Land Use and Transport Planning in the Greater Kampala, Uganda

A. T. Kiggundu, S. Mukiibi

Abstract

Urban land use (also known as spatial planning or urban form) has a big influence and impact on the way transport systems are planned and managed in large cities. In Kampala for example, transport systems are largely inefficient because of the failure by the city authorities to adopt an integrated approach towards land use and transport planning. Due to a multifarious and complex land tenure system, the provision of roads and other transport-related infrastructure such as parking facilities and bus terminals has become virtually impossible. This paper examines the impact of land use on transport planning in Kampala in view of the city's recent experience. It also draws lessons from the experiences of the role model cities in Asia. To address key transportation challenges faced in the region such as rapid motorization and traffic jam, it is critical that land use-based strategies such as transit malls, land value capture, constructing high density buildings (both commercial and residential) along the transit lines as well as establishing park and ride facilities are adopted by the urban managers.

1. Introduction

Urban land use (also known as spatial planning or urban form) relates to the way land in the urban areas is used to meet the demand for housing, transport, recreation and industrial development. Land use also has a big influence and impact on the way transport systems are planned and managed in large cities. In Kampala for example, transport systems are largely inefficient in part because of poor land use planning as well as the failure by the city authorities to adopt an integrated approach towards land use and transport planning (Mukwaya, 2011).

Due to a multifarious and complex land tenure system (a large percentage of land in Kampala is privately owned mainly under the categories of private mailo and freehold) the provision of roads and other transport –related infrastructure such as parking facilities and bus terminals has become virtually impossible. Even where the private land owners are willing to release their land, the city authorities have been unable to mobilize enough financial resources to purchase it or provide compensation where possible.

Because of the existence of a land tenure system that is dominated by the private mailo and freehold land owners, the cost of constructing and tarmacking each kilometer of an urban road has increased to about Shs1billion (US$500,000) (Kampala City Council Development Plan, 2009-2011). A large percentage of the road construction cost in Kampala is due to the land compensation policies promoted under the 1995 Constitution as well as the newly introduced Kampala Capital City Act 2010.

According to the 1995 Constitution, '….all land in Uganda belongs to the citizens of Uganda…'. Article 26 of the Constitution also provides for '….prompt compensation….' for the land acquired from individual private land owners for providing public goods such as roads, hospitals and schools.

Table 1: The scope of land tenure and the occupancy question in Kampala

Land tenure category	Percentage (%)	Status	Planning issues
Private mailo	75	Fully titled with estimated 45,000 land titles	Slum infestation and unplanned
Leasehold	15	Higher % titled	Largely planned
Kabaka's land (largely customery land)	7	Titled	Largely unplanned
Freehold	3	Titled	Partly planned

Source: Kampala City Council Development Plan (2009 - 2011)

Currently 75% of the land in Kampala is categorized as mailo land, 15% as leasehold, 7% as Kabaka's land and 3% as freehold. A large percentage of the mailo land is unplanned with several high density slum settlements (see Table 1).Continued plot subdivision as well as piece meal releases of privately owned land in Kampala has contributed to disorderly urban development as well as the development of informal settlements with no centrally provided services and infrastructure such as roads and piped water (Nawangwe et al., 2002; Kampala City Council Development Plan, 2009-2011). By nature transportation planning is comprehensive and basic transport infrastructure such as roads cannot be planned on a single small plot of land of about eleven decimals (50feet x 100feet).

The efficiency and accessibility of transport systems largely depend on the utilization of urban land resources in part because transport is a derived demand derived from the man's desire to travel and participate in various human activities such as industrial work, settlement/housing and recreation (Van Acker and Witlox, 2010). In large towns and cities such as Kampala travel patterns and commuting distances are mainly determined by the location of human activities such as recreation, housing/settlement and industrial production/work as well as the existing urban land use patterns (Van Acker and Witlox, 2010; Litman, 2011). Because of the over concentration of business activities in the city centre as well as the emergence of a mono-centric urban structure, many roads within the Greater Kampala continue to experience traffic jam especially during the morning and evening peak hour periods. Official figures show that the average traffic speeds in Kampala are less than 15 kilometers per hour (Mukwaya, 2011).

This paper examines the impact of land use on transport planning in the Greater Kampala. Previous research studies on transport such as Mukwaya (2011) in Kampala have also tended to overlook the impact of land use on urban transport planning. Greater Kampala extends to about 20kilometers from the city centre and to 40 kilometers along the rapidly developing peninsula up to Entebbe Airport. The total area is about 970 square kilometers. Greater Kampala also contains 8.5% of the country's population, contains up to half of the national vehicle population and accounts for

perhaps 30 – 40% of Uganda's gross domestic product (GDP). In the next section, a brief review of literature on the current land use and transport policy debate is provided. The history of land use planning in Kampala is discussed next. Also the paper identifies and presents key lessons drawn from the international experience. Following this section is the emerging policy issues and finally the conclusion.

2. Current land use and transport policy debate

Two dominant camps according to Bierman (2010) have emerged in the current international urban land use policy debate. That is, the SmartGrowth (urban compaction/densification/new urbanism) camp and the urban sprawl (dispersed development/dynamic) city camp. The central ideology of SmartGrowth is that high urban densities and mixed use neighborhoods are critical in reducing travel distances, fostering public transit and non-motorized transport as well as reducing the use of private motor vehicles. SmartGrowth is also associated with low transportation costs and tends to improve the mobility options for the carless travelers and commuters (Van Acker and Witlox, 2011). Importantly, SmartGrowth promotes energy efficiency in large towns.

The urban sprawl/dispersed development or dynamic city camp however believes that low urban densities are not necessarily a bad urban development policy. The dynamic city camp (dispersed urban development) also questions the evidence which is presented by the SmartGrowth lobby in support of compaction, centrality, public transit and higher densities and is opposed to the control-oriented solutions (Litman, 2011; Bierman, 2010).

Proponents of SmartGrowth however, cite Hong Kong, Singapore and Portland (Oregon) as role- model cities with high urban densities and high transit ridership. Current urban population densities in Hong Kong are 301 persons per hectare compared to 71 persons per hectare in Tokyo (Japan), 59 persons per hectare in Kuala Lumpur (Malaysia) and 46 persons per hectare in the Greater Kampala (Kiggundu, 2009; Bierman, 2010; Barter, 1999).

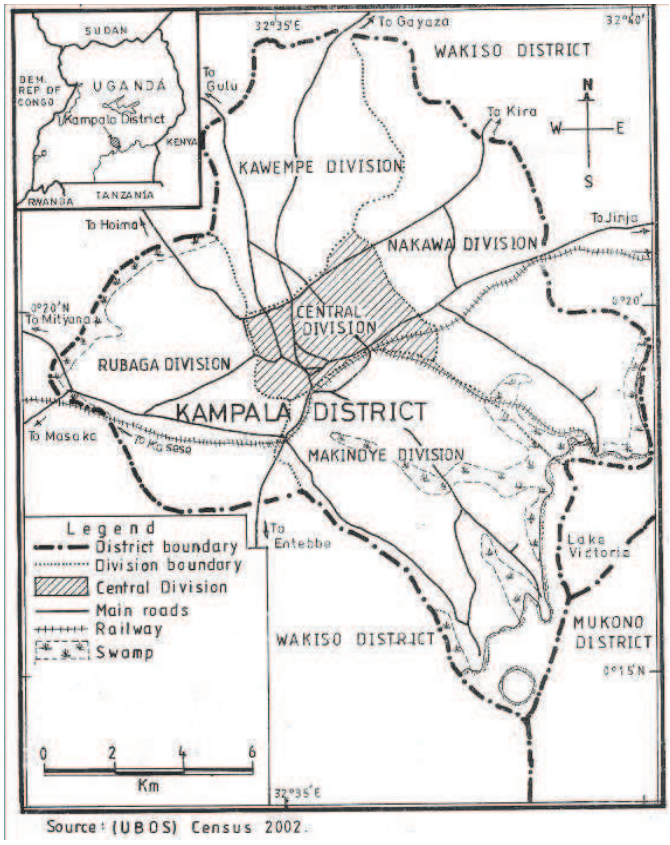

Fig 1: Map of Kampala (Source: Lwasa, 2010)

In large towns and cities faced with obstinate transportation challenges such as traffic jam and rapid motorization it is critical that an integrated approach towards land use and transport planning is adopted. This is so because transport is a derived demand derived from the man's desire and wish to travel and participate in the various human activities such as housing/settlement as well as industrial production/work (Van Acker and Witlox, 2010). A change in the location of the human activities would also help in reducing travel distances and altering travel patterns (Van Acker and Witlox, 2010; Barter, 1999).

Also worthy of mention is that in many large cities across the globe, rapid motorization has resulted in urban sprawl, high transportation costs, energy inefficiency as well as greenhouse emissions (Litman, 2011; Bierman, 2010). Van Acker and Witlox (2010) aptly state that cities with population densities of 100 persons per hectare are able to reduce the desire among the urban residents to own private cars by 4 –to- 6 percent.
Some research studies have however, questioned the effectiveness of land use-based strategies and policies in addressing transport challenges such as traffic jam and rapid motorization. Litman (2011) for example argue that land use-based policies are often ineffective in part because a few cities have the institutional capacity and required financial resources to establish and enforce effective land use controls. Critics also cite large cities like Singapore and Tokyo where transport policy in form of congestion charges and other transport demand management (TDM) strategies has been effective

in alleviating traffic jam and creating a conducive environment for the operation of public transport systems (Barter, 1999; Kiggundu, 2009; Kiggundu and Jamilah, 2007).

Table 2: Comparing Urban Sprawl/Dynamic City and SmartGrowth

Attribute	Urban Sprawl	SmartGrowth/New Urbanism
Density	Lower urban density	Higher urban density
Location of human activities	Commercial and institutional activities are dispersed	Commercial and institutional activities are concentrated into centres and downtowns
Land use patterns	Homogeneous land uses and dispersed development	Mixed land use and urban compaction
Transportation patterns	Automobile-oriented transportation, poorly suited for walking and cycling	Multi-modal transportation that support walking, cycling and public transit use
Street design	Streets designed to maximize motor vehicle traffic volume and speed	Streets designed to accommodate a variety of activities and traffic calming programmes implemented
Planning process	Unplanned, with little coordination between jurisdictions and stakeholders	Planned and coordinated between jurisdictions and stakeholders

Source: Litman (2011) and Van Acker and Witlox (2010)

3. History of land use planning in Kampala

By 1906 Kampala had been gazetted as a township and became a city on 9th October 1962 (Nyakwebara, 2010; UN-Habitat, 2007). However, the city got its first land use plan (planning scheme) in 1912. By then the entire township covered an area of 567 hectares and had a population of 2, 850 people (UN-Habitat, 2007). In 1930 another planning scheme (land use plan) was introduced to regulate developments within the region. The 1930 land use plan for Kampala segregated residential, industrial and commercial areas as well as a well- planned civic centre (Nyakwebara, 2010). Due to the rapid population growth, the first land use plans for Kampala became inadequate especially in terms of spatial coverage. In addition, urban development was taking place both inside and outside the official city boundary.

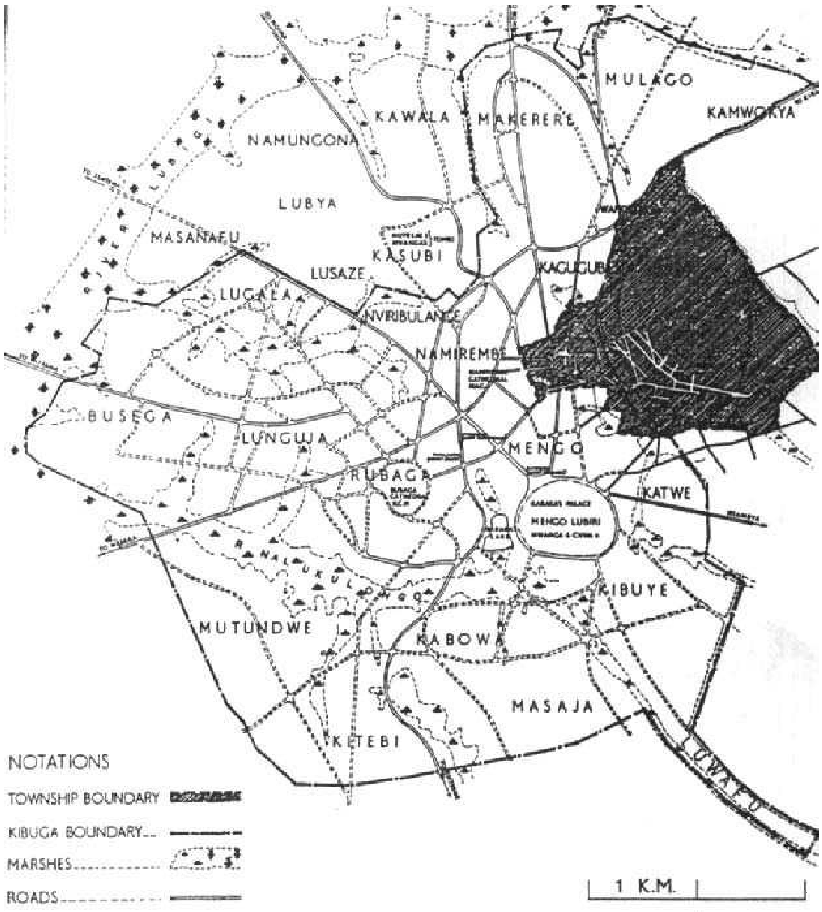

Fig 2: Kampala Township 1910 (Source: Lwasa, 2010)

The third development plan (land use plan) for Kampala was introduced in 1951 and covered 28 square kilometers of Old Kampala. However, like the first two planning schemes, the 1951 plan failed to achieve many of its stated objectives in part because of the surge in population as well as the uncontrolled developments that took place outside the official boundary (Nyakwebara, 2010). Because of rapid urbanization as well as rural-urban migration that occurred in the 1960s, the city authorities introduced a new planning scheme in 1972. This plan was meant to address the challenges posed by urban sprawl (dispersed urban development) as well as the various planning problems faced in the newly established suburbs. Before the induction of the 1972 plan, the official boundaries of Kampala had been expanded in 1968 to include key unplanned suburbs such as Kawempe Township, Mengo Municipality, Lusanja, Kisaasi, Kiwatule, Nakawa Township, Muyenga, Ggaba and Mulungu (UN-Habitat, 2007). It is also worth noting that the 1972 land use plan was more comprehensive than the previous planning schemes.

Fig 3: Kampala Planning Scheme 1912 (Source: Lwasa, 2010)

It outlined several development strategies and policies- related to housing, water supply, sewerage, transport and land for future planning in Kampala city. Peri-urban areas of Kampala were also considered in order to address the challenge of urban sprawl as well as the proliferation of unplanned settlements.It should be noted however that the physical planning activities and programmes in Kampala were greatly affected by the political turmoil experienced in Uganda in the 1970s. The 1970s also saw the collapse of the national economy as well as key city institutions (UN-Habitat, 2007). Most of the development programmes outlined in the 1972 plan were never implemented because the city lacked the necessary financial resources as well as institutional capacity (UN-Habitat, 2007; Omolo and Sengendo, 2011). Planning resumed in the early 1990s when the 1994 structure plan for Kampala was introduced. The 1994 plan had several objectives including infrastructure development, environmental protection, institutional, transportation development, demographic monitoring as well as social development.

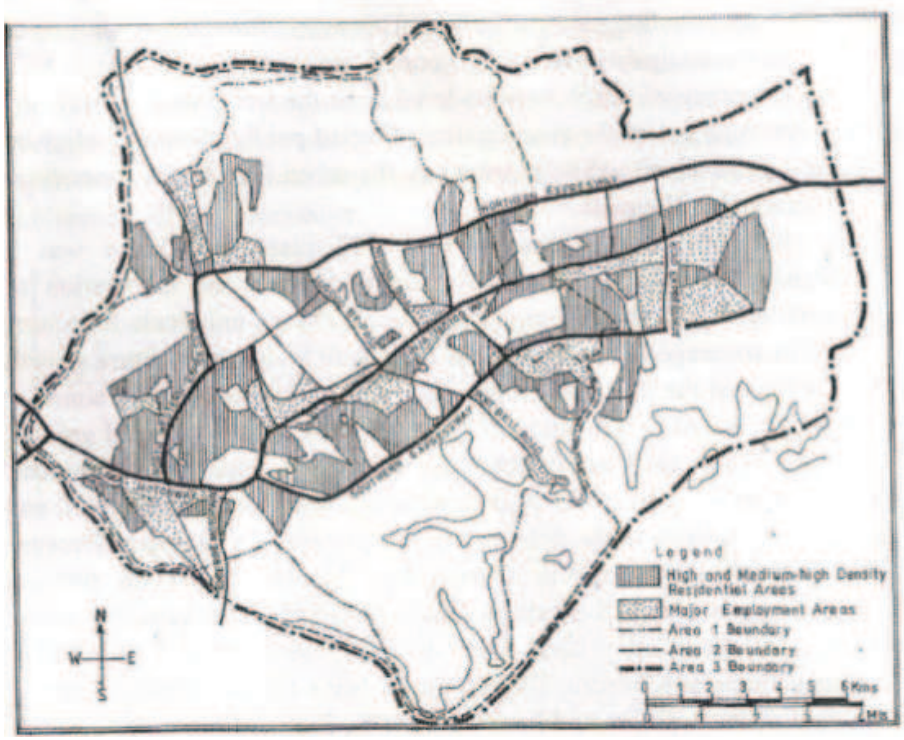

Fig 4: Kampala Planning Scheme 1972 (Source: Lwasa, 2010)

The 1994 plan was to last for 10 years but due to the lack of financial resources and institutional capacity it was extended up to 2010 by the Town and Country Planning Board. The 1994 structure plan however made very little impact especially in promoting orderly development as well as integrating land and transportation planning in the city. Aside from the central business district (CBD), which was planned during the colonial era, the rest of the city still remained unplanned.

Also, as noted before, the existence of a complex land tenure system has negatively affected orderly development and promoted the growth and development of the informal settlements in Kampala. Due to the lack of a clear mechanism to regulate developments, transport services in many parts of the city are poor and inaccessible. Several new housing estates (also known as satellite cities) have also been established by the private real estate developers in the peri-urban areas without providing proper roads, electricity, sewerage systems and piped water.Many well- prepared land use and transportation plans have not been implemented in part because the city has very few qualified physical planners. Currently there are about 11 physical planners deployed at the five division urban councils of Nakawa, Makindye, Lubaga, Kampala central and Kawempe. Each of these five Kampala city divisions has more than 500,000 inhabitants (UN-Habitat, 2007; Kampala City Council Development Plan, 2009-2011). Comparing the number of hired qualified physical planners to the entire population in Kampala, for each physical planner, there are 120,000 city residents or 1:120,000. In both Nairobi and Dar el Salam however for each hired qualified physical planner there

are 20,000 city residents or 1:20,000 (UN-Habitat, 2007).Local pundits and urbanization researchers also argue that the continued presence of the two minibus terminals (old and new taxi terminals) in the city centre has negatively dented urban productivity as well as the smooth flow of vehicular traffic. Besides, the location of the two terminals represents nothing but poor land use planning (Mukwaya, 2011).

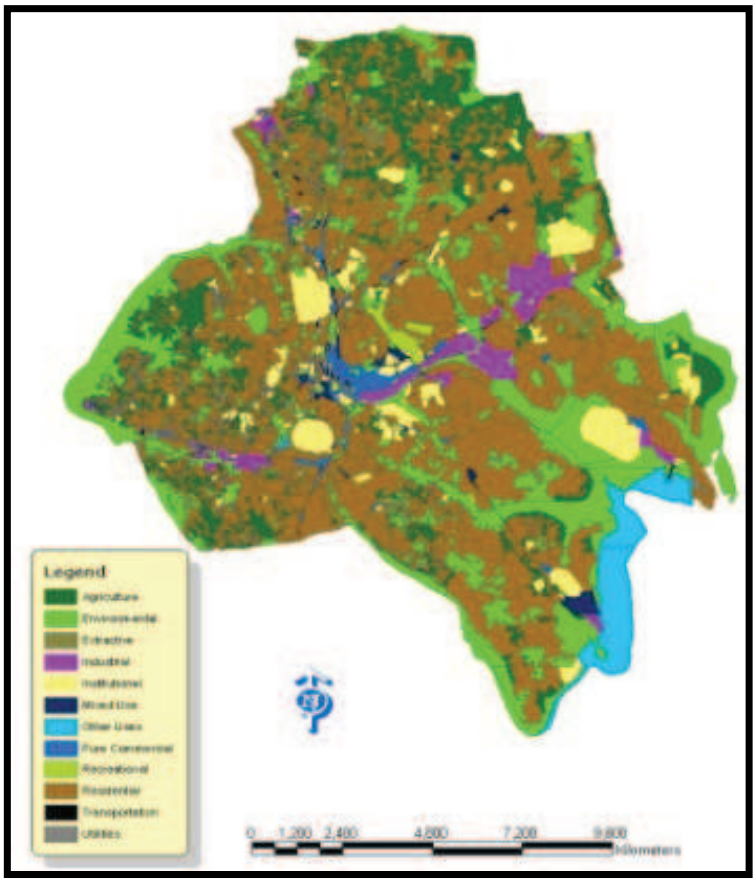

Fig 5: Kampala land use plan 2002 (source: Lwasa, 2010)

4. Lessons from the international experience

Across the globe there are a few cities that have managed to integrate land use and transport planning and to establish sustainable and efficient transport systems. In this paper two ofthese 'role model' cities (Hong Kong and Tokyo) have been selected (and compared with Greater Kampala. In addition, in trying to compare the three cities, the authors are fully aware of the differences that exist in the urban environment such as level of development, size of urban population, institutional capacity and population densities (see Table 3; Kiggundu, 2009). Developing country cities such as Kampala should however, aim to learn from developed and role model cities such as Tokyo and Hong Kong as a way of avoiding to repeat the past mistakes. Table 3 shows some of the strategies adopted by the two role model cities of Tokyo and Hong Kong to integrate land use and transportation planning. Among them is the creation of high density transit corridors. Under this strategy, high density commercial (shopping malls and office buildings) and residential (condominiums) buildings are constructed along

the transit lines such as railway lines by the transit operators with the im of benefiting from the increment in land and property value caused by the accessibility and expansion of public transport (Kiggundu, 2009).

Table 3: Key urban features of Kampala, Hong Kong and Tokyo

Characteristics	**Greater Kampala**	**Tokyo**	**Hong Kong**
Country	Uganda	Japan	China
Population in millions	2.5	12	7
Urban population Densities/Persons per hectare	46a	71	301
Dominant public transport systems	(i)Minibuses and (ii) bigger buses	(i)Rail transit and (ii) buses	(i)Rail transit (ii) minibuses and (iii)ferries
% of commuters using public transit	30	62	90
Transit ownership	Private sector	Private sector	Private sector
Average traffic speeds in Kilometers per hour (km/hr)	Less than 15	20	26
% of commuters/travelers using non-motorized transport	46	22	17
Current financing systems for transit	(i)Fare revenue (ii) individual savings and (iii) bank loans	(i)Value capture (ii) fare revenue, public-private partnerships (iii) tax exemptions (iv) Government rail development fund and (v) commercial loans	(i)Fare revenue (ii) commercial loans and (iii) value capture
Land use policy	(i)Not clear (ii) promotes urban sprawl (iii) lack of transit-oriented development (iv) land use and transport planning not well integrated (v) promotes the use of private transport such as private cars and motorcycles	(i)High urban densities (ii) transit- oriented urban development (iii) integrated land use and transport planning and (iv) discourage the use of private transport and (v) park and ride facilities as well as (vi) transit malls	(i)High urban densities (ii) transit-oriented development (iii) integrated land use and transport planning (iv)discourage the use of private transport and (v) park and ride facilities as well as (vi) transit malls
Urban problems and challenges faced	(i)Urban sprawl (ii) mono-centric urban structure (iii) traffic jam (iv) rapid motorization (v) the surge in road accidents (vi) lack of transit –oriented development (vii) low urban densities,(viii) weak city institutions, (ix) informal settlements and (x) transit financing heavily depend on fare revenue, commercial loans and personal savings	(i)Congestion on trains, (ii)mono-centric urban structure and (iii) ageing population	(i)Traffic congestion (ii) poor air quality and (iii) lack of land

Source: Kiggundu (2009); Ministry of Works and Transport (2009) and Rom Transportation Engineering Ltd (2011)
NB: a = Estimates by the authors

Also under the high urban density strategy (also known as land value capture) adopted in both Tokyo and Hong Kong, high density developments attracted by the proximity to public transport helps to increase the catchment population as well as the demand for public transport services. In Tokyo for example, the Tokyu Corporation bought low priced agricultural land in Tama new township west of Tokyo, built residential apartments and shopping malls which were either sold or rented to get the necessary capital to implement new rail projects (Kiggundu, 2009). Tama new township was also built as a public transport-oriented urban centre to reduce the financing risk associated with building the new rail infrastructure. Besides in Tokyo private rail operators have been able to achieve success and to pay both capital and operating costs in part because the trains of different companies share the same rail-lines as a way of reducing costs (World Bank, 2000).

Because of the high urban population densities in both Tokyo and Hong Kong (currently urban densities in Hong Kong and Tokyo are 301persons per hectare and 71 persons per hectare respectively), the majority of commuters use public transport on the daily basis. In Hong Kong, 90 percent of the commuters use public transport compared to 62 percent in Tokyo, 72 percent in Singapore, 31 percent in Kuala Lumpur and 30 percent in Kampala (Barter, 1999; Kiggundu, 2009). Current land use policies in both Tokyo and Hong Kong have tended to discourage the use motorized transport and foster non-motorized transport such as walking and cycling. In Tokyo, 22 % of the commuters use non-motorized transport compared to 17% in Hong Kong, 22% in Singapore and 46% in Kampala (Barter, 1999). A possible explanation for the high levels of use of non-motorized transport in Kampala could be the low income levels among the city residents as well as the low car- dependence levels (motorization) in the city.

It is also worth noting that in both Tokyo and Hong Kong land use policies in form of transit malls as well as park and ride facilities have been adopted to enhance the performance of public transport systems, discourage the use of private cars and reduce traffic jam. Normally, park and ride facilities are established near the transit stations away from the city centre to allow car users to park their cars and use transit to reach the city centre.Available statistics show the current average traffic speeds in both Tokyo and Hong Kong are higher than those of Kampala. That is, in Hong Kong, average traffic speeds are 26 kilometers per hour (26km/hr), compared to 20km/hr in Tokyo and less 15km/hr in Kampala (see table 3).

5. Emerging policy issues and future prospects

Prospects for the future adoption of an integrated approach towards land use and transport planning in Kampala appears to be good but challenging at the same time. For

instance, the recent introduction of the Kampala Capital City Act 2010 is a positive and clear sign that the central government has finally recognized the need to address the various challenges faced by Kampala, including land use planning (physical planning). Also under the new Act new governance structures such as the Kampala Metropolitan Physical Planning Authority (KMPPA) have been established.

Among the key functions of the newly created Kampala Metropolitan Physical Planning Authority (KMPPA) are: (a) developing physical development plan for the capital city and the metropolitan area; (b) handling and addressing planning issues within the capital and the neighboring districts of Mukono, Mpigi and Wakiso; (c) planning major transportation, infrastructure and other utilities in conjunction with other relevant bodies; and (d) approving the capital city; municipal and town structure plans. KMPPA is also mandated to ensure that land use in the city and the metropolitan area follow designated plans, irrespective of the tenure of land. By adopting a metropolitan planning approach, it is hoped and anticipated that the developments outside the official city boundaries will also be regulated. The problem with the new Act however, is that it over-centralized the planning functions. At the Division Urban Council level for example, there is no physical planning department provided for under the Act and yet much of the work carried out at the divisions is physical in nature. Since the people (city residents) are in divisions and not at the centre, it would be prudent to establish fully-fledged physical planning departments/units at the divisions to regulate the various human activities including housing/settlement and transportation.

Without establishing fully fledged physical planning departments at the division urban councils in Kampala it is doubtful whether neighborhood structure plans will be developed by the divisions as stated by the Kampala Capital City Act 2010 (see page 67 of the Act). A further opportunity and innovative initiative is the introduction of the Greater Kampala Metropolitan Area Transport Master Plan (GKMATMP, 2009). A key aim of this plan is to establish a transit-oriented city. GKMATMP also aims to curtail rapid motorization (increased use of private cars and motorcycles) in Kampala and promote Bus Rapid Transit (BRT). Under the BRT project, four bus-ways are to be constructed over the period of 2012 – 23, with each bus-way taking three years to construct and operationalize at a cost of US$107million per bus-way. The BRT system is expected to be operating by 2014 (Greater Kampala Metropolitan Area Transport Master Plan, 2009).

The BRT project however is faced with an obstinate challenge of low urban densities. The current urban densities of about 46 persons per hectare in Kampala are too low to generate enough demand and to ensure that a self-financing transit system is established. Without a clear strategy to restrain the use of private vehicles especially private cars and motorcycles (also locally called Boda Bodas) it is virtually impossible to establish an efficient transit system in Kampala.

6. Conclusion

From the foregoing discussion it is clear that transport planning in large cities such as Kampala is greatly influenced by land use. Also previous land use plans for Kampala have made very little impact especially in promoting orderly urban development and enhancing the performance of the transport systems. Besides, land use planning in the region has been negatively affected by the existence of a complex land tenure system that is dominated by the private land owners who prefers releasing their land in piece meal and in small plots. Experience from the role model cities such as Tokyo and Hong Kong however, shows that high urban densities are critical in creating the necessary demand for public transport as well as in reducing commuting distances and transportation costs. Besides in both Tokyo and Hong Kong land use-based policies such as land value capture, transit malls, park and ride facilities as well as the construction of high density buildings (both commercial and residential buildings) along the transit lines have been adopted in enhancing the performance of public transport systems and integrating land use and transport planning. Land use- based policies tends to be long term in nature and requires a lot of financial resources to be implemented, which many developing country cities like Kampala may not be able to mobilize. Critics also cite role model cities such as Singapore where transport policy in form of congestion charges (road pricing) and other transport demand management measures have helped to alleviate traffic jam and foster public transport.

References

Barter, P.A. (1999) 'An International Comparative Perspective on Urban Transport and Urban Form in Pacific Asia: Responses to the Challenge of Motorization in Dense Cities', PhD Dissertation, Murdoch University, Australia.

Bierman, S. (2010) 'The Role of Urban Form in Achieving Sustainable Transport and Mobility' In The Sustainable Transport & Mobility Handbook, South Africa Volume 1 Pp.95-99.

Cullinane, S. (2003) 'Hong Kong's Low Car Dependence: Lessons and Prospects' J. Transport Geography, (2003)11, 25-35.

Dekel, G. (1997) "The Cost of Urban Sprawl: A Justification Context" (online) Available from:www.asu.edu/caed/proceedings97/dekel.html

Giddings, S.W. (2009) The land market in Kampala, Uganda and its effect on settlement patterns, International Housing Coalition, Washington DC: International Housing Coalition

Kampala City Council (2009) Kampala City Council Development Plan (2009-2011), Kampala: KCC

Kiggundu, A. T. (2009) 'Financing Public Transport in Kuala Lumpur, Malaysia: Challenges and Prospects', Transportation (2009) 36:275-294.

Kiggundu, A.T. and Jamilah, M. (2007) 'The Rise of the Private Car in Kuala Lumpur, Malaysia: Assessing the Policy Options', IATSS Research Journal, (2007): 31, 1-9.

Litman, T. (2011) 'Evaluating Transportation Land use Impacts----Considering the Impacts, Benefits and Costs of Different Land use Development Patterns', 15th April 2011, Victoria Transport Policy Institute, (Online) Available from: www.vtpi.org
Lwasa, S. (2010) Urban land markets, housing development and spatial planning in Sub Saharan Africa: A case of Uganda, New York: Nova Science Publishers, Inc.
Ministry of Works and Transport (2009) National Transport Master Plan Including A Transport Master Plan for the Greater Kampala Metropolitan Area, Kampala: Ministry of Works and Transport
Mukwaya, I.P. (2011) "Sustainable Urban Transport-----Kampala's State & Future", Paper presented at a workshop organized by Kampala City Council, 13th April 2011 at Imperial Royale Hotel, Kampala.
Nawangwe, B. et al. (2002) 'Land Tenure and Administrative Issues in Kampala City and Their Effects on Urban Development' Research Report Submitted to Makerere University, August 2002., Kampala.
Omolo, F. O and Sendendo, H. (2011) "Perspectives on City Planning of Post Independence Kampala: The Emergence of the Metropolitan Growth Model and the Hexagonal Cell', Paper presented at the Second International Conference on Advances in Engineering and Technology, organized by Makerere University, Entebbe, Uganda.
Rom Transportation Engineering (2011) 'The Relationship Between Kampala Structural Plan and Non-Motorized Transport', Paper presented at a workshop organized by Kampala City Council, April 2011, Imperial Royale Hotel, Kampala
Uganda (1995) Constitution of Republic of Uganda 1995
Uganda (2010) Kampala Capital City Act 2010, Entebbe: Government Printery
UN-Habitat (2007) 'Situation Analysis of Informal Settlements in Kampala', Nairobi: UN-Habitat
Van Acker, V. and Wiltox, F. (2010) 'Commuting Trips Within Tours: How is Commuting Related to Land Use, Transportation', (2011) 38:465-486.
World Bank (2000) 'Study on urban transport development', Final Report, Prepared by Padeco Ltd, Japan, August 2000.