

Nairobi, is the capital of Kenya which has become the regional centre in the East and Central African zone, making it a node of great economic importance. It has an area of 684 km<sup>2</sup> and a population of 1,346,000 by the 1989 census results.

While the growth of urbanization has been proportionate to the available resources in the developed countries, in the less developed countries (LDC) urbanization has been disproportionate to the available resources, a phenomenon that has posed difficulties in the developing countries,

\*Lecturer Jomo Kenyatta College of Agriculture & Technology, Kenya.

\*\*Associate Professor Kyoto University, Japan.

\*\*\*Professor Kyoto University, Japan.

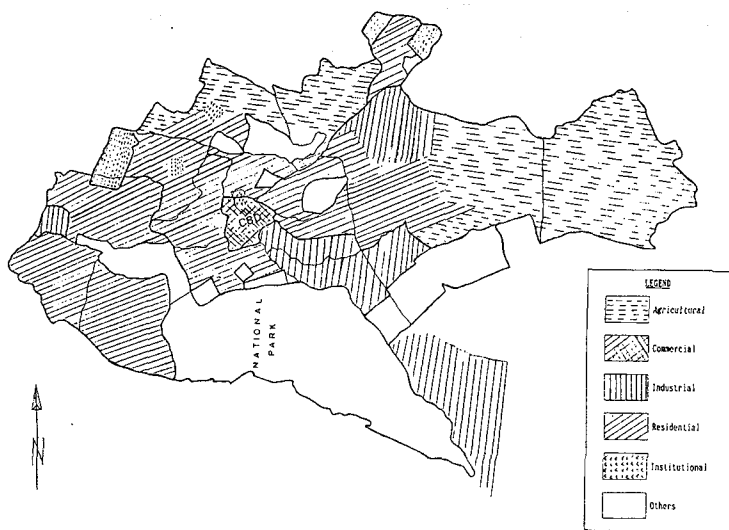


Fig. 2 Land use Pattern in Nairobi Metropolitan Region

albeit at varying degrees, depending on the economic level of the country in question.

Disproportionate of the urban phenomena in the LDC is due to the rapid population growth that is not matched with growth in the economic sector. This unfortunate situation has caused problems in proper planning, development and management of urbanization. Nairobi's annual population growth is estimated at 5%, and in real figures Nairobi caters for a larger population than any other urban area in Kenya.

Udomsri and Miyamoto (1991) report that, due to agglomeration of economic activities in the metropolises in the developing countries, about 50% to 70% of Gross National Product (GNP) is generated in these metropolises. Nairobi is not an exception to this growth phenomenon. The idea that the metropolis is the most productive place, lures most of the population into this region, resulting in a high rise of travel demand that quickly outstrips the available resources to cater for the rapid travel demand. This makes it imperative that developing countries should look into appropriate methods of managing urbanisation.

The following sections investigate the interaction between land use and transportation system in Nairobi by discussing the effect of monocentrality; road network and parking facilities in Central Business District (CBD); the impact of the development of industrial, commercial and housing estates and the extent this development has affected the performance of the road links by increasing the travel demand.

## 2 Effects of Monocentral Development Plan of Nairobi

Nairobi's original structural plan was based on class segregation. There were areas designated

for Europeans, Asians and Africans. These residents were mainly to find employment in the Central Business District, the location of government offices and head offices of the private firms and the main shopping places, and the Industrial Area which lies to the south of the CBD. After Independence (1963), policies were revised to conform with the new era. A comprehensive study of the metropolitan region was conducted in the early seventies by the Nairobi Metropolitan Growth Strategy Study Group (NMGS) in 1973. This report is the current master plan for Nairobi. However, implementation of the recommendations contained in this report have been made at a slower pace than anticipated. Due to this time lag, Nairobi has remained a monocentral city (fig. 2).

This has resulted in the rising rate of traffic congestion on links leading to and from the places of work at peak hours in most corridors. The Nairobi City Engineer reported that, there were numerous housing developments constructed by the government and other private developers in the recent years in the south west suburb which were not coupled by the necessary upgrading of the Langata road, the main artery serving the area, resulting to deterioration of the rate of traffic flow during the peak hours. In another article in the Daily Nation of 13<sup>th</sup> June 1989, a special issue reported about the deterioration condition of traffic flow in Nairobi. The Nairobi Metropolitan Growth Strategy Study Group (1973) reported a mobility rate of 1.59 trips per person per day for an average household of 4.31 persons. Calculation was based on the average number of daily trips per person irrespective of the transport mode and purpose. It is reported by the Transurb Consult (1986) that Modrige (1975) estimated the mobility rate in Nairobi at 1.80 basing his argument on a



Fig. 3 Peak Hour Traffic Flow

report compiled by the International Union of Public Transport (1983). This report stated that, due to rise in incomes in the African and Latin American cities, it was foreseen that there would be growth in the mobility rate of 2 to 3% per year during the period 1980–1990. Assuming that the figure of 1.80 trips per person per day still holds, we can estimate that presently, Nairobi generates 2.42 million all purpose trips per day irrespective of modes.

A survey conducted in January 1992 shows that people driving their personal cars to their places of work towards the CBD take on average, one and a half times of the travel time they should have taken irrespective of the direction of approach. Such a situation increases the travel costs as the level of accessibility is reduced.

On a normal working day, at peak hours congestion is noticed on links leading towards the CBD. Figure 3 shows a congestion effect on a link from the western part towards the central business district at the intersection of Ngong Road, Valley road and State House Avenue. During off peak hours congestion occurs in the CBD due to lack of parking space because either cars are double parked on the roads reducing the capacity of links, or other vehicles blocking the roads; the most notorious in this category are matatus (minibuses).

Congestion also occurs on several links in the Industrial Area, during normal working hours. The major reasons are the limited link capacities that cannot cope with the current traffic demand, very few in- and outlets into and out of the zone respectively, and lack of ample parking space, for those trucks that have to load and unload goods. Hence it is not unusual to find a truck illegally parked by the roadside, in the process reducing the road capacity.

### 3 The major Road Pattern in Nairobi

Figure 4 shows the major road network in Nairobi. From the south east is the Mombasa Highway (route A104) which becomes the Uhuru

Highway in the CBD then joins route A104 in the north west. This forms the Mombasa–Lagos Trans Africa Highway, and it is a dual carriage-way multilane from the boundary of the city in the south east at the Jomo Kenyatta International Airport to Kikuyu (north western suburb). It is reported that a large percentage of transport demand on this route originates in the corridor from Mombasa to Western Kenya via Nairobi (JICA Report, 1984); figure 5 shows the traffic flow trends on routes A104 and C58 (the high traffic flow values in 1987 was due to the All Africa Games held in Nairobi).

To the south is Langata Road (C58), a two-lane, two-way roadway serving Ngong–Karen residential areas. To the north is Murang'a Road that becomes Thika Highway (route A2), which forms part of the Cairo –Gaborone Trans Africa Highway in the north east and Kiambu Road (C64) in the north. Another link running parallel to route A104 is Limuru Road (C62) joining route A104.

Nairobi has one by-pass road, the Outer Ring Road (C59) which joins routes A 104 and A2. This is a two-lane two-way roadway, however, it practically has ceased to be a by-pass road since the city has grown well beyond it, and it is proposed to construct another larger capacity eastern by-pass located further on the eastern side of this road. There has been another proposal to connect routes A2 and A104 with a northern by-pass. The feasibility study report for the Nairobi South By-pass has been completed and construction is in progress. One of the major problems of the road network in the metropolitan region is limited direct accesses from one zone to another. This causes the road network to be inefficient in terms of travel time since it creates unnecessary traffic congestion effect on the links closer to the CBD. (Figure 6 shows traffic flow trends for routes C59, C60 and C62.)

Road capacities have been slightly increased by improving the link intersections, especially in the CBD, however, in most cases, they have remained unchanged. Some roads like the Jogoo Road (1) and Route A104 roads, are under rehabilitation process to increase their capacities. Another construction going on is a road connecting the industrial area and the Outer Ring Road (C59) to ease the traffic flow from the eastern and northern parts that have so far been using Jogoo Road (1). Poor road maintenance has rendered roads in Nairobi hazardous to drive especially at night. It is needless to say here that, the more our vehicles travel on bad roads the more the government will need to import parts to maintain these vehicles. Therefore it is necessary to limit such incidences by properly maintaining the roads.

Responses from people working in Nairobi were sought through questionnaires to find out their opinions on Nairobi road pattern. The

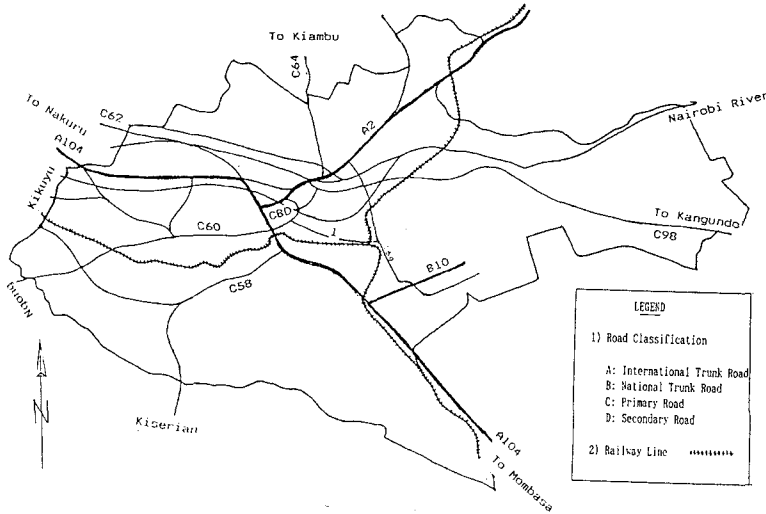


Fig. 4 Railway & Road Patterns in Nairobi Metropolitan Region

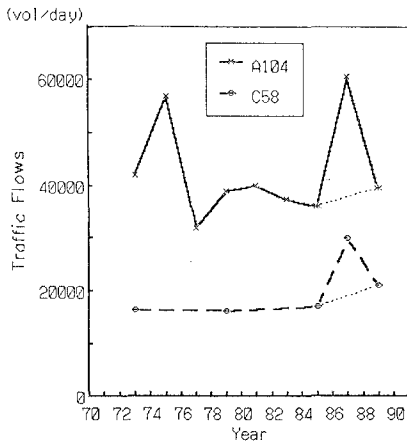


Fig. 5 Traffic Flow Trends (A104 & C58)

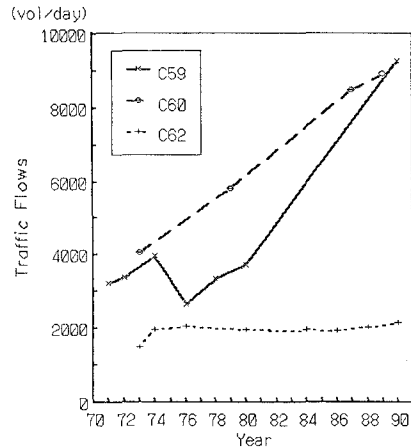


Fig. 6 Traffic Flow Trends (C59, C60 & C62)

sampling was carefully done to include people who drive to work and those who travel by public transport to places of work. The general feelings by those who use private cars are that the road pattern has inadequate link capacities to cope with the increase in the vehicle population, and the fact that all traffic is directed into the CBD due to lack of by-passes for those vehicles that would not have otherwise transversed the city centre.

#### 4 Parking Places in the CBD and Industrial Area

Surveys on parking facilities in the Central Business District have indicated an annual relative decrease in parking places. This is because although the demand for parking is rising, the supply does not increase. Data presented in table 1 shows that the recorded shortfall for parking

bays in 1977 and 1979 was 2,294 and 1904 respectively.

No other data was available for the following years but from the outcry by motorists, it can be deduced that the situation has not improved, even though the planning department of Nairobi City Commission(NCC) recently introduced a condition that for every building put up in the CBD parking areas should be provided. This is as a result of the increase in car ownership rate and vehicle population growth that has occurred in recent years. It was reported by the City Engineer's department that a number of NCC off street parking space have been lost due to transfer of this land to individuals who would then put up commercial buildings. This loss of parking places is as a result of the ambiguity on land lease holding between the Government Land Agent and the Nairobi City Commission. To avoid such

Table 1 Supply of Parking Places  
(All Types)

Year	Parking Places	
	Supply	Demand
1977	14,491	16,785
1979	15,278	17,192
1982	15,333	-
1990	13,359	-

Unit: Number

Source: Nairobi City Commission

situations to occur in the future, recommendations were given at the meeting to consolidate the car park leases, so that the NCC can control over land earmarked for parking facilities.

In some zones there are parking places that are free of charge. To attract only necessary traffic into the central area, parking should be charged at competitive rates depending on the locations instead of the current flat charging rate. This would increase the efficiency of the road system and possibly the rate at which services are offered in the offices.

Proposals have been made to provide parking area for oil tankers in the industrial area, off Mombasa Highway (A104), on a 20 ha. plot and the tank drivers will be ferried to hotels or residential areas by other means. Currently oil tankers are parked on the road sides in urban areas, a habit that is very dangerous in case of fire outbreak.

The Nairobi City Commission should also look into ways of parking country buses and matatus in different locations of the CBD so that the central area can be set free for safe human traffic flow and essential service vehicles. The central station should be left for the city buses and matatus. These terminal points should be co-ordinated within the transportation system such that pedestrians can easily walk to their destinations.

## 5 Commercial and Industrial Development Trend

The building and construction sector has maintained an upward growth in its performance for the last five years. Table 2 shows the value of building plans approved by the Nairobi City Commission and those of other major urban areas. One aspect to note is that zoning regulations have been revised in most of the high class residential areas to allow for smaller plot sizes therefore increasing the plot coverage, hence population density. Most residents in these areas can afford to use their cars on a daily basis, hence

Table 2 Value of Approved Building Plans In  
Nairobi & Other Towns Unit: Kenya Pound

Year	1986	1987	1988	1989	1990
Nairobi	78.44	111.82	148.38	212.85	186.40
Total	143.82	202.63	247.31	282.11	270.15

Source: Central Bureau of Statistics

the car ownership has expanded proportionally, resulting in increased probability of occurrence of traffic jam during peak hours.

The former agricultural areas have now changed to either residential or industrial use, within and without the Nairobi Metropolitan Region. Development in the western and northern suburbs has resulted in satellite towns, while the industrial development in Athi River and Thika has extended Nairobi's industrial area. These areas fall outside the jurisdiction of the NCC although they affect the travel patterns in Nairobi.

## 6 Public Transport Travel Demand

The modal split in Nairobi is mainly car and taxi, public transport (bus and minibuses) and walking. Motorcycles and bicycles are minimally used due to safety reasons. Due to the dissatisfaction of level of service of the public transport system, people have a great urge to buy cars so that they can use them for their day to day activities. This attitude has resulted in a fast growth of private car registration in Nairobi and it can be regarded to have increased the car ownership rate; It can be estimated from table 3 showing the growth of vehicle registration in Nairobi and Kenya that the car usership has generally increased.

A study on public transportation conducted by the Nairobi City Commission in 1981 shows that the modal split then was private car 22%,

Table 3 Estimates of Number of Vehicles in  
Nairobi & Kenya

Year	Nairobi	Kenya
1987	162,668	296,879
1988	194,421	316,403
1989	194,978 (133,235*)	366,609

Unit: Number

Source: Ministry of Transport and Communications  
& Central Bureau of Statistics

\* Actual figure in 1989

public transport 50%, walking 24% and other private vehicles 4%. The demand for public transport in 1990 was estimated as 33.1% by the Transurb Consult (TC) in 1986. Assuming that the situation is the same, it can be estimated that there are 801,020 all purpose trips by public transport per day.

Remarkably, in 1986 a state corporation (Nyayo Bus Services Ltd.) was formed and introduced bus services in the Nairobi Metropolitan Region to alleviate the acute public transport problem since the Kenya Bus Service Ltd., up to then the only town bus service in Nairobi could not cope with travel demand. In the same year, the Kenya Railways Corporation introduced commuter trains on the existing Nairobi-Kisumu line to serve the western and southern parts, and on the Nairobi-Nanyuki line to serve the northern and eastern parts. However, in February 1992, the commuter train services were removed due to the heavy running cost as compared to returns. This is because the railway lines were not planned to serve the estates in Nairobi hence there was no co-ordination between the train stations and residential locations, making them not easily accessible to commuters. Another possible reason is that the locomotives used were designed for long distance haul, therefore it was expensive to operate this service with the prevailing marketing fare.

Questionnaire responses on the transportation system in Nairobi revealed that there is need to increase the public transport services due to the fact that at peak hours, buses and matatus are over crowded, despite the fact that they have to travel on congested links. An observation of the commuters' reactions is that they have preference to owner-driven matatus. The reasons given, are that they see this as one way of reducing the rate of traffic accidents in Nairobi and in Kenya as whole. Presently most matatu drivers are employed. In many cases they have to collect a fixed amount of money to remit to the owners every day. This forces these drivers to be courageous in taking many risks, driving dangerously on roads. The responses also indicated that to some residents the withdrawal of the commuter train was a blunder, since they had tasted the experience of traveling safely and conveniently, hence urged for the re-introduction of the commuter train or any public transport mode like the Light Rail Transit (LRT) system.

Currently the industrial area has no bus service because bus services were withdrawn due to the unfair competition by the matatu industry. Because of the existing monopoly by the matatu industry, there has been an element of overcharging commuters at certain periods during the day. Therefore most workers wish to have the bus service revived.

## 7 Conclusion and recommendations

The density of economic activities in the functional nodes in a region will generate or attract a certain amount of trips. This would mean that whenever development plans are structured by the regional planning authorities, they should be able to estimate the amount of trip volume that is likely to be produced as consequence of the development. Hence strategies set for both short and long term plans.

As regards short term plans, it is recommended that a convenient and reliable public transport system be provided by introducing bus preference lanes during peak hours to increase bus speed. Also ways should be looked into increasing the availability of parking places by encouraging land owners in the CBD to invest the car parking business.

Long term plans should aim at decentralization of economic activities to enable people traveling shorter distances to their places of needs through the cheapest means of travel; consider construction of ring roads that would filter unnecessary vehicles out of the CBD; encouragement of joint ventures between the government and private entrepreneurs in developing public transport system e.g. LRT.

Finally, the locations of new ring roads require careful feasibility studies to be conducted so that construction can be done along routes that will enhance socio-economic development. It is for this reason that a recommendation is given to conduct studies on possibilities of constructing by-passes on the eastern and northern parts of Nairobi Metropolitan Region.

**Acknowledgement:** The authors attribute the success of this paper to the Japan International Cooperation Agency for the sponsorship of this study at the University of Nairobi, Kenya. Also gratitude to Dr. Ondiege of the University of Nairobi and Dr. Agoki then of the University of Nairobi for their useful suggestions during the case study.

## REFERENCES

1. The Central Bureau of Statistics (of the Government of Kenya) - Statistical Abstract, 1990.
2. The Central Bureau of Statistics (CBS) - Economic Survey, 1991.
3. Nairobi City Commission - Monthly proceeding of meetings of the Nairobi City Commission, 1988.
4. Nairobi City Commission - The Matatu mode of Public Transport in Metropolitan Nairobi, 1981.
5. The Nairobi Metropolitan Growth Strategy Study Group - The Nairobi Metropolitan Growth Strategy, 1973.
6. JICA Report for the Government of Kenya, 1984.
7. Transurb Consult (TC) - Study of Urban Transport needs of Nairobi, 1986.
8. R. Udomsri and K. Miyamoto - Present Situation and Issues on Landuse and Transportation in Bangkok Metropolitan Area, Proceedings of Infrastructure Planning, 1991.