# Who could benefit from a bus rapid transit system in cities from developing countries? A case study from Kampala, Uganda

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## ARTICLE INFO

## ABSTRACT

The present rapid urban growth of cities from developing countries causes negative externalities such as lagging infrastructure development. In combination with rapidly rising motorized vehicle use this leads to severe traffic congestion affecting the mobility of the urban residents. Therefore many urban governments are planning to improve their transport and mobility situations with mass rapid transit systems of which a bus rapid transit (BRT) is a rather easy system to implement at reasonable costs. However, due to high urban inequalities the effects of urban traffic and potential improvements of the urban transport system for the diverse group of urban residents can differ significantly. In our case study Kampala (Uganda) four main groups were identified through cluster analysis of socio-economic and residential data gathered through interviews: extreme poor, poor, middle income and rich. Each group experiences a different mobility with the extreme poor being the most vulnerable group. The planned BRT system aims to decrease the average travel time but risks to exclude the lowest income class since not enough attention is paid to the affordability of the system to all residents. Therefore we argue for a policy that works from bottom up and pays attention to the internal diversity of the population.

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## 1. Introduction

Worldwide the urban population is growing at an average rate of 2% (The World Bank, 2014b) mainly because of natural growth and rural–urban migration. Urban growth is associated with a shift from a rural to an industrial and service society. The 21st century hotspots of urban growth are situated in Africa, Asia and Latin-America. Here, rapid economic growth pushes income levels upwards and improves living standards. Also in Sub Saharan Africa (SSA), World Bank statistics (2014b) show that in many cases the economic growth exceeds urban population growth (Fig. 1). However, income distribution remains highly uneven and many rural-to-urban immigrants in the developing world do not benefit from this evolution and end up in difficult living conditions. This economic exc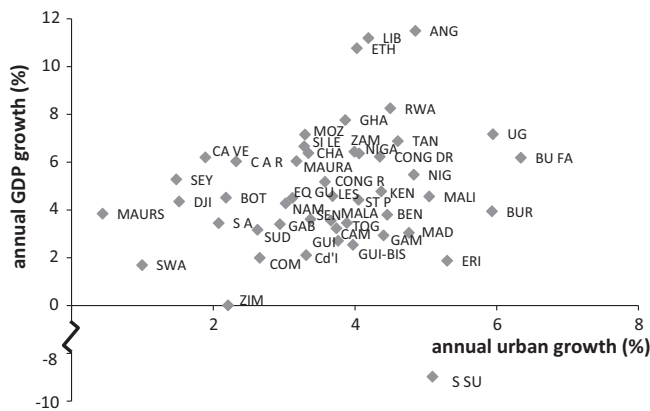lusion is exacerbated by spatial inequalities that result from uncontrolled urban sprawl. Many new urban neighbourhoods lack access to basic utilities such as electricity, water and an efficient transport network. Trip distances increase and as a result, dependency on car and other motorized types of traffic is on the rise (Zhao, 2010). Lagging infrastructure development and rapidly rising motorized vehicle use induce severe traffic congestion (Gwilliam, 2003).

Hence, urban growth decreases individual mobility. An individual is considered highly mobile when he or she is able to easily and comfortably reach his or her destination(s) in space and time. This is dependent on a city's transportation network and the modes and characteristics of the individual trips. A person's mobility determines his or her livelihood opportunities (Bryceson et al., 2003b; Tacoli and Mabala, 2010); thus, urban transport planning can have a major impact upon urban poverty patterns.

In cooperation with initiatives from development aid institutions, several (urban) governments in SSA are developing plans to improve their transport and mobility situations. A popular solution suggested by policy makers is the implementation of a bus rapid transit (BRT) system on major roads. BRT is a bus service with many characteristics of a rail network. Buses form the high capacity fleet and operate along fixed routes with preserved lanes and

**Fig. 1.** Average annual growth rates between 2005 and 2012 of GDP and urban growth of Sub-Saharan countries (The World Bank, 2014a,b) (with ANG – Angola, Ben – Benin, BOT – Botswana, BU FA – Burkina Faso, BUR – Burundi, CAM – Cameroon, CA VE – Cabo Verde, C A R – Central African Republic, CHA – Chad, COM – Comoros, CONG DR – Democratic Republic of Congo, CONG R – Republic of Congo, Cd'I – Cote d'Ivoire, DJI – Djibouti, EQ GU – Equatorial Guinea, ERI – Eritrea, ETH – Ethiopia, GAB – Gabon, GAM – Gambia, GHA – Ghana, GUI – Guinea, GUI-BIS – Guinea-Bissau, KEN – Kenya, LES – Lesotho, LIB – Liberia, MAD – Madagascar, MALA – Malawi, MALI – Mali, MAURA – Mauritania, MAURS – Mauritius, MOZ – Mozambique, NAM – Namibia, NIG – Niger, NIGA – Nigeria, RWA – Rwanda, ST P – Sao Tome and Principe, SEN – Senegal, SEY – Seychelles, SI LE – Sierra Leone, SOM – Somalia, S A – South Africa, S SUD – South Sudan, SUD – Sudan, SWA – Swaziland, TAN – Tanzania, TOG – Togo, UG – Uganda, ZAM – Zambia, ZIM – Zimbabwe).

fixed stations, which are embedded within or added to the existing urban infrastructure. BRT case studies proved to be efficient in alleviating traffic pressure at reasonable costs (Levinson et al., 2003). BRT is a frequently cited strategy in North-, Latin America and Europe (Deng and Nelson, 2011) with reported travel time savings of 25–35% (Levinson et al., 2003; ITP, 2010; Prassas, 2013). Although the needs for efficient and affordable mass transit systems like BRT are high in the rapidly growing African cities, the operating examples are limited (Table 1).

Often, urban transport planning focuses on quantitative demands while socio-economic diversity of the demanding group is not studied (Jaramillo et al., 2012). Hagerstrand's space–time

**Table 1**
List of African bus rapid transit systems (population numbers of latest national census: Statistics South Africa, 2013; NBS Tanzania, 2012; UBOS, 2010a).

| Country | City | Inhabitants (millions) | Operational status | Key source |
|---|---|---|---|---|
| Nigeria | Lagos | 17.5 | Operational since 2008 | Olufemi (2008) |
| South Africa | Cape Town | 3.4 | First phases since 2010 | Cape Town Government (2014) |
| | Durban | 2.8 | Planning | GoDurban (2014) |
| | Johannesburg | 7.9 | First phases since 2009 | South Africa Government Online (2014) |
| | Port Elizabeth (Nelson Mandela Bay) | 0.9 | Planning | Nelson Mandela Bay Municipality (2014) |
| | Pretoria (Tschwane) | 1.8 | Constructing | South Africa Government Online (2014) |
| | Rustenburg | 0.3 | Planned for 2016 | Rustenburg Local Municipality (2014) |
| Tanzania | Dar es Salaam | 4.4 | Constructing | Nkurunziza et al. (2012) |
| Uganda | Kampala | 1.8 | Planning | ITP (2010) |

geography (Hagerstrand, 1970; Shaw, 2012) forms a very useful framework in which to study the mobility patterns of contrasting agent types on one hand and to detect spatial bottlenecks on the other. When the travel activity of agents is presented in space, they can be linked to individual's and/or household's attributes and can therefore be used to study and model travel activities (Kwan, 2000). Mapping the travels and calculating the characteristics (distance, time) based on individual transportation habits and/or preferences allows to evaluate present and to simulate future trends. In this way, urban mobility studies can become decision support tools for urban planners.

At present, however, most African cities lack detailed and up-to-date information on the livelihood and mobility of city residents. This has in turn rendered governments powerless and thus incapable of preparing African cities for future travel demands. Therefore in this paper a livelihood typology is carried out and linked to a mobility analysis. In our case study Kampala (Uganda), as in many cities in developing countries, minibuses play an important role in urban transit. The growing number of these vehicles and their outdated equipment heavily contribute to major environmental and traffic problems with long travel times as a consequence (Mattrisch and Weiss, 2008). Planning suggests to introduce a BRT in order to alleviate traffic pressure and to reduce the travel times of commuters. An evaluation of this proposal is needed by simulating the potential impact on the present mobility situation for different socio-economic groups.

## 2. Case study area: Kampala, Uganda

The transport situation of Kampala is a typical Sub Saharan African case study (Kumar and Barrett, 2008). The prime city has spread out organically along a radial road network that leads all local as well as regional traffic through the very dense city centre (Vermeiren et al., 2012). The CBD (central business district) and near surroundings form the main employment centre with multi-story trade and office buildings and even house a large part of the country's industry. In 2009 a northern ring road became operational that slightly reduced the heavy urban traffic in the city centre but is already affected with congestion itself. Due to the rapid urban sprawl, the ring road of 2009 is at present already captured within the residential area of the city. As a result it takes 1–2 h on average to reach Kampala's CBD from the surrounding suburbs by means of motorized transport.

Kampala is currently estimated to house at present around 1.8 million residents (UBOS, 2010a) but because of its role as prime city and major economic hub of the country, the average day-time population is on average estimated at double the official resident number (Emuron et al., 2010). Kampala has sprawled out far beyond its administrative boundaries in the past decades affecting surrounding municipalities. Local governments are now discussing whether or not to establish a Greater Kampala Metropolitan Region (Fig. 2) that encompasses the whole functional urban region. Future growth scenarios predict a continued exponential urbanization which will severely exacerbate traffic congestion.

People use four main modes of traffic: on foot, by *taxi*, *boda-boda* and private cars (Fig. 3). The majority of commuters goes to work by walking, yet footpaths are not always provided and if present, are rarely in good physical condition or even dangerous due to potholes and uncovered manholes. Moreover, large parts of sidewalks in urban areas are occupied by street vendors. On the roadway, private vehicles, *taxis* and *boda-bodas*, dominate. The so-called taxis – or matatus – are mini vans that are privately run but serve as 'informal' public transport. They offer legal seats to 14 fee-paying passengers and are free to choose their routes