

# INTRODUCING SUSTAINABLE URBAN TRANSPORT

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## A case of Kampala, Uganda



Introducing Sustainable Urban Transport  
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In cooperation with:  
Iganga, Goudappel Coffeng and  
Goudappel Africa

Cover photograph: Looking down Entebbe  
Road towards the Clock Tower and  
Shoprite Intersections

# FOREWORD

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This report is the result of a joint study done by Robin van der Griend and Wytse Siemonsma, both Traffic Management students at the NHTV University of Applied Sciences in Breda. The reason for our cooperation is because we believe in the strength of combining our individual qualities, and to make it possible to approach the subject in a broader perspective.

In order to still allow the individual assessment of our work this report has been divided into two. Because of the integrated character of the study we have decided not to make a physical separation - what would have diminished the comprehensibility - but rather a visual distinction. The sections that represent the individual contribution of the author, the contribution of the other student, and the sections for which we share the responsibility have each been given a visual characteristic.

To complete this study, we have stayed in Kampala for two months. We have experienced the city inside out, and seen both its bright and its darker sides. What stands out is the friendliness of the Ugandan people, and they deserve better than the current chaotic, inefficient, dangerous and unsustainable urban transport system which characterises their capital. We sincerely hope that with our work we will bring a positive contribution to the development of Kampala and its inhabitants.

We wish to say special thanks to Ms. Amanda Ngabirano for all the help in Kampala, both private and business-related, and for taking good care of us, and to Fatah, for helping us find our way. Also special thanks to Mr. Tonny Bosch for giving us the opportunity to do this study, and for the pleasant cooperation in Kampala.

Furthermore we wish to thank all the people in Uganda who provided us with information, especially Mr. Bonnie Nsambu, Mr. George, Mr. Patrick Kayemba, and Ms. Christine Kawuma. Our gratitude also goes to all our colleagues at Goudappel Coffeng, for their help and their interest, especially Mr. Danny Walraven, Mr. Ben Peeters, Ms. Nicole Korsten and Ms. Karin van der Lans. Furthermore we would like to thank Ms. Ineke Spapé, our supervisor at the NHTV, for all the useful feedback she gave us.

Thank you all for making this possible and for giving us a wonderful and inspiring Ugandan experience!

Robin & Wytse  
Dordrecht, June 2011



# EXECUTIVE SUMMARY

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## Theoretical Framework

Motorised transport, with its corresponding negative impacts, contributes for a large part in creating an unbalance between the three aspects of sustainable development: economic growth, social progress and environmental protection. A shift towards sustainable modes of transport (e.g. public and non-motorised transport) will therefore be helpful in the process of redressing the balance. Through an efficient, safe and affordable transport system, which provides choice in different modes of transport, accessibility of basic needs can be improved, many costs can be saved, productivity can be increased, and thus both human and economic development can be improved. In addition, reduced pollution, less required space for transport and improved road safety will lead to improvement of the quality of life. Consequently, sustainable urban transport can positively influence the conditions within all three aspects of sustainable development.

Due to the strong link between land use and transport, integrating planning is essential for sustainable development. The urban structure of a city determines the chances for sustainable urban transport. The choice for the most sustainable urban structure depends on many factors but in all cases adequate planning should be in place. By acknowledging the link between land use and transport, and by providing for all modes, people are given realistic choices in their transport options. Integrated planning is economically beneficial as it allows governments, both national and local, to save money on urban development, and it allows people to spend less time and money on transport. These resources can be invested in improving the social situation. In addition, the reduction in travel distances and improved chances for more sustainable modes are clear environmental benefits of integrated planning.

Success experiences from all over the world have shown that the following factors can be key to the success in achieving sustainable urban transport: integration between land use and transportation, and between the different modes of transport; willingness and fortitude of politicians, mayors and governments; quick wins and pilot projects; combining encouragement of desired modes of transport and discouragement of undesired modes of transport; using economic instruments, especially to gain revenue to invest in the transport system; acknowledging non-motorised transport as important modes within the transport system; and a gradual implementation which provides the opportunity to evaluate, and for gaining support.

## Existing Situation

Kampala is suffering from several unbalances in urban development, transportation and liveability. The city has developed unplanned, resulting in a mismatch between housing, employment and services. This puts a strain on the central business district (CBD) as the sole centre of economic activity. Transportation networks for the different modes have not been able to develop properly, and today the narrow streets of the city are unable to meet the increasing demand in transport, which results in severe congestion with many negative impacts.

For long, the government has focused only on providing for motorised transport, which has come at the cost of public, and especially non-motorised transport. Proper facilities for pedestrians and cyclists are lacking, resulting in the inefficient and dangerous mixing of modes, and a disproportional amount of road traffic fatalities and injuries among these vulnerable road users. The informal public transport sector has grown beyond control, and is causing safety and congestion issues due to the number of vehicles, and their way of operating.

The transport situation is worsened due to a lack of awareness and involvement, of both the public and politicians. Road user behaviour is reckless and careless, traffic education is lacking, and enforcement is scarce and mainly focused on improving motorised traffic flow. Streets and vehicles are often ill maintained, used inappropriately, and inspection is poor. Due to the dominance of motorised traffic the living environment is

unattractive, especially in the city centre. Sustainable modes of transport in Kampala are not very attractive, due to the lack of infrastructure and facilities and the poor state of the vehicles. Furthermore the generally bad image of sustainable urban transport modes is worsening the attractiveness.

Only a small part of the population has access to private car travel and the majority is forced to travel by public and non-motorised transport. This unbalance in transport opportunities for the different income groups results in social inequity. As a whole, the transport system of Kampala is chaotic, inefficient, unreliable and dangerous, and negatively affects society, especially the urban poor, through a loss of productivity, inhibiting human development, and reducing the quality of life.

## Vision and Implementation

In order to create a sustainable urban transport system, the unbalances described above should be addressed which results in the following general vision for Kampala: Transport and urban development should be better organised to reduce the mismatch between housing, employment and services; all of the different modes should be provided for to improve transport options, safety and efficiency, and; the negative impacts of transportation should be minimised to increase the attractiveness of the living environment by favouring conditions for the more sustainable modes.

### Planning Strategy

The mismatch between housing, employment and services can be reduced through integrated planning. Considering the existing form of the urban area, with a number of major roads radiating out of the CBD, a transformation towards a *radial urban structure* lies at hand. Transit oriented development, through a combination of high density employment and services together with high quality public transport, should be concentrated along major corridors, which will aid in reducing the need to go to the CBD. In addition, sub-centres can be assigned at some distance from the CBD for further concentrated development.

Part of the CBD should be pedestrianised to increase the attractiveness of the living environment, and to provide dedicated space for pedestrians where it is needed the most. Besides improving the living environment, this will also improve traffic conditions in the CBD, by separating through traffic and organising traffic patterns. In addition, the taxi parks should be reorganised to separate flows to and from the Old and New taxi parks, which will minimise conflicting streams by creating loops. This proposed reorganisation of the CBD will not only help pedestrians, cyclists and motorists, but it will also reduce travel time for taxi minibuss passengers since they will spend less time in congestion.

Creating a proper hierarchical and coherent network for all modes will help to organise transport and will improve efficiency. The networks are integrated to allow interaction between the modes. Sustainable modes are prioritised and through traffic is diverted, by establishing ring roads, to increase the attractiveness of the living environment. The plans of JICA do not correspond with this vision as some of the proposed flyovers will only attract more motorised traffic into the CBD. The public transport network, consisting of a trunk system with feeder routes, matches the development corridors and the routes of the BRT network which was proposed for Kampala with support of the World Bank. Through integrating cycling into the BRT network, the catchment area can be greatly increased, and most of Kampala will then be within reach of the BRT. To support those who are unwilling or unable to cycle, the public transport network is supplemented with a number of feeder routes. which could initially be well served by the current taxi minibusses, if well regulated. The bicycle network is mainly aimed at feeding the BRT, but also play an important role within 5 kilometre from the CBD. Within this distance it is likely that people will cycle to the CBD if they are well provided for with infrastructure and facilities. To a large extent, the network for pedestrian includes all streets in the Kampala District. Pedestrian access should be guaranteed to all homes, services and employment locations, and pedestrians should have a coherent network, without gaps, as every journey starts and ends with walking. To ensure a coherent pedestrian network, it should be assessed more on a local than on a city wide scale.

## Complete Streets and Efficient Transport

To improve the situation for sustainable urban transport, streets designs in Kampala should include adequate provisions for all modes and functions. This way streets are made safer and more efficient for everyone. In the design process, sustainable modes should be prioritised over less sustainable modes. To ensure their safety, dedicated space should be allocated to pedestrians and cyclists. Sidewalks and proper crossing facilities (e.g. refuge islands) should be provided together with segregated bicycle paths. Buses should ideally have dedicated bus lanes and bus ways, but this should not come at the cost of dedicated infrastructure for non-motorised transport. On arterial streets, obstructions of traffic flow should be prevented, for example by including turn bays, which will make the arterial network more attractive and keep through traffic away from local and distributor streets. Complementary to that traffic calming measures should be in place to discourage through traffic on local and distributor streets. In addition, facilities such as bicycle racks, functions like parking and street vending should be considered to enhance the complete character of streets.

Existing streets in Kampala can rapidly and inexpensively be converted into complete streets using a *quick win* approach. Redesigns can be done within the existing roadway, and dedicated space can be created using for example bollards, planters or even parked cars.

## Encouraging Sustainable Modes

### Raising Awareness

Raising political awareness and improving the knowledge of politicians should be done through workshops on regular basis, which provides the opportunity to share expertise and experience. In order to involve road users into the process, there should be advocacy groups to represent the interests of the users of the different modes of transport, and the providers of the transport services. Existing organisations should be improved, and for groups for which interests are not yet represented, new advocacy groups should be established in which sustainable urban transport promoters should take the initiative. Furthermore these promoters should work together in order to operate more effectively and efficiently. Together the promoters and advocacy groups should keep sustainable urban transport on the political agenda.

In order to raise public awareness informative and persuasive messages should be distributed, in which the media can be a helpful instrument. In addition, events should be organised in order to let people actually experience the benefits of sustainable urban transport. One example of such an event is a car free day through which people can enjoy the city when it is not being dominated by motorised traffic. For instance bicycles should be available in order to give them the opportunity to discover other modes of transport. In addition to addressing the general public, it will be valuable to focus on target groups because of their specific characteristics. The target groups which have been distinguished as most potential are children, parents, students, women, cultures, current public transport users, and employees and employers.

### Improving Road Safety and Efficiency

In order to improve road safety and efficiency, improvements have to be made on three elements, namely environment, people and vehicles. First of all there should be appropriate infrastructure and facilities. Furthermore these roads and facilities have to be inspected and maintained on a regular basis with potholes, bumps, uncovered wells, broken pavements, street lighting, signs, markings, dirt, sand and mud as the main focus points.

Secondly, road user behaviour should be improved through engineering, education and enforcement. The designs of the infrastructure (engineering) should make clear what behaviour is desired. In addition, traffic laws and regulations have to be clear, and the government should publish them to improve the accessibility of these documents. People have to be made aware of the laws and rules. This should be done through education at schools, (national) campaigns and driving training. The laws and regulations have to be enforced, therefore the capacity and equipment of the traffic police should be enlarged, but their focus should shift to ensuring road safety, instead of improving motorised vehicle flow. Again, it will be most effective to focus on different

target groups. For example on the boda boda motorcyclists since this group is causing serious problems in the city. It would not be sustainable to ban them entirely, so better education and regulation is recommended to improve their service and behaviour.

Thirdly, the vehicles have to be in good condition, have to be used in a proper way and the number of vehicles should be taken into account. Vehicles should be inspected and maintained on regular basis, at least annually at a garage, but also through controls in the streets.

### **Increasing Attractiveness**

Due to the dominance of motorised traffic, the living environment is unattractive, especially in the city centre. In order to improve the attractiveness, walking, cycling and public transport have to be made more attractive, and car use less attractive. This can be done through measures in environment, including infrastructure and facilities; people, including image and incentives; and vehicles.

First of all, more space should be allocated to sustainable modes of transport. The investment in infrastructure and facilities for non-motorised and public transport show that the government recognises the importance of sustainable urban transport, which can positively influence the image. Aesthetics (e.g. materials and colours) should be well-considered in order to give the facilities an inviting character. Infrastructure and facilities should also be used in order to discourage the use of the car, for example the narrowing or even closure of streets.

Secondly, the image of the walking, cycling and public transport has to be improved. This should be done by having people actually experience the modes of transport, for example through demonstration rides. Also, prominent people should be used to convince people about the attractiveness of modes. In Kampala the English Premier League is very popular, it would be valuable if they can somehow be involved in campaigns. Furthermore, meetings between potential users and experienced users should be arranged so that they can share experiences. Economical instruments should be used to both encourage and discourage the use of a specific mode. Parking management and an Area License Scheme are proposed in order to discourage the use of the car in the city centre, and in order to make the city centre more attractive for walking and cycling. Incentives such as subsidies for bicycles should be introduced in order to encourage the use of sustainable modes of transport.

Thirdly, bicycles and public transport vehicles should be made more comfortable in order to become more competitive compared to the car. In case of the bicycle, also accessories should be introduced to make the bicycle more suitable for daily utilitarian use.

### **Potential for Cities in Sub-Saharan Africa**

The transport situation in many cities in Sub-Saharan Africa seems very similar in relation to the situation in Kampala. Consequently, this study shows potential for other Sub-Saharan African cities. However, the proposed measures for introducing sustainable urban transport in Kampala should not be copied directly to these cities. The most important aspect is that the way sustainable urban transport is introduced, matches the local circumstances and preferences. In other words, the process will always require customisation.



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# 1 INTRODUCTION

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## 1.1.1 General Introduction

This study was performed on behalf of Iganga, a foundation established by Goudappel Coffeng which encourages sustainable transport in developing countries, and is intended as a guide for the Kampala City Council (KCC) and local governments and organizations of other cities in Sub-Saharan Africa. This report is also written as a Bachelor thesis by two graduate interns of the Academy for Urban Development, Logistics and Mobility of the NHTV University of Applied Sciences in Breda, the Netherlands.

## 1.1.2 Incentive

Kampala, the capital of Uganda in Sub-Saharan Africa faces major transportation issues. Because of the social, environmental and economic problems which result from this, awareness is rising for a more sustainable urban transport system. Goudappel Africa, a local land use, traffic and transport consultant, shares this opinion and has taken the initiative in proposing how sustainable urban transport should be introduced in Kampala. The company acknowledges that expertise and experience on the subject within Uganda is not yet sufficient, and has therefore decided to cooperate with Goudappel Coffeng, a Dutch consultant on mobility, to bring in the missing expertise and experience from abroad. The collaboration between a local and a foreign consultancy, makes it possible to match the options for introducing sustainable urban transport with the local circumstances of Kampala, which is necessary for a successful introduction.

## 1.1.3 Objective

The objective of this study is to provide a blueprint for introducing sustainable urban transport in Kampala to establish a suitable balance between urban development, transportation and liveability. The study will have an integrated approach by taking into account the link between land use and transportation, and the balance between the various modes of transport. The product will address planning strategy, complete streets and efficient transport, and the encouragement of sustainable modes. The blueprint will be based on success experiences of sustainable urban transport elsewhere, and will be fitted to meet the local circumstances. This will result in a vision for sustainable urban transport in Kampala which will be established in close collaboration with local stakeholders to gain their support and to get them involved.

This leads to the following objective:

***“Providing a blueprint to introduce Sustainable Urban Transport in Kampala (i.e. planning strategy, complete streets and efficient transport, and encouraging sustainable modes) which fits the local circumstances, to establish a suitable balance between urban development, transportation and liveability.”***

In addition, to gain a broader perspective, this study will briefly address the situation in other Sub-Saharan African cities in general, to provide the option to assess the potential of this study in introducing sustainable urban transport in those cities.

## 1.1.4 Structure of the Document

The research for this study, described in more detail in the following chapter, consists of four phases, each occasionally divided into one of three integrated categories. This division has also been applied to the structure of this document. The four phases are gradual steps in introducing sustainable urban transport. Initially a theoretical framework is provided with a description of sustainable urban transport and integrated planning, the benefits, and success experiences from around the world. This is followed by a description of the existing situation, which is done briefly for cities in Sub-Saharan Africa, and in more detail for Kampala. Next is the creation of a vision. This vision suggests the direction to take in introducing sustainable urban transport in Kampala. After that, various selected measures are proposed for Kampala to develop towards the created

vision. The report finishes with a number of conclusions and recommendations on introducing sustainable urban transport in Kampala, and on the potential of this study for other cities in Sub-Saharan Africa.

When reading, the category into which a section of the report has been located can be recognised through the displayed corresponding symbol:



*Planning Strategy*



*Complete Streets and Efficient Transport*



*Encouraging Sustainable Modes*

## 2 METHODOLOGY

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*This chapter describes the used methodology of the research for this study. It will explain the research scope and approach, will elaborate on the division into three integrated categories and four phases, and will present the research questions.*

## 2.1 RESEARCH SCOPE

### 2.1.1 Research Area

Kampala is the capital of Uganda, a country in Sub-Saharan Africa. Uganda is situated in East-Africa and is bordered by Kenya, Sudan, the Democratic Republic of Congo, Rwanda and Tanzania. The country is completely landlocked but does include a large part of Lake Victoria, Africa's largest lake. Kampala is situated on the northern shores of this lake, in Uganda's Central Region.

Kampala city is part of a larger urban region, the Greater Kampala Metropolitan Area (GKMA). Kampala District itself has an estimated population of over 1.6 million (Popsec, 2010), and is made up of five divisions, namely Central, Kawempe, Nakawa, Makindye and Rubaga. This report will only focus on introducing sustainable urban transport within the five divisions of Kampala itself, but will present a broader perspective were it is considered necessary.

In addition to looking specifically at the case of Kampala, this study also briefly addresses the conditions in cities in Sub-Saharan Africa in general.

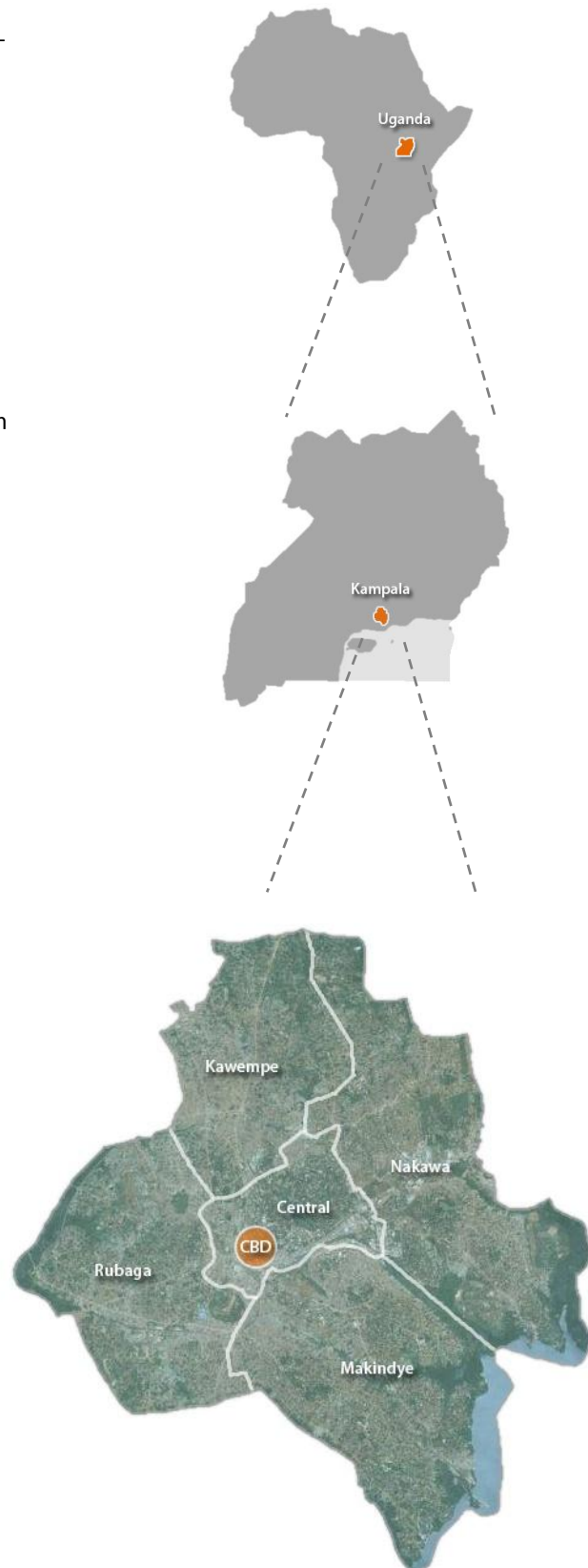


Figure 2-1: Kampala (bottom), and the city's location in Uganda (middle) and Africa (top)

### 2.1.2 Research Focus

This study is intended as a first step in introducing sustainable urban transport in Kampala. While this study acknowledges that there are many things in a developing country which will influence an urban transport system directly or indirectly, for example drainage, corruption, and health care services, it is unattainable and beyond the focus of this study to address them all. Consequently this study will only address major issues and focus points on land use and transportation, and will primarily stay at the surface of most subjects unless the situation and available resources allow to go into more detail. The most comprehensive focus will be on Kampala District, the situation in other Sub-Saharan African cities is only briefly addressed.

This study will be aimed at road transportation exclusively, mainly focused on commuter traffic. Technical innovations, such as the advantages of hydrogen fuel cells, will not be addressed. Furthermore, it will hold only a brief indication of the economical, social and environmental effects of transport, there will be no calculations on such effects in this document. This study will also not elaborate on the political system of Uganda or Kampala, although it will give a brief indication of the political situation regarding transport. While this study will give an overview of relevant policies and regulations it will not go into detail on the internal structures of the institutions which entitle them, or on how these institutions function. Additionally, the financing for proposed measures by this study will not be addressed but their estimated costs will be taken into account in judging their feasibility.

## 2.2 RESEARCH APPROACH

The research approach used in establishing the blueprint for introducing sustainable urban transport in Kampala is divided into three categories and build up in four phases. The three categories each deal with a different integrated element of achieving sustainable urban transport: planning strategy, complete streets and efficient transport, and encouraging sustainable modes. The four phases each address a stage in the introduction process, going from a theoretical framework, via the existing situation to a vision and ultimately to the implementation. Each of the three categories run through all of the four phases.

### 2.2.1 Three Categories

#### Planning Strategy



The *planning strategy* category addresses the policies, networks, plans and regulatory frameworks. It describes how these has influenced the current urban development and how it can influence urban development in the (near) future. This category can be seen as describing the situation “*on paper*” and can be recognised by the symbol next to this text.

#### Complete Streets and Efficient Transport



The *complete streets and efficient transport* category describes what the actual transport situation is like “*in the streets*”. It addresses the current transport conditions for the different modes of transport, and elaborates on the role of infrastructure in influencing safety and efficiency. This category can be recognised by the symbol next to this text.

#### Encouraging Sustainable Modes



The *encouraging sustainable modes* category describes the role of the public and political mindset. It emphasises on how the current mindset has influenced transportation and how the mindset can be influenced to encourage the use of sustainable modes. This category describes the situation “*in the minds*” and can be recognised by the symbol next to this text.

### 2.2.2 Four Phases

#### Phase 1 – Theoretical Framework

The first phase will describe sustainable urban transport and integrated planning in general, and will explain the corresponding benefits. Additionally, it will explore sustainable urban transport experiences from cities all over the world according to the three integrated categories.

#### Phase 2 – Existing Situation

The second phase will provide a description of the most important aspects of the existing situation, which will be done briefly for cities in Sub-Saharan Africa, and in more detail for Kampala. The description of the existing situation will be divided into the mentioned three categories.

#### Phase 3 – Vision

In the third phase, an integrated vision will be created for introducing sustainable urban transport as a whole. Which is then further elaborated into the three categories. To establish a vision which is suitable for Kampala, the input of local stakeholders will be combined with the existing situation and the key success factors of the theoretical framework.



### Phase 4 – Implementation

In the fourth and final phase a number of measures will be proposed for introducing and implementing sustainable urban transport in Kampala, which will meet the integrated vision and the local circumstances. The measures will again be divided into the three categories.

### 2.2.3 Research Model

The following model provides a graphic presentation of the above described research approach. The pillars represent the three integrated categories, the bonds emphasize in the integrated approach, and the arrows indicate when a phase is matched with an earlier phase.

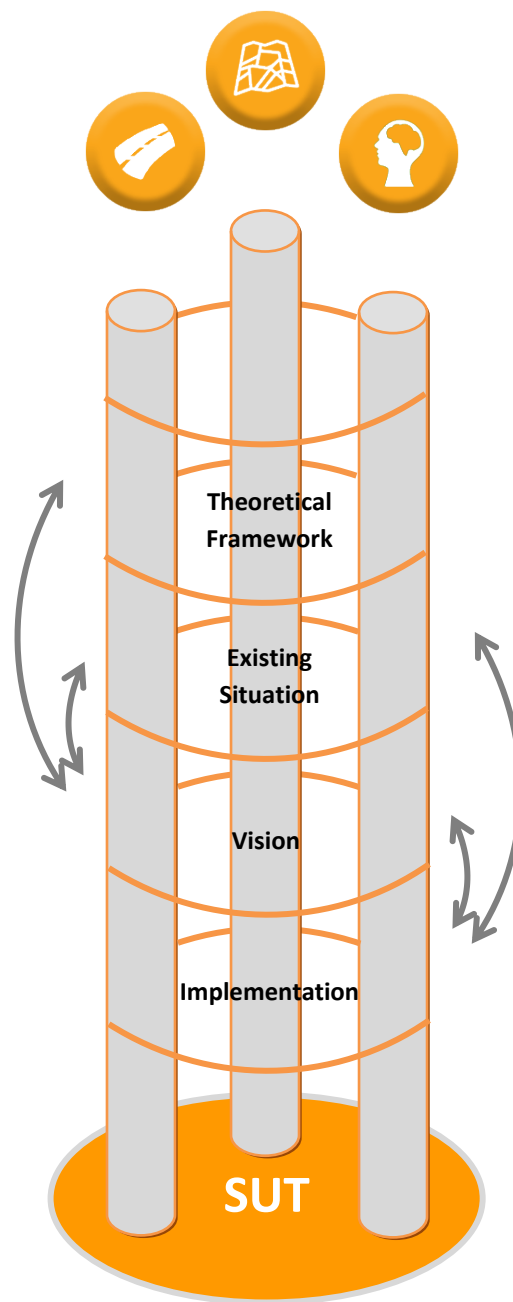


Figure 2-2: The research model which represents the used approach

## 2.3 RESEARCH QUESTIONS

Based on the research objective a main research question can be formed which will guide the research into the right direction. The project objective was stated in the introduction of this report but is also repeated below:

The research objective:

*“Providing a blueprint to introduce Sustainable Urban Transport in Kampala (i.e. planning strategy, complete streets and efficient transport, and encouraging sustainable modes) which fits the local circumstances, to establish a suitable balance between urban development, transportation and liveability.”*

The corresponding main research question is as follows:




*“How can a blueprint be established to introduce sustainable urban transport in Kampala, based on the theory on the subject, success experiences elsewhere, and the local circumstances, in order to achieve a suitable balance between urban development, transportation and liveability?”*

Furthermore, to assess the potential of this study in introducing sustainable urban transport in other Sub-Saharan African cities, the following additional research question is formed:

*“Will this study have potential for introducing sustainable urban transport in other Sub-Saharan African Cities considering their general circumstances in relation to Kampala?”*

The main research question is too broad to be answered at once. Therefore the main research question will be answered through a number of sub questions which are presented in the following four tables. These tables correspond with the phases of the research approach. In addition to the sub question, the method and expected results are presented in the tables. All sub questions have been divided into their relevant categories, which can be recognised by the corresponding symbol, with the exception of some, which are considered general (-). The sub questions apply to Kampala, and where relevant, also to Sub-Saharan Africa.




### 2.3.1 Phase 1 – Theoretical Framework

Cat.	Research question	Method	Result
-	What is sustainable urban transport (SUT) and what are the main benefits?	Desk research on literature	Definition of SUT and overview of the main benefits
-	What modes are considered sustainable?	Desk research on literature	Overview of sustainable modes
-	What are the impacts of transportation on society	Desk research on literature	Overview of impacts (e.g. social, environmental and economical)
-	What is integrated planning and what are the main benefits?	Desk research on literature	Definition of integrated planning and overview of the main benefits
	Which cities have promising planning strategies?	Desk research on literature	Key success factors for planning strategies
	Which cities have promising concepts on complete streets and efficient transport?	Desk research on literature, interviews with urban planning consultants	Key success factors for complete streets and efficient transport
	Which cities have promising concepts on encouraging sustainable modes?	Desk research on literature, interviews with urban planning consultants	Key success factors for encouraging sustainable modes




### 2.3.2 Phase 2 – Existing Situation

Cat.	Research question	Method	Result
	How has the urban area developed?	Desk research on literature	Overview of the urban development (e.g. land use, transportation networks)
	What are the current plans for development?	Desk research on literature, media; interviews with Ministries, KCC	Overview of current plans for development
	Which policies and regulations apply to transport?	Desk research on literature; interviews with Ministries, KCC, Uganda Police	Overview of policies and regulations
	How are transport projects usually financed?	Desk research on literature; interviews with Ministries, KCC	Overview of financing
	What are the conditions of the infrastructure, facilities, vehicles and services?	Desk research on literature, media; observations in the streets; interviews with stakeholders and citizens	Overview of the transport conditions
	Which modes of transport are used, and how and why?	Desk research on literature, media; observations in the streets; interviews with stakeholders and citizens	Overview of the modes and their usage (e.g. modal split)
	What are the road safety conditions?	Desk research on literature, media; observations in the streets; interviews with stakeholders and citizens	Overview of road safety conditions (e.g. accident rates)
	What is the political awareness on SUT?	Desk research on media; interviews with stakeholders	Overview of political awareness
	What is the public awareness on SUT?	Desk research on media; interviews with stakeholders	Overview of public awareness
	What are the concerns and preferences of the eligible stakeholders?	Desk research on media; interviews with stakeholders	Overview of concerns and preferences
	What are the impacts of transportation on society?	Desk research on media; interviews with stakeholders; observations	Overview of impacts on society

### 2.3.3 Phase 3 – Vision

Cat.	Research question	Method	Result
-	What should be the vision for introducing sustainable urban transport in Kampala according to the eligible stakeholders?	Workshop, interviews with stakeholders	Stakeholders' input
-	What is the general vision for introducing sustainable urban transport in Kampala?	Match the stakeholders input with the theoretical framework and the existing situation	General vision for introducing sustainable urban transport
	What is the vision for the planning strategy?	Elaborate the general vision	Planning strategy vision
	What is the vision for complete street and efficient transport?	Elaborate the general vision	Complete streets and efficient transport vision
	What is the vision for encouraging sustainable modes?	Elaborate the general vision	Encouraging sustainable modes vision

### 2.3.4 Phase 4 – Implementation

Cat.	Research question	Method	Result
	Which measures should be proposed to develop towards the vision for the planning strategy?	Match the vision with the existing situation by using the key factors to success of the theoretical framework	Proposed measures on planning strategy
	Which measures should be proposed to develop towards the vision for complete streets and efficient transport?	Match the vision with the existing situation by using the key factors to success of the theoretical framework	Proposed measures on complete streets and efficient transport
	Which measures should be proposed to develop towards the vision for encouraging sustainable modes?	Match the vision with the existing situation by using the key factors to success of the theoretical framework	Proposed measures on encouraging sustainable modes

### 3 THEORETICAL FRAMEWORK

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*This theoretical framework will provide descriptions of sustainable urban transport and integrated planning in general, and will explain the corresponding benefits. Additionally, this chapter will present a number of success experiences of sustainable urban transport from cities all over the world, categorised in planning strategy, complete streets and efficient transport, and encouraging sustainable modes. Each of these success experiences hold a number of key factors to success, which can prove valuable for introducing sustainable urban transport in other cities.*

## 3.1 SUSTAINABLE DEVELOPMENT: A GLOBAL CONCERN

Global concern for sustainability was risen in 1987 when the World Commission on Environment and Development of the United Nations (UN) published their report “Our Common Future”. In this report, also known as the Brundtland Report, the commission warns for far going risks of irreversible damage to the human environment that threaten the basis for human development. This will be caused by a world in which people strive for both survival and prosperity with little regard for its impact on others.

Environmental stress is on the one hand the result of the growing demand on scarce resources and the pollution generated by the rising living standards of the relatively affluent. This is because sometimes the improved living standards have been achieved in ways that are globally damaging in the longer term. On the other hand also poverty creates environmental problems, but in a different way. Those who are poor and hungry will often destroy their immediate environment in order to survive (for example deforestation).

Consequently, today's environmental challenges arise both from the lack of development and from the unintended consequences of some forms of economic growth and thus make it a global concern. One of the recommendations of the commission in order to deal with the environmental threats is to move towards sustainable development (United Nations, 1987).

Sustainable development projects are arising all over the world, from Bogotá in Colombia to Perth in Australia and from Copenhagen in Denmark to Cape Town in South Africa, which confirm the global concern. The following paragraphs will give the definition of sustainable development, describe the contribution of the transport sector, gives the definition of sustainable urban transport and describes sustainable modes of transport and the benefits of sustainable urban transport.

### 3.1.1 Sustainable Development

Many definitions of sustainable development are available in literature. One of the definitions which is widely known and often referred to is the one from the above mentioned report “Our Common Future” (United Nations, 1987):

*“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Within it, it contains two key concepts:*

- *the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and*
- *the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.”*

The International Union for Conservation of Nature (IUCN) mentions that this definition captures the two fundamental issues of sustainable development, namely the problem of the environmental degradation that so commonly accompanies economic growth, and the need for such growth in order to alleviate poverty (IUCN, 2006)

The UN report “Our Common Future” mentions that sustainable development, in essence, is not a goal, but a process of change (United Nations, 1987).

The 2005 World Summit Outcome Document of the United Nations mentions sustainable development consists of three interdependent and mutually reinforcing pillars, namely economic development, social development and environmental protection (United Nations, 2005). Figure 3-1 shows a visual representation of these three pillars.

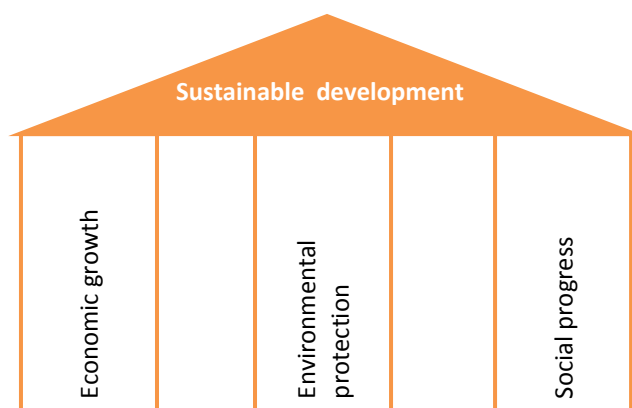


Figure 3-1: Visual representation of the three pillars of sustainable development (IUCN, 2006), adapted by authors

### Current and Desired Situation

The IUCN uses an interlocking circles model (see figure 3-2) to show the interdependent character of the three pillars, and that a better integration is desired in order to redress the balance within sustainability (IUCN, 2006).

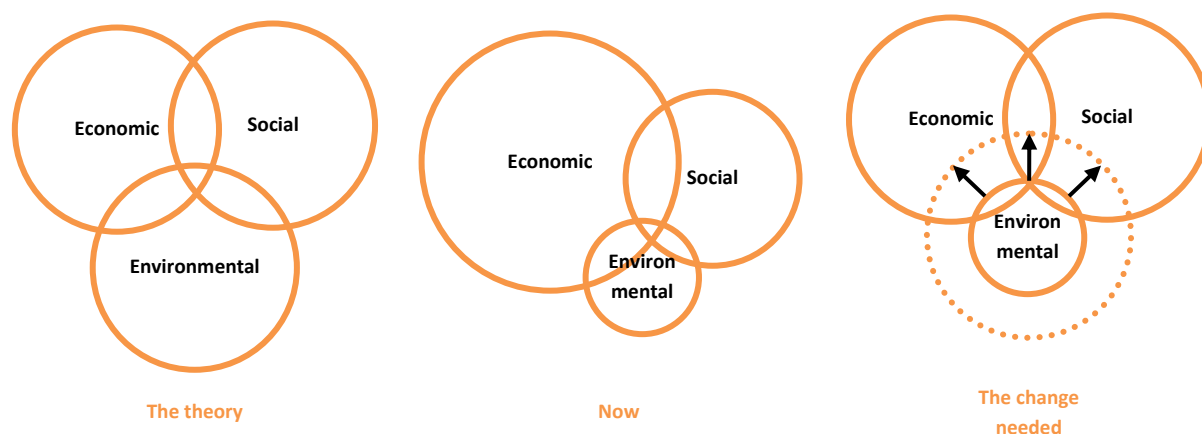


Figure 3-2: Visual representation of the desired balanced situation (left), the current imbalance (middle) and the change needed (right). (IUCN, 2006), adapted by authors

In the most favourable situation economical, environmental and social objectives are in balance. But in the present situation the economical aspect is often overruling the social and environmental aspects. In order to achieve the desired balanced situation, change is needed on social but mainly environmental aspects. Most important however is to understand the integrated and interdependent character. Change in one of the three aspects will inevitably influence the other two aspects, which is sometimes unintended and undesired.

### 3.1.2 Contribution by Transportation

Global concern about sustainability is no exception in the transport sector. The rapid growth of this sector brings advantages, such as flexibility and quick access, but also many disadvantages. Especially road transport, is associated with several environmental, social and economical problems, with increasing motorisation as the major contributor to these problems. The Sustainable Urban Transport Project sourcebook of the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) mentions increasing motorisation affects the following aspects:

### Affects of increasing motorisation

Air quality	Congestion
Noise and vibration	Energy security
Accidents	Economic efficiency
Global climate change	Severance
Natural habitats	Visual intrusion
Waste disposal	Loss of living space

**Table 3-1: Affects of increasing motorization (GTZ, 3E, 2005b)**

The effects most relevant for this research are elaborated briefly below. The selection is based on the effects which are assumed to be most common in urban areas. Global warming has been added because of the overall global concern.

### Traffic congestion

Congestion occurs when traffic demand surpasses the available road capacity. This can lead to long and unpredictable travel times and thus to losses of valuable time. As a result, this can causes economical damage due to loss of overall productivity. Also deliveries of goods and services can be late, which affects the overall economic efficiency (GTZ, 3E, 2005b). Another impact of congestion is increased air pollution due to constant acceleration and deceleration, which affects both human health and the environment. In addition the increased use of fuel leads to higher fuel costs. Congestion can also affect the accessibility of several services, such as schools, shops, health care and employment, which consequently limits economic and human development. Also emergency vehicles can be obstructed by congestion.

Cities which experience an increase in private car travel should be careful with upgrading and constructing new infrastructure since building more roads to improve traffic conditions is highly questionable. Constructing more roads may not only decrease the quality of the urban environment, it will also attract more car traffic due to the latent demand phenomenon. This is a phenomenon where new or improved infrastructure attracts traffic that otherwise would not have been there. Current traffic conditions may inhibit people from travelling, or will have them travelling at a different time or with a different mode. When congestion on a certain route is relieved, the attractiveness of a route is increased, encouraging people to use it. Measures to relieve congestion are therefore at least partially undone by latent demand (Arnott & Small, 1994). The classic approach to this is to build even more infrastructure, resulting in a vicious cycle where congestion and travel-times are ever increasing accompanied by its undesired effects.



**Figure 3-3: Wider roads are no guarantee in solving congestion (source unknown)**



### Local Air Pollution and Noise Pollution

Emissions from vehicle's tailpipes, such as nitrogen oxide (NO<sub>x</sub>), carbon monoxide (CO) and fine particulates (PM<sub>10</sub>), harm human health and the natural environment. The transport related pollution can cause ailments such as asthma, bronchitis, heart attacks, strokes and can even lead to death. The benefits of technological improvements in the past years and cleaner fuels cannot (yet) overcome the drawback of the rapidly increasing motorisation. Severe congestion worsens the local air and thus health conditions. Noise can affect economic productivity and human health. Noise of vehicle operation, horns and car alarms can cause stress, annoyance, sleep disturbance and can therefore affect concentration, performance at work or school and cognitive development (GTZ, 3E, 2005b).

### Global Climate Change/Global Warming

Unlike the local environmental impacts of transportation, climate change affects everyone. Motorised vehicles are responsible for roughly 25% of all fossil-based carbon dioxide (CO<sub>2</sub>) emissions (GTZ, 3E, 2005b). This greenhouse gas is primarily responsible for global warming. At global level in 2005, transport was the second largest emitting sector. Forecasts by the International Energy Agency (IEA) indicate a steady rise in transport related CO<sub>2</sub> emissions in developed countries between now and 2050, and an exponential growth in developing countries in the same period due to their economical and population growth and exploding automobile fleets (IPF Energies Nouvelles, 2009).

Almost 20 percent of the world's total delivered energy is used in the transportation sector, where liquid fuels are the dominant source. Transportation alone accounts for more than 50 percent of the world consumption of liquid fuels. The IEA mentions that mobility in developing countries will increase by an average of 2.6 percent per year in the period 2007-2035 (EIA, 2010).

### Loss of Living Space

Roads and parking facilities consume large amounts of urban space, sometimes at the cost of living areas due to the scarce availability of urban space. Imbalance between transport space and living space can lead to a city dominated by traffic while an attractive living environment is desired. Loss of living space affects the liveability of a city, and consequently the quality of life of its citizens (GTZ, 3E, 2005b).

### Severance

Busy streets can become a physical and psychological barrier for people. It can for example sever communities when a street literally separates neighbourhoods, and thus limits physical access, especially when appropriate crossing facilities are poor or missing at all. Besides this also noise and emission levels can make outdoor activities an unpleasant experience which can hinder social interaction and eventually even lead to social isolation of people (GTZ, 3E, 2005b).

### Accidents

Every year, road traffic accidents cause 1.3 million deaths and up to fifty million injuries. 90 percent of these are in developing countries, due to increased motorisation and dangerous traffic mixes. Road traffic accidents now kill more people worldwide than Malaria. The World Bank expects this to increase even further, as the predicted number of road traffic fatalities in 2020 is 1.9 million (The World Bank, 2011). Besides pain and grief to victims, their friends and relatives, road traffic accidents lead to high costs for society due to production losses, costs for the health sector and emergency services, and damaged public and private properties (Ngabirano, 2010).

## 3.2 SUSTAINABLE URBAN TRANSPORT

As described before, the transport sector has a major contribution to global environmental, social and economical problems. Therefore it is obvious that in this sector major progress can be made. Moreover, transport issues differ from other problems developing societies face, since they gets worse rather than better with economic development (GTZ, 1A, 2005a).

### 3.2.1 Sustainable Urban Transport

There appears not to be just one universal accepted definition of sustainable urban transport. The definition of a sustainable transport system which is often referred to and recognized by the European Union Council of Transport Ministers (Williams, 2005) is transport system which:

- *Allows the basic access needs and development of individuals, companies and societies to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between generations;*
- *Is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy, and regional development; and*
- *Limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation, and, uses non-renewable resources at or below the rates of development of renewable substitutes and minimizes the use of land and the generation of noise.*

This definition entails all the major aspects of sustainable development, namely social (1<sup>st</sup> bullet), economical (2<sup>nd</sup> bullet) and environmental (3<sup>rd</sup> bullet).

### 3.2.2 Sustainable Modes of Transport

Regarding the three pillars of sustainable development, it is obvious that sustainable modes of transport ought to be socially, economically and environmentally viable. Regarding this, mass public transport and non-motorised transport are often considered as sustainable modes of transport (Ngabirano, 2010). Train, tram, metro and bus are the most common modes of public transport. The most familiar non-motorised transport modes are walking and cycling. The separated modes are considered to be sustainable, but the combination of different modes can be even more sustainable. Regarding this, an integrated approach between and within public transport modes and non-motorised transport can be very valuable.

However, focus on public transport and non-motorised transport alone is not sustainable. Private motorised transport is not just bad, but also has its qualities such as flexibility, freedom and high speed which can hardly be substituted by other modes. The strength of a sustainable urban transport system is that people can choose between the different modes and their strengths.

## 3.3 BENEFITS OF SUSTAINABLE URBAN TRANSPORT

A sustainable urban transport system has socially, economically and environmentally benefits. The benefits in relation to the sustainable urban transport objectives, as mentioned in the definition are briefly described beneath.

### 3.3.1 Social Equity and Accessibility

Nowadays there often is an imbalance between the transport conditions for the rich and those for the poor, especially in developing countries where the contrasts in income levels are usually bigger. The transport opportunities and conditions for motorised vehicles, which are mainly used by the higher income groups, are often much more developed than those for non-motorised modes, which are mainly used by the lower income groups. This causes inequity within the population since differences in transportation opportunities subsequently cause differences in opportunities for human development (GTZ, 3D, 2003). A sustainable urban transport system provides more than just one, affordable, safe and efficient mode of transport, and safe infrastructure and facilities. Together these elements improve access to mobility for everyone and consequently improve access to basic needs like employment, education, health care and other services which are important aspects of economic and human development.

*“Simply shifting from walking to cycling can increase an individual’s transport radius by at least a factor of four.”* (I-CE, 2007a)

In a situation with a better balance between accessible motorised transport and non-motorised transport, the whole population is served instead of only a minority of affluent people. Interests of society become more important than individual interests. Human dignity will be recognized and social inequity can be reduced because particularly the situation for the low income groups will be improved. Sustainable urban transport can even lead to social cohesion because all citizens can move together as equals in public spaces, public transport or on bicycles regardless of income or social standing (GTZ, 1A, 2005a).

*“Bicycle paths are a symbol of respect for human dignity and a more egalitarian city, as are high quality walkways. Both show that a city is made for its people, and not for the motor vehicles or its upper classes as is so often the case”* (GTZ, 1A, 2005a).

### 3.3.2 Choice

The strength of a sustainable urban transport system is that people can choose between different modes of transport which all have their own strengths and disadvantages. Such a system serves not just cars, but also provides for alternative modes of transport. In a sustainable urban transport system people have the freedom to choose for the mode of transport who is most convenient at a specific moment or in a specific situation. Walking, cycling and public transport are often the most efficient ways of moving short distances and within the city, the private car can be more suitable for the longer distances. Sometimes, the car is more efficient within the city because of its flexibility, but that does not have to be a problem. The most important is not to ban specific modes completely but to recognize the strengths and disadvantages of each mode of transport, to provide dignified options so that people are not limited and thus forced to use one mode of transport, and to let people choose. Of course encouraging or discouraging specific modes of transport can be valuable, but in that case people should be provided with proper alternatives.

### 3.3.3 Liveability

A better balance between private motorised transport, non-motorised transport and mass public transport can improve liveability. Pedestrians and cyclists do not generate air pollution, greenhouse gases and little noise pollution. Consequently, more non-motorised transport in favour of motorised transport can reduce emissions, slow global warming and prevent motorised transport related diseases and sleep disorders (GTZ,

3D, 2003). Mass public transport can reduce the number of trips with private motorised vehicles and can therefore also reduce emissions and other negative impacts.

Non-motorised transport and mass public transport are space efficient modes. Bicycles use less than a third of the road space used by motor vehicles and pedestrians use less than a sixth (see figure 3-4). In addition, bicycle parking also takes up less space compared to parking lots for motor vehicles and pedestrians don't need any parking facilities at all (GTZ, 3D, 2003). Mass public transport vehicles requires less space than individual vehicles to transport the same amount of people. Both in terms of vehicles as in required infrastructure and facilities. The use of more space-efficient modes of transport can reduce the space needed for infrastructure and facilities, and thus allow more space for living which can improve the quality of life.



**Figure 3-4 –Space requirements for private cars (left), bus (middle), and bicycles (right) when transporting the same amount of people (GTZ, 2A, 2004b)**

### 3.3.4 Health

According to the US Centre for Disease Control, the global epidemic of obesity, high cholesterol, diabetes and depression are, besides diet matters, directly linked to the sharp decrease in daily aerobic exercise. A sustainable urban transport system with improved conditions for non-motorised transport can result in more healthy and fit people. Walking and cycling can provide important aerobic exercise which helps in combating the mentioned diseases. In addition, a shift to non-motorised and public transport can reduce motorised transport related diseases and sleep disorders, which also directly affects health. The health and fitness of people affects their productivity and thus has both human and economical benefits (GTZ, 3D, 2003). For this reason, also employers will benefit from sustainable urban transport through healthy and fit employees.

Each year 1.2 million people lose their lives due to vehicle accidents, and another 50 million people are injured. In developing countries, the vast majority of the victims of traffic accidents are pedestrians and cyclists. Improving the facilities for these non-motorised modes can dramatically reduce the number of deaths and injuries among pedestrians and cyclists even when the number of non-motorised transport users increases, because the presence of these modes in the streets brings the transport system onto a more human scale (GTZ, 3D, 2003). Experience from all over the world have shown that the number of cycle fatalities and injuries can decrease while the total amount of cycling kilometres increases, which can be seen in the case of the Netherlands in figure 3-5.

### 3.3.5 Saving Costs

With a sustainable urban transport system which provides for all modes of transport, and their corresponding infrastructure and facilities, many costs can be saved. Through providing infrastructure dedicated to non-motorised transport, dangerous mixes in traffic can be avoided. Together with improving the existing infrastructure, this can result in a decrease in the number of accidents. This means that, through encouraging sustainable urban transport, many direct (e.g. health costs) and indirect costs (e.g. loss of productivity) caused by accidents can be saved.

Off course infrastructure and facilities for non-motorised and public transport require investments. Generally, the costs of these are less than those for private car infrastructure and facilities, since they require less space. Consequently the cost benefit ratio can be very favourable, which has for example been the case for bicycle infrastructure in Bogotá with a ratio of 1:7 (see figure 3-6). Costs were saved through a reduced need for infrastructure, reduced congestion, reduced pollution, saved parking lots and improved road safety (GTZ, 3D, 2003).

A shift to sustainable urban transport modes, which transport people more efficiently and emits less pollution than cars, can reduce congestion, air and noise pollution. Costs of losses in productivity, health costs and wasted fuel costs can be saved.

In addition to the saving of costs, changes in favour of sustainable modes of transport can also have other economical benefits. For example full pedestrianisation of commercial areas in city centres can dramatically increase the profitability of shops in the area, and lead to an increase in land values (GTZ, 3D, 2003).

Also on individual level, sustainable urban transport can have economic benefits. Walking, cycling and using of public transport are more affordable than private car transport. Cycling is for example far less expensive regarding both purchase and maintenance. Also public transport is less expensive since the costs of purchase and maintenance of the vehicles, the service, and the infrastructure and facilities, is shared by all the public transport users.

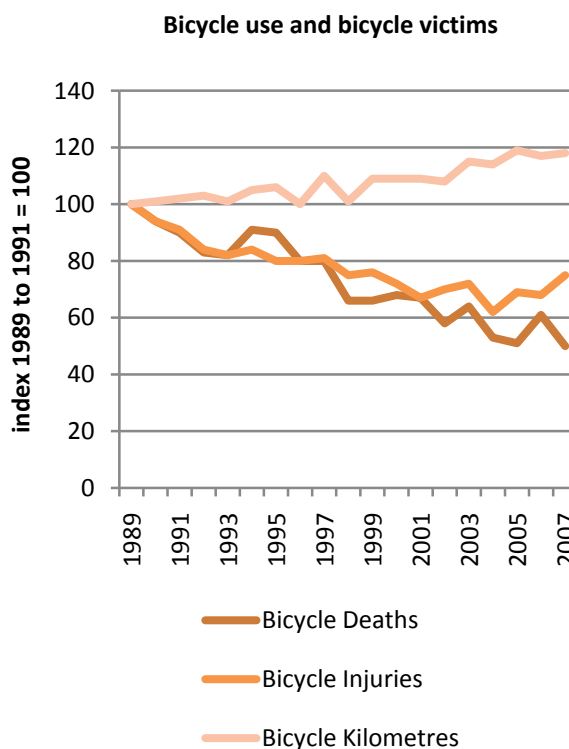


Figure 3-5: The relation between the number of cycle fatalities and injuries and the number of cycle kilometres in the Netherlands (Fietsberaad, 2008)

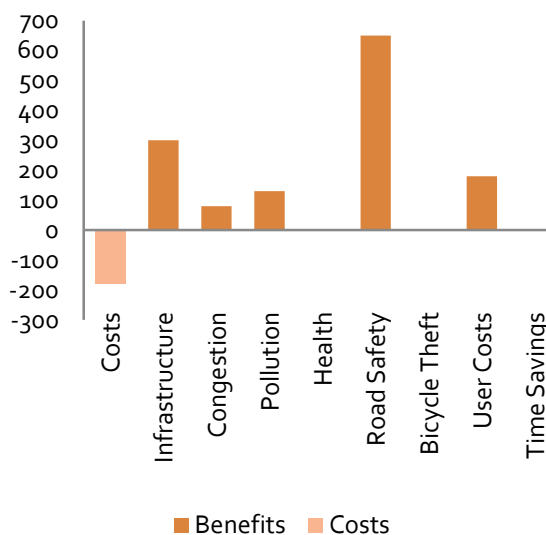


Figure 3-6: Cost benefits ratio for bicycle infrastructure in Bogotá (GTZ, 3D, 2003).

### 3.3.6 Key Factors to Success of Sustainable Urban Transport

Motorised transport, with its corresponding negative impacts, contributes for a large part in creating an unbalance between the three aspects of sustainable development: economic growth, social progress and environmental protection. A shift towards sustainable modes of transport (e.g. public and non-motorised transport) will therefore be helpful in the process of redressing the balance. Through an efficient, safe and affordable transport system, which provides choice in different modes of transport, accessibility of basic needs can be improved, many costs can be saved, productivity can be increased, and thus both human and economic development can be improved. In addition, reduced pollution, less required space for transport and improved road safety will lead to improvement of the quality of life. Consequently, sustainable urban transport can positively influence the conditions within all three aspects of sustainable development.

### 3.4 INTEGRATED PLANNING

The term integrated planning is obtained from Ngabirano’s report. An integrated planning, as mentioned in the report, is based on:

- the connection between land use and mobility;
- the balance between the provision of travel modes (walking, cycling, private car and public transport).

The following sections provide an elaboration on the definition of integrated planning. In addition to the balance between the transport environment and living environment is also described.

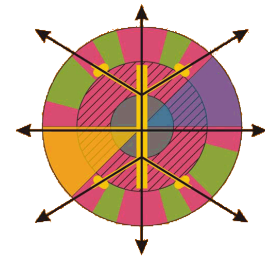


Figure 3-7: Visualisation of integrated planning

#### 3.4.1 The Connection Between Land Use and Mobility

##### Urban Density and Energy Use for Transport

A well known study by Newman and Kenworthy (1999) shows that there is a strong connection between urban density and energy use for transport (see figure 3-8): the higher the density, the lower the energy use per person. The high energy consumption of low density cities can be explained by high private car usage whereas high density cities are better suitable for non-motorised and public transport which explains their lower energy consumption.

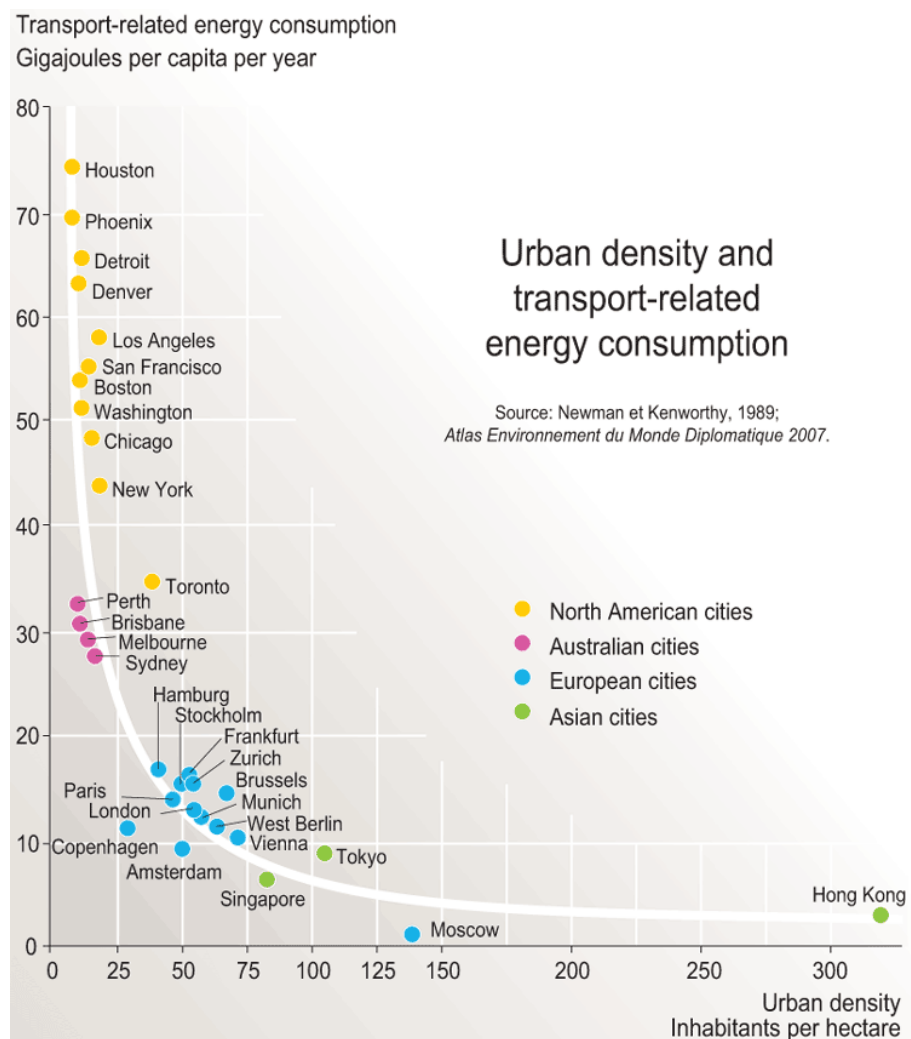


Figure 3-8: Urban density and transport-related energy consumption (Newman and Kenworthy, 1999)

## Urban Structure

One of the elements that influences mobility in a city is the structure of the urban area. This is mostly defined by the spatial distribution of population and employment (Anas et al, 1998). Martens, M. (2006) sets out three urban models: the monocentric urban structure, the polycentric urban structure, and the dispersed urban structure. These models, shown in figure 3-9, should be treated as theoretical, as real life cities will always show variations in their urban structure.

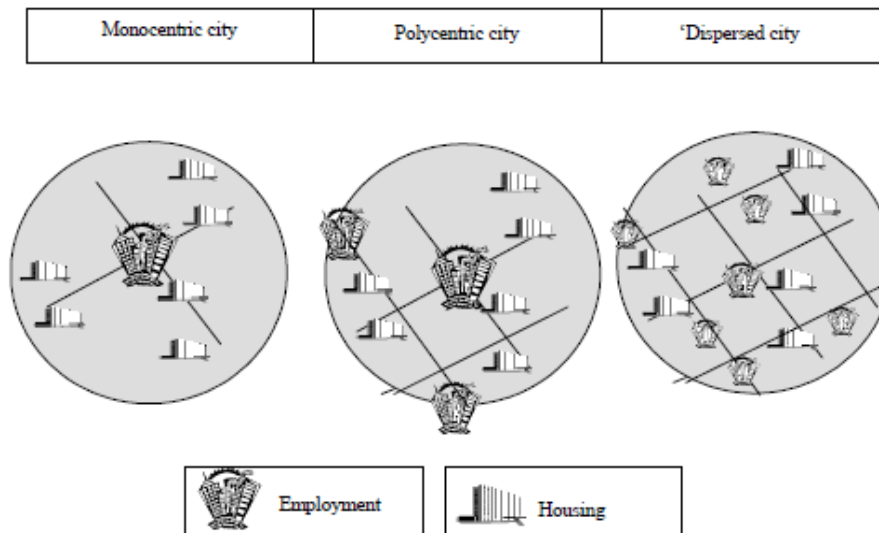


Figure 3-9: Basic urban structure models (Martens, M., 2006)

The difference between the urban structures is most dominantly defined by the spatial distribution of employment. In case of a monocentric urban structure, employment is largely concentrated in the inner city, and the resulting mobility pattern shows predominantly radial movements from the periphery towards the city centre. A polycentric urban structure sees a few large concentrations of employment in both the city centre and the periphery, and mainly has strong linear movements between these concentrations. There are no real concentrations of employment within a dispersed urban structure, employment is distributed over the entire urban area, and the mobility pattern appears mostly random. Whether a city has a monocentric, polycentric or dispersed urban structure is determined by the number centres, and the concentration of employment in these centres.

Urban structure	Concentration of employment	Dominant mobility pattern
<b>Monocentric</b>	Inner city	Radial movement towards city centre
<b>Polycentric</b>	Multiple concentrations in the core and the periphery	Linear movement between concentrations
<b>Dispersed</b>	Distributed over the entire area	Random

Table 3-2: Characteristics of the basic urban structure models

Martens, M. compares numerous European cities in his study and concludes that in small monocentric cities non-motorised modes are well represented as an alternative to car travel. In polycentric cities, public transport functions as the main alternative to car travel but its use depends on the scale of the urban area. A threshold for the size of the urban area is however not given as this depends on more than city size alone. Of the three urban structures, a dispersed city structure is generally considered the least sustainable due to the typical low density sprawl and high car dependency which come along with it. Unfortunately, a dispersed urban structure is also the most likely urban structure to develop if little or no policies and regulation on transport and land use are in place.



## Sustainability

Due to the interaction between land use and transport, each of the urban structure has its own advantages and disadvantage when it comes to sustainable urban transport. In small monocentric cities, the concentration of employment limits trip distances and thereby promotes non-motorised transport, and the urban area is confined so rural areas are kept open. But as the city grows, the distance from the periphery to the employment centre increases and the concentration of traffic into the city centre can cause accessibility and environmental problems. In addition, the distance the open space increases and land prices in the city centre are usually high. Many small and medium European cities have monocentric urban structures.

With a polycentric urban structure, the multiple centres are generally interconnected with high quality transport links. Urban development concentrates around the access points to these transport links, for example around public transport stops. Because there are more centres of employment, a polycentric urban structure limits the mismatch between housing and jobs and the high quality transport links promote public transport usage. The concept however requires large investments in infrastructure.

A dispersed urban structure distributes mobility over the urban area. Therefore there are generally no large concentrations of traffic and thus also little concentrations of its related effects, such as congestion or air and noise pollution. Land prices are usually low, which, if not controlled, can result in low density urban sprawl and leads to a high private car dependency. Dispersed urban structures are most typically seen in North American cities.

Consequently, it can be concluded that within the spatial distribution of housing and employment, proximity is a large factor in determining the sustainability of an urban structure. The distances between housing and employment, but also services, greatly determine the attractiveness of one mode over the other and the chances for sustainable urban transport within an urban structure.

## Variations in Urban Structure

Cities can have aspects of more than one urban structure. Martens, M. has made combinations of these urban structures which closer match real life cities. This has resulted in six urban enhanced structure types (Martens, M., 2006) displayed in table 3-3.

*Compact*, *network* and *dispersed* urban structures essentially correspond with the earlier described monocentric, polycentric, and dispersed urban structures, respectively. A *radial* urban structure is a combination of a *compact* and a *network* urban structure, resulting in a high density centre with development on radial transport lines. A *dispersed urban structure with a linear core* is a combination of a *network* and a *dispersed* urban structure, and has dense urban activity concentrated around transport lines which are surrounded by low density. A *dispersed urban structure with a central core* combines a *compact* urban structure with a *dispersed* urban structure, and has low density development surrounding a high density centre.







Enhanced urban structure types	
Compact urban structure	
Radial urban structure	
Network urban structure	
Dispersed urban structure	
Dispersed urban structure with linear core	
Dispersed urban structure with central core	

Table 3-3: Enhanced urban structure types (Martens, M., 2006), adapted by authors

The six urban structure types put forward by Martens, M. do not only illustrate the variation in urban structures found in cities, they also show the possibility to transform from one urban structure to another as cities grow. A growing *compact* city, faced with increasing traffic congestion due to commuting from the periphery, can for example develop towards a *radial* city to provide a better match between the distribution of housing and jobs. A typical *dispersed* city suffering from high car dependency can develop a more public transport friendly *dispersed urban structure with a linear core* by selecting areas for high density redevelopment and providing high quality public transport links between them – which roughly depicts the “New Urbanism” development currently taking place in some North American cities .

Integrated land use and transport planning are essential for environmentally, socially and economically sustainable urban development. Through influencing the urban structure, trip distances can be minimised and an environment can be created which favours public and non-motorised transport. The choice for one urban structure over the other in terms of sustainability depends on the local circumstances and on the desired situation. Key factors defined by Martens, M. include (projected) city size, the existing urban structure and mobility patterns, and the demographic and economic situation (Martens, M., 2006). When city size is concerned, maintaining a compact monocentric urban structure can be difficult for large cities due to the resulting high land prices and the also growing problems caused by the concentration of traffic in one centre. A polycentric structure, on the other hand, might not be the best choice when the urban area is rather small, as the distances between the centres may be too short for efficient public transport operation. The existing urban structure, both in terms of geographic possibilities (e.g. rivers and mountains) and historical development, are both also key factors, as is the existing mobility pattern due the current distribution of housing and jobs and the current available infrastructure. The demographic situation (e.g. wealth, workforce) is another keyfactor. If a city has for example a population largely consisting of students then a choice for a compact city structure seems rather logical, as students are very likely to use non-motorised transport due to their lifestyle and level of wealth. The economic situation is also a major factor, especially for cities in developing countries. A lack of funds may make development of high quality transport links, and therefore any polycentric urban structure concept, very challenging. In addition to that, the regulatory framework should also be considered as one of the key factors, as without it, urban planners have little control over the development of the city.

### 3.4.2 The Balance Between the Provision of Travel Modes

Over the past, many cities in the developed world have focussed primarily on developing for the private car. Although at first there were clear benefits to accommodating automobile movement, the focus on the private car also came with urban sprawl, fewer transport choices, increased noise and air pollution, as well as a decline in social, physical and economic activity on streets (NYC DOT, 2009). As these negative effects are becoming more visible, awareness has risen that the urban planning ideas of the past need to be changed.

Sustainable urban transport can only be achieved through integration of travel modes. As the choice for a transport mode partially depends on the attractiveness of the infrastructure, sustainable modes, such as walking, cycling and public transport, can only compete with private car transport if they are also well provided for. This does not mean that private car transport should be discouraged all together, but rather that a better balance should be sought between the provision of travel modes. By providing sidewalks, bicycle lanes, busways and highways, people are given realistic options in their mode of travel and additionally, through providing integrated networks, infrastructure and facilities, modes can supplement each other to alleviate the transport system to a more sustainable level. A seamless integration of the bicycle and public transport network can for example make the combination more attractive than any of those modes will be on their own.

### 3.4.3 The Balance Between the Transport and Living Environment

Roads accommodate both transport and living space, sometimes prioritising one over the other. Figure 3-10 shows the balance between the transport and living environment on roads, where an example like the German Autobahn would be on the transport environment end and a street like the Strøget in Copenhagen would be on the living environment end.



Figure 3-10 – The balance between the transport and the living environment

For both of the edges of the figure, street design can focus mostly, if not only, on just one environment. But anywhere else on the figure, a balance will have to be sought to let both environments co-exist as safely and efficiently as possible. Both environments are important but unless nearby alternatives are available it should be avoided that one environment makes it impossible for the other to exist. On roads that both have a high transport and living environment demand, neither of those environment may function well and in such a case a choice may have to be made to prioritise one environment over the other.

### 3.4.4 Key Factors to Success of Integrated Planning

Due to the strong link between land use and transport, Integrating planning is essential for environmentally, socially and economically sustainable development. The urban structure of a city determines the chances for sustainable urban transport. The choice for the most sustainable urban structure depends on many factors but in all cases adequate planning should be in place. Without adequate planning, cities are likely to see urban sprawl, long travel distances and high private car dependency. In addition, the increased cost for infrastructure like water pipes and electricity cables, and also health care and education facilities that come with urban sprawl are also unfavourable, which is particularly relevant to developing countries (GTZ, 2A, 2004b). By acknowledging the link between land use and transport, and by providing for all modes, people are given realistic choices in their transport options. They are not just limited to using (expensive) private car transport or, for the less affluent, forced to walk long distances to get to work. Applying integrated planning is economically beneficial as it allows governments, both national and local, to save money on urban development, and it allows people to spend less time and money on transport, resources which can be invested in improving the social situation. In addition, though at the moment still a lesser concern for most developing countries, the reduction in travel distances and improved chances for more sustainable modes are clear environmental benefits of integrated planning.

## 3.5 SUCCESS EXPERIENCES ELSEWHERE

For this study multiple cities from all over the world have been analysed on how they have managed to introduce sustainable urban transport. Many of these cities have applied concepts from other cities or have made combinations. The ones most relevant to cities in developing countries have been selected for presentation. The cities were categorised in *planning strategy* concepts, concepts for *complete streets and efficient transport*, and concepts for *encouraging sustainable modes*, and each example comes with a review on the key factors to success.

### 3.5.1 Planning Strategy

- Copenhagen, Denmark
- Curitiba, Brasil
- Houten, the Netherlands

#### Copenhagen, Denmark

Copenhagen is one of the best examples of how a strong vision can create a viable transportation and land use link. After World War II a steady future growth was foreseen and in order to deal with this, the progressive government introduced the so called Finger Plan in 1947. The plan uses public transport as an instrument for desired and coordinated spatial planning. It is a guiding principle to create a region with the concentration of new development along well-defined radial corridors which emanate from the city centre to historical market towns in the north and west. As a convenient and simple tool for actually realising the plans it was visualised by a hand shape (see figure 3-11), with the five fingers as the corridors and the city centre as the palm of the hand (Cervero, 1998).

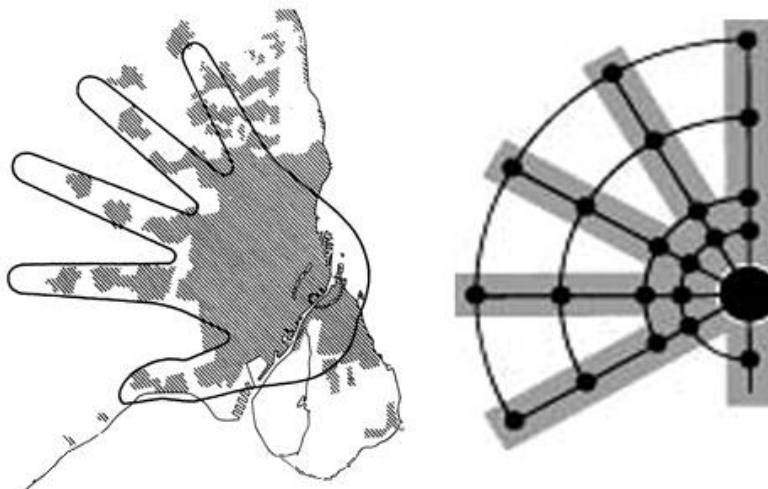


Figure 3-11: The Copenhagen Finger Plan (Ministry of the Environment, n.d.)

The concentration of new urban development along the corridors was meant to distribute the forecasted growth in a controlled way in order to enhance the viability and aesthetics of the traditional city core. A radial rail system efficiently links the historical market towns, master-planned suburbs and the city centre core along the five corridors. The focus of the plan was rail transit orientated development within the corridors and protected green wedges in between in order to preserve the balance between built-up area, and nature and recreational space. The plan has formed gradually by strict zoning laws with a top-down hierarchy in land use planning: National directives shape regional plans; which shape municipal plans; which shape local plans. However there is also bottom-up participation. Consequently most urban growth has occurred along the five corridors and most of the open space in the green wedges has been preserved. Many suburbanites live within



a reasonable distance of a rail station and as a result the majority (70%) of suburban residents heading to jobs in the central city use public transport (Cervero, 1998).

Within the city centre priority has been given to the improvement and increase of public transport and non-motorised transport networks. The central city road network has been held constant since 1970. Consequently about one third of those working in the city centre commute by public transport and most others cycle or walk to work (Cervero, 1998).

The Finger Plan has faced some challenges over the years of its existence. Alternative strategies were suggested in the last three decades of the 20<sup>th</sup> century because population growth was less than forecasted, public transport ridership declined, and automobile ownership and use were exploding. In addition, in the late 1970's municipalities allowed new industries and businesses to locate in the green wedges in order to attract employment. However, fear for car orientated sprawl through rapid suburbanisation, and loss of open space was the reason for reaffirming the principles of the Finger Plan. The government planners continued transit orientated development and mandated that all future development should be located within a one kilometre distance from existing or planned rail stations (Cervero, 1998).

### **Key Factors to Success**

The Finger Plan was adopted in an early stage of town development and was gradually developed over the years. Therefore it seems likely such a plan will be very difficult to adopt in an existing city. However, the experience of Copenhagen shows that a strong link between land use and transportation can create high shares of sustainable modes of transport and therefore avoid car independency. Furthermore, strict zoning laws can control the distribution of population growth and can preserve open spaces. Over time, the plan has proven its value, and it was firmly (re)embraced by urban planners whenever it was threatened by less sustainable developments. This fortitude in maintaining the original plan is one of the reasons of its success and an example for achieving sustainable development elsewhere.

## Curitiba, Brazil

The transport system of Curitiba in Brazil is one of the best known examples of sustainable urban transport. It is a striking example of how an emerging city can profit from sustainable transport and integrated planning. Curitiba, now home to about 2.2 million people, experienced rapid population growth over the past years (Haaren, van, 2010). Mainly due to immigration, the city's population grew at a rate of 5.7% per annum between the 1970's and 80's (GTZ, 1A, 2005a). This growth was facilitated through a strong planning strategy. To preserve the inner city and to prevent urban sprawl, the urban structure was changed from a *compact city* into a *radial city*. The city controlled urban growth through a land use master plan and development of five high density corridors (see image 3-12) (Pienaar Krynauw & Perold, 2005).



Figure 3-12: A graphic presentation of the 5 high density corridors (left) (Pienaar, et al), and the corridors in practice (right) (EMBARQ, n.d.)

Curitiba's mayor of that time Jamie had the philosophy to gain momentum for sustainable urban transport "by doing this simply and quickly at low cost" (GTZ, 1A, 2005a). Initially Curitiba intended to realise a rail-based metro system on those corridors but the limited resources ordered for more creativity. Instead a metro style bus system, now known as bus rapid transit (BRT) was developed. Buses are given absolute priority on these corridors. The system uses a combination of express buses on the corridors and circular local buses which act as feeders.

The city's priority is collective transport rather than private car transport. The transport system is competitive and allows citizens to choose their most convenient mode of transport (Taniguchi, 2001) which is proven by the high modal share of public transport. Despite having relatively high car ownership of 410 vehicles per 1000 inhabitants, public transport in Curitiba has a share of 70% for commuting trips (Pienaar et al., 2005).

Curitiba sees large income differences within the population but the BRT system is used both by the poor and the more affluent residents of the city. The closed flat fare system aids in creating social equity for the poor. Transport costs are equal regardless of the distance travelled and their access to jobs is improved. In addition the introduction of system has also created jobs, fares are collected prior to boarding at the stations, which also helps to speed up the system (Haaren, van, 2010).

Together with the development of the BRT, part of the city's centre was declared a car-free zone. To gain momentum, shopkeepers were given a voice upon the permanence of a pedestrianisation after a trial period. Local shopkeepers protested at first but quickly noticed an increase in sales, and soon shopkeepers in other areas began to demand pedestrianisation of their streets as well. The concentrations of pedestrians created through the car-free zones help to feed the BRT (GTZ, 1A, 2005a).



### Key Factors to Success

Curitiba's planning strategy proves that cities in the developing world can greatly benefit from sustainable urban transport. By integrating land use and transportation, the city has managed to control the rapid growth of the city. Curitiba's case also shows that, through using a simple and low cost approach, limited resources do not have to be a drawback in introducing sustainable urban transport.

### Houten, the Netherlands

Houten was designated as a growth area to accommodate the increase in population in the Netherlands and is now a good example of sustainable urban transport when designing a city basically from scratch. The planning strategy for the town focussed on non-motorised transport rather than on the private car. The railway station was integrated into the town centre, with shops and services on each side. Houten is surrounded by a ring road for motorised traffic with branch streets to reach the neighbourhoods (see figure 3-13). The direct routes between the neighbourhoods, and between neighbourhoods and the town centre, are accessible to non-motorised transport only (CROW, 2006).

The high convenience for non-motorised modes and the integration with the railway station have resulted in high shares for sustainable modes. Despite having the option to drive readily available – 94% of the households in Houten owns at least one car – cycling and walking respectively account for 42% and 21% of all trips shorter than 7.5 kilometre (Gemeente Houten, 2011). Because of the success, an extension is currently being developed according to the same concept.

### Key Factors to Success

Due to the scale of Houten as a town, a direct copy of the concept is not possible for most cities in developing countries. The concept can however be put into practice with the realisation of new neighbourhoods or with the redevelopment of existing areas. If allowed by the street pattern, a combination of closures or diversions could be used to create traffic calm areas, resulting in a comfortable and friendly environment for walking and cycling. By maintaining inter-neighborhood pedestrian and bicycle routes, non-motorised transport modes are given an advantage of private car use while roads surrounding the area can still allow motorised vehicle access, similar to the ring road of Houten. Because of the flexibility of grids, this concept can easily be implemented to cities or areas with a grid structured street network. Integrating the pedestrian and bicycle networks with high quality public transport stops in or along the area can result in a further advantage of sustainable transport modes.



Figure 3-13: Networks in Houten (Gemeente Houten, 2011). The inter-neighborhood connections (red, yellow and orange) are only accessible for non-motorised modes

### 3.5.2 Complete Streets and Efficient Transport

- Houten, the Netherlands
- New York City, USA

#### Houten, the Netherlands

Together with a successful planning strategy, the city of Houten, in the Netherlands, is provided with infrastructure for all modes of transport: non-motorised, motorised and public transport. Within residential areas non-motorised transport has priority, and on a ring road around the residential areas, priority is assigned to cars. Bicycles are not allowed on the ring road and bicycle routes going outside the residential area can cross the ring road safely through bicycle tunnels. The aim of this traffic model is to encourage non-motorised and public transport in favour of private car use (Gemeente Houten, 2011).

“The strength of Houten's traffic system lies in its persistent policy during the last 35 years in considering cyclists and pedestrians normative in residential areas.” (Gemeente Houten, 2011) A large part of the city centre is pedestrian only. In the rest of the residential area, local car traffic is mixed with cyclists. This mix creates a situation in which motorised traffic becomes aware of non-motorised traffic, and due to the presence of pedestrians and cyclists, the speed of motorised vehicles generally is low. There is a central backbone for pedestrian and bicycle traffic towards the city centre. At intersections between this backbone and streets with motorised traffic, cyclists enjoy right of way over cars. As a result of this unique concept, the share of cycling is 42% for distances shorter than 7.5 kilometre. The share of walking is 21%. Furthermore, road safety is twice as high compared to other Dutch towns (Gemeente Houten, 2011).

Some parts of the bicycle network in the residential areas consist of so called cycle streets, these are extra wide (3.5 meter) cycle lanes, on which cars are allowed at reduced speed (30 km/h). In order to make it obvious that bicycles have priority and cars are just “guests”, the surface of these streets is coloured red. The red colour is generally used for all cycle infrastructure in the Netherlands (I-CE, 2009) and is therefore clearly recognisable (see figure 3.14). Via cul-de-sacs and cycle streets, each single house can be reached by car. Cyclists and pedestrians can cross the whole residential area through short and direct routes, car traffic will have to travel via the ring road. As result, cyclists are often faster than cars on trips within Houten and the only motorised traffic within residential areas is local traffic.



**Figure 3-14: A cycle street in Houten. Cars are allowed, but treated as “guests”, cyclists have priority (I-CE, 2009).**





All the streets are designed in a way such that it is obvious and logical to all road users how the street has to be used (e.g. which speed is allowed and which kind of other road users can be expected). This is partly done through colours and materials of the infrastructure. One example is that many streets consist of cobblestones instead of asphalt which influences the perception of speed, and therefore slows down motorised traffic. Another example is the already mentioned cycle street (Gemeente Houten, 2011).

Besides extremely well developed cycling infrastructure, Houten is also provided with good bicycle parking facilities. These parking facilities are sometimes even covered with a roof, and are mainly located at the edge of the city centre, nearby shops and other services, and also at bus stops and railway stations. The parking facility at the railway station is for example well guarded and bicycles can be parked for free. Opening hours are based on the departures and arrivals of the first and latest trains. As a result 60% of all train passengers cycle to the railway station, which is twice as high compared to other Dutch cities (Goudappel Coffeng, n.d.).

Furthermore, there is good public transport available in Houten with segregated bus lanes on the ring road and priority for buses at intersections with traffic signal. The train station is located right in the middle of the town, close to the shopping area. The bicycle parking facilities complement the integration of the bicycle network with the public transport network, and due to that the citizens of Houten use public transport facilities more, compared to other similar cities (I-CE, 2009).

### **Key Factors to Success**

A residential area with priority to non-motorised transport and a limitation on motorised traffic can improve road safety significantly. A well developed bicycle network with excellent infrastructure and facilities can result in high shares of cycling. Through the integration of the bicycle and public transport network, cycling can be used as a feeder for public transport, and the use of public transport can be increased. Without having to ban private cars entirely, the use of cars can be discouraged. Instead of segregating motorised and non-motorised modes everywhere, the mix of cyclists, pedestrians and local motorised transport in residential areas can help to increase the awareness of each other's presence and the respect towards other modes. A major success factor for Houten has been the fortitude in this approach for over 35 years.

### **New York City, USA**

New York City is a perfect example of a North American city realizing that street design focused primarily on motor vehicle movement is not sustainable. Since the inauguration of Mayor Bloomberg, New York City has taken a move towards more sustainable urban transport, and started to pay more attention to pedestrians and cyclists in the streets. The Department of Transportation (DOT) aims to develop streets that can be enjoyed by all users; by recreating the public realm through public plazas, complete streets, comprehensive design standards, safer street design for seniors and students, weekend closures of streets, a public art program, and using street materials and furniture more carefully (NYC DOT, 2009).

The DOT acknowledges the benefits of cycling for a more sustainable urban transport system. Cycling however, was not part of the New York City culture and it was especially not a mode of choice for commuting. Cycling was considered unsafe and only suitable for leisure in a car-free environment. To address the safety issue, the DOT made simple but effective changes to city streets. As with many recent DOT projects, bikeways and new plazas were laid down using inexpensive materials and techniques, allowing for a rapid build-out. A change in markings, signs, epoxy gravel and the use of planters to physically segregate traffic was often enough to make a world of change. Parking protected bicycle paths for example only require a change in markings but have helped to reduce bicycle, pedestrian and vehicular injuries by up to 48% (NYC DOT, 2009).

Thanks to the use of inexpensive materials it is much easier for the DOT to run a pilot project to gain momentum for a permanent redesign. If a project proves successful, a more polished and permanent reconstruction can be done but a design can also be easily altered if a project shows undesired effects. A renowned example where a pilot project with inexpensive materials has been successful is the Broadway Boulevard project.

### Key Factors to Success

The examples in New York show that it is not always required to do an extensive – and often expensive – study before a redesign of a street. A ‘quick win’ approach, through creating complete streets with the use of pilot projects and inexpensive designs, can sometimes be more effective as such an approach consumes less time and resources. The combination of pilot projects and inexpensive designs allows for quick implementation, offers great flexibility and is a valuable factor in gaining momentum among the public.

#### Box 1 – Bicycle Design Examples

New York City uses three categories of bike facilities: segregated bike paths, on street bike lanes and shared lanes (NYC DOT, 2010c). This last category is shared with other road users and marked with ‘sharrows’ to indicate to best position on the road for cyclist and to alert other users of cycling presence.

Turning conflicts are a well known cause for accidents between motorised vehicles and cyclists at intersections. Such conflicts can often be solved by introducing signals with separate phases but signal changes are a costly option. The New York City DOT engineers have come up with a solution worth mentioning. They introduced shared turn bays to safely mix cyclists and turning vehicles without having to change the signal, thus saving costs. The layout of a shared turn bay points out to both cyclists and motorists that they enter a shared zone, and therefore should take account of each other. Even at intersections where no signal is present (a situation comparable to a signal showing a green light), a similar solution could help reduce turning conflicts between cyclists and motor vehicles.



Figure 3-15: A shared turn bay with a ‘sharrow’ symbol (NYC DOT, n.d.)



### Box 2 – Broadway Boulevard

One of the most striking examples of a successful change to a more complete street is the Broadway Boulevard project. On this famous stretch of road, the DOT has removed lanes for motorised traffic to make way for a pedestrian boulevard and a segregated bikeway. At Times and Herald Square, the street has even entirely been closed for motorised traffic resulting in large pedestrian plazas. At first, the proposed reconstruction was met with heavy resistance from the local shop owners who feared removing car access would result in a drop of income. Mayor Bloomberg however decided to put through and in May 2009 Broadway was closed off for motorised traffic at Times and Herald Square for a pilot project to last at least until the end of the year. A combination of barrels, markings and signs together with inexpensive plastic patio furniture resulted in vehicle free plazas, which were immediately made use of by pedestrians. As the number of pedestrians grew, and with it the local revenues, shop owners were quickly pleased. A survey by the Times Square Alliance, a business group, showed that about 75 percent of residents and office workers were “satisfied with their experience” opposed to less than half before the implementation (New York Times, 2010). In addition, the DOT has recorded a drop in pedestrian injuries of 35 percent and a decrease in injuries to drivers and passengers of 63 percent (NYC DOT, 2010b). This was reason enough for mayor Bloomberg to announce on 11 February 2010 that the pilot project was to be made permanent and by now the barrels have been replaced by more appealing planters and sturdy metal furniture has substituted its plastic counterparts.

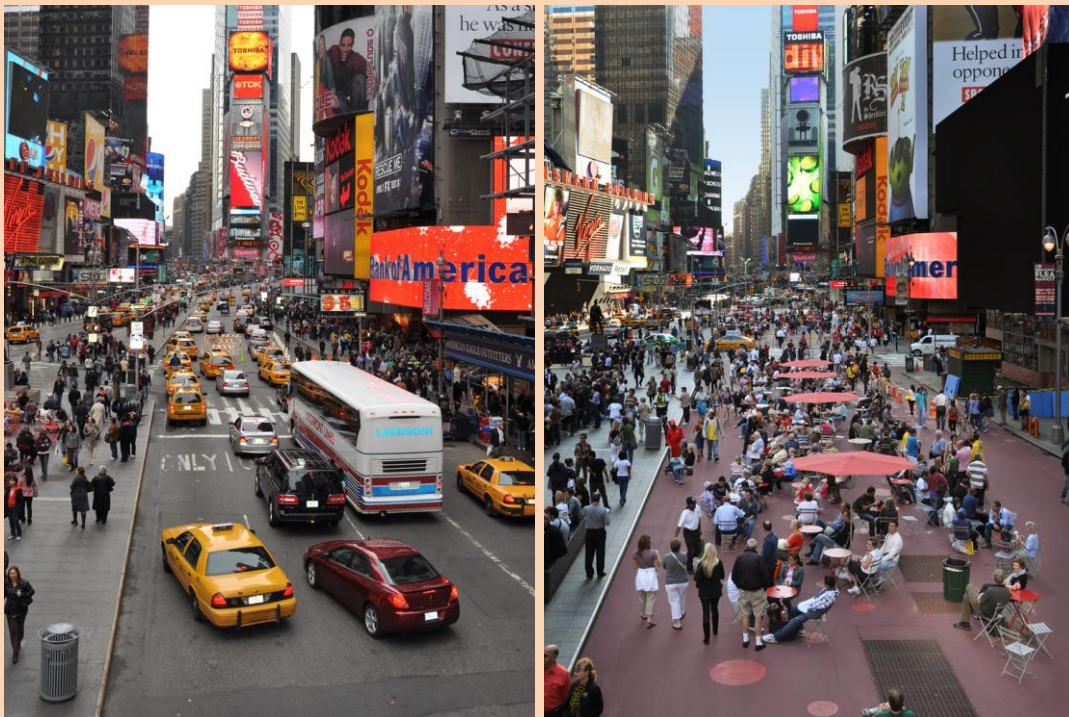


Figure 3-16: Broadway in 2008 (left) and 2010 (right) (NYC DOT, n.d.)

### 3.5.3 Encouraging Sustainable Modes

- Bogotá, Colombia
- Copenhagen, Denmark
- London, UK
- New York City, USA
- Singapore, Singapore

#### Bogotá, Colombia

In 1998 Bogotá, the capital of Colombia, had to deal with major urban development problems. According to former mayor Enrique Peñalosa: “Bogotá was a typical large city in a developing country, with terrible traffic jams and a feeling of hopelessness among the population. There were almost no public spaces, parking bays had been carved into most sidewalks or cars simply parked on sidewalks. As car numbers grew, more flyovers were built, and the JICA (Japanese International Cooperation Agency) even proposed a US\$550 million elevated highway through the city centre (see image 3-17). Public transport was totally chaotic, with mostly individually owned buses racing crazily against each other for passengers, blocking traffic, dumping passengers in the middle of main roads. Bicycle use was extremely dangerous and the number of cyclists insignificant” (I-CE, 2009). Furthermore nearly 70% of trips shorter than 3 kilometres were made by car (GTZ, 1B, 2004c).



**Figure 3-17: Artist impression of proposed but never constructed flyovers in Bogotá (Peñalosa, 2006)**

When Enrique Peñalosa became mayor in 1998 his vision was clear: “Serve people, not cars”. He envisioned a high dense city with viable low-cost, high-frequency public transport, an increase in non-motorised transport, improved public spaces and a restrictions on private car use (I-CE, 2009). The main aims were to reduce congestion, improve quality of life and increase productivity (CCAP, 2011)

Peñalosa rejected the plans for a metro system and elevated highways because it was unaffordable and ineffective, and it would only serve mobility for a minority, not for all the citizens. Instead of this, the Bus Rapid Transit (BRT) TransMilenio has been realised which significantly improved the quality of life by reducing traffic fatalities (up to 90%), air pollution (up to 40%) and travel times (32%). Furthermore it has attracted citizens of all income levels. Twenty percent of the bus users have shifted from private cars. TransMilenio has been realised in only two years time and moves more passengers at only 5% of the costs of a comparable railway

system. Key to the success of the BRT system is the integration with non-motorised transport, feeder buses and public spaces which make the system accessible to everyone (Asian Development Bank, 2008).

In addition to the BRT system, more than 300 kilometres of segregated bicycle lanes have been built. As a result the share of the population which uses bicycles for their daily transport needs has risen from virtually zero to more than 4.5%. Bicycle parking facilities have been integrated into bus stops and terminals which has boosted up ridership with 4% and has reduced the need of feeder buses. Hundreds of kilometres of quality sidewalks were built, roads were narrowed and street crossings were brought up to grade, signalling to drivers



that pedestrians rather than cars, have priority. Some of the city centre's main avenues became exclusively for pedestrians. Furthermore over 1,200 parks and plazas have been developed (I-CE, 2009).

### Public Events

Besides physical measures, also public events have been introduced in order to raise sustainable transport awareness, encourage non-motorised transport, improve quality of life and attract social interaction. Every Sunday and during holidays, 120 kilometres of main streets are closed off for motorised traffic for a period of seven hours (7am-2pm) for the so called Ciclovía. During this period the street is open for citizens to walk, jog, cycle, rollerblade and get together (see figure 3-18). Nowadays the event has more than 1.5 million weekly participants of all ages and income levels (GTZ, 1A, 2005a). Former mayor Peñalosa calls the Ciclovía route a “paved beach where people sunbathe, dance, practice yoga and sip juice in the shade” (New York Times, 2008). The public event transforms busy and dangerous streets into attractive and safe areas for socialising and relaxation. As a result weekday drivers discover the bicycle, which they can easily and safely practise on the street, and become more aware of cyclists when they drive (I-CE, 2009).



Figure 3-18: People enjoying the Ciclovía in Bogotá (Colombia Bogota, 2010)

Another event is the car-free day. Since 2000, every year on the first Thursday of February the citizens of Bogotá go to work and school by public transport or bicycle and leave their cars at home, and people meet as equals in public transport or on their bicycles (GTZ, 1A, 2005a). In order to involve people in sharing their thoughts on mobility, there is a so called “wall of ideas” on car-free days on which people can post their ideas (GTZ, 5E, 2010a).

### Restrictions on Car Use

Together with providing and encouraging public transport and non-motorised transport, private car use is discouraged through restrictions. Bogotá has access restrictions based on the license numbers of private vehicles in order to reduce congestion and encourage alternative modes of transport. Every day 40% of all cars are not allowed to use the city centre streets during peak hours, each vehicle has this restriction two days in a week. This restriction has increased travel speed with 20%, reduced travel times with about 48 minutes and reduced pollution. Furthermore, fuel consumption went down with 10.3% (GTZ, 1A, 2005a). Parking fees have been raised and gasoline tax has been increased with 20% (GTZ, 1B, 2004c). 50% of the revenue is used for maintenance and development of new infrastructure, and the operation of TransMilenio. This way the private car owners (19% of population) finance part of the TransMilenio system that has a 72% utilisation by the low income citizens (GTZ, 1D, 2004a).

All measures together have led to a modal share of 71% for public transport in all daily trips in 2000. In the same year non-motorised transport had a share of 15%, private motorised vehicles had a share of 12%, and other modes had a share of 2% (GTZ, 3E,2005b).

### **Key Factors to Success**

The choice for a people oriented strategy instead of a car oriented strategy, has made Bogotá one of the best examples of introducing sustainable urban transport and improving the quality of life. The combination of encouragement and discouragement proves to be effective, and the combination of constraints on car use and the provision of infrastructure and facilities for desired modes has shown to increase the use of the latter. Integration between the different modes can increase effectiveness even further. Additionally, through the provision of infrastructure and facilities for all kind of modes, mobility for everyone can be achieved, instead of only serving a minority. This can improve equity within a population, especially through improved accessibility for the poor. Events and the provision of attractive public spaces can improve quality of life and even realise social cohesion among the population since people of all income classes can move shoulder to shoulder. The TransMilenio system has proven that it is possible to create an effective and relatively inexpensive BRT in a short period of time. Bogotá shows that a city in a developing country can be well able to (partly) finance infrastructure, facilities and mass transport systems through economic instruments.

### **Copenhagen, Denmark**

In order to prevent Copenhagen from becoming strongly depending on car use and to protect quality of life in the city centre, the government encouraged sustainable modes of transport. This has been done through a strong link between land use and transportation, providing infrastructure and facilities for non-motorised transport, constraints on auto use and through integration between the different modes of transport.

Through transit orientated development, suburbs and the city centre are efficiently linked by a radial rail system and travelling by train is therefore inviting. Also the city centre is served by public transport, both rail and bus services. Buses benefit from preferential signalization and dedicated lanes. Furthermore the expansion and diversification of public transport encourages the use of this mode. Non-motorised modes of transport, mainly walking and cycling, was seen as an alternative travel opportunity and as feeder for public transport.

Since the early 1960s Copenhagen began to improve the conditions for pedestrians. In 1962 the city opened the first pedestrian street, Strøget (see figure 3-19), which is the longest car-free street of Europe. It quickly became the city's main shopping street, with about 55,000 pedestrians during busy summer days (Cervero, 1998). After the success of Strøget many other streets were converted to car free or pedestrian oriented streets. Today Copenhagen has one of the largest and most successful pedestrian networks. The pedestrian oriented streets attract sidewalk vendors, musicians, open air markets and street festivals and the number of people engaged in social activities in the city centre increased by a factor 3,5 (GTZ, 3E, 2005b). These results prove the city has changed its city centre from car oriented to people oriented.





Figure 3-19: Strøget in Copenhagen

Since the mid 1980s Copenhagen has been expropriating car lanes and kerb side parking spaces for exclusive use by bicyclists. Between 1970 and 1995 the total length of bicycle lanes increased from 210 to more than 300 kilometres. During the same period the number of trips made by bicycles rose with 65% (Cervero, 1998). Nowadays 55% of the citizens cycle to work (DAC, 2009).

*“The citizens of Copenhagen are neither cycling fanatics nor environment activists - they simply use a bicycle as a means of transport because two wheels get them quickly and safely from A to B”* (DAC, 2009)

Providing basic infrastructure and facilities for non-motorised transport for accessing public transport stops encourages people to walk or cycle. In 1994, a survey of access trips to fifteen suburban stations showed that walking was the dominant mode of transport for distances up to 1 kilometre from stations (38-100%). For distances from 1 to 1.5 kilometres from a station, cycling was the dominant access mode (40%). Distances beyond 1.5 kilometres were dominated by motorised traffic, with buses carrying 40-50% of the access trips. Even at distances of 2.5 kilometres from stations, cycling access (30%) was still overruling car access (19%) (Cervero, 1998). In Copenhagen the use of bicycles as feeder for public transport is also encouraged through permitting bicycles in public transport vehicles (GTZ, 3B, 2005c).

#### Constraints on Private Car Use

In addition to the improvement of the conditions for non-motorised transport and public transport, traffic management was used in order to control car traffic. The main aim of traffic management was not to remove cars from the city centre, but to ensure travel growth does not translate into increased car use. One of the measures to achieve this is that the total capacity of the central city road network has been held constant since 1970.

Over the past few decades parking supplies have been reduced by 2-3% per year, on-street parking is for example re-allocate to the periphery. Parking fees fluctuate to ensure prices are high enough to induce rapid turnover and are highest in areas well served by public transport.

Furthermore the Danish tax system contributes to controlling car ownership and use. Taxes and fees roughly triple the cost of purchasing a private vehicle, and increase with vehicle weight and engine size in order to discourage large, fuel inefficient vehicles.

The combination of encouraging the use of public and non-motorised transport and constraining the use of private cars has resulted in a relatively low amount of cars per 1,000 inhabitants, and in 1998 the amount of kilometres driven per year had fallen by about 10% below the 1970 level (Cervero, 1998).

One of the strengths of Copenhagen's strategy is that the plans have been gradually implemented over 40 years of time. Implementing drastic changes all at ones can provoke overreactions (GTZ, 3E, 2005b) Copenhagen's gradual approach, of for example pedestrianising about one street a year, allows the impacts to be studied and mitigated during the process (ITDP, 2006), which makes it easier for the city and its inhabitants to accept the change and adjust to it.

### Cycle Chic

In the past the bicycle has served to liberate the working classes, particularly women. However, in the post-war years the bicycle was relegated to being merely for leisure, fun or sport. Cycle Chic is a blog started by the Danish journalist Mikael Colville-Andersen on which photos are posted of people cycling. Cycle Chic aims to redress the bicycle culture by showing how the bicycle can be an integral, respected and feasible transport mode. The blog wants to show cycling is a chic activity, for everybody, for daily utilitarian use, that no special clothes are needed and that it can play a vital role in increasing the quality of life in cities. In order to achieve this image, Cycle Chic combines style and fashion with bicycles by photographing people riding in regular and fashionable clothes (see image 3-20). The blog has led to a worldwide popular fashion trend and the number of blogs and websites inspired on Cycle Chic has grown explosively (Cycle Chic Copenhagen, 2007).



Figure 3-20: A typical Cycle Chic image (Cycle Chic Copenhagen, 2007)





### Key Factors to Success

Copenhagen is a good example of encouraging sustainable modes of transport through providing a combination of provisions of infrastructure and facilities for non-motorised and public transport and simultaneously constraining car use. With this, car ownership and use can be held low and shares of sustainable modes of transport high.

Furthermore it proves non-motorised transport can play an important role as feeder for public transport when networks are linked. The most important lesson is that desired modes of transport can be encouraged by creating a situation in which these are the most convenient and natural. Clever promotional campaign can improve the image of cycling and other sustainable modes, as Cycle Chic is showing in cities all over the world. In addition also prominent people can contribute to an improved image of a particular mode of transport. Copenhagen's gradual implementation seems to be a successful approach for both a city and its inhabitants to accept and adjust to changes.

### London, United Kingdom

In 2002 congestion levels in London were the highest in the United Kingdom and were amongst the highest in Europe. It was estimated that the city lost between three and seven million dollars per week due to loss of time (GTZ, 1F, 2010b). The Congestion Charge Zone was introduced in 2003 with the intention to provide a transport system with more reliable travel times and to generate revenue for operating public transport. By law all revenue raised by the charge, has to be invested in further improvements of transport in London (TfL, 2011). The Congestion Charge Zone was extended to the west in 2007 but in early 2011 this extension, which made the zone nearly twice the size of the original area, was removed again on act of the newly elected major due to a lack of public support. Transport for London (TfL) is responsible for the transport system of Greater London and manages the London Congestion Charge.

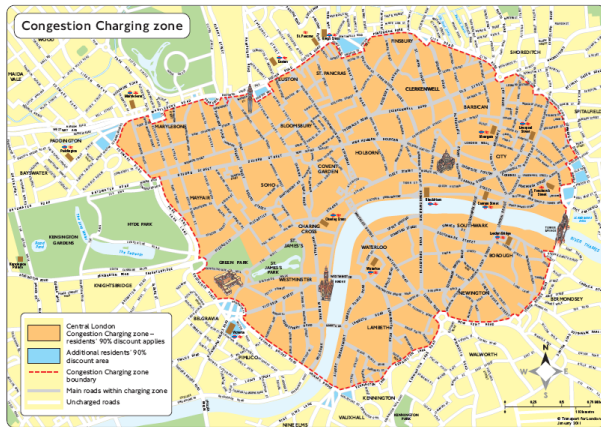
A payment of £10 is mandatory for every vehicle travelling within the zone between 7 am and 6 pm and is in operation from Monday to Friday. The charge has to be paid electronically and is enforced through an extensive network of Automatic Number Plate Recognition (ANPR) cameras. Residents receive a 90 percent discount and several types of vehicles have a 100 percent discount, for example environmental friendly cars (e.g. with electric and hybrid engines), motorcycles, vehicles with over 9 passenger seats and vehicles owned by people with disabilities (TfL, 2011).

### Box 3 - Prominent People Cycling

Cycle Chic links fashion and style with cycling and focus mainly on ordinary people. Prominent people can also play an important role in improving the image of cycling. In 2002, mayor Antanus Mockus of Bogotá promoted cycling by riding himself on one of Bogotá's new cycle routes. Also in 2002, the head of the Surabaya City Council and leading officials cycled during a car free day (GTZ, 1E, 2006). In the Netherlands, Minister Donner, Minister of Domestic Affairs and Kingdom Relations cycles to parliament almost every day. In Budapest, the capital of Hungary, demonstrations are held in order to promote the everyday use of cycling. Hungarian President László Sólyom has taken part in these demonstration in 2010 in order to show his support for cycling in Budapest (DAC, 2010). Besides promoting cycling, these kind of activities bring politicians closer in touch with citizens and confirm cycling is not only for the poor.



Figure 3-21: Minister Donner on his daily trip to parliament (RTV Drenthe, 2010)



**Figure 3-22: Map of the Congestion Charging Zone in London (TfL, 2011)**

#### Box 4 – Economical Instruments

Economic instruments can be effective in discouraging both motorised vehicle ownership and use, encouraging a shift to public or non-motorised transport, and encouraging lower emission technology use and innovation. Beside this, economic instruments can raise revenues which can be used to invest in sustainable modes of transport. There are three types of economic instruments, namely charges and taxes, subsidies, and auctions and bidding schemes. Economical instruments like fuel charges and parking fees can be used to create a situation where the affluent minority of the population who owns a car, finances part of the infrastructure and facilities for the majority of the population who cannot afford a car, and uses public transport, walks and cycles (GTZ, 1D, 2004a).

Prior to the implementation of the congestion charge, London improved bus services by nearly doubling its fleet with the introduction of new and comfortable buses, and by introducing a more frequent schedule. Roads were repainted to include dedicated bus or bicycle lanes, pedestrian crossings were improved and some streets were closed to improve the safety and comfort of pedestrians and cyclists (GTZ, 2009).

While traffic was initially reduced in the city centre with about 20% (GTZ, 1F, 2010b), congestion among private vehicles has now risen back to pre-charging levels. TfL claims congestion would have been worse without the charge. Partly, the rise in congestion is due to widespread maintenance and thanks to traffic management measures which favour pedestrians, cyclists and public transport. During charging hours there has been a 6% increase in bus passengers and cycling levels in the Congestion Zone have increased by 66% since the introduction of the charge (TfL, 2010). The net revenue of the Congestion Charge in the financial year 2009-2010 was £148 million (TfL, 2011).

#### Key Factors to Success

Although economical instruments may not solve congestion problems in the longer term, it is an effective way to gain revenue which can be used for further improvement of the transport system. A situation can be created in which the users of unsustainable modes of transport partly finance the infrastructure, facilities and services of sustainable modes of transport. Furthermore the case of London shows a combination of improvements for public and non-motorised transport and constraints on car use can actually increase the shares of the desired modes of transport. Although the system in London is very extensive, also less expensive and less complex systems are possible.



### Box 5 – Road and Congestion Pricing

Road and congestion pricing is a form of demand management. The aim is to reduce the overall traffic volume in order to reduce or even avoid congestion. It also reduces the need to add new road capacity. According to GTZ's SUTPSourcebook there are two types of road and congestion pricing:

- *Cordon pricing or area licensing* where motorists are charged for entering a designated areas at defined crossing points of a cordon boundary, or pay a charge for driving within the area that is subject to road pricing;
- *Time-dependent tolling* of individual routes where motorists are charged for using specific roads or road lanes.

Technically road and congestion pricing can be implemented in different ways at various levels of complexity:

- *Purchase a paper permit (vignette)* where for each vehicle that is used within the controlled area, a permit has to be purchased and displayed at the windscreen.
- *Manual toll station* where motorists have to pay a road charge on entering the priced area.
- *Electronic charging systems* where vehicles are equipped with electronic tags that allow the automatic identification of vehicles at nonstop tolling stations (GTZ, 1D, 2004a).

### New York City, USA

In addition to providing safe infrastructure for pedestrians and cyclists, New York is doing a lot to encourage sustainable modes. Walking was already a common sight in the streets and the Department of Transportation (DOT) is therefore focusing its efforts on encouraging cycling. As explained before, cycling in New York was however considered unsafe and only suitable for leisure. While streets are being redesigned to address the safety issue, at the same time a number of persuasive measures are used to sensitise the public.

Cyclists, pedestrians and cyclists are being educated through campaigns and brochures, teaching all road users how to pay attention to each other and how to move safely and efficiently. The DOT for example explains how cyclists can avoid 'dooring' when riding along parked cars, provides tips on wearing helmets and lights, and shows how to securely park a bike (NYC DOT, 2010c).



Figure 3-23: An image of the LOOK campaign to increase awareness among motorists about the presence of cyclists in New York (NYC DOT, n.d.)

Cycling is being made easy for potential riders by providing free maps, both on paper and online. The maps show the bike facility categories and the online route planner lets you choose between the fastest and the safest route so cyclists can plan their trip according to their liking (NYC DOT, 2010c).

New York also frequently plans events to promote non-motorised transport and cycling in particular. The city facilitates events such as Summer Streets, which was inspired on Bogotá's Ciclovía, and Bike to School, where DOT staff accommodates children on their first bicycle ride to school (see figure 3-24) . These events allow people to safely try cycling in the streets of New York and the positive experiences help to improve the image of cycling and to encourage ridership.



**Figure 3-24: Children participating in a Bike to School event (NYC DOT, n.d.)**

As a result of the encouragements, ridership in New York has increased by 13% between 2000 and 2009 and serious injuries among cyclists have fallen from 397 in 2000 to 100 in 2009, a 75% decrease (NYC DOT, 2010a).

### **Key Factors to Success**

The experience in New York shows that even a city which was not cycling minded can make a shift towards a higher use of non-motorised transport.



## Singapore

The case of Singapore shows another example of how economic instruments can be used to achieve a more sustainable transport system. Today, Singapore uses an electronic road pricing system (ERP) to discourage the use of private car transport and stimulate public transport ridership.

The city-state experienced rapid motorisation in the 1970's and 1980's. To avoid widespread congestion and pollution problems the Singapore Land Transport Authority (LTA) started with transport demand management. This transport demand management was based on three basic tenets (GTZ, 1D, 2004a):

- To deliver an effective land transport network that is integrated, efficient, cost-effective and sustainable.
- To plan, develop and manage Singapore's land transport system to meet the nation's needs, enabling growth; inclusion of the poor.
- To develop and implement policies to encourage commuters to choose the most appropriate mode of transport.

The LTA introduced an area licensing scheme in 1975. This restricted zone consisted of an imaginary cordon around the city with 33 entry points. A paper license, clearly visible on the windscreen, was required to enter the zone, which was checked by police stationed at sentry huts at the entry points. Licenses, daily and monthly, were available at post offices, convenience stores, petrol stations and at special booths along to route towards the restricted zone but were not for sale at entry points. At first licenses were only compulsory on weekdays and Saturday between 7.30 am and 10.15 am but in 1989 this was extended to the afternoon between 4.30 pm and 7.00 pm. In 1994 a whole day charge was introduced with differentiation in price for peak and off-peak hours (GTZ, 1D, 2004a). At the same time, the LTA gave financial support to its mass transit system to provide a high quality alternative to private car transport.

In 1998 the ALS, which did have some difficulties, was replaced with ERP. The increase of licenses made the ALS confusing for the users and drivers could make unlimited entries throughout the license period, which was not in line with the initial objective to make users choose their most appropriate travel mode for each trip. Furthermore, it would be fairer to let drivers pay for each time they actually use the area. The ERP has been applied on the major city axes, arterial roads and expressways. The gantries with automated payment and camera enforcement ensure uninterrupted traffic flow. The LTA differentiates prices according to time of day, vehicle size, congestion level and the place of the road to encourage motorists to choose when, where and whether to drive or to use other modes. The revenue generated by the ERP exceeds the annual capital and operating cost of road network and it meets the expenditures of the public transport system. The money is invested in infrastructure, so the benefits are immediately perceived by the users, and in public transport, to improve options for modal shift.

Besides road pricing, Singapore also restricts vehicle ownership through the Vehicle Quota System (VQS). This system is in effect since 1990 and allows the government to decide the acceptable growth rate of vehicles (1.5% annually in 2010) through a bimonthly auction system of certificates (LTA, 2011). The revenue of the VQS is also used to invest in public transport.

As a result of the measures, motorised traffic in Singapore was reduced by 50% and private car travel even by 75%, average traffic speeds improved from approximately 18 to 30 km/h. The share of public transport improved from 46% in 1975 to 67% in 1998 (Hook and Wright, 2002). Thanks to the investments in public transport, this public transport became a respectable and acceptable alternative.



### **Key Factors to Success**

Singapore shows how economic measures can be used to achieve a modal shift from private car use to public transport, and still be relatively well accepted by the public. The revenue generated by the Area Licensing Scheme, the Electronic Road Pricing and the Vehicle Quota System allowed large investments into Singapore's Transport system. While an electronic road pricing system has its clear advantages, capital costs are extremely high which make it a hurdle for cities in developing countries. Starting off with a simple paper license scheme may be more feasible for cities low on budget. The revenue generated can immediately be used to invest in the city's transport system and can be used to eventually change to an electronic road pricing system.

The situation of being both a city and a state has made it easy for Singapore to implement its VQS but, in an adapted form, the concept can also be applied to an urban area within a larger country and serve as a powerful instrument to control rapid motorisation. Through limiting the number of motor vehicles, such a system can make sure that motorisation keeps pace with what the city can handle and will help to prevent widespread congestion and pollution problems.

### **3.5.4 Key Factors to Success of Experiences Elsewhere**

Success experiences from all over the world have shown that the following factors can be key to the success of achieving sustainable urban transport:

- Integration between land use and transportation;
- Integration between the transport networks, and different modes of transport (especially the bicycle as feeder for public transport);
- Willingness and fortitude of politicians, mayors and governments;
- Quick wins and pilot projects, which provide the opportunity to try things;
- A combination of encouragement of desired modes of transport and discouragement of undesired modes of transport;
- Economic instruments, especially to gain revenue to invest in the transport system;
- The acknowledgement of non-motorised transport as important modes within the transport system;
- Gradual implementation which provides the opportunity to evaluate and for gaining support.

## 4 EXISTING SITUATION

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*In this chapter an overview will be given of the most important current aspects on land use and transportation, which is done briefly for cities in Sub-Saharan Africa, and in more detail for Kampala. The overview of the existing situation is divided into the three categories, planning strategy, complete streets and efficient transport, and encouraging sustainable modes, which will address the current situation on paper, in the streets, and in the minds, respectively.*

## 4.1 PLANNING STRATEGY

### Past and present



Besides the situation *in the streets* and in *the minds*, the transport situation should be assessed *on paper*. This section of the report will address how Kampala and other Sub-Saharan African cities have developed, and what plans are currently in the pipeline which will influence urban development in the near future. Furthermore, this section will describe the existing regulatory framework which shape the development of land use and transport.

### 4.1.1 Urban Development in Sub-Saharan Africa

In East Africa, most countries have only one or few cities of commercial importance. Due to their commercial importance, and the corresponding employment options this offers, these cities see large immigration of people from the surrounding rural areas. The cities therefore experience rapid population growth, exceeding the managing capacity of local governments.

	Dar es Salaam	Kampala	Nairobi
Population	2.2 (1994) 4.3 (2008)	1.6 (2008)	2.1 (1996) 2.7 (2008)
Annual growth	5%	3.7%	2.2%

Table 4-1: Population and growth in Sub-Saharan African cities (The World Bank, 2005b, extrapolated to 2008) and (Popsec 2010)

As planning policies are lacking, or are not adequately implemented, informal settlements emerge around the city, ranging from slum neighbourhoods for the poor, to large housing estates for the wealthy. Both result in low density dispersed development, spreading the city beyond its borders. Streets develop more or less organically, especially in the poorer unplanned areas. As neighbourhoods grow, such streets are not able to adequately serve the areas. The expansion of the urban area typically first takes place along radial arteries, with later fill-in of the remaining segments (GTZ, 2004b). Most Sub-Saharan African cities therefore have a dispersed urban structure with a high density core.



Figure 4-1: Built-up area of Dar es Salaam in 1945 (far left), 1967 (left), 1978 (middle), 1992 (right), and 1998 (far right) (Sourcebook 2A), adapted by authors

Because most commercial activity takes place in the central business district (CBD), travel patterns are oriented toward the city centre and as cities grow, so do travel distances. While the affluent can rely on the private car for their transportation, the poor have to travel by public transport, or walk or cycle.

### 4.1.2 Urban Development in Kampala

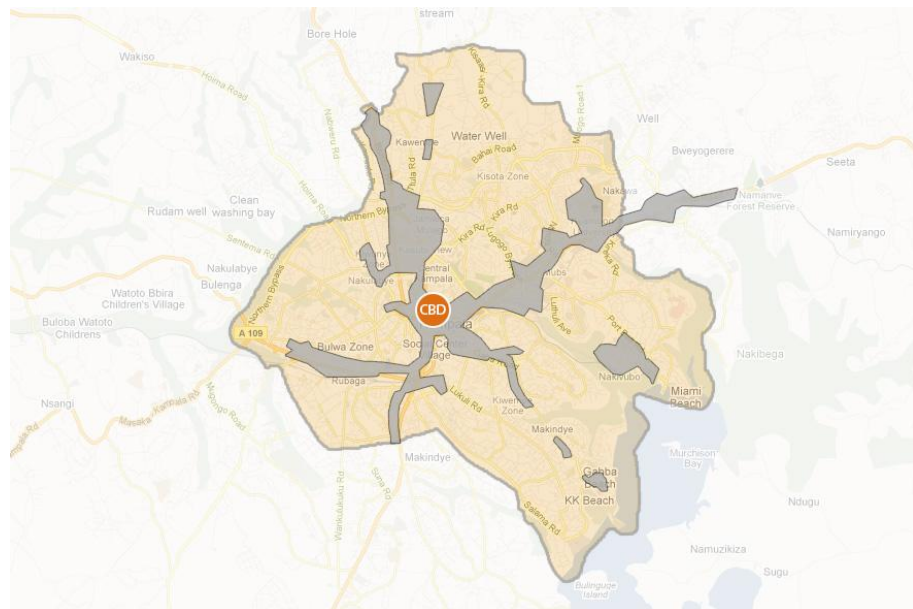
Kampala is situated on 24 low hills surrounded by wetlands. Due to its dualistic nature, the early development of the city differs to that of other Sub-Saharan cities. The Kampala Township, a European settlement, was founded on Nakasero Hill, close to the already existing Mengo, the capital of the Buganda Kingdom. The township grew well planned, while Mengo grew more naturally. As trading and business increased, more people were attracted to the Kampala Township. The centre of the town started to get congested and slums started to grow (Omolo-Okalebo, 2007). Out of health reasons, residential zones were separated from commercial and industrial zones, but also segregation between races was envisioned. The areas which were





inhabited by Europeans were well supplied with infrastructure and services, and housing was spacious. Living conditions were worse in the rest of the city, where water and food supply, and hygienic requirements weren't met (Rhode, 2006). The dualistic structure of the city – partly indigenous and partly colonial – made controlling the urban development administratively difficult. It was not until after the Ugandan Independence of 1962 that Mengo was incorporated into Kampala, with the Kampala City Council set as the administrative unit (Omolo-Okalebo, 2007).

Today Kampala is a typical city for Sub-Saharan Africa and many other parts of the developing world, with unplanned development, urban poverty, unemployment and environmental degradation (Mukwaya, 2004). Kampala has developed into a *dispersed city with a high density core*: The CBD is the major concentration of employment and the surrounding area consists of ever expanding low-density development, mostly residential. The city growth is mainly concentrated along the main roads outwards, and some small scale commercial and industrial activity is located along these corridors, which is shown in figure 4-2. Commute patterns in the GKMA tend to be radial, from the periphery into the CBD. The CBD is also the central hub for Kampala's public transport services, which is also radial in character (MoWT, 2005). The road network of Kampala does not have a planned hierarchy, and the function of streets is basically defined de-facto by its usage, with the radial routes being the most important.



**Figure 4-2: Development of employment along radial corridors in Kampala**

In the east and south of Kampala, land use has been fairly well organised but this is not the case for the north and the west (Katsigaire, 2011). Private land ownership makes government regulation of urban development difficult. Land owners have created planning problems by developing without considering proper infrastructure, such as access roads, water and sanitation (UN-Habitat, 2007). Partly through that, roads in the GKMA are generally narrow. Land owners can decide how much land they make available for roads and they are often not prepared to provide much land for infrastructure, even though it would benefit them (Katsigaire, 2011). Due to this, many low income areas are inaccessible to conventional public transport vehicles and their distance from the main centres of employment forces residents to walk or cycle long distances (MoWT, 2005).

Kampala has an estimated population of about 1.6 million but this rises during the day to a much higher number. Day-time population estimates range up about 8 million. In the past twenty years Kampala's estimated population has more than doubled, see figure 4-3. Over 60% of the residents lives in slums (UN-Habitat, 2007), many of which are situated in the wetlands, and do not have access to running water,



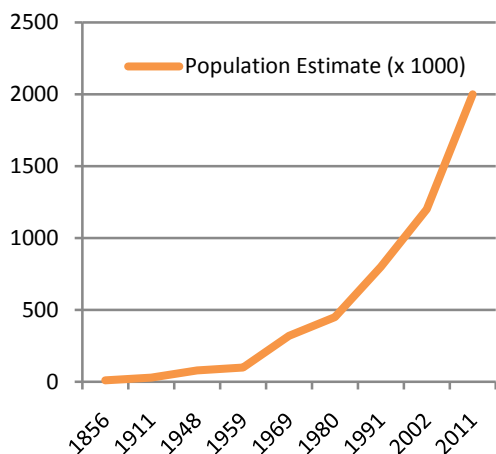


Figure 4-3: Kampala population estimate (Rhode, 2006), adapted by authors

sewers or garbage collection. About 35% of all housing units in Kampala are semi-permanent structure e.g. mud walled dwellings covered with iron sheets (Mukwaya, 2004).

Apart from a few sports fields, Kampala hardly has any public parks or plazas. In the early days of Kampala, public parks were seen as a European phenomenon and they were only included in the Kampala Township. In Mengo such facilities were considered unnecessary due to the rural lifestyle of the indigenous people. Nowadays, the phrase 'park' refers solely to either the old or the new taxi park. The few public parks that are in the city, are often fenced and not always easily accessible for everyone. In addition, the existing green spaces in the city are continuously threatened by both planned and unplanned development. The city streets are therefore the city's only public spaces available to the population.

### 4.1.3 Current Plans for Development

#### Transport

With support of the World Bank, the Kampala City Council is exploring options for introducing a Bus Rapid Transit (BTR) system in the GKMA. A pre-feasibility study has been carried out which suggests BRT routes on a number of the main roads radiating from the city centre (ITP, 2010). These routes are shown in figure 4-4. One of these routes, Jinja Road-Kampala Road-Bombo Road, has been identified as a pilot project to both demonstrate and test the application of the BRT. According to the pre-feasibility study, the demand along the selected routes is already sufficient for successful BRT operation, and demand will increase even further with the expected population growth in the GKMA. So although the concentration of economic activity in the city centre is currently a contributor to congestion, it is also an opportunity to develop high quality public transport (MoWT, 2005).

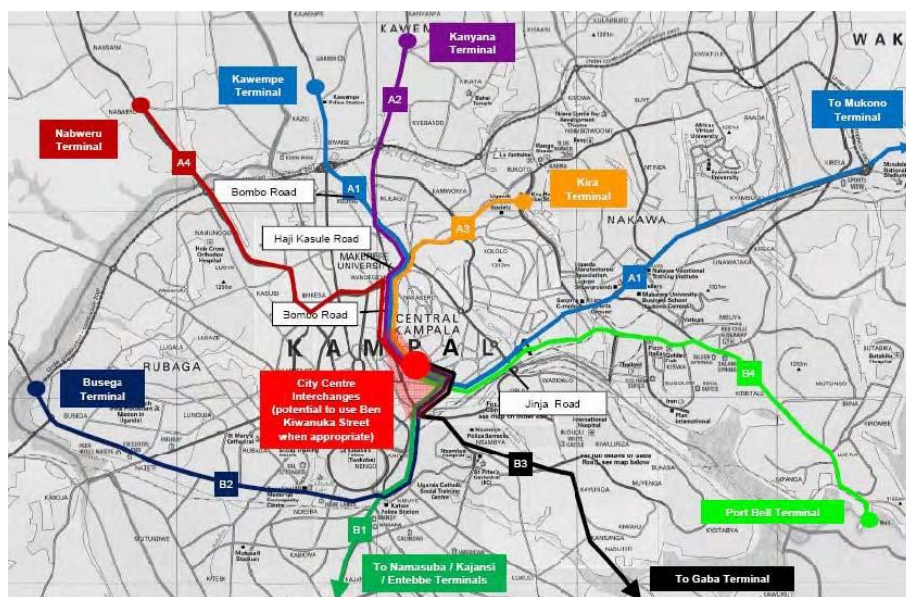


Figure 4-4: Proposed BRT network for Kampala (ITP, 2010)



In addition to the BRT there are plans to revamp the railway in the GKMA. Passenger services on the railway in were halted some 15 years ago but there are now plans to resume train services between Kampala and Namanve, a town some 18 kilometres west of Kampala (Business Week, 11 April 2011). Although initially only a few trains will be running – two Kampala bound trains in the morning and two Namanve bound trains in the afternoon – the new transport option is expected to relieve congestion in the Kampala-Jinja corridor.

Besides developments in the public transport sector, road construction is also ongoing in and around Kampala. The initial phase of the Northern Bypass, a ring road around the northern part of the city which will divert traffic around the CBD, has been just completed and the Ugandan parliament has recently approved plans to construct a new four-lane toll highway between Kampala and Entebbe. This Kampala-Entebbe highway, which will be constructed with help of the Chinese, is meant to ease the flow of traffic between the capital and the country's most important airport, and will also connect to the Northern Bypass (The New Vision, 2 May 2011b).

At the same time, the Japan International Cooperation Agency (JICA) is proposing upgrades to the road network in the GKMA. These include plans to widen several roads and build a number of flyovers in the city, most notably one on Kampala Road (JICA, 2010). For the long term JICA envisions the construction of even more flyovers. In fact, the cooperation agency foresees the need to construct an inner city ring consisting almost entirely of flyovers. The plans for flyovers see resistance from the public who fear for evictions in the road-reserve marked areas (The Observer, 6 Dec 2009).

The proposals of JICA primarily focus on motorised transport. There are some small scale improvements included for pedestrians, such as pedestrian bridges at the Shoprite and Clocktower intersections, but these mainly serve to ease the flow of motorised vehicles.

### Land Use

Besides the scattered erection of some hotels and convention centres around the GKMA, the most notable land use development is that of the Kampala Industrial and Business Park. This is a 362 hectare industrial area along Jinja Road, some 15 kilometres west of the Kampala CBD and close to the town of Namanve. Development has been ongoing since 1997 but has currently been suspended until sufficient funding can be found to continue (The New Vision, 28 April 2011a) but if developed to projections it will be the biggest industrial area in Uganda (Katsigaire, 2011) and provide a significant employment alternative to the Kampala CBD.

## 4.1.4 Regulatory Framework in Sub-Saharan Africa

### Policies and Regulations

In many Sub-Saharan African countries national policies for land use and transport are lacking or not adequately implemented. As a result, land development is often unplanned, without proper basic infrastructure and services. Public transport is provided by the informal sector, without regulation of vehicle numbers, fares or routes (The World Bank, 2005a). Regulations on parking and commercial street activities (e.g. street vending) do not always exist and enforcement of regulations is often lax.

### Funding

In general, national governments are responsible for maintaining the national roads, even within the cities (The World Bank, 2005a) while local governments are responsible for the rest of the urban system. In some countries, roads are financed directly from the central government's general coffers. All income is seen as general tax revenue and allocated through an annual budgetary process according to the needs at that moment (The World Bank, 2002b). A few countries, like Senegal, Kenya and Cameroun, have Road Funds, and in some cases the money raised is used exclusively to fund (urban) roads. In 2006, 27 Road Funds were in place in Sub-Saharan Africa and in nearly all cases a fuel levy is the main source of income with an average charge of 7 US

cents per litre for petrol and 8 US cents per litre for diesel. Only about one third of the road funds meet their routine expenditure needs on a regular basis (The World Bank, 2007).

Few Sub-Saharan countries have access to sufficient national financial resources to fund large infrastructural projects. Funding for large infrastructural projects is usually done through international sponsors. These can be national and international governments, like Japan, the United States and the European Union, development banks, like the World Bank and the African Development Bank, or private companies, for example commercial banks. Funding by sponsors is usually in forms of a loan or a grant. Grants are sometimes given, but usually when a larger loan is foreseen. Grants can also hold certain conditions, for example limiting options to firms from a particular country (GTZ, 1F, 2010b). Just like loans, grants should therefore be carefully considered.

#### 4.1.5 Regulatory Framework in Kampala

##### Land Use Policies

Currently, a new Physical Planning Act is in development by the Ministry of Lands, Housing and Urban Development to define the urbanization zones for major investment by the government. The act is intended to regulate urban development by restricting the extend of the urbanization zones and delimiting what those zones should deal with. The Ministry is also working on an urban policy to define how and when settlements should be upgraded from for example, a municipality to a town. For local developments, local planning authorities have to approve construction on lots but they suffer from inadequacies and sometimes their decisions get overruled by higher placed people who want to please the public (Katsigaire, 2011).

Probably unique in the world is the Land Tenure System. There are four Land Tenure options in Uganda; customary, mailo, freehold and leasehold. Between 1975 and 1995 all land was declared as belonging to the government, people were free to use the land as long as they could manage it effectively, but with the 1995 Constitution this was changed back. The complex form of land ownership makes it difficult for the government to enforce land management but changing the Land Tenure System is a politically delicate subject. Under the 1995 Constitution, people demand to be compensated for the land they (have to) provide for infrastructure. New road construction and road widening therefore require a lot of revenue from the government, which proves to be a major challenge in Uganda (Kastigaire, 2011).

For the Greater Kampala Metropolitan Area, the Structure Plan is the principal land use policy. The Structure Plan is currently being updated with support of the World Bank by ROM, an Israeli transport engineering company. It proposes a vision for the physical development of Kampala and the final report is scheduled for September 2012. This Structure Plan is to follow the Structure Plan of 1994 which has unfortunately seen little implementation (Katsigaire, 2011). For the new Structure Plan, ROM is using GPS data to analyse trips for all modes, including non-motorised transport. The political implications for the Structure Plan are to explore transit oriented development (TOD), develop a network for safe cycling and allow walkable distances to basic services in poor areas (ROM, 2011). The new Structure Plan should also have a better integration of transport and land use than its predecessor.

##### Transport Policies

Uganda's road network is classified in national roads, district roads, urban roads and community roads. The Uganda National Road Authority (UNRA) is responsible for the development and maintenance of national roads while the Kampala City Council (KCC) and other urban and local districts are responsible for the district, urban and community roads (MoWT, 2010). The transport policy in Uganda is in line with the government's overall policy: Eradication of poverty, liberalization of the economy and decentralization of public sector responsibilities. The transport policy is aimed at promoting cheaper, efficient and reliable transport services.



The key features of the transport policy are (MoWT, 2010):

- Increase trade and employment, reduce poverty;
- Improve access to public services;
- Provide efficient inter-modal interchange services;
- Promote private sector operation and investment;
- Equitable treatment of different transport modes (efficiency and suitability should decide modal split);
- Promote modal integration;
- Ensure safety of transport networks and operation;
- Greater integration of Government and land-use planning, and reduce the need for motorised transport;
- Provide a safe environment for pedestrian and non-motorised transport;
- Promote equal opportunities for women.

The Ministry of Works and Transport acknowledges that transport and safety regulations in Uganda are insufficient. Accident levels are very high in the country and the lives claimed are mostly users of non-motorised transport (NMT). According to the ministry, NMT is of great importance due to the inaccessibility of motorised transport for the majority of the population.

The leading transport policy for the Greater Kampala Metropolitan Area is the National Transport Master Plan which has been in development since 2002. The most recent report available is of 2005. The plan recognises NMT as a low-cost form of transportation but NMT is reliant on well maintained (bicycle) tracks and pathways and therefore proper infrastructure for pedestrians and cyclists should be included in all major road works. Under the NTMP, more than 120 kilometre of dual carriageway will be constructed over a period of 15 years with appropriate NMT provisions. Additionally, more than 570 kilometre of single carriageway will be upgraded to include appropriate facilities for NMT and for public transport, and a total of 62 junctions and 27 railway crossings will get safety improvements (MoWT, 2005).

As part of the NTMP/GKMA, there is an ambition to introduce a bus rapid transit (BRT) system in the GKMA. But, according to NTMP/GKMA, a BRT system will only be successful when motorised traffic is reduced and NMT facilities are improved. Walking and cycling can support the BRT as feeder and distributor. As walking is expected to be the most dominant mode to reach the BRT stations, and because people who cannot afford public transport will walk to work, there will be high pedestrian activity throughout the GKMA. Provisions for NMT should therefore be adequate. The NTMP/GKMA suggests a minimum footway width of 1.50 metres on all urban roads, increased to a minimum of 2.00 metres along BRT routes to accommodate the high flow of pedestrians near the stations. It also suggests to provide separate bicycle infrastructure, and sufficient and safe bicycle parking at BRT stations (MoWT, 2010).

### **Traffic Regulation**

While Uganda does seem to have a road safety act (Uganda Police Force, 1998) and a highway code it remains unclear to what extent these documents have been implemented. What can be concluded though is that enforcement of the traffic rules is rather lax, as violations such as driving under influence, ignoring traffic signals, and not wearing helmets are common and often go unpunished.



**Figure 4-5: A parking attendant at work**

### Box 6 – Shop owner parking

In Bogotá, a survey on the city’s main avenues found that 80% of the vehicles parked outside shops were actually owned by the shop owners and their employees. Only 20% of the spaces were serving their clients (GTZ, 2C, 2010c). A quick survey on Luwum Street done for this report showed that 53 of the 60 vehicles checked had a monthly parking license, the rest had purchased an hourly parking ticket. This suggests that a situation similar to Bogotá might be true for Kampala which might be interesting to look into in a further study.

## Parking Regulation

In contrast to many other Sub-Saharan African cities Kampala has relatively effective parking regulations in place for its CBD. The Kampala City Council awards a private company every four years to administer and enforce on-street parking. For the 2003-2007 contract, the KCC received a fixed amount of UGX 80 million per month, the amount that remained was considered profit for the private company (GTZ, 2C, 2010c). On-street parking is charged at a rate of UGX 400 (about US \$ 0.18) per hour, with a three hour maximum. Parking tickets can be purchased from one of the many parking attendants patrolling the streets (see figure 4-5). The system is enforced through parking fines of UGX 2,000 per hour on top of the price for a parking ticket, and, occasionally, through wheel clamps, which cost UGX 20,000 to remove. The rather low prices might not discourage most car owners, who are usually among the more affluent of the population, to come to the CBD by car, but the time limit does help in maintaining motor vehicle accessibility for the CBD. In addition to the hourly parking tickets, vehicle owners can acquire a monthly parking license which costs UGX 30,000 per month. These licenses are valid for all parking regulated streets in Kampala and are released of the three hour restriction, thereby somewhat diminishing the effectiveness of the time limit in ensuring vehicle accessibility. While parking regulations are well enforced during the day, at night parking is free and drivers then tend to park on the sidewalk close to their destinations, forcing pedestrians onto the usually dark roadway.

## Funding

In Uganda, the Kampala City Council (KCC) and other urban and local districts are responsible for the construction, rehabilitation and maintenance of district, urban and community roads. Funds are

allocated through the Uganda Revenue Authority (URA) and the Uganda Road Fund. The URA used to issue a road license but in June 2007 this system was abandoned because it was too problematic to maintain, mainly due to the large number of forgeries with stickers. The road license system has been replaced by a fuel levy. The URA mentioned that a fuel levy would be cheaper to collect and compliance would be almost total, unlike the road license fees. Before June 2007, motorists paid between 250,000 and 1,000,000 UGX annually. The fuel levy was also introduced to ensure a sustainable flow of resources and to get road users more involved in the ownership and maintenance of roads.

The income of the fuel levy goes into the Uganda Road Fund (URF) – part of the Ministry of Finance, Planning and Economic Development – unlike the road license revenue which went into the general coffer of the URA.



The URF considers maintaining the current asset the main problem and therefore finances maintenance before using the income for improvements and new road. Sometimes, though, funds are also used for other expenditures, such as road safety activities (Uganda Road Fund, n.d.). Currently the allocation for road maintenance is about \$40 million for national roads and \$12 million for district and urban roads. This is less than 50% of the budget required for proper maintenance, as an estimated \$70 million is required for national roads and \$50 million for district and urban roads (Uganda Road Fund, n.d.).

In addition to the fuel levy, funding in Uganda is derived from loans and grants. The World Bank is currently involved with funding of projects in Kampala, such as the development of the Structure Plan and the BRT, as are a number of national and international governments. The Japanese government is allegedly offering a grant to build flyovers in the city and the Chinese government has provided a loan for the construction of the Kampala-Entebbe highway (New Vision, 2 May 2011b). At least in the case of the latter, the funding seems to come with certain conditions which compel the Government of Uganda to include companies or resources from the funding country for development of the project.

## 4.2 COMPLETE STREETS AND EFFICIENT TRANSPORT

### The situation in the streets



In addition to regarding the situation *on paper* and *in the minds*, it will be valuable to look at the existing situation *in the streets*. The description of the existing situation is based on three well-known aspects which influence the situation in the streets, namely vehicles (modes of transport), environment (infrastructure) and people (road user behaviour). First of all it is described what the main type of transport is, what different modes of transport are used and how the transport system is currently functioning. After this, the general conditions of the roads and the conditions for sustainable modes of transport are described. This is followed by a description of road user behaviour. Together these three aspects determine the road safety situation. Before describing the situation in Kampala, the paragraph starts with a brief description of the situation in Sub-Saharan African cities.

### 4.2.1 Transport Situation in Sub-Saharan Africa

The growth of African cities has often been too rapid for local governments to manage and absorb, and they have been unable finance the required urban transport infrastructure. Many Sub-Saharan African (SSA) cities don't have enough capacity, and the skill levels of planning and regulatory personnel are inadequate or even nonexistent. Consequently the traffic conditions in such cities are problematical. The cities struggle with road safety problems, poor accessibility of services and air pollution caused by motorised transport (The World Bank, 2005b).

#### Transport Situation

Road transport is the dominant mode of transport in SSA cities, accounting for 80-90% of both passenger and goods transport (United Nations, 2007). Although the actual situations vary, urban road transport systems in SSA cities have several similarities. In general the traffic conditions in SSA are very chaotic and dangerous since all the different modes of transport have to share the same space (Terlouw, 2006). The majority, over 50%, of the urban trips are made by walking. In the capital of Senegal, Dakar, the share of walking is even 81%. Most other trips are made by public transport and also involve considerable walking (Terlouw, 2006). Although there are some exceptions, cycling does not have a very large share (see table 4-2). There is little or no coordination between the different modes of transport. Street vendors occupying 25-35% of road space and uncontrolled parking worsen an already bad situation. According to The World Bank no city in SSA currently meets the criteria of sustainable urban transport. No city has an efficient and effective urban transport system with reliable, affordable and safe transport (The World Bank, 2005b).

City	Country	Mobility (trips/person/day)	Walk	Bicycle	Public Transport	Private Motorised Transport
Morogoro	Tanzania	1.7	67	23	12	4
Dar es Salaam	Tanzania	1.9	47	3	43	7
Nairobi	Kenya	2.2	47	1	42	7
Eldoret	Kenya	2.7	48	12	24	16
Kinshasa	Congo	2.2	70	-	20	10
Addis Ababa	Ethiopia	4.9	70	-	26	4
Bamako	Mali	3.1	60	2	17	21
Ouagadougou	Burkina Faso	3.8	42	10	3	45
Harare	Zimbabwe	N/A	63	1	16	20
Niamey	Niger	N/A	60	2	9	32
Dakar	Senegal	3.2	81	1	17	1

Table 4-2: Mobility and modal choice in SSA cities (Terlouw, 2006)





## Public Transport Services

Since the end of the 1980's the public transport sector is characterised by a decline in large size companies in favour of the so called micro-enterprise sector. Currently the major supplier of public transport services in SSA cities is the informal small-scale private sector, which is undercapitalised and fragmented. The regulatory system governing public transport is inadequate and ineffective in meeting the demand. The most common vehicles are minibuses, collective taxis and other modes of transport, such as motorcycles. The growth of public service vehicles has been dramatic and often uncontrolled. Most private bus and minibus services are small enterprises or family businesses containing a few buses, operated by the owners or leased on a daily basis. Most of the vehicles are second hand and are often operated without any consideration for fleet renewal (The World Bank, 2005b). There exists large dissatisfaction of passengers about the quality of the services, mainly about the comfort and driver discipline. Waiting times at bus stops can be as much as 30 to 45 minutes and in congested areas trips of only 8-10 kilometres can take as long as one to two hours (The World Bank, 2005a).

## Condition of the Roads

In general SSA cities have inadequate capacity of roads and the existing roads are in poor condition (The World Bank, 2005b). Lack of maintenance and overloading of road vehicles are the main reasons for the poor condition of the roads (United Nations, 2007). The conditions for walking and cycling are tough and dangerous due to a complete lack of physical infrastructure. Basic facilities for non-motorised transport, such as appropriate sidewalks, cycle lanes and parking facilities do often not exist in most cities. "The welfare of pedestrians and cyclists is often sacrificed to planning for the faster flow of motorised transport." (The World Bank, 2005b). Drainage is often poor or missing at all and street lightning is not available in most streets (Terlouw, 2006).

## Road Safety

Traffic accident rates in Sub-Saharan Africa are high, accidents between vehicles and pedestrians are very common and their frequency is growing rapidly. Between 1968 and 1998 road fatalities in Africa increased by 400%, with pedestrians and public transport users as the largest groups of accident victims. According to an assessment of the World Bank, pedestrians and public transport users are the largest groups among the fatalities, 30-40% each (The World Bank, 2005b). Figure 4-6 shows the continent of Africa has the highest injury mortality rates in the world.

In Dar Es Salaam the number of fatalities in 2005 was 35 per 10,000 vehicles, in Nairobi this was 32 per 10,000, while in cities in the European Union 1-2 fatalities per 10,000 vehicles is common (The World Bank, 2005b). The main reasons for the high accident rates are vehicles and human behaviour. Vehicles are often old and ill-maintained and not roadworthy (Terlouw, 2006). Drivers of motorised vehicles often show minimal respect for other road users (Terlouw, 2006). Human behaviour and incapacities account for more than 85% of the accidents (UTRC, 2009).

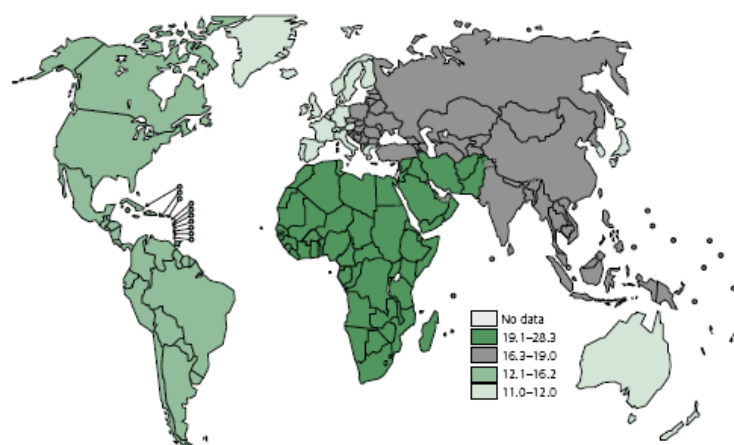


Figure 4-6: Road traffic injury mortality rates (per 100,000 inhabitants) in WHO regions, 2002 (WHO, 2004)

## 4.2.2 Transport Situation in Kampala

### Transport System

Uganda has a multi-modal transport system, with transport services by road, air, railway, lake and river. Road transport is and will remain in the foreseeable future the dominant form of transport, carrying over 95% of country's goods traffic and 99% of passenger traffic. Road traffic has continued to grow rapidly in recent years, especially in the Greater Kampala Metropolitan Area (GKMA). The current national vehicle population is estimated at 635,656 vehicles, with a potential growth of more than 10% per annum. Half of these vehicles are located in the city or use the city roads daily. Commercial passenger and goods transport by road is exclusively performed by the private sector (MoWT, 2010). Following the permanent suspension of all passenger rail and ferry services over the past few years, with only a few local exceptions, public transport in Uganda is essentially operated by buses and other forms of motorised road transport. Many rail lines were closed due to technical deficiencies and inadequate traffic volumes, though feasibility studies for rehabilitation or upgrading of passenger rail lines are near completion (MoWT, 2010).

### Modes of Transport

Besides walking, Kampala is dominated by motorised transport. On the one hand there are Public Services Vehicles (PSVs): taxi minibuses, boda boda motorcycles and a few larger buses. On the other hand the private vehicles: cars and motorcycles. In addition there are conventional taxis, trucks and bicycles.

### Walking and Cycling

Walking is moving by foot, without any vehicle. Walking is the main mode of transport of the majority of the population of the GKMA.

### Bicycles

Bicycles are two-wheeled non-motorised vehicles. The bicycles in Kampala are mostly basic second hand bicycles with hand brakes, but there is an increasing number in bicycles with gears, such as mountain, racing and city bikes. Although bicycles are used for commuting and leisure, the majority of the cyclists seem to use it for activities which generates revenue. The basic bicycles are mostly used by the low income level group for the carrying of goods, such as vegetables, furniture, fruit, crates and so on. Beside this, plain bicycles are also commercially used for carrying passengers as a public transport service (see also boda boda bicycles). Bicycles with gears are more expensive and therefore mostly used by the higher income level groups and mainly used for leisure. Second hand bicycles are imported from Japan and the UK, new bicycles from China and India (GCS, 2011).

### Taxi Minibuses (Matatus)

Second hand passenger minibuses, mainly Toyota Hiace models imported from Japan, are the main public transport mode in Kampala. Most taxi minibuses have a low capacity of 14 seats, but there are also bigger buses with capacity up to 25 passengers (Uganda Road Fund, n.d.). The 14-seaters have two seats next to the driver and four rows with each three seats behind that. On the first three rows, the third seat is created with foldable seats in the aisle. The minibuses have no fixed routes, fares



**Figure 4-7 Figure 4-8: Taxi minibuses are the main public transport providers in Kampala**



and time-table operation, they leave simply when they are full. They operate on medium and long distances at frequently used routes with intermediate stages determined according to the user's destination and request (Uganda Road Fund, n.d.). Main routes start from the taxi parks in the Central Business District (CBD) (JICA, 2010). All licensed minibus taxis have a characteristic blue-and-white band round the middle. Besides a driver, every taxi minibus has a conductor who takes care of the payments. The amount of taxi minibuses is increasing rapidly, the growth rate in the period of 2006-2008 was 24% per year (JICA, 2010). According to the National Transport Master Plan, the average year of manufacture is 1991, therefore the average age of the taxi minibus fleet is about 20 years (MoWT, 2005).

### Boda Boda Motorcycles

Boda boda motorcycles are two wheeled, single passenger motorised vehicles. The motorcycles are used for public transport services. They operate throughout the city, but also provide services in residential areas which have poor or no road access (The World Bank, 2005b). The boda bodas have no determined routes, but passengers can go to any requested destination acceptable to the service provider (Uganda Road Fund, n.d.). Because of the large number of operators, boda bodas are almost everywhere and can therefore provide door-to-door services. Fares are higher than that of the taxi minibuses, but negotiable. The annual growth rate of motorcycles was 33% in the period 2006-2008 JICA, 2010).

### Conventional Taxis

Conventional taxis, also known as "special hires", are mainly saloon cars which people can hire to get around. The fares are much higher than those of the taxi minibuses and boda boda motorcycles. Some special hire taxis have a characteristic black-and-white band round the middle, indicating some form of regulation. However the majority of the conventional taxi industry is very informal and a considerable amount of people with cars without the characteristic band or taxi sign on the roof, offer taxi services.

### Buses

Large and relatively modern buses offer public transport services mainly on medium and long distances within Uganda, and to international destinations (MoWT, 2010). They have a high capacity of 25 or more passengers. These services are more organised and have well established boarding points, routes, intermediate stops, time-tables and tickets (Uganda Road Fund, n.d.).



Figure 4-9: Boda boda motorcyclists queuing for passengers



Figure 4-10: A typical large bus for medium and long distance travel

## Cars

Cars are four wheeled motorised vehicles. Most vehicles in Uganda are second hand vehicles and mainly imported from Japan and other right-hand-drive countries. The average age of the vehicle fleet is about 18 years (year of manufacturing 1993). Currently, only about 1% of the Ugandan population owns a car (MoWT, 2010).

## Boda Boda Bicycles

Boda boda bicycles are two wheeled non-motorised vehicles which are used commercially for carrying passengers. Simple bicycles are used, often equipped with a pillow at the carrier and footrests for the comfort of passengers. Boda boda bicycles have no determined routes, and passengers can go to any requested



Figure 4-11: Boda boda bicycles

destination acceptable to the service provider (Uganda Road Fund, n.d.). In Kampala there are not many boda boda bicycles since the sector is dominated by the boda boda motorcycles.

## Other

In addition to the described modes of transport, also trucks, agricultural vehicles (such as tractors) and carts are road users. Because of their relatively small proportion in Kampala however, they will receive less dedicated attention in this report than the modes mentioned above.

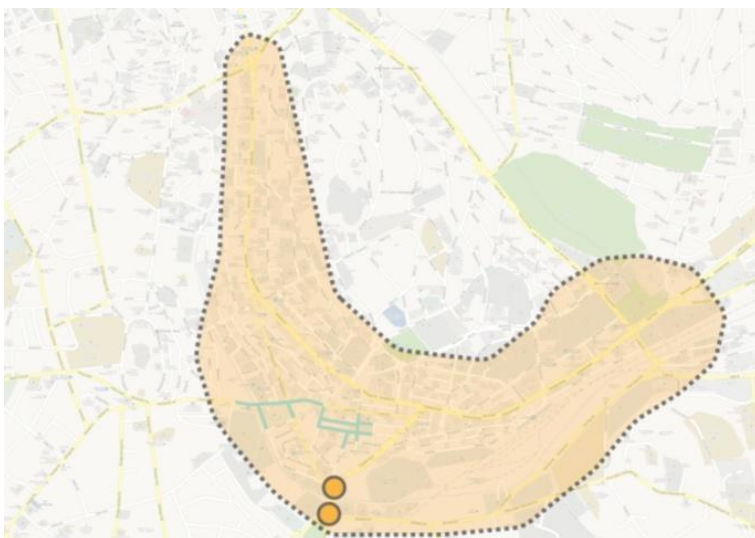


Figure 4-12: The most congested area in Kampala, the two bullets indicate the location of the Shoprite and Clock Tower intersections

## Severe Congestion

Due to rapid urbanisation, population growth, high GDP growth, rapid increase of vehicles and traffic volume, and an urban structure which concentrates traffic on the CBD, Kampala has currently to deal with severe congestion. The most congested area is the Central Business District (CBD), especially the areas surrounding the taxi parks and bus terminals. At the “Shoprite” and “Clock Tower” junctions (see figure 4-11) in the south of the city centre the delays are the highest (MoWT, 2005).



The liberalisation of car imports in 1993 resulted in an explosion of vehicles (see figure 4-12.) (Rhode, 2006). The average annual road motorised vehicle growth rate between 1997-2008 in GKMA was 10.9% (JICA, 2010). However, most roads were built in the 1930s and 1950s and are too narrow to accommodate the rapid increased traffic volume (Mukwaya, 2011). Furthermore the condition of the road network and the road user behaviour are worsening the situation.

### Condition of the Roads

The pavement ratio of the city road network in the five divisions of Kampala is low, namely 30-41%, except for Central Division in which 92% of the roads are paved. Of the paved roads, the surface condition of 33% is rated “good or very good”, 43% is rated “fair” and 21% is rated “poor” or even “very poor” (JICA, 2010). According to National Transport Master Plan (NTMP) maintenance of roads has been neglected for a long time (MoWT, 2005). The main problem of both paved and unpaved roads is the potholes, since they can cause dangerous situations as vehicles try to dodge them. Furthermore the potholes can cause serious damage to the vehicles themselves.

On many roads the street lighting is broken or non-existent and road signage is generally poor (MoWT, 2010). Several intersections in Kampala are equipped with fixed-time traffic lights. However, some of these are out of operation and those which are operational are often not able to handle the traffic, especially during peak hours. During peak hours, traffic police takes over control at several intersections in order to regulate the peak hour traffic volume. In the morning, traffic going into the city is given priority, in the evening priority is given to outgoing traffic.

The drainage of streets is of poor quality or missing at all. In case of rain, this causes puddles on the street which are unpleasant for especially pedestrians, cyclists and motorcyclists (including passengers), because it can make them wet and dirty when passing through them. The spray when going through a puddle can also be annoying for other nearby road users. For pedestrians large puddles can block their walkway, resulting in detours and crossing at inappropriate places. Bad or poor drainage causes potholes to develop more quickly and the water makes existing potholes, or at least their depth, less visible. In addition, the water also flows mud on the streets which can make the road slippery and make markings, such as zebra crossings, invisible. After evaporating, the mud can still cover markings and causes dust which is unpleasant for especially non-motorised transport, motorcyclists and their passengers.

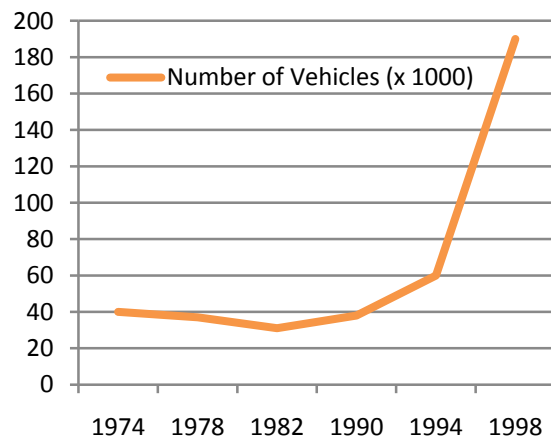


Figure 4-14: After the liberalisation of car imports in 1993, the number of vehicle increased explosively (Rhode, 2006), adapted by authors



Figure 4-13: Potholes are common in the streets of Kampala



Figure 4-15: Poor drainage is a major issue

## Conditions for Non-motorised Transport

According to preliminary findings from a biased sample by ROM Transportation Engineering, walking is the main mode of transport for about 46% of Kampala's population (ROM, 2011). Pedestrian traffic is heavy on routes leading to shopping centres, markets, commercial areas, and to the taxi and bus parks in the CBD (MoWT, 2010). Nonetheless, on the majority (60%) of the streets of Kampala's city road network, sidewalks are non-existent (JICA, 2010). The existing sidewalks are often narrow, blocked by parked cars or occupied by street vendors. Also the quality of the sidewalks is often poor: wells without cover, bumps and missing pavements are very common. These conditions regularly force pedestrians to walk on the carriageway. This situation is unfavourable and ineffective for both motorised and non-motorised transport (JICA, 2010). Along roads radiating out of the CBD, pedestrians frequently have to walk on the shoulders as sidewalks are often not provided.



Figure 4-17: Some of the obstacles pedestrians have to overcome



Figure 4-16: Many streets in Kampala lack sidewalks

Currently Kampala has no infrastructure exclusively for cyclists (including boda boda cyclists) at all. Cyclists don't have (separated) cycle lanes, but have to share the scarce space with motor vehicles and sometimes even pedestrians who are regularly forced to walk in the carriageway. Due to this, cyclists have to deal with the same poor conditions as motorised traffic, such as potholes, bumps and poor drainage. Besides the lack of proper infrastructure, there are also no parking facilities. Despite this, Kampala has several shops selling bicycles and even a few bicycle repair shops, selling different types of used and new bicycles, and spare parts. According to the preliminary findings of the ROM sample, the share of cycling in daily trips made in the GKMA is only 2% (ROM, 2011).

*“It is therefore a challenge that a country where only 1% of the population own a car lacks facilities for pedestrians and cyclists. This reflects a lack of appreciation of the role played by these modes, and a general lack of equity in resource allocation.”* (MoWT, 2010)



## Public Transport Services

Until nationalisation in 1972, the public transport system was privately owned by the Uganda Transport Company (UTC). The UTC provided bus services and only had competition from shared taxis based on saloon and estate cars. After nationalisation and some political changes, UTC focused more on its long distance services. As a result, the market for urban transport services in Kampala became open to private sector operators, mostly using small minibuses. The government believed in the development of the private market and for this reason did not strongly regulate the minibus system. Consequently, Kampala's public transport system of today is operated by the informal private sector in which passenger transport is mainly dependent on the taxi mini buses, along with a rapid increasing number of boda boda motorcycles. In addition there are boda boda bicycles, conventional taxis and a small fleet of larger buses which are part of the public transport system (The World Bank, 2005b).

The taxi minibuses operate mainly from the taxi parks in the CBD, the so called "Old" and "New Taxi Park", in all directions to basically everywhere as long as there is demand. They mainly operate on the medium and long distances. Boda boda motorcycles operate throughout the city on short door-to-door trips, but also provide residential areas which have poor or no road access or are not served by taxi minibuses (The World Bank, 2005b). They operate from almost everywhere in the city. Larger buses operate on long distances, both within Uganda as to international destinations, and operate mainly from bus terminals in the CBD.



Figure 4-18: Kampala's Old Taxi Park

On the one hand the public transport system is efficient and convenient because people can board along the routes wherever they want, by just putting their hands up, and boda boda motorcyclist can be found almost everywhere. But at the same time it is an extremely inefficient system. The main taxi parks and bus terminals are all located in the CBD, near to each other and all main routes starting and ending there. Consequently many 'routes' and vehicles are focused on the CBD. Since the capacity of the taxi parks is limited, and there are no specific entrance and exit routes, the traffic flow is poor. This results in conflicts between ingoing and outgoing taxi minibuses which often block each other's way. The minibuses queue up in long lines, very often blocking intersections and obstructing traffic flows from other directions (ITP, 2010). This can cause congestion which often spreads out on to the city centre road network (The World Bank, 2005a). Together with the high amount of street vendors and pedestrian flows this causes a very chaotic and inefficient situation in the CBD.

Furthermore the "leave when full" principle can lead to long waiting times and because of the strong focus on the CBD, people often have to make a detour and transfer to other minibuses in order to get to their destination. In-vehicle stationary time, loading and unloading, make up a considerable proportion of 20-35% of the total journey time (ITP, 2010). Due to the congestion and inefficient alternatives, and due to the widespread availability and growing number of boda boda motorcycles, the boda boda service is at the moment the most convenient and fastest way of transport in Kampala.

New public service vehicles have to be licensed by the Transport Licensing Board (TLB) which is an agency of the Ministry of Works and Transport. Public transport vehicles have to be inspected annually by the board. A special group D license is required to drive any public service vehicle. Drivers must be over 25 years old and must receive instruction from an instructor licensed by the Director of Transport and Communications (ITP, 2010). Route allocation is another responsibility of the TLB. In practice though, it devotes more effort to monitoring and regulating the inter-urban routes, mainly operated by the large buses, than the minibus routes in Kampala. Licences to operate minibuses in Kampala do not specify particular routes or times of operation, but do specify whether the minibus should operate on routes in or outside town. In practice minibus operators often switch routes depending on the demand. The TLB does not try to restrict the number of minibuses operating in Kampala (ITP, 2010).

The main taxi parks are managed by the Uganda Taxi Operators and Drivers Association (UTODA). UTODA charges fixed daily enter and exit fees. Furthermore the association represent the interest of the operators and drivers (ITP, 2010). Fares are not controlled by the government. In case of the taxi minibuses UTODA defines standard fares for each route, but in practice the actual fares are determined by taxi operators depending on the state of the market and fuel prices, resulting in higher fares during peak hours and holiday times (ITP, 2010). Approximately 15% of the minibus drivers is owner of the vehicle (JICA, 2010). The other drivers hire minibuses from taxi owners for a daily charge and are responsible for providing fuel and paying the charges of UTODA (ITP, 2010). Fares of boda boda motorcycle services are determined by the operators and are negotiable, and approximately 30% of the boda boda operators own the motorcycle (JICA, 2010).

### Road User Behaviour

In Kampala driving is characterised as reckless and careless (Uganda Police Force, 2011). Everybody minds their own business and there is a “law of the jungle” mentality. Many road users considerably neglect traffic rules and laws. For example speed limits and red traffic lights are ignored, people park their cars on sidewalks, motorcyclists sometimes ride on sidewalks, minibuses stop all of the sudden and at inappropriate places, motorcyclists drive regularly in the opposite direction, right of way belongs to he or she who claims it, and pedestrians cross wherever it is convenient. Furthermore it seems like drivers of motorised vehicles are not aware of the advantages of keeping their own lanes. They allocate themselves over the entire width of the road. Sometimes even parking lots are used for overtaking, consequently vehicles have to merge at some point which causes turbulence in traffic flow resulting in congestion. Some groups of road users behave worse than others, especially the behaviour of taxi minibus drivers and boda boda motorcyclists form a serious problem.



Figure 4-19: Queuing taxi minibuses make crossing the street difficult

### Taxi Minibus Drivers

The taxi minibus drivers have an aggressive way of driving, since they rarely respect other road users and traffic rules. All passengers have to do is say “stage” if they want to leave the taxi, and a taxi minibus driver will halt the vehicles as quickly as he sees possible. Although bus stops exist, the taxi minibuses often stop suddenly and at inappropriate places, like on the shoulders of roads even if people are walking and cycling there. Regularly pedestrians literally have to jump out of the way of taxis. When a taxi is departs again after loading or unloading passengers they just merge





into traffic whenever they want to, or use the shoulder as a merging lane. When pulling over or merging, indicators are often not used. When moving, taxi minibuses drivers continuously look for passengers along the streets, using their horn almost non-stop to attract attention. While doing so they pay little attention to the situation on the road. When queuing at the taxi parks taxi minibuses tend to stand bumper to bumper as they only keep a few centimetres space between their own vehicle and the one in front of them. As a result pedestrians can barely cross the street.

### **Boda Boda Motorcyclists**

Boda boda motorcyclists are of the biggest concern since they lack respect towards other road users and traffic rules the most. They regularly ignore traffic lights and drive in the wrong direction. The motorcycles are very manoeuvrable and therefore drivers literally use every spot on the road. They often use shoulders of the roads for overtaking other vehicles and during congestion they will even drive on sidewalks in order to pass the congested traffic (see figure 4-20). Boda boda drivers often lack formal training (Traffic Police, 2011).

The majority of the taxi minibus drivers and boda boda motorcyclists hire their vehicles for a daily charge. They therefore target revenue which they need to meet in order pay the charge to the vehicle owner. Earnings above this target revenue is income for the driver, and in the case of taxi minibuses, the conductor, after deducting fuel costs and additional costs. The more passengers, the more income, so drivers perhaps tend to take more risks in order to increase

their income. This might be one of the reasons for their reckless behaviour, but also lack of training and of awareness play an important role.



**Figure 4-20 – Boda boda motorcyclists using the sidewalk to bypass congested traffic**

A remarkable situation occurs when police take control of traffic at intersections. Traffic can be stopped by traffic police for over half an hour at busy intersections, especially at the Shoprite and Clock Tower intersections to prioritise one direction over the other. When queuing, vehicles stand close to each other which makes it difficult for pedestrians to cross the street. An extremely dangerous situation emerges when pedestrians are already in the middle of the street trying to find a way across and the traffic starts to ride because the police gave them permission to cross the intersection. At that moment the drivers are only focused on crossing the intersection as soon as possible so they don't have to wait again and will pay little attention to the pedestrians in the street.

### **Road Safety**

Due to the rapid growth in motorised vehicles, poor quality of roads and reckless road user behaviour, Uganda has one of the highest accident rates of the world (see figure 4-21) (GTZ, 5B, 2011). The number of fatalities in 2011 has increased with 13.8% compared to 2007 (The Monitor, 2011). Eighteen percent of all accidents occur in Kampala (MoWT, 2005). According to the traffic police the total number of accident in the GKMA was 12,152 in 2010, of which 697 were fatal, 4,975 were serious, and 6,480 were minor accidents. Of all 758 persons killed in traffic accidents, almost 50% were pedestrians, 23% were motorcyclists and 17% were passengers of public transport services. Of all 6,025 serious injuries, almost 40% were pedestrians, 25% were passengers and 22% were motorcyclists (Uganda Police Force, 2011).

One of the main causes of the high accident rates is a lack of training and education. According to police superintendent Sarah Kibwika, 80% of the road accidents are a result of human error. Nathan Tumushabe, secretary of the National Road Safety Council (NRSC), says Ugandan motorists need to be taught that “driving is much more than moving a car” (The Observer, 2011).

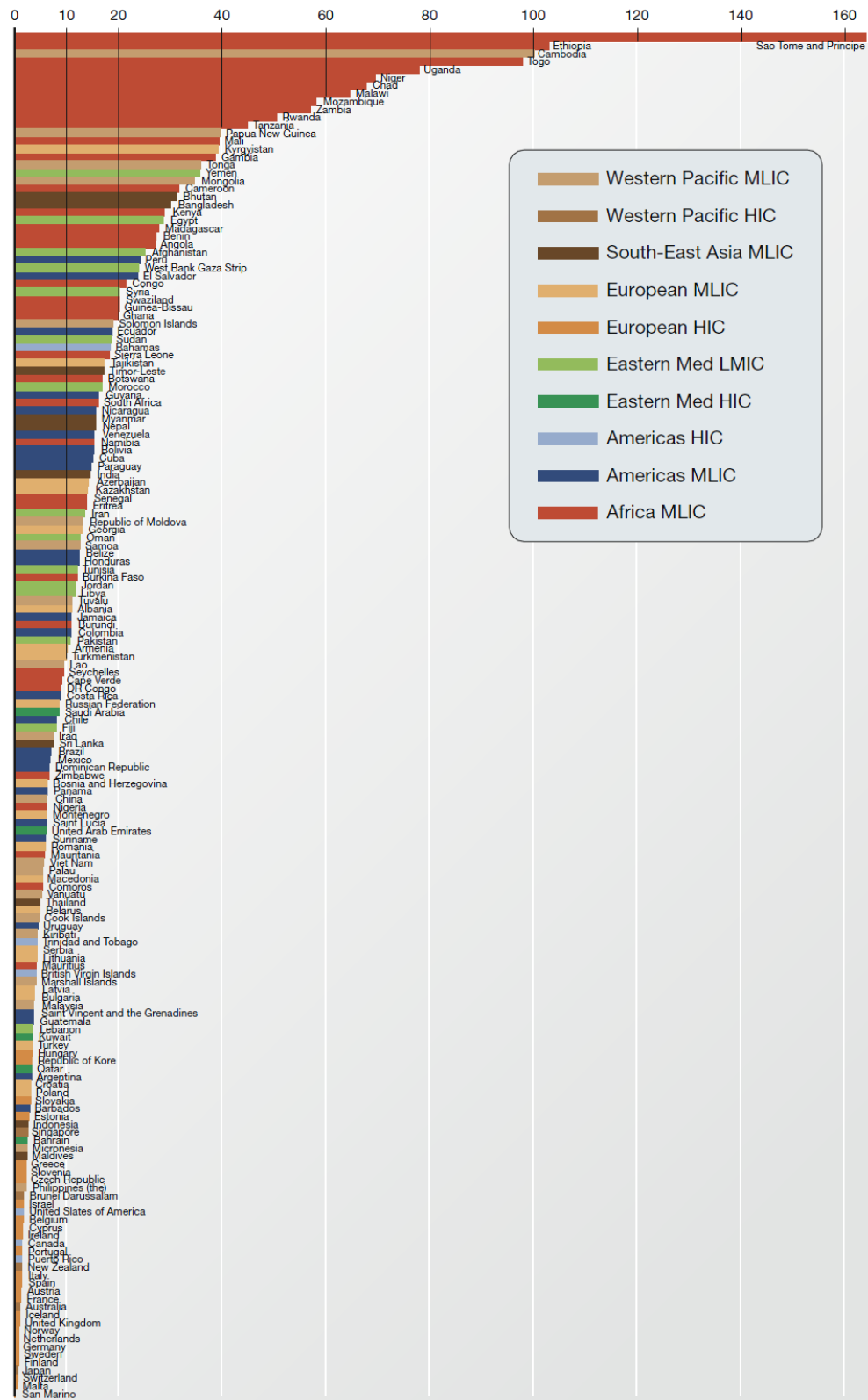


Figure 4-21: People killed in road crashes per 10,000 vehicles per country (GTZ, 5B, 2011)



## Cyclists

Cyclists are vulnerable in traffic. Cyclists in Kampala are treated as second-class road users and little respect is shown towards them. Cycling in Kampala requires a lot of courage in finding a way through the chaotic and mixed traffic, and cyclists constantly have to be aware of the chance of getting hit by motorised vehicles. Potholes can be dangerous and uncomfortable for cyclist, because they can come to fall or got hit by other vehicles which try to dodge the potholes. This makes cycling a very difficult, unpleasant and literally life threatening activity. As a result the share of cycling in the GKMA is very small, only 2% according to the preliminary ROM sample (ROM, 2011). At the same time, about 6% of all fatalities and about 5% of all serious injuries in the GKMA are cyclists (Uganda Police Force, 2011). This seems low, but regarding the 2% share of cycling, these rates are relatively high. The mixed and chaotic traffic situation, reckless driving of mainly motorists and the poor conditions of the roads are the main causes for the small share of cycling in Kampala and the relatively high accident rate.

## Pedestrians

Pedestrians are extremely vulnerable road users. The lack of appropriate infrastructure, poor crossing facilities and the presence of street vendors, mainly in the CBD, often force pedestrians to walk in the roadway (see figure 4-22), which makes them even more vulnerable. Along roads radiating out of the CBD, sidewalks are often not provided. On such roads pedestrians have to walk on the road's shoulders, making them vulnerable to other road users who often use the same shoulders as well, especially motorcyclists, taxi minibuses and bicyclists. In those situations there is no segregation between pedestrians and motorised traffic, which can be very dangerous because of the large differences in mass and speed. Although pedestrian signals are present at the few signalised intersections in Kampala, these are not very effective. Crossing pedestrians are always endangered by oncoming traffic as red light neglecting is extremely common, especially by boda boda motorcyclists. Due to missing or defective street lighting, walking is especially dangerous at night, because obstructions and pedestrians themselves are not visible.

Because of their vulnerability and the bad conditions about 50% of the fatalities and about 40% of all serious injuries in the GKMA were pedestrians in 2010 (Uganda Police Force, 2011). Most likely, fatalities and serious injuries along pedestrians are not caused by "collisions" between pedestrians only, but caused by crashes with motorised vehicles. Regarding this, a large amount of fatalities and serious injuries are caused by a relatively small group of motorised transport users. It is remarkable that in a city with such a large amount of pedestrians (46%) the conditions for this group are this bad.



Figure 4-22: Pedestrians are forced to walk in the roadway on Namirembe Road in th CBD

## Motorcyclists

Accidents of boda boda motorcycles have become a major problem due to the rapid increasing number of motorcycles and their aggressive weaving manoeuvres through congested traffic (JICA, 2010). Although helmets are required by law, the vast majority of the boda boda motorcycle drivers does not wear a helmet. Together with the relatively high speed, motorcyclists are therefore very vulnerable. About 23% of all the fatalities and 22% of all the serious injuries in the GKMA were motorcyclists (or motorcycle passengers) in

2010 (Uganda Police Force, 2011). Barbara Mayanja of the Uganda Helmet Vaccine Initiative (UHVI) reveals that an estimated 15 boda boda motorcyclists die in road accidents every month in Kampala alone. She says boda boda cyclists in particular need to be educated on road use and safety (The Observer, 2011).

### Public Transport Passengers

In 2010 about 18% of all fatalities, and about 25% of the serious injuries in the GKMA were public transport passengers (Uganda Police Force, 2010). The traffic police does not divide these figures into boda boda, bus, or taxi minibus passengers. Considering the reckless road behaviour of the boda boda motorcyclists and the vulnerability of the motorcycle passengers it is assumed that boda boda passengers have the largest share.

None of the boda boda passengers wear helmets. Although only one passenger is allowed, boda bodas frequently carry two or even more passengers. In the case of taxi minibuses, the fact that taxi minibuses are allowed to transport 16 people (14 passengers plus driver and conductor) and have the foldable seats in the aisle of the vehicle, make taxi minibuses cramped (see figure 4-23) and therefore relatively dangerous in case of an accident.



Figure 4-23: The interior of a taxi minibus

### Vehicle Conditions

In general the age of the vehicle fleet is old, most vehicles are second hand and not well maintained. Almost every vehicle has one or several bursts in the windshield, and lightning and speed indicator are often not working. These are only the visible deficiencies, but do raise questions about the state of the vehicles' internal attributes such as the engine and the brakes. Owners of minibuses do not earn enough to make it worthwhile to invest in new vehicles (ITP, 2010).

Although public transport services has to be inspected by the Transport

Licensing Board, in practice the board does not have sufficient equipment and staff and the technical inspection is limited to visual inspection (TLR Ltd, 2002) .

### Uganda Driving Standards Association

In 2009 the Uganda Driving Standards Association (UDSA) has been established in order to address safe driving and road safety. The UDSA has a team of highly qualified and experienced instructors and drivers who are trained in the United Kingdom. The aims of the association are to advise the government, improve driver training and tighten traffic rules and regulations. In other words the UDSA wants to improve road safety and reduce road accidents.



## 4.3 ENCOURAGING SUSTAINABLE MODES

### *The current mindset*



*Not only the existing situation **on paper** and **in the street** are important, but also the situation **in the minds** of the people. What is in the minds depends for a large part on awareness about sustainable urban transport. First, political and public awareness is described, as well as the organisations and companies involved in transportation in Kampala. Secondly, this paragraphs describes how transport use affects society, and how the minds of society affects the use of transport modes, mainly based on perception but also on income. Therefore, also the relation between income and mode of transport is described. Finally, the paragraph explains about the current functioning of education and enforcement, which are generally used to influence the minds of people. Again, also the situation in Sub-Saharan Africa is briefly described.*

### 4.3.1 Political Situation in Sub-Saharan Africa

Sustainable urban transport is hardly addressed in Sub-Saharan African cities. An important hurdle in this is the perception of pedestrian and bicycle mobility by political leaders and decision makers (The World Bank, 2000). Public transport has also been neglected, and in most cities is now provided by the informal sector. By now, the informal sector is very flexible, very resilient and a great generator of employment. Through that, it has a lot of power and governments will have to work with them, rather than against them to improve the quality of the urban transport system (The World Bank, 2005b). Their position is even more secured by the alleged financial involvement of politicians into the informal public transport sector. Additionally, in the efforts of reducing poverty in Africa, any measure that may come with a potential loss of jobs or income – like replacing informal public transport with a BRT system or removing street vendors from the roadway – is politically extremely sensitive (The World Bank, 2002b).

### 4.3.2 Political Situation in Kampala

#### Political Awareness

For many years the Ugandan government has only focused on motorised transport at the cost of non-motorised modes. However, more and more highly placed officials are now recognising the importance of non-motorised transport and are realising there is a need for sustainable urban transport. All interviewed persons of governmental institutions are conscious about the current traffic problems and mention the importance of sustainable urban transport (Interviews, 2011). Therefore it is assumable that more and more attention will be given to the subject. The pre feasibility studies for a BRT system of the World Bank, the preparations for a new Kampala Structural Plan including non-motorised transport, and a pilot project by the Kampala City Council (KCC) with a strong focus on non-motorised transport are some examples which confirm the increasing awareness and willingness of the government. Furthermore the sustainable urban development workshop of 13 April 2011 with its high attendance, provides evidence for the increasing awareness of the importance of sustainable development in Kampala.

What is lacking though, is knowledge (Ngabirano, 2011). Transport and land use management is practised by non-Ugandans or by the few who have followed education abroad, and because of this, it is unlikely to find politicians with adequate background knowledge on urban development.

Furthermore, some politicians allegedly have shares in UTODA which makes measures concerning public transport difficult (The World Bank, 2005b). The recently elected mayor is very popular among the people who get their income from the streets, such as boda boda motorcycle drivers and street vendors, which will likely make addressing the transport issues caused by this informal sector politically sensitive since the mayor would not want to risk losing the support of his followers.



## Public Awareness

In Kampala there is a lack of public awareness about sustainable urban transport, given that the citizens do not demand for sustainable modes of transport. They seem not to be aware of the fact that the current situation could be better (Ngabirano, 2011). Interviews with random people on the street confirm this, since all the people share the opinion that more roads will solve the congestion in Kampala (Interviews, 2011). The reason for the absence of (sufficient) public awareness probably has to do with the fact people have more urgent problems. Gaining income for food, education and health care are probably seen as more important than the availability of different modes of transport, and the poor conditions of the current transport system. As long as they can reach their destinations, they will probably not complain.

### 4.3.3 Stakeholders in Kampala

#### Civil Society Organisations

##### The First African Bicycle Information Organisation

The First African Bicycle Information Organisation (FABIO) is a Ugandan based non-governmental organisation. Fabio provides practical solutions in fighting poverty through improving the accessibility of basic services, by providing bicycles to mainly women and the young. FABIO also provides strategic solutions by lobbying and advocating for the inclusion of non-motorised transport in transport policies and designs at both central and local governments. The organisation does both rural and urban projects. In rural areas FABIO mainly provides practical solutions, while in urban areas the solutions are mainly strategic. In the past the focus used to be on the rural areas only, but FABIO has recently made the shift to more urban areas as well.

Fabio advocates for improved affordability and accessibility of bicycles through bicycle rentals and a Bicycle Credit Scheme. They try to import bicycles of better quality. In Kampala FABIO advocates for the integration of non-motorised transport in plans for the BRT. In addition, the organisation is preparing a car free zone in the city, and wants to make cycling easier and more attractive for students at universities through bicycle parking facilities and repair stores. FABIO also wants to create a cyclists federation in order to shift from advocating for cyclists to advocating with cyclist. In order to convince women who don't cycle due to cultural habits, FABIO uses role models and let them share their experiences (FABIO, 2011b).

##### The African Forum for Mobility and Development (TAFMOD)

The African Forum for Mobility and Development (TAFMOD) is an Ugandan based non-governmental organisation that aims to promote and mobilise cyclists in the Kampala metropolitan area, and to organise the stakeholders into a cycle and environmentally friendly federation. The mission is to promote environmental sustainability in urban set ups in order to enhance social and economic development through the use of non-motorised transport. TAFMOD advocates in the Ugandan government and East African Cities for the implementation of public transportation systems and the legal rights of bicycle users on roadways. The overall objective is to influence mobility policies for development in Africa.

TAFMOD has been active for about six months now. Some of the projects TAFMOD has already done is "Family Cycling", in which cycling is used to get together and is aimed to gain interest for cycling through leisure. The organisation also focuses on students at universities. They have for example organised a cycle tour at Makerere University (TAFMOD, 2011b).



#### Local Government/Organisations

##### Kampala City Council

Besides several other services, Kampala City Council (KCC) is responsible for the construction, rehabilitation and maintenance of district, urban and community access roads. KCC has embarked on numerous ambitious plans with the support of several partners including the Japanese Government and the national government of

Uganda to improve and manage city traffic. The works include: the expansion of city roads, establishment of traffic lights at major junctions, redirecting traffic and opening up new routes to decongest city traffic, and providing alternative access routes. One of the ongoing projects is the Kampala Institutional and Infrastructure Development Program (KIIDP) intended to improve infrastructure (KCC, 2011).

At this moment KCC is preparing a pilot project in the city centre in which a few streets are selected to make these more suitable for non-motorised transport. The KCC has also organised the successful Sustainable Urban Development Workshop, which was held on the 13<sup>th</sup> of April in 2011, in conjunction with Goudappel Coffeng and Goudappel Africa. Aim of the workshop was to map out the way forward for Sustainable Urban Development in Kampala by focusing on land use planning and transport planning.

## National Government/Organisations

### Ministry of Works and Transport

The mission of the Ministry of Works and Transport (MoWT) is to promote adequate, safe and well maintained public works, transport infrastructure and services, so as to effectively contribute to the socio-economic development of the country. The vision is to have reliable and safe public works and infrastructure, and a transport system that will deliver quality, time efficient, cost effective, and sustainable services to the people of Uganda. The mandate of the MoWT is to plan, develop and maintain an economic, efficient and effective transport infrastructure, with corresponding transport services by road, rail, water and air. Furthermore the MoWT mandate is to manage public works, including government structures, and to promote standards in the construction industry.

One of the agencies within the MoWT is the Transport Licensing Board which regulates the use of public transport vehicles, private omnibuses and goods vehicles through routine inspection and licensing.

Some of the current planned involvements of MoWT are the introduction of a BRT system, for which a pre feasibility study has been completed in May 2010, and road network improvement, including a road safety improvement plan, with technical assistance of JICA (See Japan International Cooperation Agency). A third planned involvement is to continue the collaboration with promoters of non-motorised transport (MoWT, 2011).

### Ministry of Lands, Housing and Urban Development

The Ministry of Lands, Housing and Urban Development (MoLHU) is responsible for providing policy direction, national standards and coordination of all matters concerning lands, housing, and urban development. The aim of the Ministry is to ensure sustainable land management and orderly urban development (MoLHU, 2011).

### Uganda National Road Authority

The mandate of the Uganda National Road Authority (UNRA) is, among others, to develop and maintain the national roads network, advise the government on the general road policy, and contribute to the addressing of transport concerns,. The goals of the UNRA are to optimize the quality, and time and cost effectiveness of road works, and to guarantee all year round safe and efficient movement of people and goods throughout the country (UNRA, 2011).

### Uganda Road Fund

The Uganda Road Fund (URF) is responsible for financing maintenance of public roads in Uganda. The URF provides the opportunity for the implementing agencies to plan for efficient and effective delivery of maintenance on their respective categories of roads (URF, 2011).

### **Uganda Taxi Operators and Drivers Association**

The non-governmental Uganda Taxi Operators and Drivers Association (UTODA) plays a very important role in the regulation of public transport by planning and supervising the operation of the minibus industry in Kampala. All operators, drivers and vehicle owners are expected to be members of this association which has been set up to represent their interests. UTODA is aimed at uniting all taxi operators, drivers and vehicle owners. The association looks forward to getting a unified system with unified standards for taxi operations throughout the country, and to streamline the taxi services.

In 1986 UTODA won the Kampala City Council contract to manage taxi minibus operation in Kampala. Ever since, they have retained this contract, and today they have taxi parks and offices in many districts. UTODA charges taxi drivers for using the taxi parks and services, and recommends standard fares for each route. Some of the achievements of UTODA is the realisation of the two main taxi parks (Old and New Taxi park) in the city centre, and increased employment opportunities among especially the young (UTODA, n.d.). According to the National Chairman, UTODA provides income, both directly and indirectly for more than 30,000 people in Kampala (Ndyomugenyi, 2011). UTODA benefits from strong political support, with some senior officials now having become major taxi fleet owners (World Bank 2005b).

### **Traffic Police**

The traffic police is part of the Uganda Police Force. The role of the traffic police is to enforce traffic laws and regulations. In addition they aim to educate the public (Traffic Police, 2011).

## **Other Organisations**

### **Foreign Organisations and Companies**

Because of a lack of expertise and experience a lot of organisations and companies from all over the world are involved in projects in Uganda. For example The World Bank is involved in the current plans for the bus rapid transport system, ROM Transportation Engineering from Israel is involved in preparing the Kampala Structural Plan and Japan International Cooperation Agency has proposed a road network and transportation improvement plan.

### **Associations**

Besides UTODA, there seem to be a few other associations representing the interests of some specific groups. One of them is the Uganda Public Transport Users Association (UPTUA). No information is available about the association, so it is not clear what it does exactly, and if it is still active. A study by John Howe mentions the existence of some local boda boda associations, the Uganda Association of Motorcycle and Bicycle Operators, and the Uganda Boda Boda Operators Development Association. Such associations represent the interests of its members which pay a fee and in some cases they allocate routes or areas of operation. The associations are characterised by instability, they are often weak, have poor management skills and often little recognition and thus influence (Howe, n.d.). There also seems to be a Uganda Bus Operator Association. It is unclear if any of the above mentioned associations are still active.

## **4.3.4 Transport and Society in Sub-Saharan Africa**

The enforcement of traffic laws in SSA cities is low or poor due to corruption and inadequate human and financial resources (The World Bank, 2005b). In addition, drivers are often young and inexperienced.



In 2002, about 40-50% of the population in SSA countries was living below the poverty threshold and most of them could not afford public transport. Consequently the urban poor are mainly dependent on non-motorised transport. The dominant feature of the urban transport sector in SSA is poverty, both for the users and for those who find employment in it. Any improvement of travel conditions will have a positive economic impact on urban productivity, especially for the urban poor (The World Bank, 2005b).



Severe congestion, traffic accidents, noise and air pollution damage the economy of cities and have negative environmental and human health impacts. Sometimes congestion is making it difficult for cities to provide the basic needs, it hinders economic development, and makes it harder for people to find work and stay employed, which particularly effect the urban poor (The World Bank, 2005b).

In the original interlocking circles model (see §3.1.1), improving the environmental aspect has been recommended to be the most relevant. This is understandable in the case of developed countries, in which serious social problems are relatively small. However, regarding the situation of Sub-Saharan African countries, the social aspect is of much more importance. Perhaps, not the environmental but the social objectives prefers priority in these countries. The social problems are the noticeable everyday problems, the environmental problems are detectable in the longer term, but do not yet play a visible role in people’s daily lives. It will probably be easier to persuade people to change their attitude when this results in improved social conditions, than to convince people to change their attitude to reduce global warming. Undoubtedly, attention must be given to the environmental aspects, but initially priority to social objectives is more important and probably more effective in order to redress the balance. Regarding this an interlocking circle model with priority to the social aspect will be more realistic (see figure 4-24).

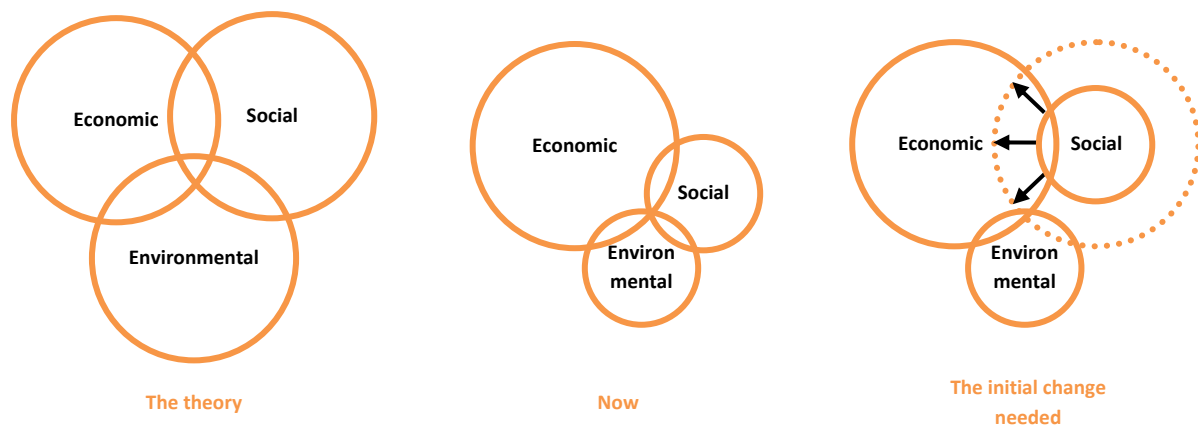


Figure 4-24: Visual representation of the desired balanced situation (left), the current imbalance (middle) and the initial change needed (right). (IUCN, 2006), adapted by authors

### 4.3.5 Transport and Society in Kampala

#### Social Impacts on Society

##### Economical and Human Development

The severe congestion limits economical development through long travel times, high travel costs and unreliability. Travel time with congestion can double compared to the situation without congestion. Time lost in congestion automatically leads to losses in productivity. Due to congestion, an inappropriate transport system, and bad road conditions Kampala has poor accessibility to social and public services. As a result this limits human development and the improvement of living standards.

##### Costs

Besides congestion, road safety is a major problem. The high accidents rates lead to high human and economic costs. The total costs of accidents for Uganda's economy in 1998 indicated an amount of US\$ 122.4 million. This represented 2.3% of the country’s GNP, of which US\$ 5.6 million was attributed to fatal victims, US\$ 6. 4 million to injured people (serious and slight injuries) and US\$ 110.4 million in material losses (MoWT, 2005).

##### Pollution

Vehicle exhaust emissions contributing largely to poor air quality. Severe congestion and the age of the vehicle fleet are worsening the air quality conditions (ITP, 2010).

## Perception and Image

In a country with large differences in income levels, status and image play an important role. The status and image of the different modes of transport according to the general public can influence the actual use of a mode.

### Cycling

Cycling is often seen as a cost effective mode of transport, which is also easy to use. But beside this it is seen as a dangerous activity, because of a lack of safety, lack of infrastructure, reckless driving and lack of respect for cyclists by the other road users (Ngabirano, 2010). For daily utilitarian use, cycling is seen as an unpleasant way of transport, because people can become sweaty and dirty (Interviews, 2011).

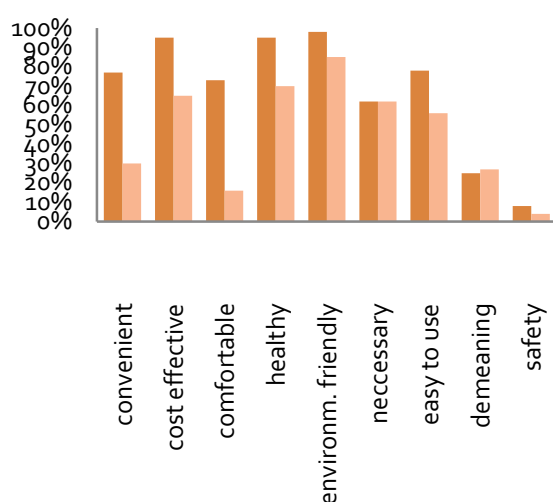


Figure 4-25: Perception of bicycle transport (Ngabirano, 2010), adapted by authors

Nonetheless, cycling is perceived as a sustainable mode of transport which is healthy and environmentally friendly (Ngabirano, 2010).

According to civil society organisation Fabio the image of cycling is worse than that of walking. Mr. Kayemba explains that when someone is walking, people can hardly see if someone walks because of poverty, or just from or to his car or from or to public transport. But when someone rides a bicycle, it is obvious that they ride it because of poverty (FABIO, 2011). According to civil society organisation TAFMOD, cycling is associated with poverty and failure (TAFMOD, 2011a). Both organisations mention that in some cultures, people think women can lose virginity though cycling.

There is a clear difference in the image of bicycles in the rural areas, compared to the urban areas. In the rural areas, bicycles are much more associated with wealth. In such areas bicycles are what cars are in the urban areas, they give someone status (FABIO, 2011a).

### Walking

Walking is seen as a dangerous activity, because of the reckless and careless driving of other road users, but also because of thugs and pickpockets on streets, especially when it is dark. It is also seen as unpleasant because of a lack of functional and respected pedestrian crossings and sidewalks. Furthermore road side parking and street vendors are mentioned as disadvantages (Interviews, 2011). Observations and experience of the research team shows that also the poor conditions for walking make it a very dangerous activity.

According to the director of FABIO the image of walking is not that bad. Mr. Kayemba clarifies that, when someone is walking, people cannot see if they walk because they have no other choice, or if they have just parked their car. Even though, the wealthier people see walking as something for the poor (FABIO, 2011a).

### Taxi Minibuses (Matatus)

Taxi minibuses are seen as uncomfortable, because people are squeezed and sometimes the taxis are overloaded. People also dislike the unreliable fares and travel times. The private sector has its own power which enables them to ask different fares, sometimes the fares even vary on the same routes (MoWT, 2005). The minibuses simply leave when they are full and sometimes waiting times can be long. Also waiting for



passengers at bus stops during the trip can be annoying. In addition the congestion makes the travel time unreliable, because trips can often take twice as long, compared to a congestion free trip (Interviews, 2011). A regulation, restricting a maximum of three passengers per row, is stringently enforced in most parts of Uganda. Consequently minibus travel is far more comfortable than in the majority of African countries where four persons per row is common (Bradt, 2010).

According to a passenger interview survey by JICA, about 44% of the passengers want lower fares and 21% wants the minibuses to speed up. Only 9% answered more comfortable vehicles (JICA, 2010) as a desired change. Probably time and money is more important to the passengers than comfort, but it is also possible that some part of the taxi minibus users don't share the opinion that the vehicles are uncomfortable. If people have simply never experienced travelling in a more comfortable way, taxi minibus travel can be very pleasant to them, since they don't have to walk. Other outcomes of the JICA survey were safety (10%), frequency (8%), station (6%) and information (2%).

Results of face to face interviews by Integrated Transport Planning (ITP) show that the majority (about 60%) of the public transport users feel that the current provision of public transport is uncomfortable, unsafe and involves long journey times, including the time for filling minibuses. A majority of the public transport users is willing to pay an additional fare for more comfortable buses and for savings in travel times (ITP, 2010).

Compared to western standards, the taxi minibuses are very uncomfortable, inconvenient and unsafe. In the Netherlands for example, the same type of minibuses is only allowed to carry 9 passengers. It is obvious that this is much more comfortable compared to the 16 persons, including driver and conductor, which is common in Uganda. The foldable seats in the aisle and the low ceiling makes it very hard to get on a seat. Furthermore, it regularly occurs that people have to temporarily exit the minibus in order to let other people get off. In addition, due to the large amount of squeezed people and the blocked aisle, taxi minibuses are very unsafe in case of an accident.

### **Boda Boda Motorcycles**

The boda boda motorcycle is seen as an easy and fast form of public transport. They are almost everywhere available and can easily manoeuvre through traffic congestion. Besides this, the image of the drivers is less positive. Drivers are perceived as unreliable and unsafe because they don't behave and are not considerate. They don't respect other road users and ignore, or are not aware of, traffic rules (Interviews, 2011).

### **Cars**

The car is perceived as something which will make life easier. A car is convenient since it provides comfort, freedom and flexibility. It is also seen as a safe mode of transport. Driving in Kampala is seen as stressful due to chaotic and mixed up traffic (Interviews, 2011). The car is a symbol of wealth, and as soon as people have enough money, they want to own a car (GCS, 2011).

*“Cars on sidewalks or parking bays where there should be sidewalks tend to suggest that citizens with cars are more important than those who don't have them.”* (Mukwaya, 2011).

### **Buses**

The large buses seem to be more comfortable and better regulated, compared to the taxi minibuses. Although they have fixed timetables, these services also do frequently not leave on time (Interviews, 2011).



## Income Level versus Type of Transport

According to the National Transport Master Plan the following relations in table are true:

Greater Kampala Income Levels (2004)			
	High income	Middle income	Low income
UShs per month, main income earner	750,000+	300,00 - 750,000	< 300,000
Proportion of population	9%	37%	55%
Type of transport	100% private	60% public 40% private	50% public 50% non motorised

Table 4-3 – Greater Kampala income level in relation to transport mode (Nsambu, 2010)

People of the high income level form a minority of only 9% of the total GKMA population. This group can choose between all the different modes of transport, but mainly uses the private car and avoid public transport and non-motorised transport. In general, cycling by this group is not used for commuting, but only for leisure. Consequently about 100% of the trips are made by a private type of transport.

The middle income level represents 37% of the total GKMA population. Part of the group cannot afford a private car and uses public transport (60%). The other part (40%) can afford a private car and use it. In general, this group of public transport users will immediately shift from public to private transport if their income enables them to.

The majority of the GKMA population (55%) embodies the low income level. Half of the group uses non-motorised transport. People who cannot afford a bicycle will walk, for them this is the only choice and thus a necessity in order to survive (Tiwari 2002b). It is assumable that not everyone who can afford a bicycle will actually shift to cycling, because of the current traffic situation and attitude of other road users (Ngabirano, 2010; Interviews, 2011). From the moment the people in this income level group can afford to travel with public transport they will probably shift to public transport. In 2004 fifty percent of this group was able to afford public transport.

The National Transport Master Plan estimates that the proportion of the population in the high income group will rise to 21% by 2018, the proportion in the middle income group will remain at 37%, while that of the low income group will fall to 42%.

A more recent survey about the use of different modes of transport, as presented in the BRT pre feasibility study for Kampala, shows more or less the same outcomes. Car use is mainly used by the upper class, particularly the high and middle income earners. Public transport by taxi minibuses and boda boda motorcycles are mainly used by middle and low income earners and walking and cycling are generally used by the lower income class (ITP, 2010).

## Purpose of Trips

According to Origin and Destination surveys of the National Transport Master Plan, trips made by motorised vehicles can be divided into the purposes mentioned in table 4-4. The purposes for the trips made by public transport vehicles are mentioned in table 4-5..

Purpose	Percentage
Shopping, family visits and related purpose	27.2%
Going to work	23.4%
For business	18.2%
For public service	14.2%
Returning from work	13.7%
Education	3.4%

Table 4-4: Purpose of trips by private motorised vehicles



Purpose	Percentage
Shopping, family visits and related purpose	44.0%
For business	20.6%
Going to work	10.2%
Education	9.5%
Returning from work	9.0%
Public service	6.6%

**Table 4-5: Purpose of trips by public transport vehicles**

### Education

According to civil society organisations FABIO and TAFMOD, currently there is no traffic education at schools at all. Perhaps there are a few schools where children learn a little bit of theory on some basic road safety behaviour, like looking at both directions before crossing a street. Children don't learn cycling at schools, but some learn cycling from their parents, often on full-size bicycles, which is inconvenient and not very pleasant (FABIO; TAFMOD, 2011a).

*“If road safety education could be introduced into primary schools in Uganda, it would be the single most important contribution to road safety ever seen in this country”* (Okat, 2000).

There are several driving training schools in Uganda. The Uganda Driving Standards Association (UDSA) works with these schools and monitor them closely to ensure that quality drivers are produced in order to ensure driving rules and regulations are adhered (UDSA, 2011). There are different driving licenses, for example a special group D license is required to drive any public service vehicle including minibuses (ITP, 2010).

According to the UDSA, Uganda has an official Highway Code, but it is not clear if this document is also recognised as the official Code by the government. On their website, the UDSA mentions that it is important that everybody knows and applies the Code, but the Code is not published online and it is not mentioned where to get a copy of the Code.

### Enforcement

The current traffic law in Uganda is the Traffic and Road Safety Act of 1998. This Act is quite extensive and seems well-considered. If all road users would obey the Act, the traffic situation would probably be less chaotic and road safety much better. For example the Act prescribes that all vehicles should have proper lighting when it is dark. However, in practice the lighting of the majority of the vehicles is poor or missing completely. Partly this has to do with negligence of the drivers, but also poor enforcement plays an important role. “In countries where the road carnage is minimal, laws and regulations are strictly enforced. They are not just on paper like is the case in this country. We have very good laws but they are just on paper, unfortunately.” (The Monitor, 2009).

The traffic law is enforced by the traffic police, part of the Ugandan Police Force. The current capacity of the traffic police is not enough to enforce the law in a proper way. The police is constrained by limited resources, including a lack of vehicles, equipment and training (UNHCR, 2010). The main focus points of the traffic police are to reduce and prevent accidents, and to address reckless and careless driving. However, in practice it seems like the police is more concerned with controlling the traffic flow of motorised vehicles. A large part of the capacity is used to regulate the traffic at intersections, for example at the “Clock Tower” intersection, where police is present every day, all day long.

Depending on the seriousness of violation, violators get a ticket (express penalty on the spot) or have to go to court, which is for example the case with drinking and driving. Violators have to be stopped by police officers by foot, by motorcycle pursuit or by police elsewhere through communicating suspect details (Traffic Police, 2011). Only a minority of the inhabitants of Kampala own a post box (Ngabirano, 2011), and therefore it is often not possible to send fines to violators. Consequently the chance to get caught is very small. And even



when the police catches someone, the first aim is to sensitise road users before enforcing the law (Traffic Police, 2011). Regarding the current traffic situation with its reckless and careless drivers, and high accident rates this seems not to be a very successful method. Corruption and impunity within the police organisation worsens the situation (UNHCR, 2010).



## 5 VISION

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*This chapter will result in an integrated vision for introducing sustainable urban transport in Kampala, which is established by combining the input of local stakeholder with the theoretical framework and the existing situation. The general vision will be further elaborated into visions for each of the three known categories. Prior to presenting the vision, this chapter will describe the events of the Sustainable Urban Development workshop which was used to acquire the necessary stakeholder input.*

## 5.1 SUSTAINABLE URBAN DEVELOPMENT WORKSHOP

### 5.1.1 Workshop Setup

On 13 April 2011 a Sustainable Urban Development Workshop was held by the KCC and Goudappel Africa which also addressed sustainable urban transport. The workshop consisted of presentations on sustainable urban development in the morning followed by group discussion in the afternoon. The presentations addressed the importance of sustainable development and integrated planning and explained the developments of the National Transport Master Plan and the Structure Plan for the GKMA. They also illustrated the opportunities for cycling in Kampala and showed the success experience of sustainable urban transport from all over the world also mentioned in this report.

The afternoon group discussions were shaped around a number of discussion questions. These questions were supplied by Goudappel Africa, which created the opportunity to match the questions to the research for this report. The questions were utilised to find out how the attending stakeholders believe sustainable urban transport should be introduced in Kampala.

The workshop was attended by more people than 120 people, among which a number of politicians and local and national media. A list of the most relevant attendees has been included in appendix A.



Figure 5-1: The sustainable urban development workshop held in Kampala on 13 April 2011



### 5.1.2 Group Guiding Questions

Together with the interviews executed with various stakeholders, the outcomes of the workshop group discussions were used as input to formulate a broadly supported vision for introducing sustainable urban transport in Kampala.

The discussions took place in six groups, each with a discussion leader, and supplied with two discussion questions. Where necessary, the group discussion leader could elaborate on the questions. For each question the group had to choose for a certain outcome and motivate their decision. The following questions were addressed in the discussion groups:

1. Urban structure; compact city, network city or dispersed city?
2. Separating or mixing land use
3. Selective provision or balanced distribution of land uses?
4. Strong link with transport or greater focus on land use alone?
5. More transport space or more living space?
6. Moving cars or moving people; a continuous provision for cars only or other modes as well?
7. Social equity or social imbalances on roads?
8. Planning for short term or long term?
9. Plan for all modes of transport or just a selection?
10. Which mode is being prioritized and what are the alternatives, if any of the modes is not planned for?
11. “Quick Wins” or “Capital Projects”?
12. Planning as a onetime activity or as a continuous process?

### 5.1.3 Workshop Results

The workshop participants concluded that a network city structure is most suitable for Kampala and that it is best to mix land uses but guiding principles should be in place. Selective provision and a balanced distribution of land uses are both applicable but there are specific land uses that need selective provisions (e.g. industrial and environmental). Land use compatibility should be taken into consideration, and exclusive land use should be avoided because of transport issues and to prevent (income) class segregation. There is an urgent need to integrate land uses in Kampala, through which travel distances and costs can be reduced, and which can ease in decongesting the city.

Over time, priority has been given to motor vehicles. But just as with land use and transport, provisions for travel modes should be balanced to achieve efficiency, accessibility and equity. Currently not all road users are well catered for and some users are even unable to use certain streets. Kampala should have an integrated transport system where all users have the right to use the road where prioritisation is given according to the local benefits of modes.

Planning in the GKMA should be done for both the long and the short term, depending on the scope and nature of the plans. A long term vision is required for consistence and there should be better coordination between local and national plans. It is important to acknowledge that introducing sustainable urban transport is a gradual and continuous process. Waiting (for resources) is not an option and a start should be made soon. Therefore a mix of quick wins and capital projects is recommended, quick wins for the fast results and capital projects for the long term planning. The feasibility of a quick wins also depends on the area and the status of the infrastructure, which should be in good shape. In both cases, the results will have to be monitored.

#### Authors' reflection

Not all group discussions initially went as intended, because the questions did not always seem to be fully understood. The cause for this was probably a lack of knowledge on the subject, which shows the importance of the workshop. Even though, the outcome of workshop results are still of great value since it has resulted in

a prudent and cooperative first outline on which direction to take in introducing sustainable urban transport, given the combined ideas and preferences of the stakeholders in Kampala. In addition, the workshop has helped to increase the knowledge and awareness on the subject, and has made it possible for the different stakeholders to meet. But most important of all, the workshop has managed to spark the discussion and it is therefore a valuable first step in the process of introducing sustainable urban transport (and development) in Kampala.

## 5.2 VISION FOR KAMPALA

### 5.2.1 Overall Vision for Sustainable Urban Transport

Based on the definition of sustainable urban transport, which was defined in the theoretical framework, the higher and general purpose is to create a sustainable urban transport system which provides access to basic needs and development; improves safety, health and equity; is affordable and efficient; offers choice, and limits emissions and waste. These elements enforce the three pillars of sustainable development, namely social, economical and environmental. In the case of a city in a developing country, prime attention should be given to social development because of the present unbalance (see §4.3.4). For cities in developing countries, the transport focus should be on “serving people, not cars”.

### 5.2.2 Vision for Sustainable Urban Transport in Kampala

Kampala is suffering from several unbalances in urban development, transportation and liveability.

The city has developed unplanned resulting in a mismatch between housing, employment and services, which puts a strain on the CBD as the sole centre of economic activity. Transportation networks for the different modes have not been able to develop properly, and today the narrow streets of the city are unable to meet the increasing demand in transport, which results in severe congestion.

For long the government has focused only on providing for motorised transport, which has come at the cost of public, and especially non-motorised transport. Proper facilities for pedestrians and cyclists are lacking, resulting in the inefficient and dangerous mixing of modes, and a disproportional amount of road traffic fatalities and injuries among these vulnerable road users. The informal public transport sector has grown beyond control, and is causing safety and congestion issues due to the number of vehicles, and the way of operating.

The transport situation is worsened due to a lack of awareness and involvement, of both the public and politicians. Road user behaviour is reckless and careless, traffic education is lacking, and enforcement is scarce and mainly focused on improving motorised traffic flow. Streets and vehicles are often ill maintained, used inappropriately, and inspection is poor. Due to the dominance of motorised traffic the living environment is unattractive, especially in the city centre. Sustainable modes of transport in Kampala are not very attractive, due to the lack of infrastructure and facilities and the poor state of the vehicles. Furthermore the generally bad image of sustainable urban transport modes is worsening the attractiveness.

Only a small part of the population has access to private car travel and the majority is forced to travel by public and non-motorised transport. This unbalance in transport opportunities for the different income groups results in social inequity. As a whole, the transport system of Kampala is chaotic, inefficient, unreliable and dangerous, and negatively effects society, especially for the urban poor, through a loss of productivity, inhibiting human development, and reducing the quality of life.

In order to create a sustainable urban transport system, the unbalances described above should be addressed which results in the following general vision for Kampala:

- Transport and urban development should be better organised to reduce the mismatch between housing, employment and services;
- all of the different modes should be provided for to improve transport options, safety and efficiency; and,
- the negative impacts of transportation should be minimised to increase the attractiveness of the living environment by favouring conditions for the more sustainable modes.

This general vision is elaborated below into, planning strategy, complete streets and efficient transport, and encouraging sustainable modes.

### **Planning Strategy**

The mismatch between housing, employment and services, can be reduced through integrated planning. A *polycentric urban structure* is envisioned for Kampala together with mixed land use and transit oriented development. To organise transportation in the city a hierarchy in networks is envisioned. These networks should be integrated, should prioritise sustainable modes, and should divert through-traffic in order to improve the attractiveness of the living environment.

### **Complete Streets and Efficient Transport**

Streets designs in Kampala should include adequate provisions for all modes and functions to make streets safer and more efficient for everyone. In the design process, sustainable modes should be prioritised over less sustainable modes.

### **Encouraging Sustainable Modes**

Both the politicians and the public have to be made aware about the benefits and importance of sustainable urban transport, the knowledge has to be improved, and important stakeholder have to be involved in the process.

Since environment, vehicles and people are the key factors in influencing road safety and efficiency, infrastructure, facilities and vehicles will have to be inspected and maintained on a regular basis, and road users will have to be better educated and stricter enforced.

Sustainable modes of transport and their corresponding infrastructure, facilities and services have to be made more attractive in order to encourage the use of them. Undesired modes of transport and their corresponding infrastructure, facilities and services have to be made less attractive in order to discourage the use of them.

## 6 IMPLEMENTATION

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*This chapter will provide a number of measures which are proposed to develop towards sustainable urban transport in Kampala City. The proposed measures will use the key factors to success of the theoretical framework to match the existing situation in Kampala with the vision for introducing sustainable urban transport which was established in the previous chapter. The measures will be divided into the three familiar categories.*

## 6.1 PLANNING STRATEGY

### Reorganising urban development



Together with *encouraging sustainable modes* and *complete streets and efficient transport*, a planning strategy is required in introducing sustainable urban transport. In this section it will be addressed how urban development in Kampala can be reorganised. The first paragraph describes how integrated planning can reduce the current mismatch between housing, employment and services. The second paragraph describes how the city centre can be reorganised to increase its attractiveness and liveability. The third and final paragraph explains how the transport patterns in the city can be organised by providing a hierarchy in the networks for the different modes.

### 6.1.1 Integrated Planning

The current urban structure of the GKMA is *dispersed with a high-rise inner centre*. This urban structure is considered undesirable due to the urban sprawl and inefficient transport patterns. An *polycentric urban structure* is considered more practical for introducing sustainable urban transport in Kampala, as it will provide a better match between housing, employment and services. Given the current shape of the urban area, with a number of major roads radiating out of a large concentration of employment, a *radial urban structure* concept, like Curitiba, lies at hand. This type of urban structure concept will provide multiple centres of employment and services (polycentric), and at the same time stays close to the existing situation, which makes realisation more feasible. Corridors can be selected where development can take place to relieve the current strain on the CBD. In the long run, the GKMA can grow even further towards a polycentric city by assigning a number of sub-centres on these corridors some distance from the CBD where development is concentrated even more.

To develop into a *polycentric* city, radial corridors as well as sub-centres should be identified where transit oriented development is to take place. This report will not define where the sub-centres should be located, other than on the radial corridors. This study does however recommend that, when selecting a location for development as a sub-centres, the present population and their relative position of the locations to each other and Kampala District should be considered. Developing employment and services in locations with an already high population will most likely have the biggest effect on commuting in the GKMA and Sub-centres situated some distance from Kampala District will aid in reducing the need to go to Kampala CBD for employment and services. High quality public transport links should be established between the sub-centres and Kampala District to ensure the employment and services developed are well accessible, and reduce automobile dependency.

The idea for radial development corridors in the GKMA is not new. The National Transport Master Plan for the Greater Kampala Metropolitan Area (NTMP/GKMA) mentions a *Kampala Urban Study* in which seven centrally-oriented major roads have already selected along which growth should be concentrated, namely:

- Jinja Road
- Gayaza Road
- Bombo Road
- Hoima Road
- Masaka/Mityana Road
- Entebbe road
- Ggaba Road

The NTMP/GKMA also adds Port Bell Road to this list which brings the number of potential corridors to eight.

As part of the NTMP/GKMA, a survey was done among nearly 10,000 taxi minibus passengers between 24 October and 8 November 2003 to determine their origins and destinations. The proposed corridors correspond with the most frequently inbound taxi routes (MoWT, 2005). JICA, after having done a similar study, comes to



the same conclusion and adds to this that most taxi minibus passengers have their origins and destinations in the Kampala CBD (JICA, 2010).

Taxi bus drivers tend to pick routes which provide a high supply of possible passengers, hence these routes comply with many origins and destinations. The taxi minibus passenger survey therefore provides a good starting point to determine the potential radial corridors for transit oriented development, and for the future BRT routes for that matter. The drawback of this method is however that it excludes origins and destinations frequently used by other modes, for example private car users. Due to the strong influence social status has on mode choice in Kampala, it is not unlikely that some routes linking the CBD with up-class neighbourhoods are only slightly served by taxi minibuses but do accommodate a high number of private vehicles. JICA however claims that the general traffic flow of minibuses corresponds to the other traffic movements (JICA, 2010).

Due to the way Kampala has developed, the areas between the main roads have been filled with unplanned settlements, often without including adequate space for infrastructure. Although narrow, the corridors mentioned by the NTMP/GKMA and by JICA are therefore still more suitable to serve as high quality transport links than most other roads within the GKMA. In addition, the corridors also already hold the highest levels of employment and services, next to the CBD. Consequently, the choice for radial development corridors within the GKMA is rather limited and the same 8 corridors are also recommended by this report.

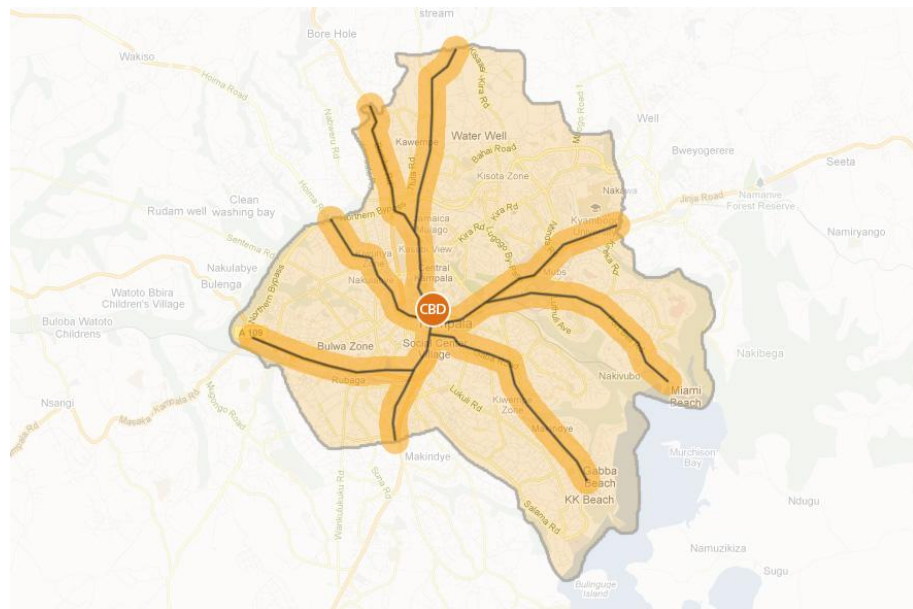


Figure 6-1: The suggested development corridors

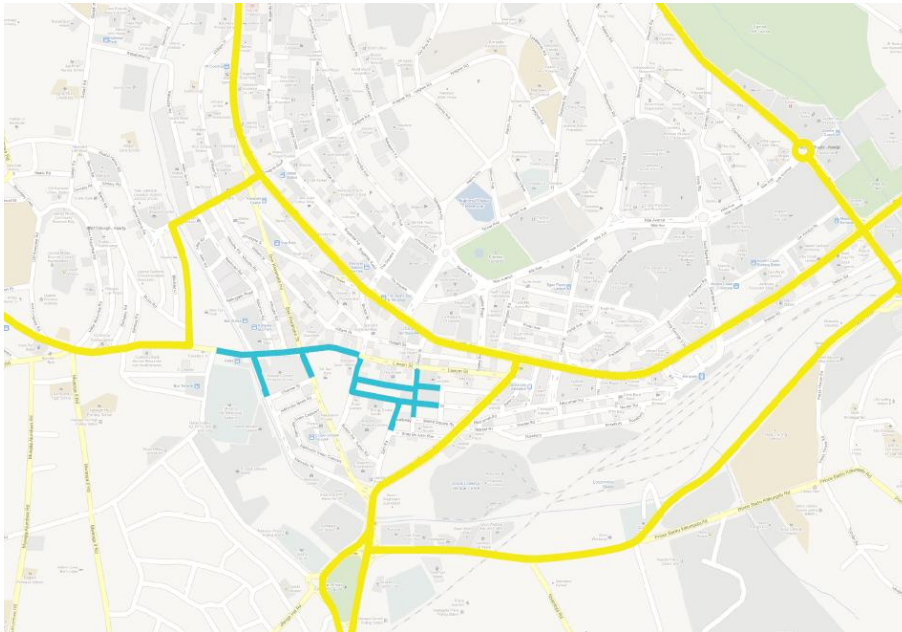
### 6.1.2 Increasing the Attractiveness of the City Centre

#### Pedestrianisation

To create a more attractive city centre and to provide dedicated space for non-motorised transport, it is suggested that part of the city centre is pedestrianised. Moreover, through pedestrianising part of the city centre, motorised traffic flow in the CBD is separated and through traffic is rerouted, thereby creating a more organised traffic pattern. The pedestrianisation is projected for the part of the CBD where it is needed the most – the area close to the Old and New Taxi parks and the Market Square, including Namirembe Road, Luwum Street, a part of Burton Street, Market Street and Dastur Street – resulting in a large, continuous pedestrian area. The combination of a high number of motor vehicles and a large numbers of pedestrians sharing the same space in this area is now creating a situation which is unfavourable and ineffective to both motorised and non-motorised transport. Additionally, it is unsafe and uncomfortable for the pedestrians. Since the number of pedestrians seems to seriously outnumber to people in motor vehicles in some of the CBD



streets, favouring pedestrian activity over motorised vehicle access seems rational. Deliveries to the shops and markets in this part of the city centre can be maintained via side streets and through handcarts and bicycles. As Namirembe Road is part of the pedestrianised area, motorised traffic between this street and Bombo Road is diverted via Mackay Road and Kyaggwe Road. The proposed pedestrian area is shown in figure 6-2.



**Figure 6-2: Proposed pedestrian area for the Kampala CBD**

A quick win approach can initially be used to implement the pedestrianisation. The closure of streets can be as simple as putting up fences or placing planters to restrict access to motor vehicles. This does not require much resources, and can be quickly realised. By closing streets this way it is even possible to first do the pedestrianisation as a pilot project to gain momentum from the public and from local shop owners, similar to the closure of Strøget in Copenhagen and Broadway in New York. The pedestrianisation can be made more aesthetically pleasing by including for example planters, benches, and bicycle racks or, when the pedestrianisation becomes permanent, by adding attractive pavement. When using fences and planters to close off the pedestrian area, boda boda motorcycles will still be able to enter so enforcement should be in place.

### Reorganising taxi parks

To complement the more organised traffic pattern created through pedestrianising part of the CBD, a reorganisation of the Old and New Taxi Park is suggested. The aim of this is to reduce turbulent traffic flow through the city centre and to prevent incoming streams from blocking outgoing streams. Currently, most taxi minibuses routes start and end in either the Old or New Taxi Park, regardless of their direction. Some taxi minibuses coming from the north will, for example, cross the CBD in order to reach the Old Taxi Park while at the same time taxi minibuses coming from the south will cross the CBD to reach the New Taxi Park. The same happens with taxi minibuses coming from the east and west. There are no official routes in and out of the taxi parks, taxi minibus drivers will use any route they see fit, being guided more by the congestion they expect to run into, than by the directness of the route. This creates very turbulent traffic patterns, resulting in delays at intersections. Incoming streams frequently block outgoing streams and taxi minibuses can be seen queuing throughout the entire CBD, blocking intersections and, with the driver's tendency to line up bumper-to-bumper, preventing pedestrians from crossing streets. Image 6-3 provides an overview of frequent taxi minibus routes in and out of the Old and New Taxi Parks, which were encountered during street observations, it is not unlikely however that other streets are also used in addition to the ones shown on the map.





To create a more organised traffic pattern in the CBD, it is suggested to separate the flows to and from the Old and New Taxi Parks. With the help of UTODA, the taxi parks should be reorganised so that the Old Taxi Park serves destinations to the east and south of the city, and that the New Taxi Park serves destinations to the north and west. Together with the suggested pedestrianisation of parts of the CBD, this reorganisation reduces the traffic that will have to go through the actual CBD. In addition, loops will be created entering and leaving the taxi parks, greatly reducing the number of conflicting streams, as is shown in image 6-4. The suggested reorganisation will not only help pedestrians, cyclists and motorists, but it should also reduce travel time for taxi minibus passengers since they will spend less time queuing.

### Integration with BRT plans

For the CBD, Kampala Road, Bomba Road, Entebbe Road and Ben Kiwanuka Street are suggested in the BRT pre-feasibility report as part of the future BRT network (ITP, 2010). The above proposed pedestrianisation does not interfere with this suggested BRT network, as can be seen in image 6-5, and, since it will help to feed the BRT system, will actually complement to the economic viability of the BRT.

If a BRT route is envisioned for Ben Kiwanuka Street, it would have to cross the pedestrianised area. This short section of Ben Kiwanuka Street (dashed in image 6-5) could be designed as a transit corridor, allowing access only to the BRT, pedestrians and cyclists. The suggested pedestrianisation does however exclude Namirembe Road and Luwum Street from being used effectively by the BRT, an option which is briefly referred to in the BRT pre-feasibility study. Although a transit corridor could also be considered for this section, this would have a rather big negative impact on BRT travel speeds as buses would have to share quite a long stretch of street with pedestrians and cyclists. The narrow street width however, makes efficient BRT operation on this street very difficult even without pedestrianisation.



Figure 6-3: The current frequently used taxi minibus routes have many conflicts

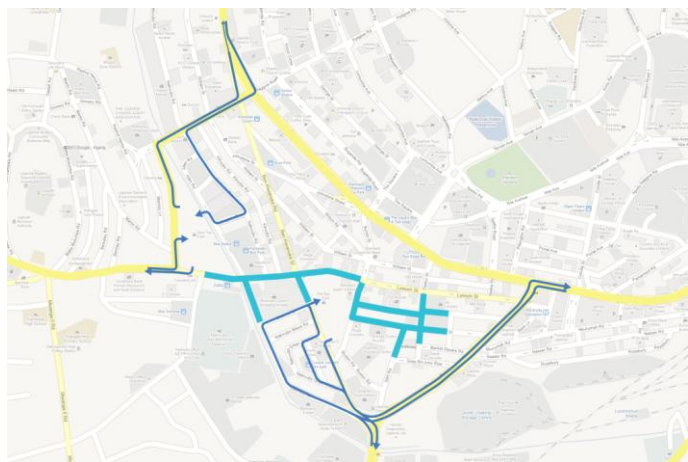


Figure 6-4: Taxi minibus routes after the introducing a pedestrian area and reorganizing the taxi parks have less conflicts

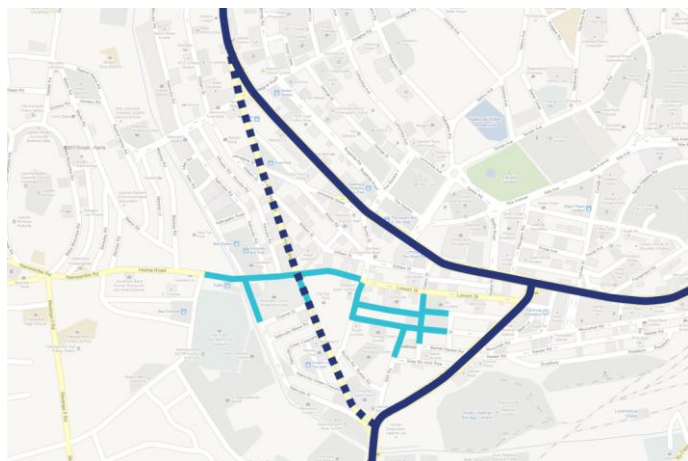


Figure 6-5: The proposed pedestrian area does not interfere with the plans for the BRT

### 6.1.3 Network Hierarchy and Integration

Presently there is no network hierarchy in the Kampala District, street functions are basically defined de-facto by their usage. As part of making the transport system more organised and efficient, this report will identify a network hierarchy for the Kampala District for motorised, non-motorised and public transport. The motor vehicle network will be divided into arterial, distributor and access streets. The non-motorised network consists of a bicycle and a pedestrian network, and the public transport network is divided into the BRT trunk network and a feeder network. The networks will be integrated to allow interaction between the modes. Furthermore they will not only be based on present street usage but also on access to major destinations and, where such data is available, street suitability.

The hierarchy in the network is defined in relation to the sustainability of the modes and the susceptibility to interruptions in traffic flow (see table 6-1). In this the BRT trunk network is given top priority. The arterial motor vehicle network also gets high priority, which will make it attractive to use. In return, the flow of motor vehicles can be given less priority on the distributor and access streets, resulting in better opportunities for pedestrians and cyclists, and in improved liveability of neighbourhoods.



































Flow Priorities							
Public Transport BRT							
Public Transport Feeder							
Motor Vehicle Arterial							
Motor Vehicle Distributor							
Motor Vehicle Access							
Bicycle							
Pedestrian							

Table 6-1: Flow priorities

#### Origins and Destinations

As the city has not been able to keep track of most of Kampala's unregulated development, a detailed layout of major origins and destinations is not available. Land-use maps, like the one in the 1994 Structure Plan, are there, but accuracy is uncertain, as is how much of what is shown on the map has actually been implemented. A new more detailed Structure Plan is currently in the making but, until that will be released, the 1994 Structure Plan currently provides the most detailed land-use map for the Kampala District.

In addition to the land-use map of the 1994 Structure Plan, a number of major commuter destinations have been identified for the Kampala District. These include the major transportation hubs, and large centres of employment and education, and are shown in image 6-6. In addition, the image also shows the existing concentration of employment along the radial corridors.



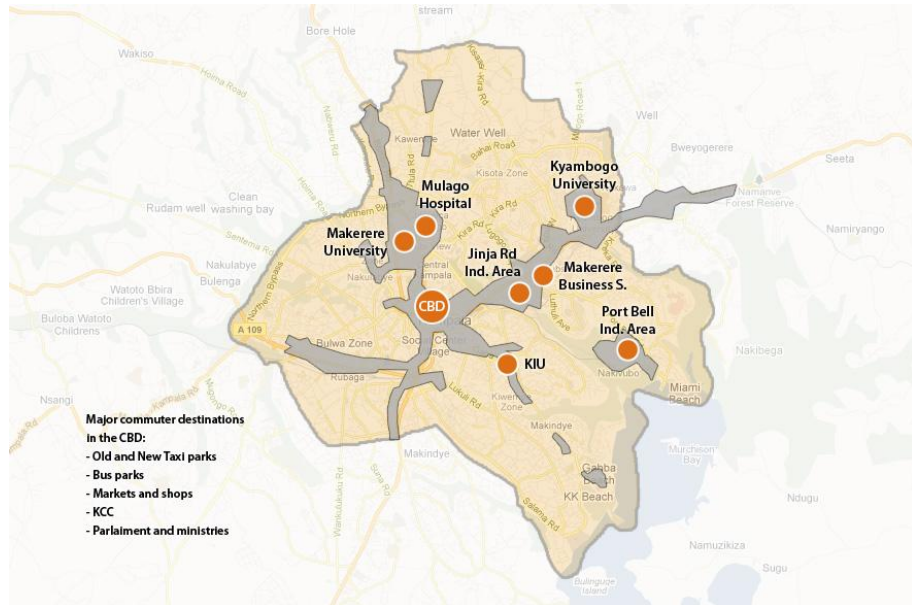


Figure 6-6: The major commuter destinations in the Kampala District

## Route Networks

### Motor Vehicle Network

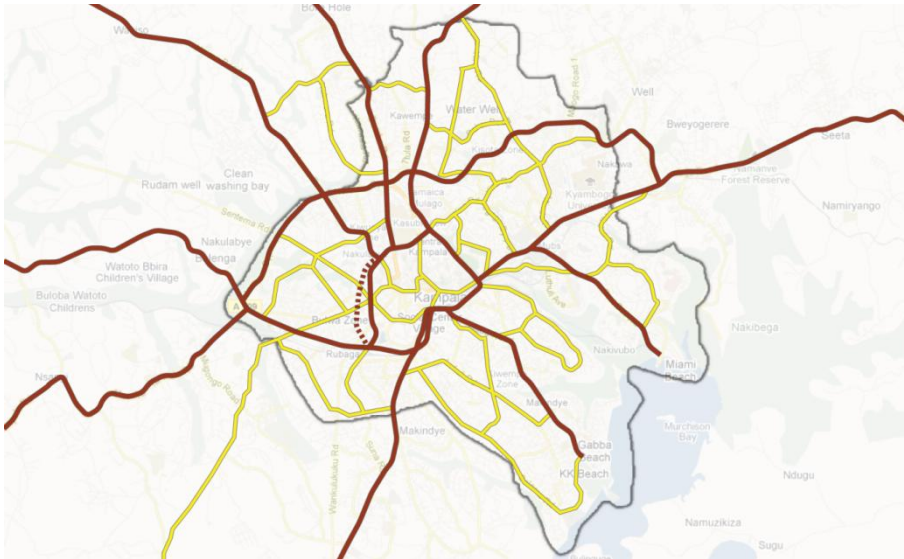
The network for private motor vehicles is classified in arterial, distributor and access streets. In order to increase the attractiveness of the living environment and to decongest Central Kampala and the CBD, motorised traffic is diverted by ring roads. The already existing Northern Bypass functions as a partial outer ring which relieves Central Kampala from through traffic. A newly suggested inner city ring will divert traffic from the CBD. The inner city ring, shown in figure 6-7, consists of Yusef Lule Road, Access Road, Mukwano Road, Kibuli Road, Nsambya Road, Queens Way, Masaka Road, Nabunya Road, Balintuma Road, Makerere Hill Road and Haji Kasule Road. The dotted section in the image might serve as an alternative or as a supplement to Nabunya or Balintuma road (for example as two parallel one-way streets).

The arterial network for the city consists of the city rings and the corridors, the latter running from the outskirts of the city up to the inner city ring. Where the corridors enter the CBD they are classified as distributor roads and hence have a lesser priority for private motorised transport. The distributor roads connecting the neighbourhoods to the arterial network were selected together with local urban planners. All remaining roads in the Kampala District are classified as access roads.

#### Box 7 – Flyovers

Most of the current plans of JICA will not benefit traffic in the city. Building flyovers at some of the proposed locations will only attract more motorised traffic into the CBD, for example the flyover suggested by JICA on Jinja Road. Flyovers can be helpful but they should be build at strategic points on the ring roads to minimise conflicts. To give an example, a flyover from Bypass Road to Yusuf Lule Road would keep ring road traffic flowing while passing the railway line, and will also ease BRT operation. A flyover from Queensway to Bypass Road would encourage users to use the bypass route and stay out of the CBD unless they have to be there. In addition, it will make the intersection more accessible for non-motorised transport, as they will not have to cross the main flow of motorised traffic. Flyovers should however be considered carefully as they can have an enormous impact on the surrounding environment. In Bogotá, JICA also proposed a number of flyovers but mayor Peñelosa rejected the idea and instead chose to invest in a BRT system.



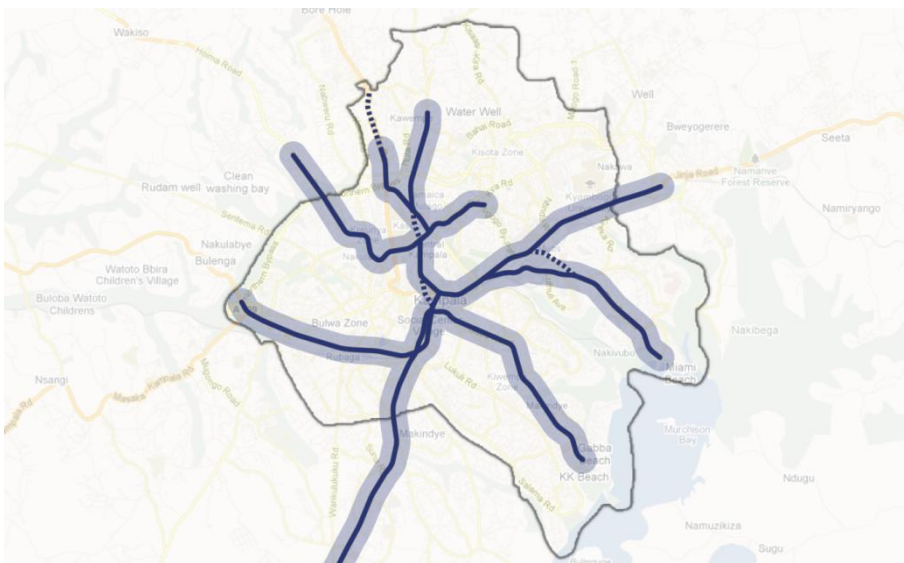


**Figure 6-7: Proposed arterial and distributor network**

### Public Transport Network

The future public transport network for Kampala will consist of both the BRT and feeder (taxi minibus) routes. The suggested BRT routes in the pre-feasibility study (ITP, 2010) serve the eight radial corridors and therefore match the major origins and destinations within the Kampala District. They are therefore also part of the recommended public transport network.

The catchment area of the BRT network does not serve the entire city. For that reason a feeder system is required. Ideally, this would be served by non-motorised transport. If most passengers would access the BRT network by walking to the stations, like is assumed in the BRT pre-feasibility report, then the catchment area will be rather small. In Europe a distance of 500 metres from a dwelling to a public transport stop is generally considered an acceptable distance. Although Ugandans and other Sub-Saharan Africans are known to walk longer distances to reach public transport, it would be unsustainable to assume that their willingness to walk such distances will remain the same when their wealth increases. A distance of 500 metres is therefore also taken for the pedestrian catchment area for Kampala. The trunk network, together with its pedestrian catchment area, is shown in figure 6-8.



**Figure 6-8: Proposed public transport trunk (BRT) network with the catchment area for pedestrians**



If however, cycling is integrated into the BRT network, the catchment area will be greatly increased and travel time will be reduced. Again, experiences in Europe have shown that people are willing to cycle between 2 and 5 kilometres to a public transport stop (Martens, 2004). This distance increases if the public transport travel speeds become higher. Due to the conditions in Kampala it is assumed that the catchment area of the BRT can be increased to 2 kilometres when cycling is included and well provided for. With this, most of the areas within Kampala are within reach of the BRT network.

However, not everyone will be willing, or able to cycle. In addition to a non-motorised feeder system, a system of smaller public transport vehicles is also suggested. This feeder system does not make use of arterial streets and could initially be well served by the current taxi minibuses. A precondition for this is that the number of feeder vehicles and their way of operating is regulated, to prevent uncontrolled growth of feeder services in the city. The combined trunk and feeder network for public transport is shown in figure 6-9.



**Figure 6-9: Combined trunk and feeder network for public transport**

When implemented, the BRT will to a great extent replace the taxi minibuses operating in the Kampala District. On the one hand, people working in the taxi minibus business can be included as employees of the new BRT system (e.g. as drivers, conductors) to prevent major loss of employment. On the other hand, the services of the taxi minibus can also be integrated into the BRT network, as they can operate as feeders from outside Kampala to the BRT bus terminals.

Since the suggested BRT routes also match the current frequently used taxi minibus routes, the proposed public transport network also applies to the situation where the city is still partially or entirely served by taxi minibuses. Coexistence of the BRT and taxi minibuses would require more and better regulation of the current taxi minibus system, especially in determining the routes served.

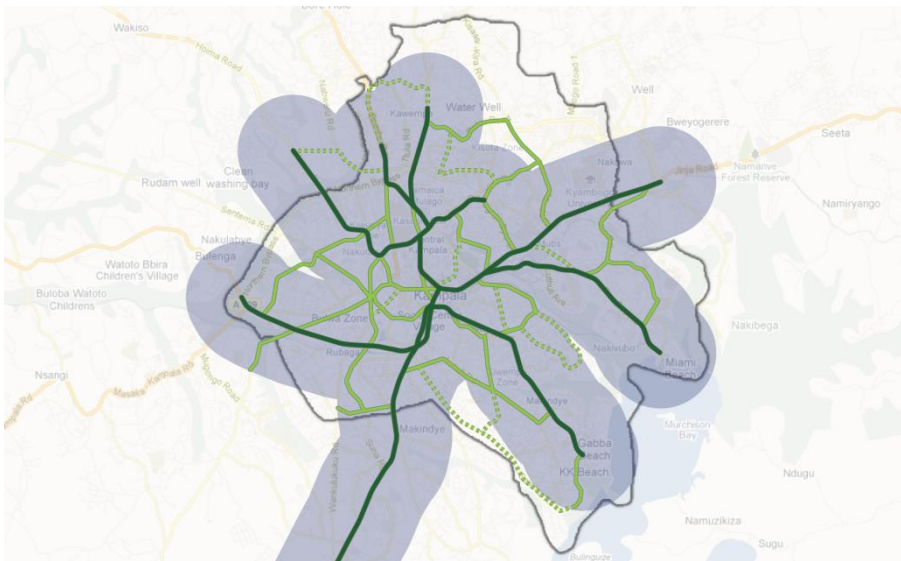
### **Box 8 – Reviving the Railway**

Currently passenger rail service in Kampala has been suspended, but plans exist to revive the service between Kampala and Namanve, a town about 18 kilometres west of Kampala. Initially trains will only be in one direction in the morning (towards Kampala), and in the opposite direction in the evening. The Kampala Industrial and Business Park which is currently under development nearby the town of Namanve, could however provide the option for viable two way passenger service if developed to potential. Integrating the railway service with the development of employment near Namanve would contribute to the vision of a polycentric urban structure for Kampala.

## Bicycle Network

The bicycle network was set up with the 2 kilometre catchment area for the BRT in mind and with a catchment area with a 5 kilometre radius for the CBD. In the Netherlands a radius of 7.5 kilometres from a city centre is considered an acceptable cycling distance but given the conditions in Kampala a smaller radius would be more realistic. Within the 5 kilometre radius from the Kampala CBD it is likely that people will cycle to reach the CBD if they are well provided for with infrastructure and facilities. Beyond this radius it is more likely that people will use the BRT to access the CBD. To bicycle network should meet and even match the BRT network to allow cyclists to reach the BRT bus stops and terminals in a safe and comfortable manner.

After defining the routes within the catchment areas of both the CBD and the BRT, the loose ends were tied up to create a coherent network. On a more local scale the bicycle network can be further expanded according to the side streets and paths available to create more direct routes. The bicycle network is shown in image 6-10 together with the increased catchment area for the BRT.



**Figure 6-10: The proposed bicycle network in relation to the BRT system**

It is advised that all arterial and distributor roads which are part of the network are clearly marked or signed to emphasize the presence and importance of cyclists. Not only does this increase awareness among motorists, but it also helps cyclists to identify the route and to find their way.

## Pedestrian Network

To a large extent, the network for pedestrian includes all streets in the Kampala District. Pedestrian access should be guaranteed to all homes, services and employment locations, and pedestrians should have a coherent network, without gaps, as every journey starts and ends with walking. To make sure of a coherent pedestrian network, it should be assessed more on a local than on a city wide scale. For example at intersections and crossings, which greatly defines the quality of the pedestrian network, but also at public transport stops which also defines the accessibility and quality of the public transport network. Furthermore, pedestrians should have segregated provisions along all arterial and distributor roads of sufficient width. Pedestrians can share the roadway of access roads with other modes if speeds and numbers are low. If pedestrian presence is not desired on a certain street, for example on roads with high travel speeds such as the Northern Bypass, an alternative should be available and severance should be minimised. On streets where there is a high presence of pedestrians, space should be allocated to this mode accordingly and in some situations where pedestrians are by far the most dominant mode, full pedestrianisation of streets should be considered.



## 6.2 COMPLETE STREETS AND EFFICIENT TRANSPORT

### Guidelines in street design



In addition to **planning strategy** and **encouraging sustainable modes**, the chances for sustainable urban transport should be increased through providing safer and more efficient transport, and by providing for all modes and functions. This section of the report proposes guidelines for converting the existing streets of Kampala into complete streets, which are safer and more efficient, by using a quick win approach. The first two paragraphs explain the approach and the design recommendations. The final paragraph elaborates on the design examples which have been included in the appendix of this report.

### 6.2.1 A Safe and Efficient Transport System for All Modes and Functions

To allow realistic choice in transport, and to encourage sustainable modes, streets in Kampala should provide for all modes and should consider other functions than just transport. Road safety is a growing concern in Kampala and including proper provisions for all road users is therefore extremely important. Furthermore, organising the use of the streets will aid in improving the efficiency of the currently chaotic transport system.

Implementing designs to improve streets in Kampala is troubled by a lack of financial resources. In order to get as much out of the limited resources available, this study suggests a *quick win* approach by using inexpensive designs and materials. As examples from New York City have shown, a redesign within the existing roadway can be as effective as a full reconstruction of a street, but at a fraction of the costs. A quick win approach can however only be used when the streets are at least in fair condition, and issues like potholes and broken sidewalks should be resolved.

The hierarchy in network and streets defined in the Planning Strategy section of this report should also be continued into the designs of the streets themselves. This results in both the prioritisation of flow and of the allocation of space. The flow priorities correspond with the network hierarchy. In case of the allocation of space, top priority is given to providing dedicated space for pedestrians and cyclists to ensure their safety and to make the use of these modes more attractive. On-street parking and commercial activities (e.g. street vending) also claim space in the streets but their priority is much lower.



































Flow Priorities							
Public Transport BRT							
Public Transport Feeder							
Motor Vehicle Arterial							
Motor Vehicle Distributor							
Motor Vehicle Access							
Bicycle							
Pedestrian							

Table 6-2: Priorities in flow


















































Space Priorities		\$	P						
Public Transport BRT									
Public Transport Feeder									
Motor Vehicle Arterial									
Motor Vehicle Distributor									
Motor Vehicle Access		\$							
Bicycle									
Pedestrian									
On-street Parking	P	\$							
Commercial Activities	\$								

Table 6-3: Priorities in allocating space

## 6.2.2 Guidelines in Street Designs

### Infrastructure for Pedestrians

Along most roads within the urban area of Kampala the number of pedestrians vastly outnumbers other road users. Considering the difference in mass and speed with motorised vehicles, sidewalks are recommended along all but some streets. Only there where motorised vehicle numbers and speeds are low, can pedestrians be safely mixed with other road users.

The NTMP/GKMA recommends a minimum width of 1.5 meters (MoWT, 2005) for sidewalks on all streets within the GKMA. The BRT pre-feasibility study holds the same recommendation but adds a preferred unobstructed minimum width of 2.0 for sidewalks in close proximity to BRT stations (ITP, 2010). This should be considered an absolute minimum as in most cases this will not be enough to accommodate the high number of pedestrians, especially when street furniture and street vendors also claim part of the sidewalk space. For New York, known for its high number of pedestrians on its CBD streets, the Street Design Manual (NYC DOT, 2009) recommends at least 2.4 metres (8 feet) of unobstructed pedestrian passage.

In general sidewalks should have a minimum width of 2 metres of which 1.5 metres is unobstructed. Where pedestrian numbers are high, such as in the CBD and near public transport stations, a minimum width of 4 metres is proposed of which 2.4 metres is unobstructed. The remaining space is considered the furniture zone. Street furniture, such as traffic signs, waste bins and bicycle racks, but also commercial activities such as street vending, should only be allowed within the furniture zone. On wide streets, additional dedicated pedestrian space or plazas can be created within the roadway by using bollards or planters.

### Pedestrian crossings

Crossing the street at grade is currently very dangerous in Kampala. Pedestrians would therefore greatly benefit from proper refuge islands. These allow pedestrians to cross a street in stages, only having to pay attention to one direction of travel at a time. Pedestrian refuge islands are recommended for all at grade pedestrian crossings on arterial and distributor streets. These can easily and inexpensively be implemented on





existing streets by using pre-formed one-piece concrete islands (see image 6-11). While some streets in Kampala already have refuge islands, these are often poorly designed and are regularly run over by motorcycles and large trucks. To prevent vehicles from driving over pedestrian islands, they should have a high kerb and include a vertical element such as a planter or a bollard. The part which pedestrians actually use to cross can be kept low to allow easy access. A width of at least 2.0 metres is advised so the refuge islands will also provide proper protection for cyclists.

Were pedestrians have to cross multiple moving lanes at grade, a signal is required due to the danger of multiple threat. In addition, proper enforcement is needed to eliminate vehicles running red light, something which is very commonly seen in Kampala among boda boda motorcyclists.



Figure 6-11 –A pre-formed concrete refuge island (Aggregate, n.d.)

On some roads, such as the Northern Bypass, pedestrian bridges have been provided to allow safe crossing of pedestrians. Pedestrian bridges and underpasses are also recommended for other highways where pedestrians are now forced to cross multiple lanes of high speed traffic. In the city centre however, where car dominance should be prevented, engineers should only build pedestrian bridges and underpasses if no other option proves feasible. Due to the elevation change, pedestrian bridges and underpasses are uncomfortable for pedestrians and can be a barrier for cyclists and people with disabilities. In addition, a study at a pedestrian bridge on a major highway observing more than 13,000 pedestrians showed that even though pedestrians had a high perception of risk, only 35.4% actually used the overpass (Mutto, Kobusingye and Lett, 2002). This study suggests that the effect of pedestrian bridges may be overestimated.

#### Box 9 – Pedestrian bridges at the Shoprite and Clocktower intersections

The sidewalks and pedestrian bridges suggested by JICA near the Shoprite and Clock Tower intersections have a proposed width of not more than 2.0 meters (JICA, 2010). Considering the high number of pedestrians that cross this intersection, a width of 2.0 metres does not seem enough and will result in an uncomfortable situation for pedestrians. Besides being inconvenient, the designs of the pedestrian bridges also do not seem to cater for people with disabilities or for cyclists.

#### Street vendors and hawkers

Street vendors and hawkers are a significant presence on Kampala’s streets. Currently they frequently disrupt motorised vehicle flow and force pedestrians into the roadway, and are therefore often considered undesired. For a large portion of people in Kampala it is however the only way of generating income and the easy access to their merchandise provides convenience for the city’s inhabitants. Rather than simply excluding them, it would be more sustainable to provide them with dedicated space on the city streets such that they cause the least amount of trouble, such as in the furniture zone on sidewalks. Street vendors could also be included in pedestrianised streets which would benefit them and the people visiting those streets. By assigning dedicated space it also becomes acceptable to keep them away from spots where they are less desired.

#### Infrastructure for Cyclists

In the case of cycling, the design guidelines have been developed with the idea in mind to increase awareness of cyclists among motorists and to minimise risks at conflicts between the two. These guidelines use examples from New York City which has fitted bicycle infrastructure designs to be more suitable in a situation where cyclists are introduced onto the city streets. A situation which is very similar to that of Kampala. Segregated bicycle paths, on-street bicycle lanes and shared routes are part of the provisions which can be used. In most many cities, bicycle lanes will function well to provide space for cyclists on the road. In Kampala however, with the current disregard of traffic rules and inconsiderate attitude towards other road users, there is an extraordinary need for segregated cycling facilities. As taxi and boda boda motorcycle drivers already try to

### Box 10 – Examples of segregated bicycle facilities



Figure 6-12: (NYC DOT, n.d.)

utilize every spot on and next to the road – including parking spots, shoulders and even sidewalks – they will without a doubt attempt to use bicycle lanes to their advantage, pushing cyclists of the road in the process. To persuade people to start cycling, not only must their safety be guaranteed, but they must also be given a feeling of safety. Therefore segregated bicycle facilities are strongly recommended for all major routes in Kampala.

Within the existing roadway, segregated bicycle paths can be achieved by using physical objects, such as kerbs, barriers, bollards or planters (see box ). Another option is to move the parking lane away from the kerb, using parked cars to separate cyclists from moving motorised traffic. In that case, a 1.0 metre buffer is required between parked cars and the bicycle lane to prevent ‘dooring’.

With any of these option, abuse by boda boda motorcycles should be considered. Where segregation by bollards and planters can prove to be adequate to keep taxis and private cars of the bicycle path, such measures may not be enough to hold off the more easily manoeuvrable motorcycles. Even segregation by kerbs may not be sufficient to withhold motorcyclists from using the bicycle path. While this should off course be enforced by the traffic police, the sheer number of motorcyclists in the city and the difficulty to apprehend them, makes this task virtually impossible. Bicycle path design should therefore make sure that, even if motorcyclists use the bicycle path, they should have no or very little advantage of it. The abuse by boda boda motorcyclists becomes more difficult when bicycle numbers increase.

Where segregated bicycle facilities are not possible because of limited right-of-way, and no alternative route is available, sharing the street is currently a better option than on-street bicycle lanes as this does not provide cyclists with a false sense of safety. Only if the attitude of other road users towards cyclists improves then on-street bicycle lanes becomes more feasible.

To safely mix cyclists and turning motor vehicles, shared zones are suggested right before the intersections. At intersections. These temporary shared zones, similar to the shared turn bays used in New York, raise awareness among both cyclists and motorists, and allow them to safely mix before they reach the actual turning conflict zone.



### Box 11 – Combining bicycle and public transport infrastructure

Some cities choose to combine bicycles and public transport infrastructure, resulting in shared bus and bicycle lanes. Although, such solutions can save space, due to the difference in speed and mass this is however not recommended (Presto, 2010). Secondly, having cyclists on a bus lane will not contribute to the operating speed of public transport. Mixing of bicycles and buses can sometimes be considered for short sections and only at low speeds (30 km/h or below) if this can improve cohesion and directness but a careful design is required (Presto, 2010).

### Recognition

Green paint is suggested for the bicycle infrastructure to let the bicycle lanes and paths contrast with the regular road surface (which is often covered in red dust). Paint is far cheaper to apply than coloured asphalt, which is used in the Netherlands, but it should be considered that it does require more frequent maintenance. Experience from New York has shown that where vehicles regularly pass over a painted bicycle lane, the paint will wear off quickly.

Bicycle lanes and paths should be marked with a distinctive symbol. This should be a clear detailed bicycle (the symbol used in the Netherlands is appropriate for this) to avoid confusion with motorcycles. Chevron symbols are recommended on intersections where conflicting traffic streams meet the bicycle route to alert motorists. As done in New York City, special bicycle symbols known as ‘sharrows’ can be used to emphasize bicycle presence on shared streets that are part of the bicycle network. These symbols are a combination of a bicycle symbol and chevrons and are recommended on all shared streets in Kampala which are part of the bicycle network. Not only will such symbols alert drivers, they also make clear that even on shared streets cyclists are formally recognised users of the road. In addition they will help to position both cyclists and motor vehicles. If the street is also used for parking, the sharrows should be placed 1.5 metres away from the parked cars to prevent cyclists from being ‘doored’.

### Infrastructure for Public Transport

Currently plans are being developed for introducing a BRT system in Kampala. The design guidelines in this study are not intended to prescribe how a BRT system should be designed. Such information is readily available, and is also partly included in the BRT pre-feasibility study (ITP, 2010). However, a typical BRT route with median stations, one or two BRT lanes, two mixed traffic lanes and appropriate space for cyclists and pedestrians requires a wide avenue (ITDP, 2007), presumably at least 35 metres in width, which does not resemble any of the present streets in the Kampala CBD. This would require expensive reconstruction and will take years to implement. These guidelines will therefore illustrate how public transport – operated by larger buses on trunk routes – can be included in the existing streets without a full scale reconstruction. This way, public transport service can be improved in streets where a BRT is not (yet) possible, and on streets which will continue to be served by public transport but are not part of the (actual) BRT network. This study however does emphasize that infrastructure for public transport should not come at the cost of dedicated infrastructure for non-motorised transport.

While public transport can utilize the same space on the road as other motorised vehicles, it can prove valuable to create special provisions to increase operating speed, trip reliability and, with that, the general attractiveness of the mode. Dedicated facilities for public transport could be on-street bus lanes or physically separated busways. Even without a full reconstruction, on-street bus lanes can be included in streets by reallocating space on the road. Wide moving or parking lanes can be narrowed, or a moving or parking lane can be removed in favour of a bus lane. While taking out a moving lane for motorised traffic may seem like a bad idea to ease congestion, it should be remembered that, when properly designed and operated, the installed public transport lane can have a higher capacity in moving people. In addition, when considering the way taxi minibuses in Kampala currently operate, the more orderly traffic pattern created by a dedicated public transport lane can actually decongest the remaining mixed traffic lane(s) (ITDP, 2007). Creating



exclusive lanes for public transport, even if it comes at the cost of space for private cars, is also recommended in the NTMP for the GKMA (MoWT, 2005).

Just as with cycling infrastructure, on street bus lanes face the danger of being encroached by other modes. In contrast with cycling infrastructure however, safety is not as much a concern. On-street bus lanes are therefore a realistic inexpensive option for Kampala but enforcement should be in place to ensure their functionality. An additional option would be to include a small grade separation in the design between the bus lane and the mixed traffic lane, for example a bump, to discourage illegal use of the bus lane while still allowing access in case of blockage of the mixed traffic lane. Where necessary, on-street bus lanes can be converted to busways by using, for example, kerbs or Jersey barriers.

Where right-of-way is insufficient, buses can share the road with other users but it should be considered that this comes at a loss of operating speed and reliability of the public transport system. If the shared sections are short, this can be acceptable. In some situations, the only feasible way to ensure high quality for public transport may be by excluding other motorised modes, i.e. creating transit-only corridors where buses have the share the right-of-way with pedestrians and cyclists. Again, this should only be accepted for short sections as the buses will have to operate at a lower speed to ensure the safety of non-motorised transport.

While public transport services with larger buses should be encouraged on trunk routes, smaller vehicles, such as taxi minibuses, remain an option for feeder routes. Some feeder routes have been included in the public transport network addressed in the *Planning Strategy* section of this report. In general, these vehicles can operate along with other motor vehicles as travel speeds are not as important as on the trunk routes. It is however recommended to provide proper public transport stops to improve the transport service and to eliminate the current disruptive behaviour of taxi minibus driver to stop abruptly anywhere they please. Taxi minibuses should only be allowed to load and unload passengers at dedicated public transport stops.

Public transport stops, on both the trunk and feeder routes, should allow easy access for pedestrians and cyclists. To integrate the public transport and bicycle networks, bicycle racks should be included near public transport stops. In addition to cycling and walking, boda boda (motor)cyclists can serve as feeders for the public transport system. It is therefore recommended to assign dedicated queuing space for boda boda (motor)cyclists nearby public transport stops. Part of the parking lane (in either the main or in side streets) can be allocated for this purpose.

### Infrastructure for Private Motorised Transport

On the arterial network, it is important to maintain motor vehicle flow. This will allow the arterial network to be more attractive to use and makes it possible to 'downgrade' travel speeds on other streets. Adequate flow does not mean that cars and motorcycles will have to reach high speeds but rather that traffic maintains a constant flow. This can be achieved by including left and right turn bays at intersections, or where that is not possible, by providing space where turning vehicles can yield without obstructing other vehicles. Where buses share the street with other motor vehicles, bus bays should be included to maintain traffic flow and for the same reason on-street parking is not advised on the arterial network. In addition besides improving the situation for cyclists, segregated bicycle facilities on the arterial network are also beneficial for motor vehicles as such facilities will help to improve traffic flow.

By improving motor vehicle flow on the arterial network, less priority can be given to motor vehicle flow on the distributor and access network. High speeds and through traffic on these networks should be discouraged to maintain a safe living environment. To ensure this traffic calming measures, such as mid-block speed bumps and speed tables at intersections, are in place.



### 6.2.3 Design Examples

The designs presented in this study are a combination of Dutch and American engineering practises and are intended as guidelines in converting the existing streets of Kampala into complete streets. To be as flexible and practical as possible, examples of complete streets are given for different network categories and street widths. The design examples include 2 typical designs for access streets, 5 typical designs for distributor streets, and 3 typical designs for arterial streets. In addition also design examples for a NMT-only street and a transit corridor have been added. The hierarchy presented by the numbering of the design examples should not be kept strict but should rather be used as an indication. If one design doesn't fit then the next one down is considered most suitable. Both the design examples and a short overview of the above recommendations and considerations have been included in this report in appendix B.

## 6.3 ENCOURAGING SUSTAINABLE MODES

### *Changing the mindset*



Besides **planning strategy**, with a focus on networks and spatial planning, and **complete streets and efficient transport**, with safe and efficient infrastructure for all modes of transport, there are several other essential aspects influencing the **encouragement of sustainable modes of transport**. The first three paragraphs of this section give a view on the most important focus points for Kampala in changing the mindset about sustainable urban transport; raising awareness, improving road safety and efficiency, and increasing attractiveness. The last paragraph presents a number of proposed measures to initiate the process of changing the mindset, which are a combination of push, pull and persuasion methods.

### 6.3.1 Raising Awareness

Awareness is one of the most important things in order to achieve change and can be divided into political awareness and public awareness. Both forms of awareness influence each other, especially in a democracy, and can influence political will.

#### Political Awareness

A key player in encouraging sustainable modes is the government. If the government does not recognize the importance of sustainable urban transport (SUT), hardly nothing will change in favour of SUT. The government has the mandate to make decisions and to allocate available budgets over projects. It seems like the national government of Uganda and the local government of Kampala are getting more and more aware of the importance of SUT, which is a positive development. In order to keep SUT on the political agenda, sharing of expertise and experience, advocacy groups and public awareness will be valuable.

#### Sharing Expertise and Experience

Awareness comes for a large part with expertise and experience. The Sustainable Urban Development Workshop which was held on the 13<sup>th</sup> of April in 2011, with the attendance of many important stakeholders, is a positive first step, but now it is important to continue. The first workshop should definitely be followed up by new ones on a regular basis in order to share expertise and experience. In this way all the stakeholder will be aware of the current projects and developments. Together, information and discussion can lead to “eye openers”.

Although the awareness is rising, the current knowledge of the government on the subject is not sufficient (Ngabirano, 2011). To improve this, certainly in the beginning, companies, governments and organisations from all over the world can play an important role because their expertise and experience can be useful for Kampala. For example, they can indicate both problems and solutions the government of Kampala may have never even thought about before.

#### Advocacy Groups

Advocacy groups representing the interests of the users of a specific mode of transport can be useful for raising both political and public awareness about these modes. Together, motivated people can advocate more effectively and efficiently than individuals. In general the interests of a whole group is more representative and valuable than the interests of just one person. The main advantages are that a group of users can be represented by one or a few persons and that those people know exactly what the main interests of the group are. Besides this, an advocacy group is a good example of user participation which can improve the final results significantly. Advocacy groups should be active towards politicians in order to keep their interests on the political agenda. At the same time, politicians should listen to, and involve these advocacy groups in the process. Listening to, and considering each other's interests and objectives can increase support and sympathy for both politicians and citizens.



## Public Awareness

In a democracy, politicians are chosen by the population to represent their interests. If society is aware of the benefits of SUT, and demands for sustainable modes of transport and their corresponding infrastructure and facilities, then the chances of getting and keeping SUT on the political agenda will be bigger. In addition, when the society is more aware of sustainable urban transport, understanding and support for the measures taken by the government can be gained more easily.

There are three types of actions to raise public awareness, namely *informative messages*, with general information about sustainable urban transport, *persuasive messages*, to convince people of the benefits, and *specific activities*, to let people actually experience proposed modes or situations. The most effective is a combination of the three types of actions (GTZ, 1E, 2006).

In order to reach the general public, the media can be a helpful instrument since the media can be very powerful and literally “make or break” things, for example the image of a mode of transport. Radio, television, newspapers, magazines, etc. can be used to distribute messages and to make announcements for events and activities.

### Target Groups

Raising public awareness among the public can either be formal or informal, depending on the target group. Also the content and objectives of the messages and events can differ per group. General publicity has its advantages, but in some cases it can be more effective to focus on specific target groups. This can be groups which can be influenced relatively easily, for example children, or groups which cause serious problems, like the boda boda motorcyclists and taxi minibus drivers, or potential users of sustainable modes of transport, like students because of their flexible lifestyle. Another target group can be the present public transport users who might shift to private cars when their income allows them to.

## 6.3.2 Improving Road Safety and Efficiency

The use of (sustainable) modes of transport partly depends on road safety and efficiency of the transport system. Road safety is often quantified in accident rates. Causes of accidents can be categorized into three groups, namely people (human behaviour), environment (infrastructure) and vehicle. Although human failure is the most important cause, many accidents are caused by a combination of these three factors (CROW, 2008).

### Environment

The safety and efficiency of a transport system depends for a large part on the presence of appropriate infrastructure and facilities. In the current situation there is a lack of infrastructure for sustainable modes of transport which leads to a dangerous mix of modes. Without proper infrastructure for sustainable modes, it does not matter how much is talked about it, the shift to these modes will probably never be made. How the current situation can be improved through infrastructure designs is described in 6.2.

Building infrastructure and facilities is not a one-shot activity but a process. Once these are built they need to be maintained. Infrastructure with potholes can be very dangerous and can reduce the efficiency of the transport system. Therefore existing infrastructure and facilities have to be inspected on a regular basis and damage should be fixed as soon as possible. The same is true for street lightning, signs and markings. Also garbage and sand (mud) on infrastructure should be avoided.

### People

Infrastructure alone is not enough to guarantee road safety and efficiency. If road users do not use the infrastructure the way it is meant to be used, this will (partly) undo the effectiveness of the infrastructure. Road user behaviour is one of the main causes of the current chaotic and inefficient situation, and of the current road safety problems. It is obvious road user behaviour has to be improved in Kampala. There are



three categories of instruments to influence road user behaviour, namely engineering, education and enforcement, also known as the three E's. The consistency between these three instruments is important, the use of the instruments separately is often not or at least less effective (CROW, 2008).

#### **Box 12 – Engineering, Education and Enforcement (3 E's)**

It is not only the presence of the infrastructure which is important, but also the way it is designed: Engineering can influence road user behaviour. Through design of streets and its surrounding, desired use of the infrastructure can be encouraged and undesired use discouraged. In the most ideal situation the designs encourages or even forces people to use the infrastructure in the right way, and active enforcement will not be necessary.

Education can influence road user behaviour by providing people with knowledge, skills and motivation, which are all conditions for a safe and efficient participation in traffic. Behaviour is partly learned through formal instructions and training. Another part is learned through copying behaviour of other people. The effectiveness of education can be increased through focusing on target groups.

Enforcement is the establishment, publicity and enforcement of traffic rules and laws. Without appropriate enforcement, traffic laws and rules are useless since road users can do whatever they want. Instruments of enforcement are punishment of undesired behaviour and, possibly, rewarding of desired behaviour (CROW, 2008).

### **Vehicle**

Besides the environment and road user behaviour, vehicles also influence road safety and efficiency. Important are the condition, the use and the number of vehicles. It is obvious poor technical state of vehicles can cause dangerous situations and congestion, for example when a vehicle gets broken on a busy road or intersection. Also the use of vehicles, for example overloading, influences safety significantly. Therefore inspection and maintenance of vehicles is essential, both when imported and on an annual basis. Additionally, the number of vehicles is affecting road safety and efficiency. At this moment there are no limits on the number of imported vehicles. Consequently the number of vehicles in Kampala is growing rapidly. More, often ill-maintained, vehicles with reckless and careless drivers will certainly not improve the current situation.

### **6.3.3 Increasing Attractiveness**

Attractiveness determines for a large part the use of a mode of transport. At this moment, the sustainable modes of transport in Kampala are not very attractive. The attractiveness of sustainable urban transport can be improved by making the modes itself more attractive, or by making undesired modes of transport less attractive. Even more effective is to do both. The attractiveness mainly depends on the environment, including infrastructure and facilities, people, including image and incentives, and vehicles.

#### **Environment**

Allocation of dedicated space for public and non-motorised transport, and the investment in infrastructure for these modes, would show that the government recognises the importance of sustainable urban transport. If the government shows the will to invest in public and non-motorised transport this will have a positive effect on the public image of these modes. But infrastructure alone is not sufficient, also facilities influence the attractiveness of the modes. Every mode of transport needs facilities, e.g. bicycles need parking facilities and repair stores, and a bus rapid transport system needs bus stops. Well provided facilities will make a transport system more easy and convenient to use.

Aesthetics also play an important role for the attractiveness. Trees for example do not only provide an attractive view, but can simultaneously protect pedestrians from the hot sun which makes walking more comfortable, or can be used to separate modes of transport, for example cyclists and motorised traffic. Also





the choice for materials can influence the attractiveness. It will be more attractive to walk on elegant pavements instead of broken gray tiles. The colour can also be helpful. Green bicycle lanes are more attractive than black ones. In addition this can influence the image of cycling as being a “green”, environmentally friendly mode of transport. When the infrastructure and facilities have an inviting character, people will be prepared to use it more quickly.

At the same time the environment can be used to make a specific mode of transport less attractive. For example the narrowing or even closure of streets for motorised vehicles, and a reduction in parking lots will definitely make car use less attractive.

Besides, infrastructure, facilities and aesthetics, also the direct surroundings influence the attractiveness. Street vendors for example, make a place lively and can therefore be attractive in a pedestrian area.

### People

The image of a certain mode of transport can be a psychological barrier to use it. In addition to infrastructure and facilities, image can be improved in several other manners. For example, prominent people can influence the image by using the modes of transport themselves. Another way is to let people actually experience the use of the modes of transport, so they can judge for themselves. Also sharing experiences between experienced and potential users can contribute.

Economical instruments are helpful in making modes of transport more, or less attractive through incentives. When people have to pay additional costs for the use of a mode of transport, infrastructure or facility, this will make it less attractive. On the other hand when people are offered discounts on the use or purchase of a specific mode of transport, this can encourage the use of it.

### Vehicles

Besides environment and people, also the vehicles play an important role in the attractiveness. Poor modes of transport can be a physical barrier to use a certain mode. The attractiveness is highly dependent on the level of comfort, safety, convenience and affordability of the modes. For example, it is not very attractive to ride a bicycle without gears and an uncomfortable seat, especially not in a hilly terrain.

Besides the vehicles, also the services are of importance. Reliable and efficient services are more attractive than when people for example have to wait long times and cannot tell when they will depart or when they will arrive at their destination.

## 6.3.4 Proposed Measures

In order to raise awareness, improve road safety, and improve the attractiveness of sustainable modes of transport, a combination of push, pull and persuasion measures is recommended. In this paragraph a list of proposed measures is given. The measures are categorised into environment, people and vehicles.

### Box 13 – Push, Pull and Persuasion (3 P’s)

Encouraging sustainable modes can be done in several ways. A well known method is the use of push, pull and persuasion measures, also known as the three P’s. Push measures are used to “push” people out of undesired behaviour or modes of transport. One example is to discourage the use of private cars through a fuel tax. Pull measures can be used to “pull” people into the desired behaviour or modes of transport. For example through (temporary) free rides with public transport. Persuasion is the third measure which is focused on changing the knowledge, awareness and attitude of people. For example information about the benefits of the desired behaviour/modes and the disadvantages and risks of undesired behaviour/modes (CROW, 2008). Push and pull measures can influence behaviour directly, persuasion indirectly. A combination of the three P’s is often more effective than using the P’s individually. The most successful experiences with introducing sustainable urban transport in cities all over the world, often used a combination of the three P’s.

### Environment

The measures in this category are meant to improve the infrastructure and liveability of the city.

#### Maintenance and Inspection of Roads and Facilities

In order to improve road safety and the attractiveness of the roads and facilities, inspection and maintenance of the roads and facilities should be improved. Roads and facilities have to be inspected on a regular basis. The main focus points should be:

- Potholes and bumps
- Uncovered wells
- Broken pavements
- Street lightning
- Signs and markings
- Dirt, sand and mud

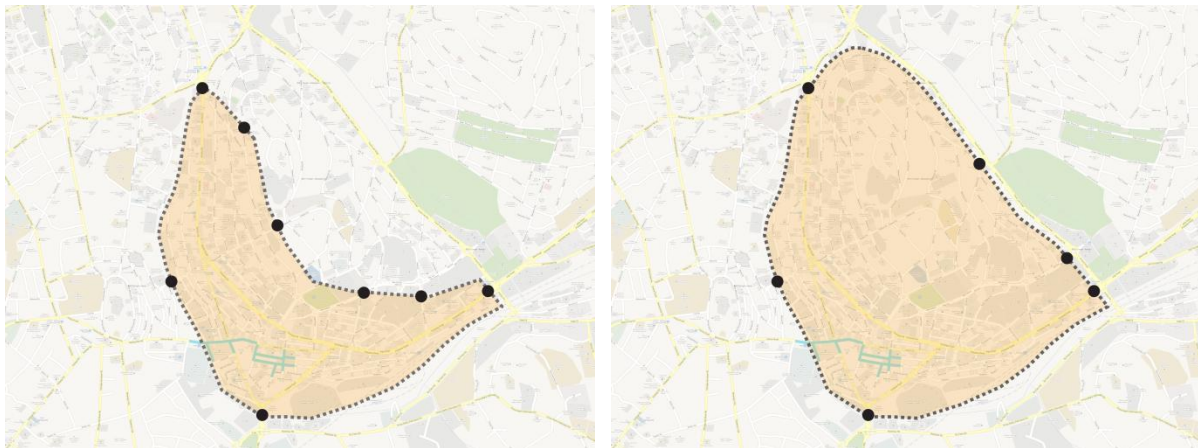
Potholes, bumps and uncovered wells directly affects safety since they can cause injuries and damage to vehicles. Broken pavements are inconvenient, not attractive and can cause a fall. Street lightning affects sight when it is dark and thus affects road safety. Additionally street lightning contributes to social safety, which makes transport in dark more attractive. Signs and markings have to tell people how the infrastructure has to be used and thus affects road safety. Dirt, sand and mud can be very unpleasant especially for pedestrians, cyclists and motorcyclists and can make the road slippery. These aspects are directly influencing road safety, efficiency and attractiveness, and are relatively easy to address.

#### Area License Scheme and Licensing Quota for the CBD

To increase the liveability of the CBD and to make better use of its infrastructure, an Area License Scheme (ALS) together with a Licensing Quota (LQ) is proposed. The combination of these two economic instruments is an effective and relatively inexpensive way of reducing the volume of motorised traffic and to control the number of vehicles in the area where they cause the most problems. The ALS is an area in which motorised vehicles are required to have a valid license in order to be allowed to enter. These licenses will have to be checked by police or well trained security people at the entry points. The LQ is aimed at directly restricting the number of motorised vehicles in the city centre by providing a maximum number of licenses per month based on the estimated number of motorised vehicles the area road network can handle. These licences must be purchased beforehand and have to be displayed clearly visible on the windscreen. In the case of motorcycles this is not always possible. As alternative they could wear their license in a holder on a key cord. To keep the system accessible, licenses can be sold by street vendors, just like is done now with mobile air time.



The licenses will be categorized by vehicle type in order to control different types of vehicles separately. In this case the licenses for the number of taxi minibuses can be limited. Through the provision of relative many licenses for larger buses, the shift to larger buses can be stimulated. There basically are a two options for the ALS in the centre of Kampala. One is a small area around the central business district (CBD) with advantage of just affecting the area where the problems are biggest, but with the disadvantage of a lot of entry points which makes enforcement more complex and expensive. Another option is a slightly larger area around the CBD with the advantage of fewer entry points, which can be enforced easier, but with the disadvantage of affecting a larger area than is actually necessary.



**Figure 6-13: Two basic possibilities for an ALS in Kampala: small, with more possible entry points (left), or large, with fewer possible entry points (right)**

Without undermining the importance of the environment, priority should be given to reducing the volume of traffic, before focusing on encouraging environmentally friendly vehicles e.g. vehicles with cleaner engines. Therefore it would be wise to start with a simple system in a small area with the use of paper licences. Later on, the area can perhaps be expanded, charges can be differentiated to the time of the day, location and vehicle characteristics (e.g. weight, level of pollution), and a switch towards an electronic charging system can be made, if necessary or desired. Such a gradual implementation gives the inhabitants of Kampala the opportunity to get used to the new situation and gives the government opportunity to evaluate the system.

The revenues of the licenses should be used to invest in improving the sustainable urban transport system. The government should decide about the allocation of the revenues within this constraint. Valuable investments can be made in public transport, non-motorised transport, maintenance, inspection, education, enforcement, evaluation, publicity, subsidies, events, incentives and the system itself.

As a result of the ALS and LQ some of the taxi minibuses and boda bodas will probably start to operate up to the edge of the licensed area instead of in it, or change to operate larger vehicles. By gradually increasing the area, a situation can be established where inner city public transport is operated with large buses, fed by taxi minibuses and boda bodas from the outer urban area.

The expected results of the ALS and LQ are a reduction in air and noise pollution in the city centre because of the reduction in motorised vehicles and reduction of congestion. Furthermore this will lead to improved liveability and improved road safety, if speed limits are strongly enforced. It can also lead to more awareness about the use of cars. If people have to pay for entering an area they will reconsider their trip by car, and less expensive alternatives will become more attractive. Also a shift towards public transport and non-motorised transport will be expected, but only if proper public transport and non-motorised transport alternatives are provided.



#### **Box 14 – Commercial Attractiveness of the CBD**

Prior to the implementation of the road pricing in Trondheim, there was a concern that road pricing in the city centre may reduce the attractiveness of the central business district and may drive trade and business out of the city. Detailed studies, however, have shown that this has not happened. In fact, trade and commerce were able to maintain their growth levels (GTZ, 1D, 2004a).

When the government of Uganda decides to implement an ALS and LQ, the current fuel levy can be maintained. At this moment fuel in Uganda is taxed. All revenue from the fuel levy goes to the Ugandan Road Fund and is used mainly for road maintenance. A national increase in fuel levies, or a surcharge in Kampala, would also affect the longer distance trips, and public transport services will almost certainly increase their rates, so this will probably lead to strong resistance and to avoiding behaviour. Considering this, an increase in fuel tax is perhaps not the right way to discourage the use of cars in the city centre, because it will also influence the public transport and long distance trips negatively.

The current national fuel levy should be maintained, but the revenue should, in time, be reallocated. In a situation where the ALS and LQ exist besides the fuel levy, the revenue from the ALS should be used for investments in sustainable urban transport and the system itself, and the revenue from the fuel levy should be used to maintain the roads. In case the ALS is not (yet) introduced, the revenue from the current fuel levy should be reallocated to both maintenance and investments in sustainable modes of transport. Right now, however, maintenance of the existing roads prefers priority in order to improve road safety.

At this moment Uganda has no vehicle taxation. Although with vehicle taxation large revenues can be obtained, this is not advisable. Lessons from abroad learn it would be better to charge along the “user-pay-principle” with differentiated charges. In addition, a vehicle quota is not yet necessary or feasible, but it can be useful in order to control the expected increase in car ownership which is something that should to be taken into account. Regarding this, the expansion and further development of an ALS is preferred.

#### **Parking Management**

The current parking rates are low and thus not an incentive to not use a car, especially not for the affluent people, which are generally the ones which own cars. High parking fees in the city centre would discourage the use of cars in the CBD because it becomes more expensive and thus less attractive for many motorists. Beside this, parking fees raise revenue that can be (partly) invested in encouraging sustainable modes of transport. Parking fees should vary, for example higher fees at attractive locations, busy areas or in areas well served by public transport. Another option is to charge parking during working hours and provide free parking outside the working hours. Parking space in the city centre should (remain to) be limited in order to make it less attractive and less convenient to go to the city centre by car. Simultaneously the space of the parking lots can be reallocate to living space, bus stops or (parking) facilities for cyclists. From examples all over the world, the combination of parking fees and limiting parking space has proved successful in stimulating commuters to switch from private cars to the use of public and non-motorised transport. This contributes significantly to the reduction of congestion since commuting is often the main cause of peak hour congestion (GTZ, 1D, 2004a). Though, the quality of public transport and non-motorised is very important in order to realize the actual shift.

The high parking fees and the limited parking space can be supplemented by the provision of parking space in the periphery and incentives to shift to public transport. For example the Park and Ride (P+R) concept can be introduced. This is the combination of parking spaces in less congested areas in the periphery and public transport terminals. Through P+R facilities the volume of motorised traffic in the city centre can be reduced and car users do not have to search for parking spaces for a long time.



## People

The measures in this category are meant to make people more aware of sustainable urban transport, to influence the perception of people about modes of transport and to encourage or discourage the use of specific modes of transport.

### Workshops

The successful first Sustainable Urban Development workshop should definitely be followed up by new ones on a regular basis, at least annually. These workshops can function as a platform for stakeholders to share expertise, experience and ideas in order to influence politicians and keep sustainable urban transport on the political agenda. Certainly at the beginning expertise and experience from abroad should be involved. Most important are the attendance of the right stakeholders, and the opportunity for discussion. For example, organisations representing the interests of the users and providers of the different modes of transport should be involved. Also the attendance of representatives of the government are essential, since they have the mandate to make decisions and allocate the available budget. It will be valuable to invite journalists in order to promote the subject. Publicity about these workshop can increase public awareness and thereby political awareness.

### Advocacy Groups

Currently there are only a few organisations concerning and advocating the importance of sustainable urban development and transport in Kampala. These organisations only have a few employees and two of them have recently been established (TAFMOD and Goudappel Africa, the latter actually being a consultancy). Although this is a positive development, it would probably be more valuable if these organisations would work together. FABIO and TAFMOD both have the objectives to encourage mainly non-motorised transport. Goudappel Africa adds the link with land use planning and the efficiency of a privately run consultancy. Together they can probably be more effective and efficient in achieving their goals. They can for example form a “SUT Work Group” which can take the lead in advocating and organising events.

There seem to be some associations dedicated to a specific mode of transport, both for users and providers. However, it appears most of them are instable, poorly managed, poorly equipped, and hardly recognised. Furthermore it seems like these organisations mainly focus on activities which generate revenue and pay little attention to actually represent the interests of their members. Therefore existing associations should be improved or replaced by new ones. In addition to the services they provide for their members, they should also represent their interests. It will be valuable to establish new advocacy groups for the users of modes of transport which are not yet represented. In addition, also advocacy groups for other groups who are using the streets will be helpful. Regarding this there should be stable, well managed and recognised advocacy groups for at least:

- Non-motorised transport users
- Private car users
- Public transport users
- Public transport providers (boda bodas, taxi minibuses, conventional taxis, buses)
- Street vendors

Advocacy groups can be established by unifying individual users or providers who are motivated and believe in the strengths of their modes. It would be ideal if the representation of interests could be picked up by existing associations in order to prevent fragmentation. UTODA, for example could represent the interests of public transport users, in addition to those of their drivers and operators. But in some cases it would probably be better to establish an independent association in order to represent interests objectively.



FABIO has the intention to establish a cyclists federation which is a positive development. Non-motorised transport promoters like FABIO, TAFMOD and Goudappel Africa are suitable organisations to make these kind of first steps. In this way they can shift from advocating *for* to advocating *with* the users.

An essential condition for the establishment of an advocacy group is consciousness about a shared interest or problem. In case of the street vendors, if they are not limited in their freedom they will probably not have the urge to organise themselves.

### **Enforcement**

First of all, there should be clear traffic laws and rules. At this moment Uganda has the Traffic and Road Safety Act of 1998 which seems well-considered. While this act for example mentions that all vehicles should have proper working lights, in practice, many vehicles drive with broken lights when it is dark. There seems to be a Highway Code, but it is not clear if this code is officially recognised by the government and it does not seem to be published anywhere. It is extremely important that all road users know which laws and rules are official, and that they are published so that people actually know the laws and rules themselves. Therefore a strong link with education is required. Only when people are aware of these laws and rules, than enforcement can be in place.

At this moment the capacity and equipment of the Ugandan traffic police is not sufficient to enforce in a proper way, and the chance to be caught is very small. In order to improve enforcement, capacity of the traffic police should be enlarged. Generally, as the chance to be caught increases, even if it is only the perceived chance, people are more likely to behave according the rules.

The current focus point of the traffic police seems to be traffic flow of motorised vehicles, but the main focus point should be road safety, especially road user behaviour and the condition and use of the vehicles. The focus of the traffic police should shift from car oriented to people oriented. In order to improve the effectiveness, the number of controls should be increased and improved.

Within the police organisation, corruption is a focus point which has to be strictly controlled and tackled. This subject is not within the scope of this research, but it is obvious it has to be dealt with, since it affects proper enforcement significantly. Police officers taking bribes after pulling over a vehicle with a broken light have a diminishing effect on the entire enforcement system.

### **Education**

First of all, people have to be aware of the different modes of transport, traffic laws and rules. General knowledge about these subjects can be provided through (national) campaigns. The media can be a helpful instrument in order to reach a large amount of people. Also posters and flyers can be effective. These general campaigns should include messages about the basic traffic laws and rules, for example about right of way, traffic signs, drinking and driving, seat belts, maintenance, etc. Furthermore it has to be clear which laws and highway codes are official, and these should be available for all citizens.

Besides general knowledge, it will be useful to focus education on several target groups. Children have to be taught other things than adults, and in a different way. It is recommended to focus on children, because they can be influenced relatively easily; parents, because they are role models for their children; students, because they have a lot of contacts and therefore can spread knowledge relatively easily through talking about it; women, because some women think they cannot use specific modes of transport; and boda boda and taxi minibuses drivers, because they cause serious problems due to their behaviour.

In addition to the theoretical knowledge, people have to be trained how to use the modes of transport. For driving motorised vehicles, these skills are learned through driving training. In Kampala there are several driving schools, which is a positive thing. The quality of these driving schools should be inspected on a regular



basis. For non-motorised vehicles there is no driving training, people learn cycling by themselves. In order to provide skills for cycling, these can be taught at public events or through cycle schools.

### **Boda Boda Motorcycles**

The behaviour of many boda boda motorcyclists is reckless and careless. They constantly ignore traffic rules and don't respect other road users. Consequently motorcyclists and their passengers are significantly involved in traffic accidents. The number of boda boda motorcyclists is growing rapidly, so it is expected that the situation will get even worse. Boda boda motorcyclists cause nuisance and unsafe situations, but on the other hand they are currently the fastest and perhaps most convenient mode of transport within the city centre. Moreover they can be promising as a feeder mode for the proposed bus rapid transit system (BRT). The boda boda itself is not a bad mode of transport, it is the behaviour of its drivers, and the number of motorcycles, which makes them dangerous and undesired. The major causes are a lack of training, and that the drivers are young and inexperienced. It is obvious something has to be done.

On the one hand strict enforcement may seem an effective way to control the behaviour of the boda bodas. When caught, violators have to pay a fine or are brought to court, depending on the severity of the offense. In addition the vehicle should be confiscated if the driver cannot pay the fine, the state of the vehicle is poor, the vehicle is not registered, or when the driver has no driving license. In this way dangerous vehicles and drivers are immediately taken care of, and the chance of accidents will effectively be reduced. On the other hand, the passenger service of the boda boda drivers is often the only source of income of which the driver, and sometimes even a whole family, has to live of. For them, it is literally a way to survive (Africa Report, 2009). There are many people who earn a living this way and hence also many families in Kampala which depend on the business. Consequently the confiscation of their motorcycles can cause serious social-economic problems. Eventually this could even lead to an increase in crime since people who have lost their jobs still have to survive. Because they depend so much on their service, boda boda drivers are probably prepared to do anything in order to get out of the hands of the police. Furthermore the motorcycles are very manoeuvrable and thus difficult to catch. Strict enforcement could cause dangerous manoeuvres and can perhaps even worsen the current situation and is thus questionable.

As an alternative, improved registration, training and regulation can ensure that drivers and vehicles meet certain licensing and safety standards. These standards can be a driving license, proper and well-maintained vehicle, helmets, fixed and transparent prices and so on. A new city approved quality license could be introduced. Boda bodas with this license can be marked with, for example, a coloured front wheel fender as a characteristic and visible sign. This alternative for strict enforcement might be less effective because unlicensed boda bodas can still operate. Some dangerous vehicles and careless drivers will remain, but some will transform into more 'appropriate' boda bodas. Furthermore, this alternative will be more sustainable since it will lead to less loss of income. In this situation passengers can actually choose between a licensed and unlicensed service, and boda boda drivers can choose to get the license or not. The licensed services should be recommended by the government. In addition the government can give licensed boda bodas some advantages in order to encourage them to get licensed. For example by only allowing licensed boda bodas to queue at BRT stops. This way, the bad boda bodas should eventually be phased out.

Improving the boda boda services requires investments which could be financed by the government. If a driver's budget is insufficient, a micro credit scheme can be considered in order to give boda boda operators the opportunity to meet the licensing and safety standards. Unlicensed boda boda drivers who pretend to be licensed choose deliberately to do so and should therefore be strictly enforced.

### **Street Vendors**

Street vendors cause serious problems by occupying large parts of the sidewalks, especially in the central business district. A ban of street vendors will definitely improve the road safety and traffic circulation, but this would not be sustainable since a lot of people depend on the income gained with this kind of commercial



activity. Furthermore street vendors contribute to a lively city, and social safety. The street vendor activities should be more organised. Street vendors should be made aware of the problems they cause and where they are allowed to sit and where not. An advocacy group for street vendors will be helpful in order to communicate with them and to become aware of their interests. Through such an advocacy group, it will be easier to make arrangements. Also signs, which make clear where street vendors are and are not allowed, can help, though enforcement will still be necessary.

### **Children**

It is hard to change the attitude of adults. It is much easier to influence children. Children are the future and a well known saying is “knowledge in youth, is wisdom in age”. Therefore it would be valuable to educate this group, both in a theoretical and practical way. At schools, children should for example be taught about traffic rules and traffic signs, proper behaviour in traffic, and the different modes of transport with their strengths and disadvantages. Schools should also be provided with some bicycles so children have the possibility to actually learn how to cycle. At events, children should be involved in activities which make them more aware. Also specific projects can be established for children, for example Cycle to School projects.

### **Parents**

Only educate children will not be sufficient. Parents play a very important role in teaching and influencing their children. Parents are role models, so if they are not aware and do not act properly, children can copy this and (part) of the education will be lost. Parents could be invited to come to the schools of their children, and should be made aware of the benefits for their children if people act properly in traffic and how they can contribute to this. If children for example are encouraged to cycle to school, the parents play an important role in accompanying their children to actually do so.

### **Students**

Students are in general young and fit people and like to be free and flexible. That’s why this group is a promising potential group for cycling. But if they are not aware of the possibilities, they will never try it. Furthermore students are generally ambitious and have a lot of energy, so probably they can contribute through advocating and organising events. Perhaps they will even come with their own (creative) ideas and initiatives. Another strength of students is that they often have a large network of contacts, so knowledge and awareness can be distributed relatively easily and fast by talking and discussing about the subject among friends.

### **Women and Cultures**

Cycling in Kampala seems to be a men’s activity (Ngabirano, 2010). However, in general the mobility need for women is high since they are often responsible for taking care of the household. Therefore they have to do shopping and they have to bring the kids to school. Regarding this mobility need, women are perhaps more sensitive for improvements in the transport system, and can therefore be made aware more easily. In order to convince women about the benefits, meetings can be arranged in which women who already cycle can share their experience. Another way is to organise a bicycle race for women only in order to let women actually experience cycling.

Some cultures in Uganda believe women will lose their virginity when riding a bike. While this is off course not true, some people are saying it is impossible to change this part of culture. However, FABIO uses the example of trousers to prove that such a change is possible. In the past many women were not allowed to wear trousers, but nowadays a lot of woman actually do wear them. Another way to convince these women is to arrange meetings with women who already ride bicycles to share experiences. Also articles in newspapers which conclude losing virginity and cycling has nothing to do with each other, might help in convincing the women influenced by this superstition.





### **Prominent People**

In order to improve the image and status of sustainable modes of transport, involving prominent people can be valuable. The English Premier League is extremely popular in Kampala. Seeing their star players riding a bicycle might be very convincing for a large part of the population, and can positively influence the image. For example bill boards can show star players on a bicycle or in a public transport bus. City councillors advocating for sustainable modes can make themselves more trustworthy by using the modes of transport themselves. For example they can open new bicycle lanes by riding on them. Moreover these kind of activities will bring the politicians closer to the citizens

### **Employers and Employees**

Commuting is one of the main causes of peak hour congestion. Much effort can be made by making employers and employees more aware of the problem they cause and how the situation could be improved. Employers for example should made aware of the benefits when their employees use non-motorised and public transport instead of cars. Cycling and walking contribute to the health of the employees and affects the productivity directly, from which both employers and employees would benefit. Another advantage is that less cars requires less parking spots. Companies could for example give their employers the opportunity to buy a bicycle in terms. Other advantages of a shift to sustainable urban transport modes will be more reliable travel times, and less loss of time. This is also something where both employees and employers will benefit.

The government is also an employer and should therefore be the first to take initiative in order to encourage its employees to shift towards sustainable modes of transport. The government should act as a role model for other organisations and companies. In order to convince employers, and to make them aware of the benefits and opportunities, a team of employers of the government should be dedicated to visit companies and organisations.

### **Current Public Transport Users**

The current group of public transport users is important since a large part of this group will currently most likely shift to private motorised transport when their income enables them to do so. It will be most challenging to prevent this group from making this shift. Most ideal would be a situation in which the use of non-motorised and public transport is more attractive than the car because it is the fastest, most convenient and most efficient way of transport within the city. In such a situation, it will just be logical to use non-motorised and public transport instead of the car. Another option is to make the use of car less attractive through economical instruments, such as the ALS, increasing the fuel levy, reducing parking space, or to make non-motorised and public transport more attractive through (temporary) free rides, discounts, micro credit schemes, etc.

### **Car Free (Sun)day**

With a car free day, public awareness can be raised in an informal and attractive way. When one or several main roads are closed for motorised traffic, these roads can be opened for the citizens of Kampala to walk, cycle, jog and play. In this way they can actually experience how pleasant it can be when more space is dedicated for non-motorised traffic and living space. Bicycles should be available so that people can try, practice and thus experience cycling. FABIO has mentioned be willing to provide bicycles for such events. Bicycle shop owners like General Cycle Suppliers might also be willing to contribute as such events can be beneficial for their business. It will therefore be wise to involve these kind of organisations and companies. FABIO actually even already has the intention to organise a car free day.

As soon as the first large buses for the BRT have arrived, these should be demonstrated at the car free day, so people can also experience the comfort of the new public transport vehicles. Through these demonstration rides people can actually experience the benefits of these modes and made aware of how pleasant sustainable transport can be. This could fix a missing link in convincing people of the strengths of the modes and in actually having them make the shift towards these modes.



In Kampala, the Sunday seems to be the best day of the week for having a car free event since traffic is already considerably less on this day. Most effective will be the closure of Kampala Road, because this is one of the busiest roads. The contrast between a busy dangerous road transforming into a pleasant and safe space to enjoy will be significant. This study recommends to close Kampala Road/Jinja Road from the Jinja Road/Yusufu Lule Road intersection to the start of Bombo Road. This way, the closed street covers both an area which is frequently visited by low income groups (the area close to the taxi parks) and an area which is frequently visited by high income groups (the area close to the parliament and the golf shopping malls). Furthermore the condition of this road is quite good, so it will be relatively safe to play and cycle. The closure of this road does not have to be a problem, because the city will stay accessible from all directions via other main roads.

Additionally, a car free day gives the opportunity to organise public events and activities on the closed streets. Children can be involved through several kind of activities. One, for example, is to let them draw on streets with street marking crayons. In order to raise awareness on sustainable modes, street marking competitions can be organised. For example a competition of drawing the most beautiful bicycle. Playing children on streets which are usually very busy emphasise the contrast between a liveable city and a city dominated by motorised traffic. In order to make the event more attractive and to bring the citizens more together, (local) music bands and artists should be invited and allowed to play and work in the street. They could be encouraged to make songs, art and crafts around a sustainable urban transport theme. In this way awareness can be raised in a very informal, attractive and perhaps entertaining way. In order to involve citizens, a wall of ideas should be introduced. On this wall, citizens can display their vision on for example sustainable urban transport or a more liveable city. Examples in Latin America have proven that these kind of public events can become extremely popular and create social coherence since people of all income level groups join shoulder by shoulder. Currently, Kampala has no public street events, so an event like this can be of great value.

### **Cycle to School**

In order to stimulate the use of the bicycle for daily utilitarian use, children should be encouraged to cycle to school. The first step is to educate children about the different modes of transport and about the basic traffic rules. The next step is to teach the children how to cycle. Therefore schools should be provided with (a few) bicycles so that the children can learn it in a safe and familiar environment. For example one of the teachers should be trained to become an instructor. When the children are older and more experienced, the shift towards the public streets can be made. In order to make other road users aware of the children, and for safety reasons, it will be wise to let the children wear safety jackets. Eventually the children should be able to cycle from home to school. Of course the parents play an important role, since they have to accompany their children, at least in the beginning, and they have to buy a bicycle for their children. In order to stimulate the children, the schools can use incentives, for example a sticker for each day someone has used a bicycle to get to school.

### **Commuter Race**

A commuter race is a race between different modes of transport, for example a private car, public transport vehicle and a bicycle, all starting at the same point and having the same destination. The aim of the race is to show which mode is the fastest on a particular route in order to convince people about the benefits of some modes. Sometimes the perception of characteristics of a specific mode differs from the real characteristics. A race between different modes of transport can be helpful in making people aware of what really is the most efficient way of transportation within the city.



### **Cycle Chic Kampala**

Cycle Chic campaigns all over the world have improved the image of cycling in many cities. In such campaigns fashion and style are linked to cycling by showing photos of fashionable people riding a bicycle. In Kampala the image of cycling is bad since it is seen as an activity for the poor. In the city fashion plays an important role, especially among the middle and high income groups. Together these are the right ingredients for a cycle chic

campaign in Kampala, in order to show cycling is for all kind of people, for daily utilitarian use, and not only for the poor, for men or for leisure. Photos of ordinary cyclists can be showed on a website, just like most other cities do. But in order to reach also people who do not have internet access, in addition these photos should also be shown in newspapers and magazines, for example in a weekly section. This is a simple and relatively inexpensive campaign. Positive publicity about cycling can make people more and more aware of the bicycle and it can improve the image when cycling is associated with fashion and lifestyle. Photos of prominent people can strengthen the campaign. What would be more convincing than the president of Uganda or the mayor of Kampala, riding a bicycle.

### **Media**

Radio, television, newspapers and magazines can be useful instruments for the distribution of messages or to announce events and incentives.

Besides the media, the government could also invest in its own equipment. At this moment some commercial vehicles operating in the streets of Kampala are equipped with exterior sound systems in order to promote their merchandise (e.g. music albums). It might be useful if the government would invest in some of those vehicles of their own, so they can be used to announce events or incentives. In busy areas, for example at Market Street and Market Square, this is a convenient manner to reach large amounts of people. Furthermore, the government should distribute messages through posters and flyers.

### **Vehicles**

The measures in this category are meant to improve the state and attractiveness of the vehicles.

#### **Maintenance and Inspection of Vehicles**

Because the state and use of vehicles affects (road) safety and attractiveness of the modes, all motorised vehicles should be more thoroughly inspected on their technical state at workshops, at least once a year. Through such inspections the roadworthy can be assessed. Vehicles which are no longer roadworthy, should no longer be allowed to operate. This also accounts for public transport vehicles. There appears to be an annual inspection, but it is not clear if this inspection is executed consistently and which organisation is responsible for this inspection. In the case of the public transport vehicles, the annual inspection of the Transport Licensing Board consists of a visual inspection only, due to lack of equipment and staff.

Also on the street, the state of vehicles should be inspected, for example by police controls. At least they should check evident and visible parts of the vehicle, such as tyres, mirrors, lights and heavy damage. In order to ensure drivers will actually repair their vehicles, it would be valuable if the police cooperates with some companies which sell spare parts, so that the police can refer to those companies.

For cyclists the number of repair shops has to be enlarged, so that more cyclists will more easily have the opportunity to have their bicycles repaired, and to buy spare parts and accessories. It is likely though, that the number of such shops will already increase naturally as the number of cyclists grows.

#### **Incentives**

Although bicycles are relatively inexpensive vehicles considering both purchase and maintenance, a large part of the population cannot afford a bicycle. Micro-credit programs which allow people to pay a bicycle in terms, can make the purchase of a bicycle more accessible for a larger part of the population, especially for the low income groups. Another way to make the bicycle more accessible and to give people the opportunity to experience how it is to cycle, is to develop locations where people can hire bicycles. In order to stimulate the purchase and use of bicycles, the government could subsidise the purchase, for example through not charging import fees or VAT. Revenues of other measures, can be used to finance subsidies.



In Kampala a bus rapid transport system is proposed. After implementation, free rides can be helpful to encourage people to use the new system. Another incentive can be to provide discounts on tickets for riding in off-peak hours. Generally people are sensitive for discounts.

### **Bicycles**

At this moment most bicycles are very basic and relatively uncomfortable. In order to make cycling more attractive and comfortable, bicycles should be available in all types and sizes. Bicycles for children, men and for women. A comfortable seat and gears can make cycling much more attractive, especially in a hilly terrain such as the Greater Kampala Metropolitan Area.

Also accessories can play an important role. For example, cycle bags can ease and thus encourage the use of a bicycle for shopping. Seats for children at the front or rear of the bicycle can stimulate bringing children to school by bicycle. The popularity of the English Premier League can be used. Bicycles equipped with accessories of popular clubs can make bicycles more popular. In this case, bicycles can become a status or lifestyle symbol which may stimulate the purchase and thus use of bicycles.

### **Quality Public Transport Vehicles**

Currently the quality of public transport vehicles and services are very poor. The vehicles should be safer and more comfortable, and the services more reliable and faster. In the coming years a bus rapid transit system will be implemented in Kampala, which will be operated by new buses. It is therefore expected that both the quality of vehicles and the service will improve, compared to the current situation. This is a positive development and will probably make public transport more attractive and will increase the use of it.

### **Import, Registration and Licensing of Vehicles**

Currently there is no limit on the number of imported vehicles. An import stop or limit is recommended on at least minibuses and motorcycles, because the number of these vehicles is increasing rapidly and currently causing major problems within the city. For the same reason, temporarily, no more licenses for public transport services should be provided. Priority should be given to first establish proper regulation of the import and licensing of vehicles.

### **Conclusion**

In order to encourage sustainable modes of transport in Kampala, the main focus points are to raise political and public awareness, to improve road safety and efficiency through a combination of engineering, education and enforcement (3 E's), and to improve the attractiveness of sustainable urban transport. Regarding examples from all over the world, the most effective way to do so is a combination of push, pull and persuasion (3P's) measures. Environment, people and vehicles are recognised as the main factors on which road safety and attractiveness are depending, therefore measures in all three categories is recommended.

Through a combination of the 3E's and 3P's, while considering the three main factors, Uganda might be able to position itself at the forefront of Sub-Saharan Africa in developing sustainable urban transport, as it has been at the forefront in the fight against AIDS in the past.



## 7 CONCLUSIONS AND RECOMMENDATIONS

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## 7.1 CONCLUSIONS

### 7.1.1 General Conclusion

Currently there is an unbalance in Kampala between urban development, transportation and liveability. In addition there is an unbalance in the aspects of sustainable development; economic growth, environmental protection and social progress. While these elements are mutually important, in Kampala, initial attention should be given to social development. A sustainable urban transport system in Kampala should be aimed at “serving people, not cars”.

Introducing sustainable urban transport will be beneficial for Kampala as it will reduce the mismatch between housing, employment and services; improve transport options, safety and efficiency; and minimise the negative impacts of transportation and increase the attractiveness of the living environment. To achieve this, transport and urban development should be better organised; all of the different modes should be provided for; and conditions for the more sustainable modes should be favoured.

How this is done is described in more detail in the conclusions for each of the three integrated categories.

### 7.1.2 Conclusion on Planning Strategy

Kampala has experienced rapid and uncontrolled growth. The CBD is the main centre of employment, surrounded by low density urban sprawl, which has resulted in a mismatch between housing, employment and services. The unplanned urban development has inhibited the proper development of transport networks and the narrow streets of present day Kampala are unable to meet the increasing demand in transport, resulting in severe congestion. Through traffic and disorganized traffic patterns in the CBD result in an inefficient transport system and in an unattractive living environment in an area where motor vehicles are outnumbered by pedestrians.

The mismatch between housing, employment and services can be reduced through integrated planning. Considering the existing form of the urban area, with a number of major roads radiating out of the CBD, a transformation towards a *radial urban structure* lies at hand. Transit oriented development, through a combination of high density employment and services together with high quality public transport, should be concentrated along major corridors, which will aid in reducing the need to go to the CBD. In addition, sub-centres can be assigned at some distance from the CBD for further concentrated development.

Part of the CBD should be pedestrianised to increase the attractiveness of the living environment, and to provide dedicated space for pedestrians where it is needed the most. Besides improving the living environment, this will also improve traffic conditions in the CBD, by separating through traffic and organising traffic patterns. In addition, the taxi parks should be reorganised to separate flows to and from the Old and New taxi parks, which will minimise conflicting streams by creating loops. This proposed reorganisation of the CBD will not only help pedestrians, cyclists and motorists, but it will also reduce travel time for taxi minibus passengers since they will spend less time in congestion.

Creating a proper hierarchical and coherent network for all modes will help to organise transport and will improve efficiency. The networks are integrated to allow interaction between the modes. Sustainable modes are prioritised and through traffic is diverted, by establishing ring roads, to increase the attractiveness of the living environment. The plans of JICA do not correspond with this vision as some of the proposed flyovers will only attract more motorised traffic into the CBD. The public transport network, consisting of a trunk system with feeder routes, matches the development corridors and the routes of the BRT network which was proposed for Kampala with support of the World Bank. Through integrating cycling into the BRT network, the catchment area can be greatly increased, and most of Kampala will then be within reach of the BRT. To support those who are unwilling or unable to cycle, the public transport network is supplemented with a

number of feeder routes. which could initially be well served by the current taxi minibuses, if well regulated. The bicycle network is mainly aimed at feeding the BRT, but also play an important role within 5 kilometre from the CBD. Within this distance it is likely that people will cycle to the CBD if they are well provided for with infrastructure and facilities. To a large extent, the network for pedestrian includes all streets in the Kampala District. Pedestrian access should be guaranteed to all homes, services and employment locations, and pedestrians should have a coherent network, without gaps, as every journey starts and ends with walking. To ensure a coherent pedestrian network, it should be assessed more on a local than on a city wide scale.

### 7.1.3 Conclusion on Complete Streets and Efficient Transport

Streets in Kampala are currently dominated by motorised transport. Proper facilities for pedestrians and cyclists are lacking, and road user behaviour causes safety and congestion issues. This has resulted in high traffic fatalities and injuries, especially among the more vulnerable road users. The streets are inefficient, unsafe and unattractive which makes the situation for sustainable modes difficult.

To improve the situation for sustainable urban transport, streets designs in Kampala should include adequate provisions for all modes and functions. This way streets are made safer and more efficient for everyone. In the design process, sustainable modes should be prioritised over less sustainable modes. To ensure their safety, dedicated space should be allocated to pedestrians and cyclists. Sidewalks and proper crossing facilities (e.g. refuge islands) should be provided together with segregated bicycle paths. Buses should ideally have dedicated bus lanes and busways, but this should not come at the cost of dedicated infrastructure for non-motorised transport. On arterial streets, obstructions of traffic flow should be prevented, for example by including turn bays, which will make the arterial network more attractive and keep through traffic away from local and distributor streets. Complementary to that traffic calming measures should be in place to discourage through traffic on local and distributor streets. In addition, facilities such as bicycle racks, functions like parking and street vending should be considered to enhance the complete character of streets.

Existing streets in Kampala can rapidly and inexpensively be converted into complete streets using a *quick win* approach. Redesigns can be done within the existing roadway, and dedicated space can be created using for example bollards, planters or even parked cars. Examples of how complete streets can be created have been included in appendix B.

### 7.1.4 Conclusion on Encouraging Sustainable Modes

In order to encourage sustainable modes of transport in Kampala, the main focus points are to raise political and public awareness, to improve road safety and efficiency through a combination of engineering, education and enforcement (3 E's), and to improve the attractiveness of sustainable urban transport. Regarding examples from all over the world, the most effective way to do so is a combination of push, pull and persuasion (3P's) measures.

#### Raising Awareness

Political awareness on sustainable urban transport is increasing in Kampala, however the knowledge about the subject is not (yet) sufficient. Raising political awareness and improving the knowledge of politicians should be done through workshops on regular basis which gives the opportunity to share expertise and experiences. In order to involve road users into the process, there should be advocacy groups to represent the interests of the users of the different modes of transport, and the providers of the transport services. Existing organisations should be improved, and for groups from which interests are not yet represented, new advocacy groups should be established in which sustainable urban transport promoters should take the initiative. Furthermore these promoters should work together in order to operate more effectively and efficiently. Together the promoters and advocacy groups should keep sustainable urban transport on the political agenda.

There is a lack of public awareness on sustainable urban transport. In order to raise public awareness informative and persuasive messages should be distributed with the media as a helpful instrument. In addition, events should be organised in order to let people actually experience the benefits of sustainable urban transport. One example of such an event is a car free day. Through this event people can experience the city when it is not being dominated by motorised traffic. For instance bicycles should be available in order to give them the opportunity to discover other modes of transport.

Raising awareness is about sharing knowledge, education and letting people experience sustainable modes of transport. In addition to addressing the general public it will be valuable to focus on target groups, because of their specific characteristics. The target groups which have been distinguished as most potential are children, parents, students, women, cultures, current public transport users and employees and employers.

### Improving Road Safety and Efficiency

Infrastructure and facilities are lacking or in bad condition. Vehicles are often ill-maintained, used inappropriately and inspection is poor. Road user behaviour is reckless and careless. Traffic education is lacking and enforcement is scarce and mainly focused on improving motorised traffic flow. In order to improve road safety and efficiency, improvements have to be made on three elements, namely environment, people and vehicles.

First of all there should be appropriate infrastructure and facilities. Furthermore these roads and facilities have to be inspected and maintained on a regular basis with potholes, bumps, uncovered wells, broken pavements, street lighting, signs, markings, dirt, sand and mud as the main focus points.

Secondly, road user behaviour should be improved through engineering, education and enforcement. Through the designs of the infrastructure (engineering) it should be clear what behaviour is desired. In addition, traffic laws and regulations have to be clear, and the government should publish them to improve the accessibility of these documents. People have to be made aware of the laws and rules. This should be done through education at schools, (national) campaigns and driving training. The laws and regulations have to be enforced, therefore the capacity and equipment of the traffic police should be enlarged, but their focus should shift to ensuring road safety instead of improving motorised vehicle flow. Again, it will be most effective to focus on different target groups. For example the boda boda motorcyclists is a target group which is causing serious problems in the city. It would not be sustainable to ban them entirely, so better education and regulation is recommended to improve their service and behaviour.

Thirdly, the vehicles have to be in good condition, have to be used in a proper way and the number of vehicles should be taken into account. Vehicles should be inspected and maintained on regular basis, at least annually at a garage, but also through controls in the streets.

### Increasing Attractiveness

Due to the dominance of motorised traffic, the living environment is unattractive, especially in the city centre. Sustainable modes of transport in Kampala are not very attractive, due to the lack of infrastructure and facilities and the poor vehicles. Furthermore the generally bad image of sustainable urban transport modes is worsening the attractiveness. In order to improve the attractiveness, walking, cycling and public transport have to be made more attractive, and car use less attractive. This can be done through measures in environment, including infrastructure and facilities; people, including image and incentives; and vehicles.

First of all, more space should be allocated to sustainable modes of transport. The investment in infrastructure and facilities for non-motorised and public transport show that the government recognises the importance of sustainable urban transport, which can positively influence the image. Aesthetics (e.g. materials and colours) should be well-considered in order to give the facilities an inviting character. Infrastructure and facilities



should also be used in order to discourage the use of the car, for example the narrowing or even closure of streets.

Secondly, the image of the walking, cycling and public transport has to be improved. This should be done by having people actually experience the modes of transport, for example through demonstration rides. Also, prominent people should be used to convince people about the attractiveness of a mode. In Kampala the English Premier League is very popular, it would be valuable if they are involved in a campaign. Furthermore meetings between people should be arranged so that they can share experiences.

Economical instruments should be used to both encourage and discourage the use of a specific mode. Parking management and an Area License Scheme should be used in order to discourage the use of the car in the city centre, in order to make the city centre more attractive for walking and cycling. Incentives such as subsidies for bicycles should be introduced in order to encourage the use of sustainable modes of transport.

Thirdly, bicycles and public transport vehicles should be made more comfortable. In case of the bicycle, also accessories should be introduced to make the bicycle more suitable for daily utilitarian use.

### **7.1.5 Potential for other cities in Sub-Saharan Africa**

The transport situation in many cities in Sub-Saharan Africa seems very similar in relation to the situation in Kampala. Consequently, this study shows potential for other Sub-Saharan African cities. However, the blueprint for introducing sustainable urban transport in Kampala should not be copied directly to these cities. What the case of Kampala has shown is that there can be many variations which can greatly influence the feasibility of a concept or measure, for example the support of certain group for a mayor, which makes addressing them and their issues a politically sensitive subject. Therefore, the approach of this study will probably be more valuable in introducing sustainable urban transport in other SSA cities than the specific result for Kampala itself. The most important aspect is that the way sustainable urban transport is introduced, matches the local circumstances and preferences. In other words, the process will always require customisation.

## 7.2 RECOMMENDATIONS

This study comes with the following recommendations:

### **Regulating private land use and constructions**

New zoning plans should be implemented which match the envisioned development of the radial urban structure. Land use changes and constructions should only be allowed if they match the zoning plans.

### **Additional Assessment of the Proposed Networks**

The route network for the different modes were selected based on the limited resources available. The lack of accurate maps, aerial and street images, and adequate street condition data requires the network to be observed first hand which has proven to be very difficult and time consuming considering the number of streets and current inefficient transport system in the city, and the limited resources of the research team. The route networks suggested below have been developed in close collaboration with local urban planners to ensure their feasibility but it is however still recommended that street suitability is more carefully assessed.

### **Effects of Reorganising the City Centre**

This study proposes to reorganise the traffic patterns in the city centre. Further research is required to assess the effects of this proposed measure. A pilot project might be considered in pedestrianising part of the streets, but it should be taken into account that the full effects will not be visible until the taxi parks have also been reorganised and through traffic has been diverted.

### **Customise designs**

The design guidelines provide examples on how to create complete streets with a quick win approach. This approach is only possible when streets are in decent condition. Furthermore, the design examples should be used as suggestions and should always be customised to fit the streets and the network.

### **Formally acknowledge the bicycle as a mode of transport**

In order for the dedicated bicycle infrastructure to be effective, bicycles should formally be recognised as a mode of transport. This will make it possible to enforce abuse of bicycle infrastructure.

### **Establish an SUT workgroup**

An SUT workgroup should be established to elaborate the proposed measures on encouraging sustainable modes. This workgroup could be established by sustainable urban transport promoters such as FABIO, TAFMOD and Goudappel Africa in collaboration with the KCC.

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UDSA	(2011)	<i>Uganda Driving Standards Association</i> , <a href="http://www.udsaonline.org/">http://www.udsaonline.org/</a>
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UNRA	(2011)	<i>Uganda National Roads Authority</i> , <a href="http://www.unra.go.ug/">http://www.unra.go.ug/</a>
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UTODA	(n.d.)	<i>Uganda Taxi Operators and Drivers Association</i> , <a href="http://utodakla.com/">http://utodakla.com/</a>
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# APPENDICES

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## A. Workshop

### List of Organisations and Companies Present at Sustainable Urban Development Workshop – April 13<sup>th</sup> 2011

Akright
Alliance Media
CBS Radio
Dembe FM
First African Bicycle Information Organisation (FABIO)
Goudappel Africa
Goudappel Coffeng
Injury Control Center Uganda (ICCU)
Institution of Surveys of Uganda
Interface for Cycling Expertise (I-CE)
Kampala City Council (KCC)
KFM Radio
Makerere University
Makindye Division Mayor Dr. Clarke
Market Vendors Association
Mayor elect of Kampala Mr. Lukwago
Mayor elect of Kawempe District
Ministry of Lands, Housing and Urban Development (MoLHUD)
Ministry of Works and Transport (MoWT)
Mukono District
National Environment Management Authority (NEMA)
National Housing and Construction Company (NHCC)
National Planning Authority (NPA)
Outgoing Mayor of Kampala Mr. Sebagala
Private Sector Foundation of Uganda (PSFU)
ROM Transportation Engineering
Star FM
STV
The African Forum For Mobility And Development (TAFMOD)
The Observer
Town Clerk Mr. Kijjambu
Uganda Broadcasting Corporation (UBC)
Uganda Land Owners Association (ULOAA)
Uganda Society of Architects
Uganda Taxi Operators and Drivers Association (UTODA)
Wakiso District

## **B. Design Examples**

The following design examples have been downsized in order to fit in this report. Full size examples are available in digital format upon request.

