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Thesis Title:

Formalizing Bicycle Taxi Operations as a Sustainable means of public Transport in Mzuzu City, Malawi. Views from Operators, Users, and local Authorities.

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UMD 7

Summary

This thesis seeks to explore how informal bicycle taxi operations (as paratransit) can be formalised and their contribution to sustainable public/urban transport in Mzuzu city, Malawi. The main objective of this thesis is to explore how bicycle taxi (Sacramento) operations contribute to sustainable urban transport and policy options for its formalization in Mzuzu city. In order to meet the objective, the following research questions were raised and have to be answered: What are the characteristics of bicycle operators and current organisational setup of the operations? Do bicycle taxi operations contribute to sustainable urban/public transport in Mzuzu City, and what are the major advantages and challenges? How do different stakeholders conceive the future of bicycle taxi operations in Mzuzu City? What are the policy and support mechanisms required to facilitate bicycle taxi operations in Mzuzu city?

The research methods used in this study include: 1) background literature review which provides a conceptual framework for the study, 2) a questionnaire survey which was conducted to various stakeholders i.e. bicycle taxi operators, bicycle taxi users, other road users, city authorities and government departments, 3) individual case interview and, 4) photography. The background literature reviewed covers issues pertaining to sustainable urban transport, paratransit/informal transport operations, bicycle as a means of paratransit, bicycle transport and safety, advantages and challenges of paratransits, and regulation of the non-motorised paratransit.

The main findings and analysis of the study mainly covered the following categories: 1. Operator characteristics, 2. Organization of bicycle operations, 3. Sustainability of the bicycle taxi operations (advantages and challenges), 4. Future perceptions of bicycle taxi operations, and 5. Policy options and support mechanisms to facilitate formalization of bicycle taxis.

Young to middle aged males with a poor background most of whom have a responsibility to support their families operate bicycle taxis. These men usually stay within the city, but in traditional and high density unplanned settlements. The analysis also shows that, despite the existence of associations as reported by government officials most of the operators do not subscribe to the associations since these associations lack good leadership. The findings also reveal that the bicycle taxi operations lack proper regulation.

The study shows that the bicycle taxi operations are socially, economically, and environmentally sustainable since they are reliable, promote social equity, affordable, accessible and do not cause any harm to the environment. This is despite the current perception that the bicycle taxis are not safe, and comfortable. The analysis also leads to the revelation that most people still prefer that the operations should continue since they are regarded as essential because; they are a source of informal employment to the urban poor, and they offer cheap and easy mobility to the city residents and goods. A number of alternatives are raised by all stakeholders which are incorporated as policy options and support mechanisms for the facilitation and formalization of bicycle taxis and that are later incorporated as proposed recommendations. Some of these include formulation of city by-laws to regulate the operations at city level, the introduction of bicycle infrastructure, operator/bicycle registration and licensing, and strengthening the activities of the operator associations.

Keywords: Mzuzu City, Sacramento, Paratransit, bicycle taxi, sustainable transport, public transport.

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Abbreviations

NVM	:	Non-motorised Vehicles
UNESCAP	:	United Nations Economic and Social Commission for Asia and the Pacific
ISO	:	International Standards Organisation
DNRR	:	Depletion of Natural Resources
WHO	:	World Health Organisation
KSI	:	Killed or Seriously Injured
UITP	:	International Association of Public Transport
SPSS	:	Statistical Package for Social Sciences
MMC	:	Mass Media Centre.

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Chapter 1. Introduction

1.1 Background Information.

Developing countries have several factors in common that contribute to the severity of their transport problems. Overall population growth and increasing urbanization have led to the rapid growth of cities, which have been overwhelmed by the sudden jump in travel demand (Pucher et al. 2005). In most of these cities, many of the inhabitants are poor so that they cannot afford travelling by motorized transport, which forces them to travel long hours a day.

Mzuzu City is the third largest city in Malawi, one of the fastest growing and urbanizing cities in the country. The City has for the past years seen some tremendous increase in the number of economic activities and investments. Some conservative projections on the city's Gross Domestic product estimate more than 6 billion Malawi kwacha for 2009 with a potential growth rate at 5.8%. However, it only indicates for the formal economy (Mzuzu City Council 2008). Being the administrative centre of the region, Mzuzu has also seen a number of government offices and non-governmental services, which were previously not available. This has lead to a rapid increase of the city's population since people flock in from the surrounding districts and rural areas searching for job opportunities, business potential, and a better living. This has put pressure on a number of resources in general and transport demands in particular, within the City as people need to commute from their homes to work areas and business premises. This coupled with the rising costs and unreliability in terms of efficiency of motorized transport, people have resorted to using bicycle taxi transport, popularly known as *Sacramento*[1].

Sacramento is regarded as fast and efficient because of its ease of accessibility, and price. These bicycle taxi operators have been plying their trade for several years now, yet there is little recognition of the role they play in the economy of which they are a part, neither research outputs nor policy initiatives towards encouraging or promoting the creative enterprise (Jimu 2008).

In times of fuel shortages in the city, which may last up to a week, most of the motorized taxis and minibuses do not operate. Due to this, many residents turn to Sacramentos as a means of transport to work places, business premises, schools and health facilities. Not only do bicycle taxis serve people, but they are also used to transport merchandise for small-scale business operations.

Most of the areas, which are serviced by the bicycle taxis, are those areas, which are categorized as the high-density traditional and semi-permanent housing areas where a vast majority of low and middle-income earners live. This does not imply that some high-income groups do not benefit from the service. Most of these areas developed informally, without proper planning; hence, they lack a good road network infrastructure. This research therefore focuses on how bicycle taxis as a paratransit contribute to sustainable urban transport, and how such an informal paratransit may be formally regulated and formalized as a means of urban/public transport.

[1] Sacramento is a name derived from sacramento speed buses, introduced after Shire Bus Lines, a state run bus company was on the verge of dissolution (Jimu 2008).

Picture 1. 1Sacramento operators waiting for customers

Picture 1. 2 Passengers on bicycle taxi

Picture 1. 3 Some of major developments taking place in Mzuzu city attracting immigrants.

1.3 Problem Statement.

Bicycle taxi operation in Mzuzu city emerged as an informal paratransit means (business) of urban transport and has since boomed due its rising demand. A number of factors, which include; rising informality and lack of employment in the City, which forces people to opt for bicycle transport means, cause this demand. Some people have also resorted to venturing into bicycle taxi operations as a means of earning a living.

However, these informal/paratransit transport operations in Mzuzu has been widely criticized by local authorities, other motorized road users, and pedestrians as posing a safety risk to the operators themselves, passengers and other road users, as most of these operators lack knowledge of traffic and road safety rules, regulations and are sometimes negligent on the road. This calls for actions from city authorities and police who regularly prohibit the operators from accessing the city centre by confiscating their bicycles. Such actions are usually due to how these bicycle operators ply their business. Due to this, there is a constant crash between the operators, city authorities even motorised taxi operators. Many accidents in which bicycle taxi operators and users have fallen victims have occurred. However, such business operations are regarded as sustainable, hence the need to be conducted in a proper manner, there is need for regulation and guidance of the operations. It is this aspect of recognition and regulation by the authorities and other road users that are a core to the study.

1.4 Research objectives.

The main objective of the research is:

- To explore how bicycle taxi operations, as paratransit contribute to sustainable urban transport and policy options for its formalization in Mzuzu City.

1.5 Research Questions

1.5.1 Main Question

In order to address the above objectives, the study will focus on the following main research question.

- How can bicycle taxi operations be formalized as sustainable means of public transport in Mzuzu City?

1.5.2 Sub-Questions

For the main question to be fully answered, the following research sub-questions need to be addressed.

1. What are the characteristics of bicycle operators and current organisational setup of the operations?
2. Do bicycle taxi operations contribute to sustainable urban transport in Mzuzu City? And what are the major advantages and challenges?
3. How do different stakeholders conceive the future of bicycle taxi operations in Mzuzu City?
4. What are the policy and support mechanisms required to facilitate bicycle taxi operations in Mzuzu city?

1.6 Significance of the study.

There is conflict, which arises between urban authorities (which include city officials and police) who try to keep the city clean and safe, by removing operators from the streets of the City. They are considered an eyesore due to the unnecessary congestion they cause in the city streets. Bicycle operators, on the other hand, need space and income from their activities and hence keep on coming back to do their business within the City streets. However, the integration of such informal sector activities may form a basis for the provision of pro-poor urban service delivery, in this case urban paratransit transport provision.

In the wake of climate change, it is also of paramount importance mobility measures that mitigate against climate change, and reduce carbon dioxide emissions from the motorized means of transport, particularly in growing cities like Mzuzu.

The constitution of the republic of Malawi section 29 stipulates that;

> *"Every person shall have the right freely to engage in economic activity to which to pursue a livelihood anywhere in Malawi".*

As such, bicycle taxi operators have the right to perform their economic activities without being pushed around. However, they need to be regulated.

The study findings will specifically help to raise awareness on pertinent issues pertaining to the bicycle taxi operations. This will help the city to formulate initiatives and policies for bicycle taxis. The study will also assist the bicycle taxi operators by providing them with necessary information as to how they should ply their operations in order to be accepted by city authorities.

1.7 Scope and Limitations.

The study aims at exploring the sustainability of the bicycle taxi operations, policy options to be adopted in order to formalise the bicycle taxi operations in Mzuzu city. However, the study will in the course, examine the current organisation of bicycle taxi system i.e. how the operators organise themselves in terms of associations and if at all they are guided by regulations. The study also seek to find out the perceptions of the bicycle taxi users, other road users (motorised), local authorities and government on the future of the transport system, in terms of its sustainability. Finally explore on policy options for its formalisation.

The major limitation to the study might be due to lack of support to travel to the research destination, which prompted the researcher to send the questionnaires to the colleagues at his office to assist with data collection. This in one way or another, affected the validity, reliability, and quality of results since the assistants may not have conduct the research as perfect enough in absence of the researcher himself.

1.8 Thesis structure.

The thesis is divided into the following six chapters;
Chapter 1. This is an introductory chapter, which highlight the background information to the study, definition of the problem, research objectives, research questions, and the scope of the study.

Chapter 2. The chapter gives an overview of sustainable public transport and its theoretical background. It further investigates on literature related to paratransit/bicycle operation as a means of urban transport, challenges, and success that have been registered in other areas where it is operated. The chapter review how paratransit services are formalised and integrated into urban transport system.

Chapter 3. This chapter presents the research methodologies that were used during the course of study. It highlights on the research type and strategy, research design, study population, sampling techniques, data collection and analysis methods and how the results of the findings are presented. The chapter also explores the research constraints and its limitations.

Chapter 4. The chapter introduces the case study area, by firstly focussing on the context of the focus country, the description of the research area and a brief overview of the background and status of bicycle taxi services.

Chapter 5. This chapter gives an overview of research results and analysis, on bicycle taxi operation in Mzuzu city; this is from the current system of operation, socio-economic background of operators. Future perceptions of operators, users, authorities, and other attributes outlined in the research objectives. The chapter presents the research findings, which will be used to answer the research questions. The results, which advocate whether bicycle taxi, as a paratransit transport contributes to sustainable urban transport and what type of public policy options would be necessary to formalise the operations and integrate them into urban transport system.

Chapter 6. This chapter presents answers to research questions a reflection on literature, and proposed recommendations.

Chapter 2. Literature review / theory

2.1 Introduction.

This chapter reviews literature related to sustainable urban transport, its characteristics and indicators in order to provide a link with bicycle transport. Later in the chapter, the concepts of paratransit services, (in which bicycle transport falls) their characteristics, and the role they play, as a means of urban transport will also be reviewed. A review of what various authors have written on policy options for the regulation and formalisation of the paratransit services will be conducted as well.

Then a review of previous research and case studies in relation to bicycle use as a means of sustainable urban transport will be done. This will provide an overview of how bicycle operations; have been regulated and formalised as a means of paratransit urban transport. This will give a general and theoretical insight and come up with a suitable conceptual framework in relation to the planned research in Mzuzu City. In this chapter, terms like informal transport, paratransit service and non-motorised transport, will be used interchangeably.

2.2 Sustainable urban transport

The concept of sustainable transport was introduced in order to solve problems related to the traffic disturbance, transport efficiency, environmental protection, safety issues, and social welfare of human societies (EU commission 2003) in (Yifan Xu 2010). The term 'sustainable transport' owes it origin from sustainable development a term coined by the Brundtland Commission, which defined it as development which meets the needs of the present without compromising the ability of future generation to meet their own needs. To be more specifically, sustainable transport is used to describe the modes and systems of transport, which are considered as sustainable from social, economic, and environmental perspective (Council of EU 2001). According to the Hand book on Cycling-Inclusive Policy Development 2009, a sustainable transport system is one that;

- Allows the basic access needs of individuals and societies in terms of mobility to be met safely and in a manner consistent with human ecosystem, health and with equity within and between generations;

- Is affordable, operates efficiently, offers choice of transport mode and support a vibrant economy;

- Limits emissions and waste within the planets ability to absorb them, minimises consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, reuses and recycles its components, and minimizes the use of land and the production of noise (as cited in Toronto Centre for Sustainability).

It is therefore considered that a sustainable and developed transport system is postulated to be: `a transport system that meets the people's transport related needs in terms of mobility, accessibility and safety, within limits of available or affordable environmental, financial and

social resource capacities' (Zuidgeest 2005). Several countries have particularly paid attention to the use of non-motorised transport, especially cycling, to contribute in the realization of sustainable public transport.

The overall objective of sustainable transport is "to ensure that our transport system meet the society's economic, social and environmental needs whilst minimizing their undesirable impacts on the economy, society and the environment" (Council of European Union 2006). Due to its impact on the economy, environment, and society, transport is regarded as an important factor in sustainability.

According to the sustainable transportation indicators subcommittee of the transport research board (ADD40 [1]) 2008, Chaired by Todd Litman, sustainable transport indicators are classified and summarized in the table below;

Table2. 1 sustainable transport indicators.

Economic	Social	Environmental
• Accessibility quality • Traffic congestion • Infrastructure costs • Consumer costs • Mobility barriers • Accident damages • DNRR*	• Equity / fairness • Impacts on mobility disadvantaged • Affordability • Human health impacts • Community cohesion • Community livability • Aesthetics	• Air pollution • Climate change • Noise pollution • Water pollution • Hydrologic impact • Habitat and ecological degradation • DNRR*

Source: sustainable transportation indicators subcommittee of the transport research board 2008 pp 5
* Depletion of Non-Renewable Resources.

A more sustainable transport system should stimulate the economy, reduce energy and carbon footprint, increase safety, provide equal access to destinations for all groups of society, and increase the overall quality of life (Buehler, Pucher & & Kunerrt 2009).

As seen from above, sustainable transport as defined by different authors is being viewed as the transport that should meet peoples wale fare economically, that is to say people of various economic status have to afford to pay for the transport modes, even provision and operation of the transport has to be economically viable. It also has to have a positive contribution to economic wellbeing of societies. Sustainable transport has to be easily accessible even by the poor communities; it also has to provide easy accessibility to various places like schools, hospitals and market places. Socially, sustainable transport should not discriminate regardless of one's social status, which means, it has to bring together people of different social backgrounds, hence improving the social cohesion and livability of societies. On the other hand, sustainable transport has to meet and improve the mobility needs of all people in society.

Various definitions reveal that, sustainable transport should not cause any harm or damage to peoples living environment, either in form of pollution of the air, water, causing a lot of noise and disturbing the natural habitats of other living creatures. It also comes clear in various definitions that a sustainable transport is the one that should be of benefit not only to the

current generations but it has to be considerate by having positive externalities even to the future generations.

In terms of transport modes, public transport, because of higher occupancies and better use of road space, are usually considered to be sustainable transport modes. Similarly, walking and cycling modes which do not make use of fossil fuels, quite clearly contribute to sustainable objectives (Goodbody Economic Consultants 2000). The later (cycling) also falls within the category of Paratransit services, which are provided informally, operated on public streets in mixed traffic and providing services that are adaptable in routing and scheduling to meet various user desires (Vuchic 2007). Paratransit services mostly operate in terms of small to medium sized, motorized and non-motorized vehicles which range from human powered rickshaws (bicycles, becaks, tricycles) and two-and three- wheel motorized vehicles (motorcycle taxi, Tuk tuk, bajas) minibus (vans, matatu, mikrolets) (TANGPHAISANKUN 2010). However, despite the knowledge of sustainable transport and its role in urban mobility and accessibility particularly for the poor, urban transport policies and planning marginally respond to the needs of these urban poor.

2.3 The Paratransit services sector.

2.3.1 Definition and characteristics of paratransit services.

There are a number of definitions of Paratransit service. However, it is generally defined as an alternative mode of flexible passenger transport that does not follow fixed routes or schedules (Wilkinson P. 2008). Most of the vehicles in a paratransit service are distinguished by small-sized, low performing, aging or unfit vehicles. They have poor organisation that cause them to compete vigorously for passengers, overload vehicles, pick, or drop off passengers away from designated areas hence lowering the quality of service. Paratransit system of transport is usually considered *informal* transport because its service operates, to some degree, with lack of official and proper sanctions, and fails to meet certification requirements for commercial and public carrier vehicles.

Technically, informal/paratransit transport operate without official endorsement, meaning vehicles and operators do not have appropriate licenses, permits, or registration papers from public authorities to provide collective-ride services to the general public (Cervero, Golub 2007). Most of these operators are lowly skilled young men, who migrate from the rural areas to cities, this, coupled with an overabundance of idle labour in cities makes paratransit transport an attractive employment opportunity.

Basically, paratransit modes of transport are regarded as an important component of urban transport in the cities of developing countries due to its distinguishing characteristics like, low speed, low energy requirements, higher labour intensity, more dependable in terms of small area of coverage. Paratransit system can be broadly classified into two types; non-motorized and motorised (Shimazaki, & Rahman -). The non-motorised paratransit, which are the focus of this paper, includes animal powered and human powered. Cycling, which forms part of the human powered non-motorized paratransit services is regarded as a mode of sustainable transport which is not only environmentally friendly but also economically and socially beneficial.

In many areas, paratransit/ informal services are the only bona fide means of mobility available to the poor. They allow carless, disadvantaged individuals to reach jobs, buy, and sell produce, and access medical care (Cervero, Golub 2007). This aspect of paratransit contributes to the social sustainability of the urban transport due to its contribution in improving and promoting mobility.

Since the various forms of paratransit services are also considered informal, it is important to review the characteristics of the informal sector and relate to the paratransit service. The informal sector for most of the developing countries, account for up to 50% of the economic activities. According to De Soto (1989) as quoted by Elbadawi & Loayza (2008), defines the informal sector as "the collection of firms, workers, and activities that operate outside the legal and regulatory frameworks". This entails that those participating in the informal sector are escaping the burden of taxation and regulation while at the same time not enjoying the protection and services that the state can provide. This explains there is a greater need for approaches that seek to build on and formalise the informal sector rather than merely seeking to deter and punish such activities. However, the quest to formalisation enterprises needs to be addressed from various angles, which include, reducing entry, and operating costs, reducing obstacles to their growth, and searching for inexpensive approaches through which to enforce compliancy with government regulations (Ishengoma, Kappel 2005).

Large numbers of people pour into towns and cities to look for employment opportunities or improve their economic circumstances and those of their families. Such influx creates two acute crises of unemployment and poverty on the one hand and excess pressure on, or lack of the most basic facilities on the other (Jimu 2008). This leads to people resorting to informal innovations that would ensure their economic survival. Among these innovations is the introduction of the paratransit services in the transport sector.

The table below gives various contrasting dimensions of formal and informal sectors. It gives a general overview of the informal sector to which the paratransit also belong, with the formal sector.

Table2. 2 Contrasting Dimensions of Formal versus Informal Sectors

Dimension	**Formal**	**Informal**
Economic Standing	Middle and upper class	Lower class, poor
Political Influence	Strong, empowered	Weak
Legitimacy	Legal, regulated	Illegal, unregulated
Society and Culture	Modern	Traditional
Internal Organisation	Orderly, vertically integrated	Less structured, horizontally integrated
Assets and Capitalization	Intensive	Minimal
Financing and Credit Access	Commercial banks	Family and Loan Sharks
Technology	High Tech	Low tech
Skill Levels	Knowledge-based, cognitive	Labour-based Adaptive
Legal Status	Registered	Unregistered

Source: Cervero R. 2000 Informal Transport in Developing World. Pp10

Just like the paratransit, informal public transport modes vary in size, type, and operation from place to place all over the world (Aworemi et al. 2008). This mode of transport system is

characterised by; low-performing and old vehicles, operation in a laissez-fair environment, low profit margins, overloading and unsafe driving habits, offering service mainly at peak hours and in directions with high number of people. Hence, no differentiation between paratransit and informal transport sectors.

2.3.2 Bicycle transport as a means of paratransit service

A bicycle is any two-wheeled vehicle that operates without a motor, and that is driven with human power by a person pedalling (Institute for Transport & Development Policy 2009).The natural form of locomotion for human being is walking. Human on foot is thermodynamically more efficient than any motorised vehicle and most animals, yet humans on bicycles surpass them, able, as they are to go three to four times faster and yet use five times as much energy in the process. Equipped with a bicycle, man is more efficient than all machines and all animals too. The bicycle is cheap to buy and run and is in urban areas often the quickest door-to-door mode of urban transport (Tolley 1990). This simply shows how effective a bicycle as a machine is, hence its popularity in use worldwide. Cycling, the green mode, is thus an ideal way of travelling from view point of energy conservation, environmental impact and social equity since it is the mode which does not discriminate people of different social status in terms of its use and affordability (Tolley 1990),

Compared to walking, cycling as a means of transport, increases the distance that can be covered, that is to say generally a bicycle as a means of transport can reach areas which may not be accessed by other forms of transport, hence the increase in distance. When used as a means of urban transport for business purposes, in developing countries bicycle can contribute to the economic development and aid the fight against poverty, particularly to those operating them (Wegman, Zhang & Dijkstra 2010). In this case, there is need for encouragement of bicycles transport as the most efficient paratransit mode. This is for all trips in cities of all types and income levels, particularly for trips too long for walking and too short for express public transport services, particularly where travel demand density or economics do not permit high frequency public transport services (Wegman, Zhang & Dijkstra 2010).

There are several cases found in the literature that indicate the importance of bicycle as a means of transport. In the case of Uganda, the boda-boda industry has made a significant and unique contribution to the conduct of economic and social activities, by providing services in circumstances where the main alternative is to walk, which is slow, expensive as a means of load carriage, and of limited capacity. The low capacity of boda-boda enables them to service demands that other forms of transport find uneconomic. This implies that in circumstances where other forms of transport may not operate due to perceived economic loss that may be encountered, for instance due to less number of customers, the boda-boda still provides the service since it only requires a single customer for it to operate, albeit at a relatively high unit travel cost (Howe J. & Davis A.).

The local community through their patronage has supported the boda-boda system in Uganda. A survey conducted on the users of boda-boda showed that about 8 - 11% of household trips are done by boda-boda. The survey also revealed an increase in house hold expenditure form a mean of 6.5% to 10.3% (Howe J. & Davis A.). As outlined in the box 2.1 below, the use cycle boda-boda in the Ugandan context cannot be over emphasised as even the country's president

appreciated its role. This simply show how important a bicycle as a paratransit can be in circumstances when other means of transport may not be functional.

Box 2. 1 Uganda's president rode on the back of a bicycle, after his official convoy failed to materialise.

President Yoweri Museveni beckoned a bicycle taxi operator over when his helicopter landed in Fort Portal in western Uganda. He was chief guest at celebrations to mark the 12th birthday of King Oyo of Toro. Bicycle taxis are a cheap means of transport used by ordinary people in Uganda and the western parts of Kenya.

The five "boda boda" riders who ferried the president and his staff to the function were paid about $35, according to The New Vision newspaper. It was the second time in two days that the president has resorted to ordinary transport because of unexpected problems with his convoy, the newspaper reported

Source: BBCNEWS: http://news.bbc.co.uk/go/pr/fr/-/2/hi/africa/3638709.stm

A survey conducted in five different cities across the world (Accra. Delhi, Guangzhou, Leon, and Lima) in 1995 revealed that most of the bicycle users in these cities preferred to use bicycles than bus primarily because it was less expensive, but the majority also found it more flexible in routing, faster, and more reliable (Gwilliam 2002). Cycling as a mode of urban transport therefore enables people to travel at relatively low cost (Rwebangira 2001)**.** Bicycle as a means of public transport is also considered quite economical as compared to other means of public transport.

Other studies conducted in Asia shows that although the number of automobiles and motorcycles are increasing in Asian cities, non-motorised vehicles (NVMs) such as bicycles and cycle-rickshaws still play a significant role. Some cities have experienced substantial growth in NMVs over the past several decades because of pervasive rural poverty and subsequent migration to urban areas. Because city buses usually provide poor services to the low-income areas in the periphery of cities and often are very crowded, and because motorcycles and private cars have been unaffordable for the majority of households, many persons still depend on NMVs.(Kuranami C. Winston B. P. Guitink P. A. 1994).

2.4 Advantages and challenges of paratransit services.

2.4.1 Advantages of paratransit services.

The paratransit sector provides key benefits and advantages to the development of urban areas and urban transportation, particularly in cities of developing countries in different ways.

Firstly, paratransit services offer valued mobility especially for the urban poor travellers who do not own or have access to private vehicles. In places where regular public transport is not reliable and is in adequate, paratransit becomes the complementary mode to serve the travellers

needs. They have an important role in connecting poor neighbourhoods to city centres and outlying residences to public transport provided on main streets (TANGPHAISANKUN 2010). Paratransit services like bicycle transport is usually affordable and contribute in the improvement of community cohesion

Secondly, paratransit services are usually very markets responsive as it provides an effective flexible service in such a way that they can easily alter routes, schedules and operating strategies, this is in response to fluctuated travel demands because the operators are not constrained to accommodate their services. Because of low capital and operating costs, the paratransit services are able to keep costs low while they are also well responsive to ever changing markets.

Thirdly, the paratransit service plays an important role in providing feeder connections between neighbourhoods and trunk routes. This is usually due to poor and narrow roads, which renders it difficult for the systematic feeder service, which is economically infeasible as it costs more per passenger trip. Hence, it is regarded to be complementary to the formal public transport system.

Fourthly, the paratransit transport service represents a very significant entry point to urban employment. For example, pedicab drivers in many Asian countries have some of the longest hours of work (typically 70 per week), lowest levels of education and lowest incomes of all categories of workers, and contain a disproportionately large share of recent rural-urban migrants. It is reported that paratransit services comprise around 15% up to 30% of the total employment in many developing countries particularly in poor cities (Cervero R. 2000)

In many Asian cities it is estimated that over 15% of the population are dependent directly or indirectly on informal sector transport for their livelihood, and in Dhaka, Bangladesh the proportion has been estimated at over 25% (World Bank, Gwilliam 2002).

In case of the non-motorised paratransit transport, (which bicycle transport is part of) there are a number of advantages from sustainability point of view. The non-motorised paratransit do not cause any harm to the environment since they do not pollute the air, and they produce little noise. In case of bicycle transporters, they are more efficient users of scarce road space than private motor vehicles, helping to combat congestion as they use less than a third of the road space used by private motor vehicles. Bicycle transport is also the most efficient and environmentally sustainable means of making short trips. Therefore, improving the efficiency of non-motorised travel is economically vital. Promoting safe bicycling is crucial to improving the accessibility of the poor and social cohesion (Hook 2003)

User Perspective of paratransit services.

A study conducted in a slum settlement in Indonesia revealed that residents in the settlements are mainly concerned with the affordability of transport. Cheaper public transport ranks as the first expectation among residents in urban center (UN HABITAT May 2009). Another attribute of paratransit service from the user's point of view is the proximity or accessibility of the service. This implies that paratransit service has to be accessible by the user. It is therefore concluded that, the main concerns by users are affordability, speed, safety, and comfort.

Despite using the paratransit, users still feel unsafe and uncomfortable. This relates not only to how the paratransits are operated and driven but also to security.

A study conducted by Joewono (2007), on private paratransit operation in Indonesia revealed that the perception of paratransit users was based on loyalty to use the paratransit when the business is running as usual as well as loyalty to recommend the use to others when there is an improvement. The findings were positive as they showed loyalty from community group that clearly wants to keep using paratransit, hence indicating its considerable potential.

Operator's perspective of paratransit services.

According to Jimu (2008), most of the operators join the transport operation not only because of being despondent, but also because of the perceived opportunities to improve per capita income levels and advance in life. Mainly, the operators point of view of the paratransit transport is to maximise the number trips for more profits i.e. operators try to maximise their economic output from the operations. This is also demonstrated by Roschlau, 1981, as quoted by Cervero and Golub that 'in Mexico city in the 1960s, taxi drivers cruising to pick up multiple fares during the pick hours called "paseros", were originally tolerated by officials for their ability to serve peak-hour demand'. This clearly shows the operators efforts to increase the economic gains of the paratransit operations. Operators perceive the paratransit service as a gateway to employment opportunities to low-skilled young men, many of whom support their entire families from their driver earnings.

2.4.2 Challenges of paratransit services.

Despites having a positive side the paratransit service also have several challenges.
Firstly, due to unrestricted entry into the market, there is excessive supply and over competition, which leads to traffic congestion as the operators, wants to maximise the number of passengers hence drivers cut each other off, stop in the middle lanes to load and offload customers and weave erratically across lanes. In case of low travel speed of the non-motorised paratransit vehicles, results in impeding traffic, which has led to some cities banning their services, or provide separate lanes for them.

Secondly, over competition leads to chaotic and reckless driving behaviour as operators tend to compete for customers. There is also a tendency to halt services or change areas of service regardless of how others might be affected. All this leads to disorderly service operation.

Aggressive and reckless driving of paratransit operators which include poor driving behaviours such as cutting off traffic, blocking lanes, overloading and ignoring traffic rules leads to traffic safety which includes accidents and public security as a result of overcrowding. In case of the boda boda service in Uganda, the main disadvantages are their poor safety record and the pollution, in case of motorcycles. However, this may be addressed by providing operator education and training (Howe J. & Davis A.).

The tendency by paratransit operators only to operate in lucrative routes and during peak hours because of perceived costs and high ridership rates otherwise referred to as cream skimming.

This leads to people travelling during off peak hours as well as those living in areas, which are less lucrative at a disadvantage.

Informal paratransit service is also challenged by; erratic scheduling which results from lack of adherence to a regulated schedule. This leads to erratic headways between vehicles, especially during times of low demand; safety compromise; lack of accountability because of lack of official regulation leaving passengers with no avenue for complaints about service; inefficient business practices; inadequate investments; and lack of capacity (Golub 2003).

A study conducted by John Howe and Deborah Bryceson on Poverty and Urban Transport in East Africa (2000), it was revealed that when it comes to cycling as a means of paratransit service, middle and high income households had a negative perception due to its danger and status, as it is considered to be the transport mode for the poor. Hence, this poses a great challenge to service if it is to be deemed acceptable across the spectrum of the society.

2.4.3 Bicycle Transport and safety.

Cyclists are vulnerable road users as they suffer from the hazard of the road. It is obvious that, in the event of collision with motorized vehicles, they are most at risk. Reliable and accurate data is important and can help to identify road safety problems, risk factors and priority areas. However, there is an incidental evidence that more severe crashes and crashes involving motorized vehicles are better reported than less severe crashes and crashes involving 'vulnerable road users'. Crashes involving cyclists tend to have a relatively low reporting rate compared with other transport modes. These crashes, even those with serious injury, are often not reported to the police. Therefore, the real numbers of injured are grossly underestimated by the police (Wegman, Zhang & Dijkstra 2010)

There are an estimated 1.1 million traffic deaths worldwide every year. According to World Health Organisation (WHO), traffic accidents are the second leading cause of death among young people in developing countries, most victims being pedestrians and cyclists. However, increasing the share of cycling and providing users with safe facilities can substantially improve safety (Godefrooij, Paldo & Sagaris 2009). In many countries, travelling on a bicycle is dangerous and getting worse. In Britain for example, the KSI(Killed or Seriously Injured) rate for pedal cyclists per billion vehicle-km rose by 80% from 1954to 1988 to a level some 20 times that for car drivers, whose KSI rated halved over the same period (West-Oram, 1989) in Tolley, 1990).

Africans use either non-motorised transport (walking and cycling) or informal transport for most of their trips. It is well known that pedestrians and cyclists are the most vulnerable and more of them are injured or killed on traffic incidents. Safety is less of a concern to many informal paratransit operators and can be compromised in the quest for commercial benefits. (International Association of Public Transport, 2010). Cyclists are generally required to share space on the carriage way with fast moving, relatively heavy, powerful, motorised vehicles, furthermore it is often the carriage way margins which suffer most from poor maintenance, thus making cycling additionally unpleasant and dangerous (Gaffron 2001)

The most common problem for cyclists worldwide is that our modern traffic system is designed largely from a car-user perspective, which results in lack of coherent planning of route networks for cyclists (ETSC 1999). Nor does the system take the main characteristics of cycling into account: a cyclist is vulnerable (in a crash), flexible (in behaviour), instable (may fall of bike), inconspicuous (difficult to see), is conscious of effort (i.e. highly motivated to minimise energy expenditure), and sometimes seen as intruders in the traffic system, rather than an integral part (Wegman, Zhang & Dijkstra 2010).

According to a research conducted in urban area of Pelotas, Southern Brazil by Giancarlo Bacchieri et al, with the aim of outlining the profile of bicycle commuters, analyzing their use of safety equipments and risk behaviours in connection with their involvement in traffic accidents. It was observed that mostly accidents occurred due to risky behaviour such as zigzagging through traffic, riding after ingestion of alcohol, and riding rapidly. It was also noted most of bicycle commuters did not obey traffic safety rules, which included, running red lights, riding the wrong way on one-way street, and riding side by side with other cyclist. Most of bicycles studied had no safety equipment as required by the Brazilian Traffic Code, these include, working bakes, pedal reflectors. The other causal factor for exposure to accidents is greater exposure to traffic and intense use of bicycle during the night (Bacchieri et al. 2010).

A study conducted in the cities of Pune and Accra, India and Ghana respectively showed that more individuals in the two cities regard the bicycle transport as safe. A similar proportion of individuals from both cities regard the bicycle as an ‘acceptable’ mode of transport, more Pune residents think of bicycle as ‘comfortable’. In both cities, more men than women are positive about ‘safety’, ‘acceptability’, and ‘comfort’ of bicycles (Palmer, Astrop & Maunder 1997).

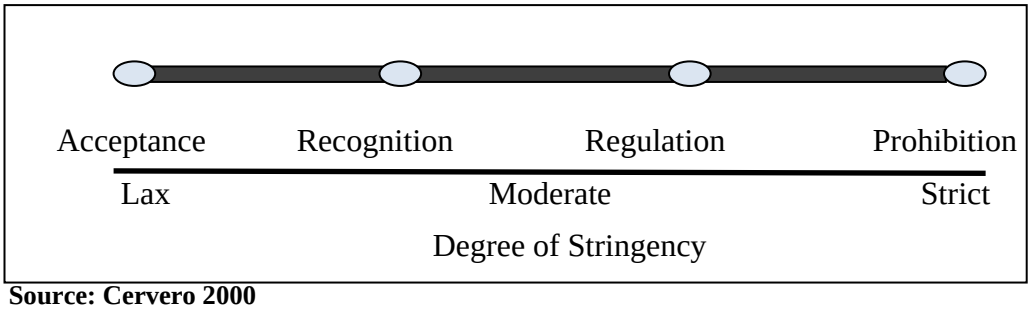
2.5 Public Policy Options to informal paratransit services

Public policy can be defined as a system of laws, regulatory measures, courses of action, and funding priorities concerning a given topic promulgated by a governmental entity or its representatives (Kilpatrick Dean 2000). In the definition above it is clear that policies or policy options are a set of laws and regulations, which are formulated, with the intent of guiding a smooth implementation of programmes.

There is need for governments and organisations to consider a number of public policy strategies that would be important in order to upgrade and formalize the paratransit services. There are a number of policy strategies that may be used which include; management and organizational options; regulatory reforms; financial initiatives; infrastructure improvements; traffic management; training; and demonstration programmes. However, not all options may be suitable in different context.

Cervero (2000) identifies a spectrum of intervention, which range from inaction to banishment and has four main choices required to cope with informal paratransit. These actions include; acceptance, recognition, regulation, and prohibition. (Refer to figure 2.1 below)

Figure 2. 1 spectrum of public policy response to informal Transport (paratransit)



Source: Cervero 2000

In the spectrum, Cervero distinguishes the four choices, which are categorised as lax, moderate, and strict in terms of stringency. The acceptance choice is whereby there is no action by government being taken to the paratransit operators; hence, the negative externalities of unlicensed paratransit increasingly mount. Recognition and Regulation are more moderate positions which incorporate the informal paratransit services into the formal transport network. The main difference between the two is that, recognition is influenced by the market place, which determines the level of supply of paratransit whereas under regulation, the entry into the market is strictly controlled. Prohibition involves an outright ban on the paratransit services. In this scenario, violation to prohibition is punishable by fines, incarceration, and confiscation of vehicles. However, extreme policy choices like acceptance and prohibition are rarely the solutions to problems of paratransit operations.

In this respect, it is important that governments and organisations should promote policies that aim at recognising and regulating the paratransit services rather than the extreme ends of acceptance and prohibition. This would help in improving the mobility and accessibility within and around cities.

2.5.1 Formalisation of informal paratransit.

In many cities, as in cities in most parts of the developing world, informal, unscheduled and largely unregulated paratransit operations represent a significant – if not the only – the only mode of transport available to the great majority of residents. Attention in some African cities has been focused on the question of, firstly, whether an effort should be made to formalise or regulate paratransit operations as part of an integrated public transport system, and secondly, if so, how any such process of regulation should proceed (Wilkinson P. 2008). However, there is need to consider to what extent it may be possible to bring together the interests of operators, passengers even the authorities through such a process of formalisation or regulation.

In south Africa for instance, efforts made to formalise the informal taxi operations were done through the establishment of a formalization policy in 1996 which aims more at remedying the minibus taxis negative externalities and operational short comings. The policy provides for the formulation of associations, which among other things; protect its members from infringing competitors through negotiations with competing operators.

A critical issue throughout Africa, and one that will certainly shape the future of urban transport across the continent, is the need to reconcile the dominant informal sector, with its

advantages of low public investment and flexibility, and adapt it to a more formal and organized operational structure, interchanging with formal high-capacity public transport. As evidenced from literature, formalization of the informal paratransit can be done in a number of ways as identified in the spectrum by Cervero.

2.5.2 Regulation and policies of Non-motorised Vehicles use.

The term regulation usually encompasses multiple forms or modes of governmental intervention in various and diverse arenas of economic and social activity. In conventional discourse of international development agencies, however, it refers to the sustained and focused control, normally exercised by a public agency, over activities that are valued by community and which can either prevent undesirable behaviour, actions and activities or enable and facilitate the desirable ones (UNESCAP 2001: 1; also cited by (Wilkinson P. 2008).

Regulations and policies include taxes and import duties, vehicle registration and licensing fees. Frequently regulations and policies have been used to discourage or suppress the use of non-motorized vehicles, while fostering motorization of transport (Replogle M.)

It is very important for governments to have a regulatory framework for the paratransit non-motorised vehicles. For the motorised vehicles, governments regulate the types of vehicles that are allowed to operate. This includes vehicle parts, and components that are generally registered by the International Standards Organisation (ISO) and the subsequent registration with the police or motor vehicle department, this is to ensure peoples and vehicles safety. However, as bicycles, rickshaws and other NMVs generate no pollution, and operate at slow speeds; very few countries require these vehicles to be inspected for roadworthiness or emissions (Hook 2003).

Equally, to operate a motor vehicle generally requires having a driver's license. This is because operating a motor vehicle is a skill that requires training, and untrained drivers are a risk to themselves and others. The relative simplicity of operating a bicycle or other non-motorised vehicle has made operating license unnecessary world over (Hook 2003). Hence, the vulnerability in terms of exposure to the risk of accidents. This is because every person can operate the bicycle regardless of being experienced or not.
Some non-motorised vehicles operate as commercial vehicles; hence, they are subject to further regulation for the following reasons:

1. To protect consumers

2. To limit adverse traffic and related impacts, and

3. To protect the operators.

Proponents of the need for regulation in the provision of public transport service generally identify a number of principal economic arguments in support of their position, sometimes supplemented by certain social arguments. The most important of the economic arguments are generally considered to be:

1. That regulation guarantees provision of an essential or desirable public good in the form of public transport service, where the market would not offer this or there has been overt market failure;

2. That regulation is necessary to manage the externalities or spill-over effects associated with unregulated competition, such as intensified traffic congestion and the increased pollution generated by poorly maintained vehicles;

3. That regulation is required to address the potential abuse of market power by natural or other monopoly producers, which might involve the restriction of service or the raising of prices, or the restriction of access to the market by other producers; (Wilkinson P. 2008).

In most of developing countries, the regulation of bicycle taxis and rickshaws is different from country to country and form city to city. For instance, becak operators in Surabaya and Yogyakarta, Indonesia are required to pay a fee in order for them to register their becaks and to be allowed to operate. In most first world cities, cycle rickshaw taxi services are relatively scares. As such, they have remained completely unregulated. No licenses are required and fares unregulated and negotiated case by case. Municipal authorities only require that operators hold insurance for the passengers in case of accidents (Godefrooij, Paldo & Sagaris 2009).

In Delhi, for example, there are an estimated 500,000 cycle rickshaws operating without a license, mostly in outlying areas. In the higher income and hence more profitable parts of the city, licenses are required, giving control of the market over to the *maleksI* or big fleet owners, who are sometimes said to form a kind of " local mafia" (Godefrooij, Paldo & Sagaris 2009).

Box 2. 2 The Indian Case

In most Indian cities where rickshaws are allowed, operating them requires a license. In Delhi, getting the license is difficult and often requires going through a malek (fleet owner), who rents the vehicles, or a financier (who sells vehicles on credit at high interest rates). Oddly, the vehicle licenses are issued by the veterinarian Department of the Municipality, because they were historically lumped together with animal traction vehicles. These regulations stipulate very specific sizing requirements that did not in fact correspond to any of the actual sizes of the mass manufactured models. They also required the presence of mudguards and a canopy for the sun, but do not require that the canopy be functional.

Source: Godefrooij, Paldo & Sagaris (2009)

In the state of Chandigarh, India. The Municipal Corporation of Chandigarh regulates the cycle rickshaws as per the provisions provided in the section 343 of the Punjab Municipal Corporation law (Extension to Chandigarh) Act, 1994. It says cycle rickshaw is governed as per the directions provided in "The Punjab Rickshaws (regulation of license) Act, 1976. It further describes the cycle-rickshaw as a three- wheeled cycle rickshaw driven by a manual labour. The rickshaws are subject to being licensed in order to operate in the state.

2.5.3 Restrictions on non-motorised paratransit vehicles (bicycles)

The paratransit service is most prominent in the poorest countries of the world. It is this inverse relationship between wealth and informal transport that prompts public authorities to attempt to ban them in hopes of conveying a modern, first-world image (Cervero, Golub 2007)

In most cities, non-motorized vehicles (bicycles) are restricted from accessing some of the streets and highways for safety and other reasons. In Asia there has been, in recent years some restrictions of certain types on non-motorised vehicles. For example, in China, and Southeast Asia, bicycles and other NMVs were allowed on all intercity and other roads until the 1990s; however, for the last decade China has been building a national limited access freeway network on which non-motorised vehicles are not allowed. In recent years, restrictions on bicycles and other non-motorized modes have been introduced on some urban arterials, which serve primarily local traffic. Cities like Shanghai, Guangzhou, Beijing, and other cities have imposed restrictions prohibiting bicycle use on some major roads, many of which are now virtually impossible or extremely inconvenient to cross by bicycle, hence severing millions of short distance origin-destination pairs that previously could have been made by bicycle (Hook 2003).

In Indonesia, entire classes of NMVs are not allowed on certain primary arterials, not only bicycle are not allowed on the major arterials and limited access free way in Jakarta, but Bajaj, Bemo, becak, and other slow moving motorised modes are also not allowed. In almost all of Indonesian cities the three-wheeled non-motorised becack are being phased out. This is mainly due to prejudice against non-motorised transport which is perceived as being primitive and outmoded, and due to some political connotations the becack drivers have had since 1960s (Institute for Transport & Development Policy 2009)

In Dhaka, Bangladesh and other places, the bans/restrictions of non-motorised vehicles is sometimes justified on the grounds that there are too many of them relative to the demand for their services, and as the result there are many unoccupied non-motorised vehicles occupying scarce road space and generating needless pollution. This is a legitimate concern, and it is one that is true of cities with unregulated taxi fleets. Anytime a commercial transport service is completely unregulated, the result is an overconcentration of services along the most lucrative main routes, and a scarcity of services on less popular routes and in peripheral areas (Institute for Transport & Development Policy 2009).

According to (Simon 1996), although non-motorised forms of paratransit often have long traditions and may serve the needs of many poor residents while providing many jobs, governments are generally still seeking to phase them out on grounds of congestion, slow speed and claimed inappropriateness in modern cities. However, banning bicycles as a traffic

mitigation measure will not be successful as bicycles are among the efficient users of road space after buses and pedestrians (Institute for Transport & Development Policy 2009)

2.5.4 Infrastructure support

Transport infrastructure provision is one of the most important prerequisite if the paratransit services, especially non-motorised transport like bicycle transport, if it is to be formalised. The low priority given to urban transport combined with limited funds has resulted in a low level of investment in the developing world, with regard to both public transport and infrastructure. Moreover, whenever governments invests in transport infrastructure, it is often aimed at car-based, not necessarily the most accessible for the majority of population (Kaltheier 2002).

Though it is obvious that sufficient transport facilities and safe traffic conditions are essential for economic and social development, in most regions of Sub Saharan Africa non-motorized means of transport like the bicycle are ignored by national governments, focusing on the motorization of the upper-income groups and interpreting the car-ownership as the symbol of progress and power (Heyen-Perschon J.). This leads to movement conflict and the vulnerability of many paratransit operators to accidents, since they use the same carriage way with others. However, there is need for physical separation of incompatible modes, than single lane.

Through investment in transport infrastructures, the involvement of public authorities in management of public transport activity, establishment of transport organizing authorities, public transport planning and integration with urban planning, cities of Dakar, Lagos and Johannesburg, shows that the formalization of the informal operators can be successfully done. This can improve the conditions for those working in the sector as well as those using it, reduced externalities and helped protect the environment (UITP 2010).

In Yogyakarta city, the administration is improving its pedestrian and non-motorised vehicle facilities. This is because walking, bicycles, andong, and becak have been part of Yogyakarta transport culture, hence the need to revitalise the infrastructure for non-motorised vehicles, as these are still important in serving local transport mobility as well as employment for low-skilled workers, Surakarta's transport policy is similar to that in Yogyakarta. Surakarta's local government is, however, more progressive in revitalising it's pedestrian and non- motorised facilities (UN HABITAT May 2009).

In a case examined in Uganda, it was observed that in order to formalize the paratransit system, it is critical that city authorities institute a transport policy that is balanced and aims to provide supportive and pro-paratransit infrastructure such as parking facilities for Boda Boda and exclusive motorcycle lanes (Tamale K. A. 2008).

2.5.5 Associations and organisational capacity building.

The formation of operator associations for the paratransit service providers play an important role in the formalisation of transport provision. This is through mediation between the operators and government, law enforcers and other regulatory authorities.

The associations deal with illegal operators plying their trade without any operating license for lack of enforcement. The association also provide their members with service that also reveals a rather high degree of collective organization by, negotiating with regulatory authorities (licensing boards) the award to their members of operating licenses, running gas or service stations for their members, providing members with loan guarantees and ensuring that they refund the bank loan they obtained (Lomme 2005).

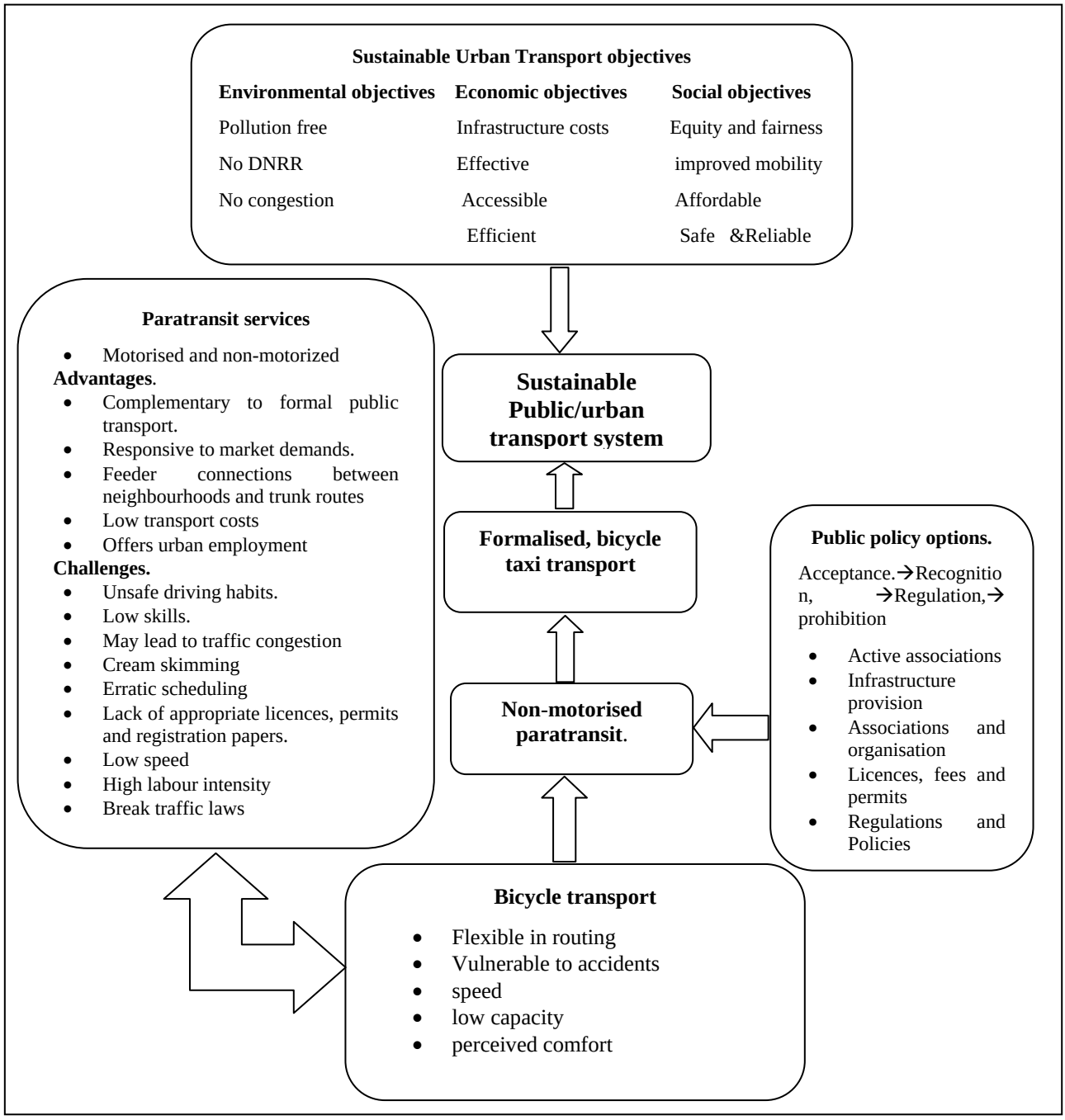
A study conducted in Uganda revealed that, the regulation of Boda Boda industry by the government proves to be difficult. However, there have been some initiatives by associations to which the majority of the operators belong, to formalise the industry. For an operator to belong to the association they have to pay an entry fee. On the other hand, the association represent the members in various cases, which include; harassment by security personnel, tracing members in cases of theft, or tracing the operator's relatives if there is an accident. The association also enforce discipline and hygiene though fines and other sanctions. Sometimes the association also assist its members financially through a semi-banking (savings) and credit.

2.5.6 Implications of formalising the paratransit sector.

There are a number of implications, which follows the formalisation of the paratransit sector. These include the number of procedures, time and costs which the informal firms are supposed to undergo if they are to be formalised.

Formalization and regulation of paratransit enables the enhancement of market efficiency. When firms decide to become formal, they have to be registered as a company and pay a licence fee. During the registration process, the informal actors may undergo several procedures like screening, health and safety certificates, and registration with statistical offices, local authorities, and respective ministries in order to meet the official requirements. On the other hand operating in the formal sector denotes the involvement of a firm in different societal institutions that are entail in the following; time consuming, burdensome, and complex taxes, unaffordable labour regulations, cumbersome property registration and formal loan application, inefficient contract enforcement mechanism (Ishengoma, Kappel 2005).

Figure 2. 2 Conceptual framework



Source: Authors own construct 2011

2.7 Literature review summary

Sustainable transport is a universal concern for most urban authorities in both developed and developing countries. Mainly this is due to the role it plays in promoting the economic, social, and environmental landscape of the society. However, due to rapid population growth in urban centres, there has been an increased expansion of transport networks and modes, which have resulted in most cities being unsustainable due to increased pollution, traffic congestion unproductive travelling times, and noise. However, literature has revealed that there are other modes of transport, which emerge informally because of innovations of the population migrating into urban areas. Such other modes include the non-motorised means of transport which bicycle transport also forms part. Such kinds of paratransit modes have also proved to be sustainable, hence the need for their regulation and formalization for their integration as means of urban/public transport, particularly in developing countries.

Literature has also showed that there are a number of ways in which such kind of paratransits can be integrated into urban transport system. For instance, Cervero (2000) identified a spectrum of public policy response, which range from acceptance, recognition, regulation, and prohibition and can be used as a benchmark by governments and organisations in formalising the paratransit transport sector. Out of this literature review, a conceptual framework has been developed, which shows how different concepts are linked to each other. Out of the concepts identified, indicators and variables were identified and form the basis for the study.

Chapter 3. Research Methodology

3.1 Introduction

This chapter presents an overview of the methodologies, which were used in the course of study. It also highlights the research type and strategy, research design, study population, sampling techniques, data collection methods, analysis, and presentation of findings. Further to that, research variables and indicators will be explored. Finally, research constraints and limitations will also be presented.

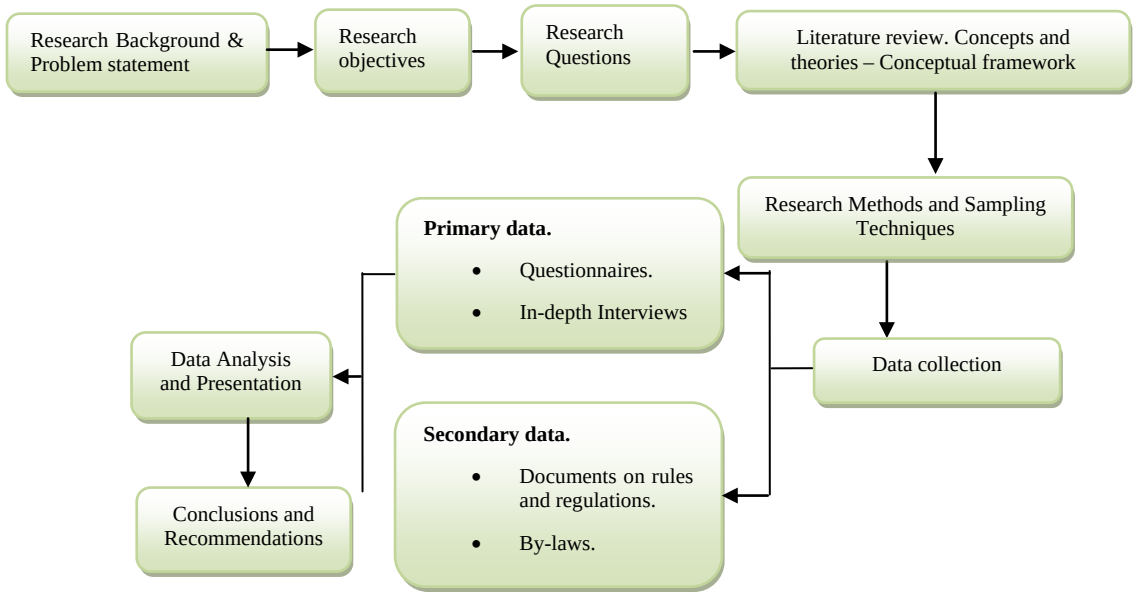
3.2 Research type and strategy

This is both an exploratory and descriptive research seeking to explore the contribution of bicycle taxis in Mzuzu city to sustainable transport and describe ways, means, and strategies that should be adopted to have bicycle taxi operations formalised. As such, a research survey was conducted, as a strategy for data collection. There was also some literature and case study reviews.

3.3 Research Design

The research design provides a detailed guide on the phases through which the study was conducted. First, the study identifies the problem then research objectives and research questions were formulated. Literature review was conducted leading to the identification of concepts and theories which later led to the identification of variables and indicators linked to questionnaires and interview guides. The stages for the research design are illustrated in the figure 3.1 below.

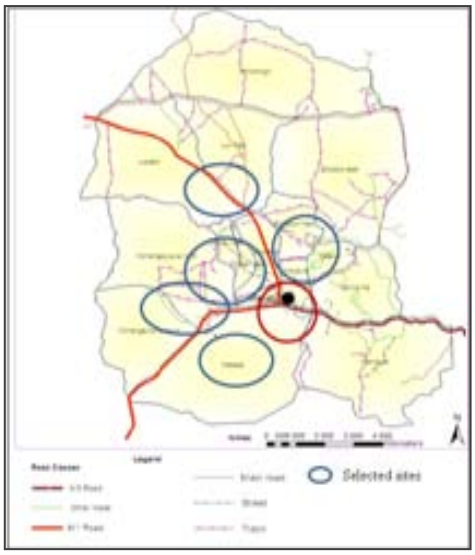
Figure 3. 1 Research design



Source: Author

3.4 Sampling

Map 3. 1 Research area



The study population comprised of bicycle taxi operators, user, other road users, City authorities, Regional road safety council, and Road traffic directorate. The sampling technique was random, in case of operators, users, other road users. This was done to avoid bias in selecting respondents as regards age, gender, and income level. Five sites in the research area were selected. These included residential areas (circled in blue), and the city centre (in red), refer to map 3.1. Purposive sampling was used in case of authorities and other stakeholders. Data collection included the use of semi-structured open and closed ended interviews. E-survey was also designed particularly for those respondents category with access to internet e.g. Authorities. The study population was 78. For detailed breakdown of sample size and data collection framework refer to table 3.1 below.

Table 3. 1 Proposed data collection Framework

Category of respondents	Sample size	Sample techniques	Data type	Research instruments
Bicycle taxi operators	25	Random	Primary	Questionnaire & in depth interviews
Bicycle taxi users	25	Random	Primary	Questionnaire & in depth interviews
Other road users	25	Random	Primary	Questionnaire & in depth interviews
Authorities (City council, etc)	3	Purposive/ Representative	Primary/secondary (documents on rules and regulations, by-laws etc.	Questionnaire/ in-depth interview

Source: Author 2011

3.5 Validity and Reliability.

The validity of the study was ensured by designing appropriate questions for the interviews and questionnaires. This was be done by ensuring that the questions are framed based on the context of the indicators for the research questions. The validity was also ensured by use of triangulation technique, where by different stakeholders were interviewed.

Reliability of data was be ensured firstly by establishing a clear research design, and a clear sampling technique. Secondly, through formulation of clear variables and indicators, which

also influenced the formulation of clear and unambiguous list of interview questions and questionnaires.

3.6 Data collection methods.

This research mainly used qualitative data collected from primary and secondary sources, these include:

3.6.1 Primary data.

1. This includes data collected through questionnaires from the bicycle taxi operators, bicycle taxi users, and other road users. This included both open and closed-ended questionnaires.
2. Data collected from in-depth interviews conducted to working staff of various departments appearing under the category of 'Authorities.' Data collection from this category also conducted by e-survey.

3.6.2 Secondary data

Secondary data was mainly collected through a review of literature from various academic books, journals, reports, thesis, source books, newspaper articles, and online sources about sustainable transport, informal transport (paratransit), and previous case study review of similar studies.

3.7 Data analysis methods.

The data collected was analysed by clustering it into categories and organising it into themes. This involved a descriptive analysis, done by quantifying the variables in terms of occurrence in accordance with the study objectives and research questions. The data is presented in form of tables, graphs, charts where necessary. These were created by SPSS computer programme.

3.8 Operationalization: Variables and Indicators.

Following the literature review, a table of variables and indicators was prepared and is presented below.

Table 3. 2 Variables and indicators

Research Question	Variables	Indicators	Data source
R.Q 1. What are the characteristics of bicycle operators and current organisational setup of the operations?	• Socio-economic status of operators. • System of operation	• Age • Education level • Gender • Income level • Regulatory frame work availability. • Operator Associations. • Route allocation	Questionnaire interview with bicycle taxi operators In-depth interview with city council official, and government officials.
R.Q 2. Do bicycle taxi operations contribute to sustainable urban transport in Mzuzu City? And what are the major advantages and challenges?	• Advantages • Challenges (economic, social, and environmental)	• Accessibility/mobility • Reliability of bicycle taxi • Affordability by users. • Comfort • Equity • Unsafe cycling habits. • Harassment and violence • Safety • Effects on the environment.	Questionnaires interview with bicycle taxi users, bicycle taxi operators. Questionnaire interview with relevant government officials. Desk search
R.Q 3. How do different stakeholders conceive the future of bicycle taxi operations in Mzuzu City?	Perceptions	• Employment • Congestion • Demand • Continued bicycle taxi operations.	Questionnaire interview with bicycle operators, users, other road users, and government officials.
R.Q 4. What are the policy and support mechanisms required to facilitate bicycle taxi operations in Mzuzu city?	Policy options	• Registration of bicycle taxis. • Regulations. • Appropriate infrastructure • Licenses and permits for operators	Questionnaire interview to bicycle operators, government departments and city council authorities

Source:Author2011

3.9 Time schedule.

The research time scale for the study is illustrated in a form of a table below.

Table 3. 3 Thesis time schedule

	Dates			
Activity	June	July	August	September
First draft proposal				
Submission of 2nd draft proposal	24			
Presentation of 2nd draft proposal (colloquium)	27-28			
Final submission of research proposal		1		
Field work		4 - 29		
Presentation of research findings (colloquium 3)			11 – 12	
SPSS data entry workshop/qualitative data analysis workshop			15 – 18	
Submission of 1st draft final thesis			22	
Submission of final thesis				12
Thesis defense				14 – 19

Source: thesis handbook

3.10 Research constraints and Limitations

The research was constrained and limited in a number of ways. Firstly, there is limited information regarding the formalisation of informal public transport, in general and bicycle taxis in particular which really poses a great challenge in obtaining secondary data In the course of literature review.

There were some limitations in the fieldwork during data collection exercise, as the questionnaires were designed in English. This was a big challenge particularly to the research assistants when administering it to bicycle taxi operators, bicycle taxi users and other road users most of whom were not be in a position to understand English, hence the need to translate the questionnaire to the local language.

The other limitation was that the researcher himself was not able to travel to the research area due to financial limitations from the sponsor. This made it tough to supervise the research progress, hence he had to depend on internet and telephone contacts in guiding the research assistants. The other limitation reported by the assistants was that it was sometimes difficult to source data from operators as they were expecting to receive financial rewards for offering information through questionnaire interviews. It was also difficult to source information from other government departments particularly police as research assistants were supposed to seek clearance and permission from the Inspector General of police.

Another limitation which affected research progress was the political unrest which resulted into riots in Mzuzu city, immediately after the questionnaires were administered. It was now difficult to get pictorial information and recorded interview as the situation was tense for a period of one week. However, the information was later captured.

Chapter 4. Contextual Background

4.1 Introduction

This chapter presents background information about Malawi, and Mzuzu city. It focuses on transport provision in Malawi as a whole and specifically gives an overview of the growth of Mzuzu City and circumstances leading to the introduction of paratransit services in the city. In this chapter and the next, terms like bicycle taxi and Sacramento will used interchangeably.

4.2 The context of the focus country

Malawi, also known as the warm heart of Africa is small land-locked country in the southern part of Africa. However, it has the potential of accessing the Indian Ocean through the shire and Zambezi Rivers. It is surrounded by Mozambique, Zambia, and Tanzania. It has a land area of approximately 120,000 sq.km and Lake Malawi occupies most of the country's eastern border, which is approximately 20% of Malawi's total land area.

Malawi boasts of four main urban centres. The first to be established were Blantyre and Zomba in the south in the late 19th and early 20th centuries, later in the 1920s Lilongwe in the Central Region sprouted, which was later elevated to the status of the capital city in 1975. Much later in the 1940s, Mzuzu was established in the north (Jimu 2008).

Map 4. 1 Map of Malawi showing the location of Mzuzu city

Sources: http://www.guideforafrica.com/malawi/malawi-map.html

In terms of transport, there are a number of private companies providing transport services between the major cities and towns, and to rural areas in Malawi. Previously, there used to be city line buses which used to provide public transport service to the residents of the major cities in Malawi. These buses were operated by a state owned company, however, due to structural adjustment programmes the operation of the services ceased when the company was privatised. The subsequent liberalisation of the economy and transport provision, led to the boom of private and informal paratransits, which included both motorised in form of mini buses and informal taxis. All these competed heavily with the city line buses. Non-motorised transport also emerged, in most of urban as well as rural centres in Malawi.

4.3 Background to Mzuzu City

Mzuzu is the largest urban centre in the Northern Region of Malawi and the third largest city after Lilongwe and Blantyre. Therefore, it plays an important role as a regional centre in the settlement hierarchy of Malawi. The city is located at the road junction of M1 from the south and M5 from the major port of Nkhata-Bay, on latitude 11. 27 S and longitude 34.01 E. refer to map. It is located 385 Km from the Capital City Lilongwe, 300 Km from Malawi and Tanzania border and 45 kilometres from Lake Malawi. It is located at an altitude of about 1600 m above sea level.

Population size.

According to the 1998 population and Housing Census, Mzuzu had a population of 86,980 with a growth rate 6.2%. The population has since grown to 133,968 as of 2008. About 50.2 percent of the population comprised of males and the remaing 49.8 percent females (Malawi. National Statistical Office 2009), as a regional centre, the city serves a total population of about 1.7 million. It is projected that by 2015 and 2020, the population will grow by 4.16 percent as shown in table below.

Table 4. 1 Population development and projection in Mzuzu city

Year	Population
1977	16,108
1987	44,217
1998	87,030
2008	133,968
2015	220,346
2020	270,423

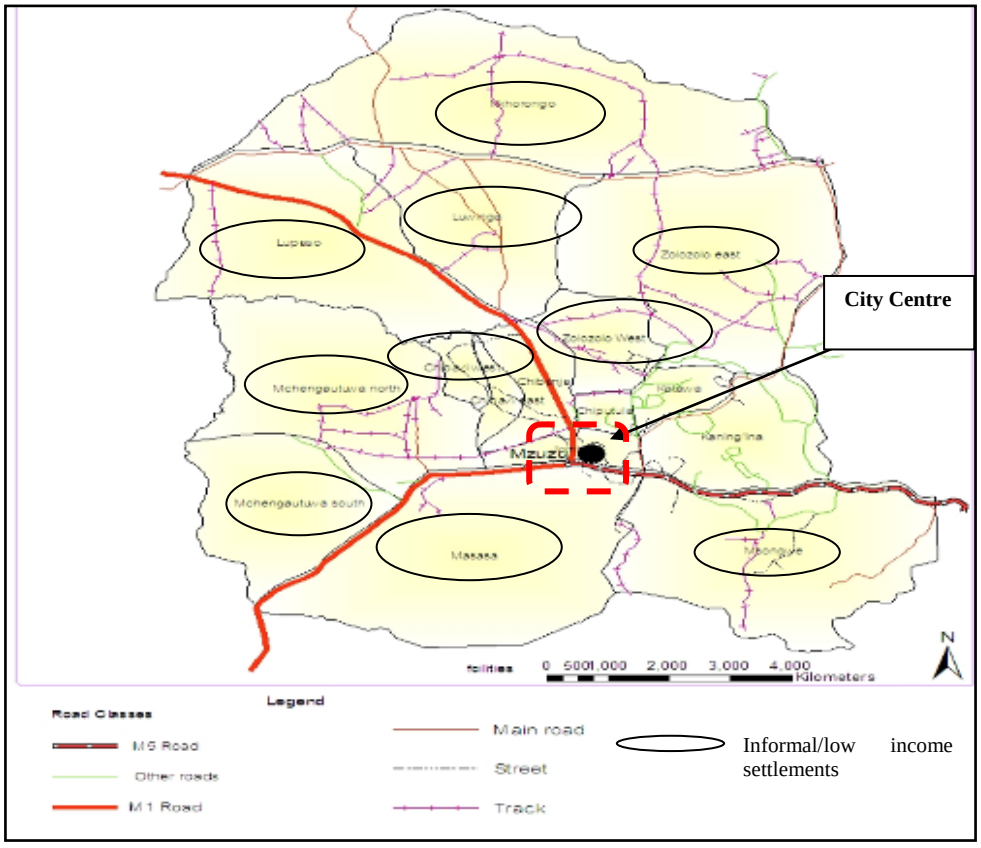
Mzuzu urban profile

City Development.

Mzuzu City originally developed around the Commonwealth Development Corporation's Tung Oil Estate in 1947. It became a municipality in 1980 and a city in 1985. Some of the major economic activities leading to the development of Mzuzu city include agriculture, livestock keeping, transport services, hospitality services, and food processing. The city centre is mostly the hub of banking, retail and distribution activities. However, the economy of Mzuzu city largely depends on the informal economy, which is growing rapidly, and accounts for 63% as opposed to the formal economy, which accounts for 37%. (Mpoola D. et al 2011). Since Mzuzu is also a regional centre, it houses a number of regional government offices as well as nongovernmental organisation, which have in recent years been opened up.

Owing to the above facts, the city is also experiencing rapid growth of population and in spatial terms, leading to the development of informal settlements most of which are located at distances of about 2 to 6 kilometres away from the city centre. According to Mpoola et al (2011), more than 60% of Mzuzu city population lives in these informal settlements. These settlements characterized by a lack of provisional basic amenities and infrastructure like portable water and good roads. These are mainly areas in which the low-income earners in the city settle, and mostly people who have migrated to the city from other surrounding areas in search for jobs and business opportunities settle in these locations.

Map 4. 2 Map of Mzuzu city showing the spread and development of settlements



Source: Mzuzu city profile 2009

On average, most people living in these areas earn a very low income from various sources which range from 5,000. To 10,000. Malawi kwacha per month. This translates to a weekly income of about 1,250 to 2,500 Malawi kwacha that is much lower and not enough to sustain ones living and access all basic necessities in the city. This situation prompts these residents to opt for walking long distances or use the cheapest means of transport when commuting to access facilities like hospitals and clinics, education facilities, work areas, business premises and other services in the city.

Topography.

Mzuzu city is situated on the northern end of the Viphya plateau on the edge of the rift valley escarpment. It lies at an altitude between 1,200m and 1,370m above sea level. It is bounded by the Vipya Mountains to the north and south, and the Kaning'ina Mountains to the east. Due to its development on the natural gap of the Viphya Mountains, most of the city lies on a slight basin with flat and gently sloping land with ridges and gullies to the south and east. This type of topography poses a great challenge to transport provision in the city particularly the use of bicycle taxis in some areas. However, there are other areas that are reasonably flat, and gentle sloped, and the use of bicycle is relatively easy.

Transport in Mzuzu City

The transport industry in Mzuzu City is growing at a fast rate due to the high demand for public transport services in the city. Like other cities in the developing world, much of the transportation in Mzuzu takes place by road, ranging from walking on unpaved paths, to motor transport on unpaved to well-paved roads (Jimu 2008).

Unlike many cities in the developing countries, the city of Mzuzu has no formal urban public transport/transit system, to link different parts of the city and facilitate the movement of people and goods. However, those residents who are well off make use of private cars whereas a majority of middle and low-income earners use informal paratransits, ranging from hired and shared taxis, minibuses, handcarts, wheelbarrows and bicycles taxis popularly known as Sacramento all of which play a vital role in the transportation of people and goods within the city.

The cost of travelling by mini bus and shared taxis range from a minimum of 80 Malawi kwacha to 100 MK per trip which may go higher depending on the distance. While for the same distances covered by Sacramentos cost 40Malawi kwacha to 50 Malawi kwacha per trip. The fares are equivalent to 0.35 to 0.44 Euros and 0.17 to 0.22 Euros respectively.

Despite the bicycle taxi being the most common means of transport in Mzuzu city, there are no cycle tracks as well as bicycle parking facilities in workplaces, shopping centres and other public buildings. Due to the above situation, the bicycle operators and their passengers use the same carriageway as motorists thereby compromising on the road safety and exposing themselves to road accidents. A number of stakeholders as captured in the box below have echoed the safety concerns of Sacramento operators and other road users on the roads of Mzuzu city.

Box 4. 1 Road accidents increase in Mzuzu, Malawi

People walking, driving or cycling on roads in Mzuzu City are doing so with a lot of fear following increasing numbers of road accidents on the city's roads and those connecting the city to townships.
Police confirmed that within a space of a week, the city has registered seven accidents in which three people have died and four others have been admitted to Mzuzu Central Hospital.
On Monday, a cruising vehicle hit a bicycle taxi (Sacramento) near Katoto Filling Station, killing a passenger and injuring the cyclist who is admitted to Mzuzu Central Hospital. On Sunday, a man walking behind a sacramento owner and his passenger died on the spot when a cruising car hit him near Kawiluwilu House. The car also injured the sacramento passenger now admitted to the central hospital. Mzuzu police spokesperson Edward Longwe attributed the increasing rate of accidents to the increase of traffic in the city and reckless driving. "The number of vehicles and bicycles is increasing while roads are limited. As such, there is congestion by such traffic, heightening the probability of accidents," said Longwe. He said some drivers deliberately ignore road signs like traffic lights, and one-way drive ways. He warned that those caught should be prepared to face the law.
National Road Safety Council of Malawi (NRSCM) Regional Manager Leonard Mtonya said most of the accidents happen because of ignorance of relevant rules and regulation, and selfishness by road users. "In cities, cars are not expected to travel beyond 50 km per hour. But this does not happen in the city. Many drivers cruise beyond that and they end up hitting other road users," said Mtonya. "Selfishness among pedestrians, cyclists and drivers is also a big problem in and even outside the city. You usually see a cyclist or driver or even a pedestrian trying to concentrate on a road despite having knowledge that a car or bicycle is coming." He observed that such accidents might continue increasing because of inaccessibility to the Highway Code by road users. He said the code has not been available for about 10 years. A Highway Code is a booklet containing rules guiding users of various roads. Among others, it gives some of the important road signs and signals and their interpretations.

Source: http://www.bnltimes.com/index.php?option=com_content&task=view&id=597

WRITTEN BY JONATHAN JERE Sunday, 08 November 2009.

4.8 Background to bicycle taxi operations.

A bicycle taxi is an ordinary bicycle, which is fitted with a cushion (a comfortable seating pad) at the back for the passenger to sit on (refer to picture 4.1 below). According to Jimu (2008), bicycle taxi operations started in Mzuzu sometime in early 2004 by an enterprising man called Sata, who brought the idea from Lilongwe where bicycle taxis also operate. At the time of introduction Sata used to work in an Indian shop and saw the need to diversify his income after noting that what he used to earn could not sufficiently support his family, and that there were no such operations in the city. Seeing how successful this man was, the bicycle taxi operations attracted more people who joined the operations.

Picture 4. 1 Picture of bicycle taxi

Source: fieldwork July 2011

As at now, City authorities have approximated that there are about 3,000 to 4,000 bicycle taxi operators, however with caution that the number keep fluctuating due to freedom of entry and exit into the operations. The city authorities have varying viewpoints as regards Sacramento operations. The City Council is of the view that the bicycle taxi operations are influenced by the market, since there is a lot of demand which determines the level of supply. The operations are relatively easy to start since there are no rules and regulations to which the operators have to abide before hence, the figures given above. The National Road safety council of Malawi and the Road traffic directorate are however, of the view that entry into the market by the bicycle taxis should be strictly controlled by regulations. This is possibly because bicycle operators are supposed to observe certain road traffic rules and regulations.

The Sacramento operators are allowed to conduct their business operations only within the residential neighbourhoods and are restricted from plying their operations within the city centre streets. The Regional Road Safety Manager gave examples of the City Council by-laws, 'though not legally binding', which restrict bicycle taxi operators from plying their operations on some highly congested areas of the City Centre, and the time limit given to operators to operate at a given time between 5:00 a.m. to 8:00 p.m. The Road Traffic Department, which is responsible for regulation of the transport industry by providing all relevant documents and law enforcement, is of the view that the road signs and signals provided on the roads are the ones, which are supposed to guide these bicycle operators, as such, they have to be adhered to.

Reports from the National road safety council indicate that annually, not less than 3 fatal accidents occurring between the Sacramentos and motor vehicles are reported and at least 5 minor to severe accidents on a monthly basis. While on daily basis there are several reports of conflicts between the operators and other road users and near misses. This is mainly attributed to the way Sacramento operators conduct themselves on the road. However, the regional manager for the coincil pointed out that the data which they used is sourced from the traffic police department which is in many cases under reported. Efforts to get more data on the bicycle taxis and safety of the bicycle operations from police proved futile because of the political situation which unveiled during the data collection period.

Government Departments which include road traffic directorate, National road safety council and the city council are of the view that bicycle taxi beneficial to the city residents. According to the Mzuzu City council, the bicycle taxis are advantageous to both operators and users. The council believes that bicycle taxi operations are a source of informal employment to the operators and bicycle owners in the City. The transport mode is economic and convenient as it is affordable to most users and offers a door-to-door service. The council also believes that since the operations are not fossil fuel based, they are environmentally friendly, as they do not contribute to the emission of green house gases. The council however does not have direct monetary benefits from the operations, as it does not collect revenue from the operators and their operations. However, there is an indication the city council might consider collecting revenue from bicycle operators.

According to the Regional Road Safety Manager, the bicycle taxi operations are beneficial to the city as they; assist all city inhabitants who cannot afford other means of transport, reduce

crime and unemployment, and alleviate poverty on side of the operators who in most cases are breadwinners in their families.

Despite the advantages of bicycle taxis in Mzuzu city as noted above by some government, there are several challenges affecting the bicycle taxi operations which requires serious attention, and these include the following;

1. Lack of necessary bicycle infrastructure e.g. bicycle tracks and parking facilities, to enable easy operations.
2. Sometimes motorists have no consideration for bicycle taxi operators and regard them as aliens who do not deserve a share of the road.
3. The bicycle owners and operators invite illiterate relatives and friends from the villages who are not familiar with city traffic to join and relieve them of their operations as they graduate to other businesses.
4. Lack of regulatory and legislative framework such as non-existent of legally binding by-laws to regulate the operations.
5. Inadequate sensitisation to operators as well as passengers on road safety, which culminates into fatal road accidents.

4.9 Reasons for restricting bicycle taxis in Mzuzu City

The Director of planning for Mzuzu city and the Regional Road safety Manager said the operators are barred from the city due to inadequate infrastructure to accommodate them since the current scale of infrastructure is congested by vehicles and pedestrians, secondly they concurred with some of the reasons given by the operators themselves saying they are barred due to non observance of traffic regulations, (like jumping traffic lights and entering into no entry zones) either due to ignorance or deliberate non-compliance. This exposes them to high risk of accidents. However, the city Council authority and national road safety council have different views in terms of whether restriction of bicycle taxis in the city is the best option. The city council believes it is the best option since it would reduce congestion and accidents while the national road safety council says it is not the best option as it is segregatory in nature since the operators are not to blame for the absence of bicycle facilities. All are of the view that there is need of finding lasting solutions to accommodate and recognize them in the city transport system.

4. 10 Conclusion.

In Mzuzu city, the provision of public transport provision is privately and informally organised mainly through paratransit operations, as there is no public transport provision by government or the city council. This has led to introduction of informal paratransit such as bicycle taxis to offer transport services to the residents of the city. According to information presented above, it is clear that bicycle taxi operations have a number of advantages and they face a number of challenges as well. The next chapter presents an analysis of the research findings from the study, which was conducted on the bicycle taxi operations in the city.

Chapter 5. Research Findings and Analysis

5.1 Introduction

This chapter presents findings from the survey, which was conducted among three targeted groups namely; bicycle taxi operators, users, other road users. The analysis is mainly based on research questions highlighting on; operator characteristics; current organisation of the operations; sustainability of the operations (advantages and challenge); perceptions on the future of the operations and future public policy options for facilitating integration of the operations. The research findings are analysed qualitatively through explanation description of findings and quantitatively using SPSS for graphic presentation of the findings. In this chapter, bicycle taxi and Sacramento are interchangeably.

5.2 Sacramento operator's characteristics.

A total of 25 Sacramento operators were interviewed. These respondents vary in terms of age, weekly income, ownership of bicycles they use for daily operations, and period spent as Sacramento operators. The bicycle taxi operations in Mzuzu city are male dominated as l00% of the respondents to the survey were males. Even the researcher's personal experience of the operators is that no women are seen operating bicycle taxis. This is because the operations require a lot of human energy, hence labour intensive

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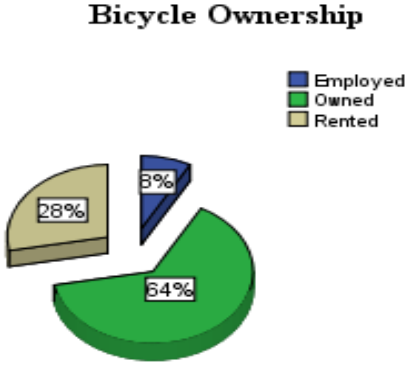
In terms of age categories, the survey reveals that most of the respondent operators (52%) fall within the 25-30 age category, 20% of the operators fall within the 20-25 age category, both 30-35 age category and 35or more category represents 12% each, of the operators. While 4% fall within the 15-20 age category. This shows the domination of the 25-30 age categories, presumably because they are energetic. Amongst the respondents interviewed, the eldest respondent was 39 years old and the youngest was 19 years old. The majority of the Sacramento operators 18 (72 %) have been doing the business for a period of 2-5years while the remaining 7 who represent 28% have been in this business for a period of 1year or less. Apart from operating Sacramento's, some of the operators have other jobs and businesses. These include running small-scale retail shops, working as garden boy on part time basis, working as security guard, and others indicated they also work as builders. While some do not have extra employment apart from operating Sacramento.

Chart 5. 1 Bicycle Ownership



The study reveals three types of bicycle ownership. Either the operators own the Sacramentos, Rent, or employed. 64% of the respondent operators own the bicycle they use as a taxi (Sacramento). Either they purchased the bicycle from savings of previous jobs or business, others indicate they were given by their relatives. 28% of the respondent operators rent the bicycles, this is the situation where by the Sacramento owner agrees with the operator on a daily or monthly fee the operator is supposed to pay the owner for using the bicycle. The remaining 8% of the operator respondents clearly indicated that they are employed. This is the situation where by the bicycle

owner employs the operator and pays him a monthly or weekly salary/wage.

In terms of income, a majority of operators (68%) earn between 1,000 - 3,000 Malawi Kwacha (an equivalent of 4.5 - 13.7 Euros per week). While the remaining 32 % of the operators earn between 3,000 – 6,000 Malawi Kwacha which (an equivalent of 13.7 – 27.4 Euros per week). This imply that the 68% of the operators earn a maximum income of 12,000 Kwacha, while 32% earn maximum income of 24,000kwacha per month. These earnings differ from one operator to the other depending on the number of clients one is able to serve.

Considering the level of education of the bicycle taxi operators, 17 respondents (68%) only attempted primary education and did not proceed to secondary level. 5 respondents (20%) reached the junior level of secondary education while three 3 respondent representing 12% reached the higher level of secondary education. The survey also sought to find out the operator marital status. 18 respondents (72%) are married and they live with their families of about 3 to 6 members who they support with income from their operations, while 7 respondents, (28%) are not married.

Table 5. 1 Education level of Sacramento operators interviewed.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Junior level	5	20.0	20.0	20.0
	MSCE	3	12.0	12.0	32.0
	Primary level	17	68.0	68.0	100.0
	Total	25	100.0	100.0	

Source: fieldwork 2011

Most of the Scacramento operators live in the informal settlements of Masasa, Ching'ambo, Mchengautuwa and Gesha. These are areas which are basically, traditional and informal in nature. This is where a majority of low income earners in Mzuzu city live. As described in the earlier chapter, traditional housing areas are those locations whose houses are constructed of traditional materials like grass for roofing, mud and wattle walls. While other houses are constructed with permanent materials like burnt bricks, iron sheets for roofing and concrete floor. Other houses are constructed of both materials. A typical example of low income and traditional settlement is depicted in the picture below. Most of these operators indicated that they migrated from the villages and districts surrounding Mzuzu city with the aim of trying their luck in terms of employment and business opportunities.

Picture 5.1 A typical example of traditional housing area in Mzuzu city

Source: Mzuzu urban profile

The box below gives a summarised individual case for one of the Sacramento operators in Mzuzu city.

Box 5. 1 The case of Moses Chanza

Moses is a 27 year old man who works as a bicycle taxi (Sacramento) operator in Mzuzu city operating from katoto rank. Moses grew up in the remote areas of Mzimba, one of the districts in northern Malawi where Mzuzu City located. He did not proceed with his education since his parents were too poor to support him and the entire family. In 2007, at the age of 23, he decided to go to Mzuzu city to stay with his uncle where after some time he landed himself a job as a security guard in one of security companies. Two years ago, he decided to supplement his earnings by operating a bicycle taxi (Sacramento). He uses a bicycle he bought from money he gets as a security guard. Moses is married and has two children, all of whom depends on his two jobs (as security guard and bicycle taxi operator). Moses says on average he earns about 800 Malawi kwacha, per day which translates to 5,600 kwacha per week (an equivalent of approximately 3.5 Euros per day and 21.3 Euros per week), that is when there is good business. Moses says the bicycle taxi assist him in paying house rent, buy food, and other necessities for his family. As part of the challenges to his business, Moses bemoans the tendency of other bicycle taxi users who usually negotiate for too low prices. This affects his business. He also does not like the treatment he gets from city authorities particularly the traffic police who usually bar the Sacramento operators from operating in city centre street. These are streets they consider being more profitable since they find more customers. He therefore says it is his wish that the government should recognise the operators to conduct their operations freely in the city. He feels that Sacramentos help people, particularly the low-income earners, with their transport needs. Moses says he is willing to abide to any regulations, which the government may introduce for smooth running of bicycle taxi operations.

Source: fieldwork July 2011 (recorded interview)

5.3 Organisation of bicycle operations

5.3.1 Availability of user association

While conducting the survey among the bicycle taxi operations in Mzuzu city, it was revealed that there seem to be no proper organisation (in form of associations) by the operators to oversee their operations. Almost all of the interviewed operators when asked about the availability of bicycle taxi associations they responded no, meaning there are no bicycle associations. However, an in-depth telephone interview with the Regional Road Safety Manager revealed that there are two associations. The Northern Region Bicycle Taxi Association, and MMC Njinga taxi services, a privately run association in which members are requested to an affiliation/membership fee of about 2 Euros per month. Other information obtained from an academician from Mzuzu University who is also in research field reveals the availability of an association, but with leadership problems.

These associations according to the manager are responsible for the social welfare of the bicycle taxi operators, organise training sessions with the National Road Safety Council of Malawi (NRSCM) to drill the bicycle taxi operators belonging to their associations on general road safety tips and the highway code.

However, despite the availability of the association, most of the operators informally organise themselves into ranks (places where they pick and drop clients) where they operate from. These are open spaces, which the operators informally identify as best places from where to pick clients. Due to lack of legally constituted associations and regulations, some of the bicycle taxi operators are seen cycling around the city with the hope of finding customers on their way.

Picture 5.2 Bicycle taxi operators waiting for clients at Katoto rank near the health centre

Source: field work July 2011

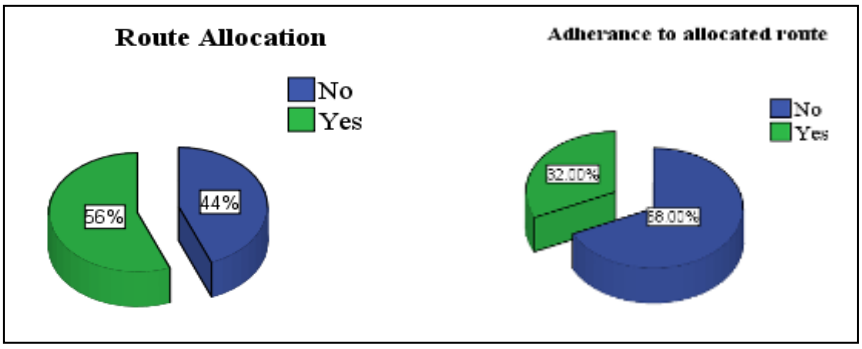
5.3.2 Road user rules and regulations

The survey also aimed at finding out if the operators are aware of rules and regulations guiding their operations as road users. 17 respondents, representing 68% are aware of the guiding rules and regulations, while 8 respondents, representing 32% are not aware of any guiding rules and regulations as bicycle operators. For those who responded yes to the question, they cited examples such as; using the hand signals whenever they want to make a turn; cycling on the far end of the road; wearing reflecting material when cycling at night, not to over speed, to pick and drop passengers from designated places (ranks). Most of the rules and regulations cited are the ones that are provided in the highway code handbook, which guide all road users and cyclist not only Sacramento operators.

On government official's side, the three that responded to the questionnaires said yes, there are regulations, which guide the bicycle taxi (Sacramento) operators. However it is not clear if these are the general road user rules and regulations or special rules for bicycle taxi operators.

5.3.3 Route allocation

Chart 5. 2 & 5.3 Route allocation and adherence to allocated routes



Source: fieldwork 2011

14 respondents representing 56% indicate that they have specific routes which they operate from, while 11respondents representing 44% said they do not have specific routes to operate from. However, despite some respondents indicating that they operate from specific routes, 17 respondents representing 68% say they do not adhere to the routes they are supposed to operate from. While 8 respondents representing 32% say they do adhere to the routes they are supposed to operate from. The Sacramento operators are mainly allowed to freely operate in routes that connect residential areas where traffic is much less than in the city centre. This is a rule from the city authorities and the police, hence their restriction from city centre.

5.3.4 Advantages and challenges of Sacramentos from operator perspective

The study sought to find out the advantages of the bicycle taxis to the operators, and the challenges they face during their operations. In terms of advantages, almost all respondent operators are of similar view. They say bicycle taxi operations are advantageous because; they are a source of their livelihood. They indicate that is where they get income which assists them and their families with their basic necessities. They also say bicycle taxi operations assist in

reducing the unemployment in the city, which also leads to subsequent reduction of incidences of theft as most young men are involved in Sacramento business.

There are also a number of challenges which these bicycle taxi operators face in their daily business. These include;

1. Most of the times the operators are denied access to operate in the city street and particularly the city centre where they also feel are the most lucrative area where they may access more money than other areas. This also leads the authorities to confiscate the bicycles when operators are found in the city. Most of the operators indicated they are not satisfied with the treatment they get from the authorities as it is a clear violation of their business right. This was indicated as their main challenge.

2. Due to unlimited and uncontrolled entry into the bicycle taxi operations, they say there is tough competition among the bicycle taxi operators themselves.

3. Due to market responsiveness in terms of fares, sometimes the users take advantage of the stiff competition, by negotiating for lower fares, this affects the operators as they have to meet costly maintenance when faced by breakdowns.

4. Sometimes users completely shun paying for the fare or they pay a little amount when they reach their destination.

5. Some users disguise themselves as genuine clients/passengers when they have intention of stealing the bicycle on the way especially at night.

6. Due to lack of bicycle infrastructure, road sharing with other users becomes problematic hence the operators are forced to cycle on the road edge and most of the times within the carriage way which is dangerous and causes traffic congestion.

7. Sometimes the motorized taxi operators do not respect Sacramento operators and regard them as competitors, hence conflict ensues among these two groups of operators.

The researcher also wanted to find out from the bicycle taxi operators if they have any knowledge for the reasons why they are restricted access to the city streets as part of their challenges. 22 operator respondent, (88%) said they know reasons why they are chased by the traffic police from the city street. They cited reasons such as; ignorance of road rules and regulations hence prone to accidents or can easily cause accidents, they contribute to the un cleanliness in the city and, they contribute to traffic congestion. While 3 operators, (12%) said they do not know why they are chased from the streets in the city.

Pictures 5.6 & 5.7 Roads with no bicycle infrastructure make the operations difficult.

Source: fieldwork July 2011

5.4 User characteristics

In order to get information from the users, the questionnaire was administered to 25 Sacramento users. 10 respondents were females, (40%) and 15 respondents were males,(60% of the total respondents). The respondents, both male and female are in the 25-30 age category, (28%) seconded by 6 respondents in the 20-25 age category (24%) of all respondents. The rest of the respondents were in the 15-20, 30-35, and 35years and above (16%). The survey also revealed that almost all of the bicycle taxi users interviewed live in the informal settlements and traditional housing areas of Mchengautuwa, Masasa, chiputula, chibavi, and zolozolo. The users interviewed indicated they do business at the market, work in shops, and some in government and private offices. As stated earlier in chapter four, these settlements/housing locations are areas, which are habited mostly by low-income earners.

5.5 Advantages and challenges of Sacramento's from user perspective.

In order to assess the sustainability of bicycle taxi operations in the City, the Sacramento users were questioned on the advantages and challenges in terms of; accessibility, reliability, affordability, comfortability and safety of Sacramento services.

Table 5. 2 sustainability of bicycle taxis in Mzuzu city

Response / Sustainability component	**Yes**		**No**		**Total**	
	Frequency	Percent	Frequency	Percent	N	%
Accessibility	20	80.0	5	20.0	25	100
Comfortability	8	32.0	17	68.0	25	100
Affordability	19	76.0	6	24.0	25	100
Safety	2	8.0	23	92.0	25	100

Source: fieldwork July 2011

In terms of accessibility, the study reveals that bicycle taxi services are very accessible to most users, 20 (80%) of the respondent users said they can easily access the Sacramento services, this is due to the fact that they do not need to travel a long distance from their homes or in the city to find a Sacramento operator. Whereas 5 user respondents (20%) say the bicycle taxis are not easily accessible. The bicycle taxi users were also asked if they feel comfortable when using the service. 17 respondents (68%) say they don't feel comfortable travelling on the bicycle taxi. Reasons given by most respondents who said no to the question of comfortability include; during harsh weather (rainy or windy) the Sacramento becomes uncomfortable and, sitting at the back for long distance is another cause for discomfort. While 8 respondents (32%) say they have no problems and feel comfortable travelling on the bicycle taxi.

The Sacramento users were also asked if they find the use of the transport means affordable. Most of the users are of the view that the bicycle taxis are affordable since they are reasonably cheap compared to mini buses and shared taxis . 19 respondents, (76%) said the bicycle taxis

are affordable while 6 respondents, (24%) said the bicycle taxis are not affordable. Most people who said the Sacramento is cheap made a comparison with other means of transport like mini buses and shared taxis which cost more compared to Sacramentos. For instance the cost of traveling from Mchengautuwa location which is at a distance of about 5km by a minibus or shared taxi is 100 kwacha, while the same distance on a Sacramento cost 50 kwacha.

Table 5. 3 reliability of Sacramento

	Not reliable		**At least reliable**		**Very reliable**		**Total**	
	Frequency	Percent	Frequency	Percent	Frequency	percent	N	%
Reliability	6	24.0	13	52.0	6	24.0	25	100

Source: field work July 2011

As for reliability of the bicycle taxis, respondents were asked to choose between not reliable, at least reliable, and very reliable. 6 (24%) of the respondents said the service is not reliable and the other 6 (24%) said the service is very reliable. The rest, 13 (52%) of the respondents said the service is at least reliable. The most common reason given is that the users believe that whenever they hire a Sacramento, they are sure it will take them to the destinations they want to go without hustles. These sentiments were shared by many who responded very reliable and at least reliable.

Users of bicycle taxis were also asked their experience with the transport means in terms of safety, as part of user challenges. Most of the respondents to the survey are of the view that Sacramento's are not safe. 23 respondents (92%) say it is not safe to travel by Sacramento, while 2 (8%) respondents say it is safe. Safety dissatisfaction by most users is as a result of the way the operators conduct themselves on the road. They reported that most of the times these operators do not follow the road rules and regulations like, cycling on the wrong side of the road, jumping traffic lights and turning without indicating direction, all these make the users feel unsafe. Some respondents reported that due to the undulating topography of some parts of the city, most of the areas are not easily accessed due to the steepness of land which forces the operators to avoid such areas as they prove not to be safe. Such safety concerns deny the users the privilege of accessing some areas.

Box 2. 3 Sentiments of one observer on the safety of bicycle taxis in Mzuzu city

Dear Editor,

I am not happy with the way bicycle operators conduct themselves on the roads in Mzuzu. These bicycle operators are popularly known as "wasakramento". It is clear that they have very little knowledge of the Highway Code and most accidents that occur in Mzuzu involve them.

I appeal to the Road Traffic to look into this issue urgently. I also recommend that every bicycle operator should be given an official document by the Road Traffic to authorize them to operate on the road. Otherwise, innocent people will continue to lose their lives because of ignorance of these bicycle operators.

Tony Mfune, Mzuzu.

Source:http://www.nationmw.net/index.php?option=com_content&view=article&id=10029:on-mzuzu-bicycle-operators&catid=25:letters&Itemid=17

The contribution of transport to city *mobility* is the other indicator which was used to find out how sustainable the operations are. The survey then reveals that bicycle taxis in Mzuzu city play a vital and important role in terms of mobility. The following are some of the remarks that user respondents made when asked how the bicycle taxis contribute to mobility of people and goods in the city;

1. The respondents say bicycle taxis go to places where cars may not reach, as they are able to pass through paths which are narrow.

2. People, goods and merchandise are ferried to the required destinations at reasonable period of time. This is also alluded to by the fact that clients are not delayed in waiting for more passengers as the case may be with other motorized transport.

3. The respondents also say bicycle taxis offer door to door services in locations not easily reached by cars, particularly to low income earners.

4. Economically bicycle taxis are reasonably cheap in transporting goods as follow more direct routes as compared to other means.

5. Respondents also say bicycle taxis play a crucial role in transporting patients to the hospital and children to school.

Pictures 5. 3, 5.4 &5.5 Pictures of Sacramento offering much needed transport.

Source: fieldwork July 2011

The researcher also wanted to seek the views of bicycle taxi users on the impact to their life in the event that bicycle taxis would stop operating. The findings revealed that 13 respondents (48%) say if bicycle taxis stop operating it may have a negative effect on their life since they mostly depend on it for their daily mobility. While the other 12 respondents (48%) say even if the bicycle taxis stop operating that would not have any effect on their lives.

5.6 Other road users responses

In order to have non biased view of the bicycle taxis, other road users who in this case comprised motorists and pedestrians were also interviewed to give their opinion regarding bicycle taxis. In total, 25 respondents were interviewed. 11 respondents (44%) were motorists and 14 respondents (56%) were pedestrians.

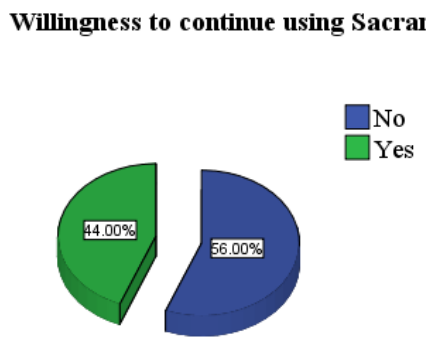
The respondents were mainly asked if they are satisfied with the way bicycle taxi operators conduct themselves on the road. In response, 21 respondents (84%) say they are not satisfied with bicycle taxi operators on the roads. Reasons given for their dissatisfaction include; most of the times operators over speed with the aim of arriving at the clients destination as fast as possible so that they may have chance of having another client, operators do not follow road regulations, bicycle taxi operators cycle carelessly by not sharing the road space with other road users which also leads to traffic congestion, and others use bicycle which are not roadworthy, while others do cycle when they are drunk. While 4 respondents (16%) say they are satisfied with bicycle taxi operator's conduct on the road. However, reasons given for their satisfaction are contrary to the objective of the question (about operators conduct).

5.7 Opinions on future perceptions of bicycle operations

This part of the survey sought the views of the bicycle taxi operators, users, other road users, and the city authorities on the future of the operations. This was concerning the willingness to continue using the bicycle taxi in the event that all other means of transport are available, their perception on demand and continued operations, of bicycle taxis.

Bicycle taxi users were asked if they are willing to continue using the bicycle taxis even if all other means of public transport were in place in the city. 14 respondents, (56%) said they were not willing to continue using the bicycle taxis and would prefer other means rather than Sacramentos, since they are risky and prone to accidents. While 11 respondents, (44%) said they are willing to continue using the bicycle taxis. They said the bicycle taxis would remain cheap compared to other means of transport hence the continued patronisation despite the safety risk. The other reasons for willingness to continue using the bicycle taxi are those cited earlier like, the ability of the bicycle taxis to ferry people from a doorstep to areas where other means may not reach, despite the fact that it may not be as fast as compared to other means.

Chart 5. 3 Willingness to continue using Sacramento

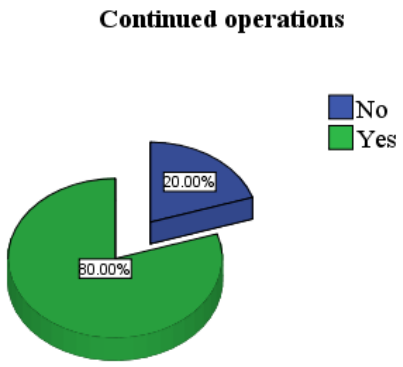


Source: fieldwork July 2011

The users were also asked for their opinion on whether the bicycle taxis must continue operating or not. Most respondents, 20 (80%) said it was necessary for the operations to continue as they are a source of earning a living for the operators, and a source of mobility for the urban poor. While 5 respondents (20%) said the operations should not continue. Citing safety as the main reason for the operations not to proceed.

Most of the operators are of the view that the operations must continue. Many of them indicate they have various aspirations and needs in order to improve their living standards. They cited things like owning a house, obtaining a drivers license (motor vehicle) so that they may one day be employed as a driver, employing others to assist in operating Sacramentos. All this can be achieved only if they continue operating and are able to save enough.

Chart 5. 4 Perceptions on continued operations



Source: fieldwork July 2011

When asked about their views on the future demand for the service (operations), most of the users and operators were of the view that there will be an increase in demand for the service. They cited reasons such as; an increase in city population which is mainly comprised of low income earners, an increase in the price of fuel which would subsequently lead to increased fares of motorised transport and the level of poverty in the city. Government officials

interviewed said it was necessary that the bicycle taxi operations should continue, however, there is need to support the operations. They cited reasons given in chapter 4.8 as the basis for the Sacramento to continue operating.

However, most users expressed satisfaction with the way the bicycle taxi operators treat their clients. They say some operators have good customer care skills and friendly to their clients. There are however a few operators with ill motives who are not trustworthy, particularly when it comes to delivery of goods to various destinations and during odd hours like at night.

5.8 Policy options and support mechanism to facilitate Sacramento formalisation.

Various questions were asked to bicycle taxi operators if they would welcome some support mechanism if they are to be introduced by government or city council. This included such things as identity cards, bicycle registration, operator uniforms, and infrastructure like bicycle lanes, and if they would be willing to pay for the services apart from infrastructure.

On the introduction of identity cards and bicycle taxi registration, all 25 respondents, (100%) says they would welcome the initiative. While on the introduction of operator uniform and bicycle lanes, 23 respondents (92%) said would welcome the initiative. while only 2, (8%) said they would not welcome the initiative and no reasons were given for their choice. However, on the question of willingness to pay or support the initiatives, all the 25 respondents, (100%) said they would be willing to pay for, or support the introduction of the support mechanism.

When government officials from two government departments and city council were asked what they think are the requirements to have bicycle taxi operations formally accepted and integrated as a means of urban transport from the bicycle operators side, government side and users side, the following were the responses.

A. Bicycle taxi operators side:

1. Formation of a working association with a legally binding constitution to guide their operations.
2. All operators must belong or subscribe to the association for easy identification.
3. Every operator must have thorough knowledge of the Highway Code through training with the National road safety council and traffic police.
4. All bicycles must be roadworthy. And
5. Adherence to stipulated legislation and regulations for their safety and those of passengers.

B. Government side:

1. Introduction of the required facilities for cyclists on the road like, bicycle tracks, bicycle ranks, and proper signage to guide bicycle taxi operators.
2. Ensuring the availability of the Highway Code booklets and easy access.

3. Supporting the National Road Safety Council of Malawi, and the Traffic police department with more resources to offer training to bicycle taxi operators.

C. Users side:

1. Passengers must have the responsibility to check the level of road safety knowledge in the operator as well as fitness and roadworthiness of the bicycle.
2. Passengers must assess the volume of traffic and decide how safe it is for them to hire a bicycle taxi.
3. Passengers must lobby to government to support their service providers (bicycle taxi operators) by improving road infrastructure.

5.9 Implications of formalising bicycle taxis

The city authorities and other government departments were asked what would be the possible consequences, both positive and negative if bicycle taxis would be formalised. On the positive side they reported that if the operations would be formalised, they would lead to; creation of an environmentally friendly city, continued provision of affordable public transport. Formalisation may also improve revenue base for the city council, as they will be able to collect revenue from the operators.

On the negative side the city authorities and government are of the view that formalisation may lead to the worsening of the cold war currently existing between the bicycle taxi operators and motorised taxi operators, since they will continue scrambling for customers. They also hinted to say that if the cost of formalisation i.e. issuance of licenses, permits etc would be high, this may hinder some of the operators from registering their operations with the authorities, hence opting to continue operating illegally.

Chapter 6. Conclusions and Recommendations

6.1 Introduction

The main purpose of this study was to investigate the contributions of bicycle taxi (Sacramento) operations to sustainable transport in Mzuzu city, Malawi and explore what needs to be done in order for the operations to be formalised, as a means of urban transport. This chapter is divided into three parts. The first part provides answers to the research questions and highlights on the major findings of the study. In the second part, the findings are placed in the light of existing knowledge of literature as analysed in chapter 2. Finally, the last part a number of recommendations are proposed regarding the formalisation of bicycle taxis, and recommendations for further research.

6.2 Answering Research Questions

The research was built around four research questions, as presented in the first chapter. The answers to these research questions will be presented below.

6.2.1 What are the characteristics of bicycle operators and current organisational setup of the operations?

The findings reveal that the bicycle taxi operations are male dominated, mainly conducted by married men, the majority of whom are in the age group of 25 to 30 years. This is a relatively young age. Most of these operators are married with an average family size of 3 to 6 members, which depends on their low income, which range from 1,000 to 6,000 MK per week from the bicycle taxi operations. The majority of these operators did not finish their primary education, hence characterising the operations as being conducted by least educated group of people in the city. Most of these operators migrated from surrounding rural areas to the city with the aim finding jobs and business opportunities. The findings also reveal that most of the operators have been involved in the bicycle taxi operations for a period of two to five years. The majority of these operators live in low-income housing areas mainly habited by the urban poor.

The research findings indicate that there is no legally binding Association (s) despite efforts by government to assist in the formulation of the bicycle taxi association through the National Road Safety Council of Malawi. It is also clear that there are no specific rules and regulations guiding the bicycle taxi operations. Operators choose to informally organise themselves in specific areas referred to as ranks, and routes. However, most do not adhere to specific routes. Some operators area seen cycling around the city roads in search for customers. The government departments interviewed have different views as regards the availability of operator guiding rules and regulations. The city council indicates there are no regulations guiding the operator, while the national road safety council and the road traffic directorate department are of the view that bicycle taxi operators are supposed to be guided by the general road user rules and regulations.

6.2.2 Do bicycle taxi operations contribute to sustainable urban transport in Mzuzu City? And what are the major advantages and challenges?

Bicycle taxi operations in Mzuzu city contribute to sustainable urban transport in various ways. According to user respondents, economically bicycle taxis are affordable in terms of fares, if a comparison of fares between motorized and non-motorised is done for instance a distance costing 100 Kwacha on a motorised taxi may cost 50 Kwacha on a bicycle taxi. This is reasonably cheap such that most people in the city can manage to pay for the service. Bicycle taxis are also reliable and offer the much-needed mobility within the city to both people and goods as they offer door-to-door service. They are easily accessible and contribute to the productivity and economic development of the city through transportation of people to various work and business premises.

Socially, bicycle taxis contributes in the social development by promoting liveability, social cohesion and equity of the residents of Mzuzu city, they do not segregate between social and economic class of people since they provide service to all groups despite the lower income group benefiting a lot.

Environmentally, since bicycle taxis do not use fossil fuels as a result they do not contribute to green house gas emissions, which contribute to the pollution of the atmosphere. They do not contribute to noise and water pollution. Bicycle taxis do not contribute to habitat and ecological degradation.

Owing to above reasons, bicycle taxis can be considered to contribute to the sustainability of the transport system in Mzuzu city. However, some challenges were also identified. These include; lack of safety as most of the user respondents, other road users, and government officials considered Sacramentos as not being safe due to operators conduct (e.g. speeding, disregard of rules and regulations) on the road. The other challenge from user perspective is that a majority do not find the Sacramentos comfortable. This is due to its sitting arrangement, which they find not comfortable, and exposure to harsh conditions like heavy rains, since the taxis do not provide any protection.

6.2.3 How do different stakeholders conceive the future of bicycle taxi operations in Mzuzu City?

Research findings on the future perceptions of various stakeholders regarding the bicycle taxi operations are similar. In terms of terms of willingness to continue using the bicycle taxis, most of the users indicate they would prefer using another more comfortable means of transport than Sacramento due to its perceived lack of safety and comfort.

Both operators and users are of the view that bicycle taxi operations will continue to have high demand in future due to the increasing population of the city. Most of these are low in-come earners who may not be able to afford other means of transport. In addition, increasing demand is alluded to the increase in fares of other motorised transport due to worsening economic situation leading to the increase of motor vehicle fuels, which forces motor taxis to raise their fares, hence making people to still opt for bicycle taxis.

All stakeholders are of the opinion bicycle taxi operations should continue as they are considered essential. They are of the view that bicycle taxis help poor people with the much-needed mobility within the city. They are a source of employment to many urban inhabitants and hence assist in poverty alleviation. The city authorities are of the view that if encouraged, bicycle taxis would contribute to greening of Mzuzu city, due to their zero-emission (GHG's) and environmental friendliness.

6.2.4 What are the policy options and support mechanisms required to facilitate bicycle taxi operations in Mzuzu city?

The research findings reveal a number of policy options and support mechanisms, to be adopted in order to facilitate formalisation of bicycle taxis in Mzuzu city. According to responses given by all stakeholders, there are a number of things which can considered in terms of policy. Government officials are of the view that there is need to formulate city legislations in form of by-laws to guide bicycle taxi operations in the short term. However, there is need for transport policy review to recognise non-motorized transport as a means of public transport. There is need to provide infrastructure in terms of bicycle tracks and parking areas, registration and licensing of bicycle operators, formation of working operator associations. while bicycle taxi operators, users and other road users are of the view that; introduction of operator identity cards or uniforms, training of the operators on rules and regulations, and civic educating the users are some of the necessary mechanisms which can assist in the facilitating bicycle taxis in Mzuzu city.

In conclusion, the research looked at contributions of bicycle taxis to sustainable urban transport in Mzuzu city. It also looked at whether and how bicycle taxis bicycle taxi operations should be formalised. The findings have revealed that bicycle taxis are making a considerable contribution to sustainable urban transport. Economically, bicycle taxis are cheap and affordable to most users and are contributing to economic wellbeing of operators, socially they promote equity and social cohesion among the users, and environmentally they do not contribute to the pollution of natural resources e.g. air, land, and water. Despite the fact that some people consider Sacramento as not safe, comfortable and recommending that the operations should not continue. The majority of the respondents are in favour and support of the operations and wish the operations should continue.

However, in terms of formalisation, the bicycle taxi operators are of the view that their operations need to be recognised. While the government departments are for regulation of the bicycle operations. Therefore, there is need for a consensus towards regulation between the two stakeholders, this would ensure smooth running and full protection of the operations. The operators must however be properly organised if the formalisation of their operations is to materialise. Regulation and support is the only way in which the bicycle taxis can be formalised.

6.3 Reflections on Literature

In chapter two, a review of literature on sustainable urban transport and various aspects of paratransit services was conducted. This review resulted in the development of a conceptual framework and indicator matrix, which formed the basis for this study. The purpose of this part of the chapter is to consider in what way the thesis fits to and adds to the current literature related to informal sector sustainable urban/public transport.

The sustainability concept prompted the researcher to look at an urban phenomenon like Sacramentos not only from a transport perspective, but also it also guided him to; a social perspective of equity, mobility, safety; economic and environmental perspectives.

The Council of EU 2001 recognises sustainable transport as the system of transport which are considered sustainable from social, economic, and environmental perspective. This is equally the same with the analysed data, which has revealed that bicycle taxis as a means of public transport are socially sustainable, as they promote mobility and equity among the poor, economically viable, as they are cheap in terms of fares, and are environmentally friendly, as they do not contribute to the pollution of land and air. However, despite the fact that the transport system is considered sustainable and contributes much to climate change reduction, little has been done to support the sector. Relatively little research regarding the sector has been done particularly in developing countries where such operations are an order of the day. The research himself found difficulties in getting appropriate literature sources to form the basis for this research.

Literature also reveals that, a more sustainable transport system should stimulate the economy, reduce energy and carbon footprint, increase safety, provide equal access to destinations for all groups of society, and increase the overall quality of life (Buehler, Pucher & & Kunerrt 2009). As much as the research findings are in conformity with sentiments by Buehler et al in the sense that bicycle taxis do not require high energy consumption like other motorized vehicles. The findings differ with the aspect of increasing safety as in the case of Mzuzu city, the bicycle taxi are regarded as the most unsafe means of transport, this is where 92% of user respondents to the survey view bicycle Taxi operations as not being safe, this is largely due to operators unsafe cycling behaviours .

Technically, informal or paratransit transport operates without official endorsement, meaning vehicles and operators do not have appropriate licenses, permits, or registration papers from public authorities. It also goes further to say that, most of the operators are lowly skilled young men, who migrate from the rural areas to cities, as put by Cervero and Golub (2007). The research findings also reveal that bicycle taxi operations in Mzuzu are not officially endorsed, as such, they are not licensed, the operators do not have permits and are not registered. Hence they qualify as informal or paratransit services. On the other hand, as much as the research findings show that most of the bicycle taxi operators include young men from rural areas, there is clear evidence that not all are lowly skilled. However, some have a certain level of education and poses some skills. They are involved in bicycle taxi operations due to lack of employment opportunities.

With regard to ownership of paratransit vehicles like bicycles taxis, literature reveals some local mafia type of ownership where by a person owns a fleet of bicycles and rent them out to operators. This type of ownership is mainly practiced in Indian cities like Delhi with large economies of scale. Such kind of arrangement has not been identified in Mzuzu city. However, the tendency of hiring out bicycles to operators may lead to such kind of local mafia groups.

Tolley (1990) describes a bicycle as cheap to buy, run and as the quickest mode for door-to-door transport in urban areas. Equally, the research findings reveal that most of the residents of Mzuzu city, who were interviewed, prefer using bicycle taxis, as they are able to travel from their doorstep direct to destinations of their choice or vice versa, and that they regard the bicycle taxi as the quickest mode to access.

A survey conducted in five different cities across the world this is in Accra, Delhi, Guangzhou, leon, and Lima, in 1995 revealed that most of the bicycle users in these cities preferred to use bicycles than bus primarily because it was less expensive, but the majority also found it more flexible in routing, faster, and more reliable (Gwilliam 2002). The research findings also indicate that most of the respondents find the bicycle taxis reliable compared to other means, hence we see to a certain extent the continued use of the bicycle taxis. Gaffron (2001) observed that cyclists in most cities are generally required to share space on the carriageway with fast moving, relatively heavy, powerful, motorised vehicles, further more it is often the carriageway margins, which suffer most from poor maintenance, thus making cycling additionally unpleasant and dangerous. The observation was also made on data analysis that some respondents, particularly from government institutions that, bicycle taxi operators share the same narrow roads in Mzuzu city with other road users (motor vehicles) hence exposing them to accidents.

An observation is made that transport infrastructure provision is one of the most important prerequisite if the paratransit services, especially non-motorised transport like bicycle is to be formalised. Usually, low priority given to urban transport, combined with limited funds results in low level of investment in the developing world with regard to public transport and infrastructure, hence, whenever governments invest in transport infrastructure, it is often car based. The research findings also reveal that in Mzuzu city, all road/transport infrastructure is car based and poorly developed, as there are not bicycle tracks. The absence of such kind of infrastructure is in many cases the leading cause of the dangers of using bicycle transport as the operators are forced to use the same roads with fast moving motorized traffic. Research results further shows that formalisation of bicycle taxis can effectively be implemented only if infrastructure is improved or provided.

Cervero (2000) identified a spectrum of government's intervention on the informal paratransits. This spectrum range from inaction to banishment, with four main actions, which include acceptance, recognition, regulation, and prohibition. In this spectrum Cervero recommends that governments and organisations should promote policies that aim at recognising and regulating the paratransit services rather than the extreme ends of acceptance and prohibition. However, the research findings reveal contradicting positions by the city authorities. The two government departments indicate that the bicycle taxi operations are regulated, meaning that entry into market is strictly controlled by regulations that is not the case on the ground. While the city council is of the view that market force influences the operations, hence unlimited entry into bicycle taxi operations. Another observation is that, in Mzuzu city the authorities' particularly

police bar the operators from plying their business within the city streets. This represents an outright ban of the operations, which is prohibition according to Cervero's spectrum. In this regard, since the operators are allowed to freely ply their operations in routes leading to residences, hence being considered more lax in those areas, and restricted in the city centre, hence applying double standards. It would be ideal to apply a more moderate position of regulation for all areas in order to have a balanced stand.

Overall, the research findings portray many similarities with non-motorized informal paratransit and sustainable transport characteristics as outlined in various literature sources. This leads to a conclusion that the bicycle taxi operations in Mzuzu city are a typical example of informal paratransit, as such they need the required attention from government.

Table 6.1 below is a matrix showing how bicycle taxi transport as a paratransit fits into sustainable urban transport, in comparison with the sustainable transport indicators outlined in chapter 2.

Table 6. 1 Matrix relating bicycle taxi operations to sustainable transport indicators

Economic	Bicycle taxi	Social	Bicycle taxi	Environmental	Bicycle taxis
Accessibility quality	***Easily accessible*** ***Affords accessibility of work areas, business premises, schools and health facilities.***	**Equity / fairness**	***Employment opportunity*** ***Offers easy mobility to people of different social & economic classes.***	**Air pollution**	***Produces no green house gases.***
Traffic congestion	***Requires less road space*** ***Contributes to congestion if it remains unregulated.***	**Impacts on mobility disadvantaged**	***Improves mobility***	**Climate change**	***Contributes to mitigation of green house gases***
Infrastructure costs	***Low capital and operation costs***	**Affordability**	***Affordable as it is reasonably cheap.***	**Noise pollution**	***Noise pollution free***
Consumer costs	• ***Affordable*** • ***Productive time***	**Human health impacts**	***Does not negatively affect society's health.***	**Water pollution**	***Water pollution free***
Mobility barriers	***Provides cheap mobility for the urban poor.***	**Community cohesion**	***Promoted.***	**Hydrologic impact**	***None***
Accident damages	***Vulnerable to accidents***	**Community livability**	***Contributes to community livability through transport services to various areas***	**Habitat and ecological degradation**	***None***
DNRR	***Cycling dose not contribute to depletion of natural resources.***	**Aesthetics**	***Low status for high income earners***	**DNRR**	***Cycling dose not contribute to depletion of natural resources.***

Source: author (2011) based on sustainable transport indicators.

6.4 Recommendations

Following the review of literature and analysis of research results, which indicate that bicycle taxis in Mzuzu city are sustainable and will continue, the following recommendations are proposed regarding the formalisation of these bicycle taxi operations:

Governmental level

In Malawi not much has been done to sufficiently consider sustainable urban public transport at local level. This calls for consideration of all forms of transport (particularly non-motorised) to be incorporated as a means of urban public transport. In this regard city Authorities and other government departments should advocate for a review of transport policy at National level to incorporate the non motorised transport modes as a means of recognised public transport, this will provide basis for the city councils at local level to formulate byelaws regulating the operations in the long run.

Mzuzu city council in conjunction with other governments responsible for transport regulation should initiate the formulation of legally binding city byelaws, which should recognise a bicycle taxi as vehicle that can be operated within the city streets. The byelaws should be clear in terms and conditions that the operators must follow. For example, registration and certification of bicycles with the city Council. Before engaging into the operations, all operators must be trained on road safety rules and regulations upon completion to be given an operator license or identity card through which users may easily identify competent operators. It has to be made a policy that all registered and recognised bicycle taxis have to be distinguished from other bicycles through a registration number and distinct colour.

Since the city does not have infrastructure to support bicycles in general, and bicycle taxis in particular. It is of paramount importance that at city level, long term strategy or policy should be initiated that should advocate for the planning and development of bicycle infrastructure, and visible signage in all the streets of the city if all other recommendations cited above are to materialise.

Operator level.

There is need for all operators to organise themselves into working associations according to areas they operate from. These associations should be reporting to the main association which should be a mother body of all associations in the city. These associations must have a clear leadership ladder and must be guided by a constitution, and operator rules and regulations, which should be endorsed by all members. No operator must be allowed to operate bicycle taxi outside the membership of any association. This is going to instil discipline among the operators, as they would be answerable to those holding positions in the associations, in case of any indiscipline and in the event that they operate contrary to rules and regulations. The city council should oversee the operations of the associations.

User level.

Mzuzu city has to ensure that there is a deliberate policy, which should promote bicycle taxi users civic education. The policy should aim at instilling in users the responsibility of checking the level of road safety knowledge in the operators, fitness, and roadworthiness of the bicycle taxis.

Another important issue that needs to be highlighted as a policy matter is that an insurance policy for bicycle taxi operators has to be deliberately introduced for their safety and of those, they serve. This has to be considered as a prerequisite if bicycle taxi operations have to be conducted in the city.

Areas for further research.

This research has not been exhaustive and has not covered all aspects of sustainable urban and paratransit transport in general and non-motorized transport in particular. It is proposed that in future, focus has to be made on how best the provision of infrastructure for non-motorized transport can be done in developing cities like Mzuzu city.

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Annex 1.Questionnaire for Bicycle Taxi operators

Location of interview: _____

Operator characteristics

Sex Male. Female.

1. Which age group do you belong to?

☐15-20 ☐20-25 ☐25-30 ☐30-35 ☐35 and above

2. What is your education level?

☐ Did not attempt school ☐Primary ☐C. level ☐MSCE

3. Are you married? If yes how many are you in the family?
   ☐ Yes ☐ No
4. Which location do you live in Mzuzu city? Do you live with your family in the city?
   ☐ Yes ☐ No
5. Where did you live before you started this business?
6. Why did you decide to start the bicycle taxi business?
7. For how long have you been operating the bicycle taxi business?
   ☐ Less than 1year ☐ 2-5 years ☐ 6 – 10 years ☐ more than 10 years
8. Besides operating bicycle taxi, what other job do you do?
9. Approximately how much do you earn per week from your business?

   ☐ 1,000–3,000 Mk ☐ 3,000–6,000 Mk ☐ 6,000–9,000 Mk ☐ 9,000–12,000 Mk

10. Do you own this bicycle? If yes, how did get it? If no, what is the arrangement for its use?
    ☐ Yes ☐ No
11. Which category of people, income wise do you offer the service?
    ☐ Low income ☐ middle income ☐ high income ☐All the three

Current organisation of bicycle taxi system.

12. Are there bicycle taxi associations/organisations in the city?

    ☐ Yes ☐ No

13. If yes to question 10, how many associations/organisation are there?
14. Do you belong to any of the bicycle associations/organisation?

    ☐ Yes ☐ No

15. If yes, to question 12 what does it take to be a member of the association/organisation?
16. What is the role of the associations/organisation in bicycle taxi business?
17. What are the advantages of being a member of the association/organisation, if you belong to any?
18. Are there rules and regulations which guide you as bicycle taxi operators?

    ☐ Yes ☐ No

19. If yes to question 18 above, what kind of rules and regulations guide your operations? (give examples)
20. If yes to question 18, who ensures adherence to these rules and regulation?
    ☐ Association ☐ City council ☐ Police ☐ Other (specify)
21. Are you allocated a specific route to which you operate?

    ☐ Yes ☐ No

22. If yes, do you only operate along that route on daily basis?
    ☐ Yes ☐ No
23. Do you have regular customers who you pick at fixed timings? If yes what are the arrangements?

    ☐ Yes ☐ No

Advantages and challenges

24. What are benefits or advantages of the business to you personally and society/city as a whole?
25. What challenges do you face in your daily business?
26. Are you satisfied with the treatment you receive from government/city council in your daily operations?
    ☐ Yes ☐ No If No give more details below
27. Do you use a mobile phone in contacting your customers?

    ☐ Yes ☐ No
28. If yes, has this positively affected your business?
29. Sometimes the police and city officials chase you from the streets, do you have any idea why they do that?

    ☐ Yes ☐ No. If yes, give more details below.

    Does the association help in solving some of the challenges you face? If yes or no how?
    ☐ Yes ☐ No

Future Perceptions

30. Do think there is anything, which the government should do improve bicycle transport operations in Mzuzu city? If yes or No, explain

    ☐ Yes ☐ No
31. What do you think is the future of these operations?
32. If the government is to introduce the following support mechanism would you welcome them?

A.	Identity cards	Yes ☐	No	☐
B.	Bicycle registration	Yes ☐	No	☐
C.	Operator uniforms	Yes ☐	No	☐
D.	Bicycle lanes	Yes ☐	No	☐

33. Will you be willing to pay for their services?
    ☐ Yes ☐ No
34. Do you think bicycle taxi operations would create more employment opportunities if offically accepted?

    ☐ Yes ☐ No
35. In your opinion do you think there will be an increasing demand for bicycle taxi services in future? Why?

    ☐ Yes ☐ No
36. Do you think it is necessary for bicycle taxi operations to continue? If yes/no why?

    ☐ Yes ☐ No
37. What are your future aspirations regarding the bicycle taxi operations?
38. What other important information can you give regarding your bicycle taxi business?

Annex2: Questionnaire for Bicycle Taxi Users

Location of interview: _____

General information.

Sex ☐ Male ☐ Female

1. Which age group do you belong to?

   ☐ 15-20 ☐ 0-25 ☐25-30 ☐30-35 ☐35 and above

2. In which location do you stay in the city?

Advantages.

3. Is it easy for you to access the bicycle taxi operator when you want the service?

   ☐ Yes ☐ No

4. How far do walk from your house to access the bicycle taxi?

5. Do you regularly use a bicycle taxi? If Yes, how often, if No why?
6. Why do you like using a bicycle taxi (sacramento)?
7. Is it affordable for you to travel by bicycle taxi on regular basis?

   ☐ Yes ☐ No

8. How does the bicycle taxi service contribute mobility of people and goods in the city?
9. Do you think a bicycle taxi is better than other means of transport (walking mini bus or motorized taxis)?

   ☐ Yes ☐ No

10. Do you feel comfortable travelling by bicycle taxi?

    ☐ Yes ☐ No

11. How reliable is the bicycle taxi in the city?

    ☐ Not reliable ☐At least reliable ☐Very reliable

12. If all other means of urban transport were in place, will you still be willing to use bicycle taxi? If Yes, or No, why?

    ☐ Yes ☐ No

Challenges.

13. What do you think are the main challenges of the bicycle taxi here in Mzuzu city?
14. What is your experience as a user, on the treatment you get from the bicycle taxi operators?
15. Are you satisfied with the way bicycle taxi operators conduct themselves on the roads within the city? If Yes/ No why?

    ☐ Yes ☐ No

16. Do you feel safe when you are on a bicycle taxi? If yes or no specify why?

    ☐ Yes ☐ No

17. If bicycle taxis would stop operating, would that impact your daily life?

    ☐ Yes ☐ No

18. How do you think the safety of bicycle taxi operators and users and other road users can be improved in the city?

Future perceptions.

19. Do you think it is necessary for the bicycle taxi operations to continue? If yes or No? why?

    ☐ Yes ☐ No

20. How would you want the bicycle taxi operations be conducted in future?
21. Do you think there will be an increasing demand for bicycle taxi operations /service in future? If yes or no, why?

    ☐ Yes ☐ No

22. Do you think bicycle taxi operations would contribute to incidences of congestion if regulated/formalized?

    ☐ Yes ☐ No

23. What do you think the government/council can do to improve bicycle taxi operations in Mzuzu city?

Annex3: Questionnaire for other road users.

Type of road user. ☐Pedestrian. ☐ Motorist.

1. What is your opinion, on the bicycle taxi operators and their operations in Mzuzu city?
2. Are you satisfied with the way bicycle taxi operators conduct themselves on the roads of the city? If Yes or No, why?

   ☐ Yes ☐ No

3. Do you feel disturbed by their presence on the roads of the city? If yes in what way?

   ☐ Yes ☐ No

4. What do you think can be done by the bicycle taxi operators for their operations to be formally recognized and accepted by other road users in the city?
5. What do you think can be done by government/council to improve bicycle taxi operations, safety and to integrate them in urban transport in the city?
6. Do you have any other information which can be of importance regarding the improvement of bicycle taxi operations in the city?

Annex 4. Questionnaire for Government/City Council Officials

Name of Department :

Position in office :

1. What is the role of your office in transport provision and regulation?
2. Is there any coordination between your office and the bicycle taxi operators? If Yes what kind of coordination?

   ☐ Yes ☐ No

3. Are there regulations specifically guiding the operations of bicycle taxis in the City? If available please give examples.

   ☐ Yes ☐ No

4. How many operators do you think are there in mzuzu city?
5. What do you think are the major challenges of bicycle taxi operation in Mzuzu city?
6. In your opinion, what do you think are the benefits of bicycle taxi operations in the city?
7. Are you (as an office) satisfied with the way bicycle taxi operators conduct themselves on the roads of the city?

   ☐ Yes ☐ No

8. What is the frequency of bicycle taxi accidents in Mzuzu city? If there are supporting documents it will be appreciated to have them.
9. In most cases non-motorised transport are often considered an asset for more sustainable transport for city development. Do you agree with this in case of Mzuzu city? If yes/no why?

   ☐ Yes ☐ No

10. How does the Assembly/council benefit from the operations of bicycle taxis?
11. Do you feel that bicycle taxis (sacramento) requires to be formalized? If Yes / No why?

    ☐ Yes ☐ No

12. What would be the requirements to have the bicycle taxi service/ operations formally accepted and integrated as a means of urban transport? From

A. Bicycle taxi operators side.

B. Government side.

C. User's Side.

13. If the bicycle operations would be formalized/ regulated, what do you think would be the possible consequences? Both positive and negative.
14. Do you think introduction of bicycle licenses, fees and penalties would help improve the bicycle operations in the city? If yes or no how?

    ☐ Yes ☐ No

15. Sometimes bicycle taxi operators are restricted access to the City streets by removing them, what are the reasons for their restriction / removal?

16. Do you think the restriction of the bicycle taxi operators from the streets is the best option? If yes/no, why?

    ☐ Yes ☐ No

17. What is the stand of the Authorities, Mzuzu city council regarding the bicycle taxi operators on the scale below? Please circle one option.

    a. Acceptance, No action by government being taken to operators

    b. Recognition, the operations influenced by market place determining the level of supply

    c. Regulation, entry into the market is strictly controlled by regulations.

    d. Prohibition, an outright ban on the operators

18. Do you think bicycle infrastructure would play an important role in bicycle taxi operation? If yes are there plans to provide such infrastructure and what type?

    ☐ Yes ☐ No

19. What policy options would be required for the regulation and acceptance of bicycle taxi operations in the City?

20. Do you have any other information that can be of great importance in relation to bicycle taxi operations?

Annex 5. Detailed variables and indicators including interview questions.

Research Question	Variables	Indicators	Questions	Respondent group	Data source
R.Q1. What are the characteristics of bicycle operators and current organisational setup of the operations?	Socio-economic background of operators.	Age Education level Gender Income level and status	1. Would you mind telling me your age?	Bicycle taxi operators	In-depth interview with bicycle taxi operators
			2. What is your educational background?		
			3. Which location do you live in Mzuzu city?		
			4. Where did you live before you started this business?		
			5. Why did you start this business?		
			6. Do you own this bicycle? If yes, how did get it? If no, what is the arrangement for its use?		
			7. For how long have you been operating the bicycle taxi business?		
			8. Besides operating bicycle taxi, do you have another job? If yes/no why?		
	System of operation	Regulatory frame work availability.	9. What your position in office?	Government officials	Questionnaire In-depth interview with Local Authority official
			10. What is the role of your office in transport provision and regulation?		
			11. Are there regulations guiding the operations of bicycle taxis in the city?		
			12. Is there any coordination between your office and the bicycle taxi operators?		
		Operator Associations.	13. Are there any bicycle associations in Mzuzu city? if yes how many?	Bicycle taxi operators	In-depth interview with bicycle taxi operators
			14. Do you belong to any bicycle association?		
			15. If yes what does it take one to be a member?		
			16. What is the role of the bicycle association? If available.		
			17. What are the advantages of being a member of the association, If you belong to any?		
			18. Are there rules and regulations which guide your operations?		
			19. If yes to question 19, who ensures adherence to these rules and regulation?		

		Route allocation	20. Are you allocated a specific route to which you operate?		
R.Q 2. Do bicycle taxi operations contribute to sustainable urban transport in Mzuzu City? And what are the major advantages and challenges?	Advantages (Economically, Socially)	Accessibility/ mobility	21. How far do you travel from your house to access the bicycle taxi?	Bicycle taxi users	Questionnaires In-depth interview with bicycle taxi users.
			22. Is it easy for you to access the bicycle taxi operator when you want the service urgently?		
			23. How does the bicycle taxi service contribute to the mobility of people and goods in the city?		
		Reliability and effectivenes of bicycle taxi	24. How reliable is the bicycle taxi?		
			25. How often do you ride a bicycle taxi?		
			26. If all other means of urban transport were put in place, will you still be willing to use bicycle taxi? If yes/no why?		
			27. In your opinion do you think a bicycle taxi is better than other means of transport? If yes/ no why?		
		Affordability	28. Do you regularly use the bicycle taxi? If so why?		
			29. Is it affordable to travel by bicycle taxi on daily basis?		
		Flexibility /Comfort	30. Compared to other means of transport apart from walking, how flexible is the bicycle taxi in terms of routes?		
			31. Do you feel comfortable travelling by bicycle taxi?		
			32. Do you think a bicycle is taxi is better than other means travelling in the city?		
			33. How does the assembly benefit from bicycle taxi operations?	Government/municipal official	Questionnaires
		Equity	34. Which class of people regularly use the bicycle taxi?	Operator	Questionnaires In-depth interview with bicycle taxi operators.
			35. As a follow up to question above, why do you think that is the case?		
		Low capital	36. What benefits do you get out of this business?		
			37. How much money does one need to start the business?		
	Challenges	Unsafe cycling habits	38. Are you satisfied with the way bicycle taxi operators conduct themselves on the roads of the city?	Bicycle taxi user/government	Questionnaires In-depth interview with

			39. Do you feel disturbed by the presence of bicycle taxi operators on the roads of the city? If yes, in what way?	official/other road users.	bicycle taxi users and government.
		Harassment and violence	40. Are there any incidences of harassment from different clients you serve?	Operators.	
			41. Sometimes the police and city officials remove you from the streets, why do you think they do that?		
			42. What is your experience as user, on the treatment you get from the taxi operators?	Users	
			43. What do you think are the main challenges of the bicycle taxi here in Mzuzu city?	Operators, users, government officials	
			44. Are you satisfied with the way you are treated by other quarters of the society? If No, specify why?	Operators	Questionnaires
			45. If you belong to any of the associations, does it help in soliving some challenges you face?		
		Safety	46. Do you feel safe when travelling on a bicycle taxi? If yes or no specify how or why?	Users	Questionnaires
			47. What is the frequency of bicycle taxi operators accidents in Mzuzu city?	Authorities & Users	Questionnaires
			48. How do you think the safety of bicycle taxi operators and users and other road users can be improved?		
RQ 3. How do different stakeholders conceive the future of bicycle taxi operations in Mzuzu City?	Perceptions	Employment	49. Do you think bicycle taxi operations would create employment opportunities if formalised?	Bicycle taxi operartors	
		Congestion	50. Do you think bicycle taxi operations would contribute to incidences of congestion if regulated/formalized?		
		Demand	51. Do you think there will be an increasing demand for bicycle taxi operations in future?		
		Responsiveness	52. What do you think is the future of bicycle taxi?		
			53. Do you think it is necessary for bicycle taxi operations to continue? If yes/no why?		
			54. How would you want the bicycle taxi operations to be		

		Licenses and permits for operators.	conducted in future?		
			55. What do you think can government do to address problems and challenges the transport sector faces in Mzuzu city?		
			56. If the government is to introduce tax/fees or licenses for you to be officially accepted, will you be willing to pay?		
RQ.4 What are the policy and support mechanisms required to facilitate bicycle taxi operations in Mzuzu city?	Policy options	Registration of bicycle taxis.	57. Do you think it would be necessary for bicycle taxis to be registered as one way of formalising?	Government /council officials	Questionnaire
		Regulations	58. What policy options would be required for the regulation and acceptance of bicycle taxi operations?	Government /council officials. Bicycle taxi operators	
		Appropriate infrastructure	59. Do you think infrastructure plays an important role in bicycle taxi operation?	Government /council officials	
			60. Are there any plans of providing infrastructure to support bicycle taxi operations?	Government /council officials	
				Government /council officials	

Source:Author,2011