PARATRANSIT FARES AND COMMUTERS' MODAL CHOICE: A STUDY OF INDUSTRIAL WORKERS IN SAMEER PARK EPZ, NAIROBI.

BY

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DECLARATION

This project is my original work and has not been submitted for a degree in any other university.

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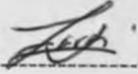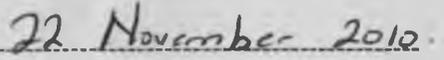
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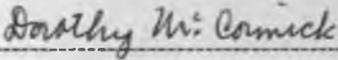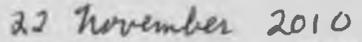
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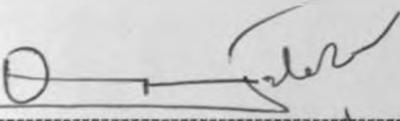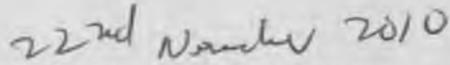
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DEDICATION

To Mummy, Sheila, Maureen, Cedric, Melissa and Benson

Thank you for your support.

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LIST OF ACRONYMS

BPO-   Business Process Outsourcing

CBD-   Central Business District

EPZ -   Export Processing Zone

EPZA-   Export Processing Zone Authority

Ltd-   Limited

KBS -   Kenya Bus Service

NCBD-   Nairobi Central Business District

NMIMT-   Non Motorised Intermediate Means of Transport

NMT -   Non Motorised Transport

PSV-   Public Service Vehicle

TLB-   Transport Licensing Board

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ABSTRACT

Paratransit operations play a key role in serving the mobility needs of both the low income and the middle income populace in developing countries. The extent to which this means of public transport is affordable is key in determining whether their basic mobility needs are met. Matatu means of transport which is a form of paratransit in Kenya has grown over the years since independence. Despite the increased numbers of matatu operations in Kenya, a significant proportion of Kenyans in the urban setting continue to use non motorised means of transport such as walking or bicycles to get to their work destinations.

This study interrogates the effects of paratransit fares on work trip modal choices of industrial workers. It proposes that matatu fares affect commuters' modal choice, implying that industrial workers may opt to use other modes of transport to get to work if they cannot afford to pay for matatu use. The study objectives were met by carrying out a field survey and case study interviews on the modal choices of industrial workers in Sameer Park EPZ. Key informant interviews were also carried out to collect information on fares.

The study found that industrial workers who could not afford to use matatus for their work trips relied solely on NMT or used matatus interchangeably with NMT. The study also found that apart from fares, there were also other factors that influenced modal choice. A key finding was that a significant proportion of industrial workers resided at informal settlement areas which were close to Sameer Industrial Park. The study concludes that paratransit fares influence industrial workers modal choices. The study recommends the establishment of a fare regulatory board which would set and control fares of all public transport means.

CHAPTER 1: INTRODUCTION

1.1 Study Overview

Travel is an integral component of everyday life. It allows people to meet their needs and provides access to other persons, locations and services. A fundamental condition for human existence is the satisfaction of individual needs, ranging from basic needs like eating and sleeping, security needs up to the need for self-fulfillment (Maslow 1943). Transport itself is a result of needs that cannot be met in situ (Becker et al. 1999). To meet these needs, people or goods must cover distance. This study aims to investigate how work travel demand is satisfied. It seeks to find out how paratransit[1] fares influence modal choice to work destinations. This will be accomplished by focusing on how the individual industrial worker in Nairobi gets to his/ her work destination. The modal choice of the workers will be investigated to determine to what extent the decision to use or not to use a matatu for work trips is determined by the fares charged or by other factors. The distinct characteristics of paratransit fares necessitate the need to investigate their effects. This study will assist in understanding travel behaviour of the industrial workers.

This report is written in five parts. The introduction section covers the study background, the problem statement, the research questions and objectives and finally the justification for the study. The second part focuses on the literature review, the theoretical and conceptual framework. The literature review section is further divided into the theoretical and empirical literature review. The third focuses on the methodology that was used in the study. Section 4

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[1] Paratransit refers to privately owned means of public transport. In this study it will be used interchangeably with the word 'matatu' which is the most popular form of public transport in Kenya's urban settings.

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presents the study findings of the specific research questions. It provides an analysis of the relationship between modal choice and various independent variables. The final section gives a summary of the study, conclusions and general recommendations.

1.2 Background

In the urban setting of most developing countries, public transport is run by paratransit operators (Cervero and Golub, 2007). According to Illes (2005), paratransit operations are characterised by flexible fares, unscheduled operations and semi fixed routes. Paratransit comprises informally operated minibuses, vans, taxis, station wagons, three wheelers, motor cycles and in some cases informally operated buses (Illes, 2005; Cervero and Golub, 2007). In many developing countries such as Kenya, paratransit constitutes the main means of public transport. Matatu is the dominant means of paratransit transport in Kenya (Graeff, 2009; Aligula et al. 2005).

Traffic Act 403 defines a matatu as a public service vehicle having a seating accommodation for not more than twenty-five passengers exclusive of the driver, but does not include a motor car. According to Chitere (2009), the word matatu is used to refer to smaller and medium-sized Public Service Vehicles (PSVs)—Nissans, Mini-buses and built-up Pigeout pick-ups with seating capacities ranging from 14 to 41 passengers; however the term matatu itself is Kikuyu in origin referring to the three ten cent coin (mang'otore matatu) that was the standard fare when these vehicles began operating in the 1950s (Khayesi, 1999). Matatus began as illegal transport entities during this period. In 1973 a presidential decree allowed matatus to carry fare paying passengers without obtaining a Transport Licensing Board (TLB) licence.

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Public transport fares in many developed countries are subject to government control (Iles, 2005). The aim is to limit fares to a level which is universally affordable. This is however not the case in Kenya where matatu operators being private sector investors have over the years increased their fares without considering the passengers. The unregulated nature of most paratransit operations in developing countries can result in high levels of fares (Cervero and Golub, 2007). There have been attempts by the Government of Kenya to reform the matatu industry in order to make it conform to the national policy goal of putting in place an efficient, affordable and safe transport services (Chitere, 2006). However these policy reform efforts have made no reference to public transport fare regulation. For instance Traffic Act 403 has on the one hand focused mainly on refund of fares, payment and non-payment of fares (Cap 63, 65, 66 and 101). The sessional paper on transport on the other hand has only made reference to fare tariffs for air travel and railway.

According to the Sessional Paper on Integrated National Transport Policy (2010), 60% of the residents in Nairobi meet their daily travel needs by walking while 35% travel by public transport (mostly matatus and buses) and only 5% use private cars. However according to Salon and Gulyani (2008) non-motorised transport (NMT) users in Nairobi consist of approximately 49% of the population. Based on the draft sessional paper on transport, the use of motor vehicle is generally limited and largely unaffordable to the majority of the low income individuals and households, in both urban and rural areas. The draft sessional paper on transport further states that in urban areas, access to Non Motorised Intermediate Means of Transport (NMIMT) is still hampered by many constraints, including lack of appropriate infrastructure and bias against NMT.

Study Site

The focus of this study is on the influence of fares on modal choices of industrial workers in Sameer Park EPZ. Sameer Industrial Park was established in 1990 as part of Kenya's Export Development Program. It is located in Nairobi's Industrial Area. Sameer Park hosts six Export Promotion Companies. These include: Garment Label EPZ Ltd (garments), Indu Farm EPZ Ltd (horticulture), Kenya Trading EPZ Ltd (garments), Kencall EPZ (call centre services), Techno Relief Services EPZ Ltd (Relief Supplies) and Vermont EPZ Ltd (fresh flowers). Many industrial workers in the Park are casuals who earn a wage of approximately 250 Ksh a day. There are however a few permanent contract industrial workers who earn at least more than 10,000 Kshs in a month (EPZA, 2008). According to the Kenya National Bureau of Statistics industrial workers earning below 23,671 Kshs can be classified as low-income. Consequently a majority of workers in Sameer Park can be classified as low-income earners. Public transport routes to Sameer Park consist of Mombasa road to the NCBD, Farm Engineering Industrial road that connects to Enterprise road to the NCBD or to Likoni Road and Lunga Lunga Road into Eastlands (see Maps 1.1 and 1.2).

Map 1.1: Sameer Industrial Park

SAMEER INDUSTRIAL PARK

Source: Google Earth

Map 1.2: Sameer Industrial Park, Route Networks and Selected Residential Locations

Source: Google Earth

These routes are served by matatu mode of public transport. Workers in the industrial park also have the option of using non motorised transport such as walking or cycling to get to and from their work destinations. The modal choice for these workers is between motorised and non-motorised transport. Based on this background this study seeks to investigate the effects of levels and variation in paratransit fares on modal choice of Industrial workers in Sameer Park EPZ in accessing their employment destinations.

1.3 Problem Statement

Matatu mode of public transport has grown over the years since independence with the goal of catering to the mobility demands of both the low income and the middle income populace in Kenya (Chitere, 2006; Khayesi, 2002; Graeff, 2009). Like other paratransit operations in the developing world matatu is characterised by flexible fares, flexible routes and unscheduled operations (Cervero and Golub, 2007). Despite the growing numbers of matatus approximately 49 % of the commuters in Nairobi make their daily trips to destinations by the

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use of non-motorised transport i.e. walking and use of bicycles (Salon and Gulyani, 2008; Aligula et al, 2005).

Matatu mode of transport is perceived to be an expensive mode of transport for the many urban poor in Nairobi (Salon and Gulyani, 2008). This is in terms of the level of fares paid and fare variations. This has implications on affordability. According to the World Bank (2002) inability to pay for public transport use limits travel choices. Some of these travel choices have been seen to affect the welfare of the commuters (Baker et al, 2005). This has for instance been observed in Brazil and China where high public transport fares have forced a significant urban population to reside in informal settlements which are closer to their work place thus enabling them to use NMT (Gomide et al, 2004; Gannon and Liu, 1997). According to Howe and Bryceson (2000), studies in Temeke region of Tanzania demonstrated that high public transport fares affected workers' travel patterns and travel modes hence these workers were only able to afford to use public transport after being paid.

Scholars of travel behaviour and modal choice emphasise that commuters make decisions on whether or not to use a particular means of transport based on the considerations of costs and benefits of the available alternatives (Ben-Akiva and Bierlaire, 1999). Individuals systematically compare alternatives to extract maximum value. Studies on public transport affordability have focused on the effects of high fares on household mobility (Carruthers et al, 2005; Gomide et al, 2004). However, these studies have focused on the entire public transport sector, i.e. consisting of both formal and informal public transport means, thus ignoring the difference in operations between the two. Consequently the effect of paratransit fares on the modal choice of the individual remains scarce. Research on industrial workers in

Nairobi has in many instances focused on working conditions (Mireri, 2000, McCourt, 2004). Travel behaviour of industrial workers in Nairobi remains inadequately explored. This study is an attempt to contribute towards this knowledge gap by studying the effects of paratransit fares on modal choice in accessing employment destinations by industrial workers in Sameer Park EPZ.

1.4 Research Question

The broad research question for this study is: **What are the effects of paratransit fares on modal choice in accessing employment destinations by industrial workers in Sameer Park EPZ?** This is based on the premise that modal choices of industrial workers are influenced by the fare levels and fare variations in matatu mode of transport. To answer this question the following specific questions were developed:

i. **What are the basic characteristics of the industrial worker in Sameer Park EPZ?**

This question sought to find out the characteristics of the workers such as their age, nature of employment at EPZ, residential location, distance covered to get to work destination and their marital status. Nature of employment was used as a proxy for income. There is an intrinsic dimension that ones basic characteristics may determine ability to pay for paratransit mode thus influencing the modal choice.

ii. **What modes and routes do industrial workers in Sameer Park use to get to their work destinations?**

Here the study sought to explore the means of transport and routes that the industrial workers use to get to Sameer Park. This question also sought to establish how regular a particular means of transport was used for work trips.

iii.   **What are the paratransit fare levels and variations that occur in these routes?**

The study sought to find out the standard matatu fares on routes serving Sameer Industrial Park. It also sought to find out the variations in terms of the highest and the lowest fares paid for matatu use in various routes of Nairobi.

iv.   **To what extent do paratransit fares determine industrial workers' modal choice in accessing employment destinations?**

This question sought to determine whether the matatu fare levels and fare variations deter industrial workers from Sameer Park from using matatu to get to work.

v.   **What other factors could influence industrial workers' modal choice?**

Based on literature review, there is evidence of other critical factors that may influence modal choice. The study sought to find out if there were other factors apart from paratransit fares that could influence an industrial worker from using a matatu or using any other mode of transport.

1.5 Study Objectives

The overall objective of the study is **to investigate the effects of paratransit fares on modal choice in accessing employment destinations by industrial workers in Sameer Park EPZ**. The study is guided by the following specific objectives

i.   To find out the basic characteristics of the industrial worker in Sameer Park EPZ.

ii.   To find out the modes and routes that industrial workers in Sameer Park use to get to their work destinations.

iii. To find out the paratransit fare levels and variations that occurs in these routes.

iv. To investigate the extent to which paratransit fares determine industrial workers' modal choice in accessing employment destinations.

v. To find out other factors that could influence industrial workers' modal choice.

1.6 Justification for the Study

This study has the potential of contributing to analysis of travel behaviour in Kenya. This is because it focuses on the industrial worker's travel behaviour to work destinations. The study sought to find out how paratransit fares influence modal choice to work destinations therefore the travel behaviour of the individual was investigated. Understanding travel behaviour is important because it can shape transport policy towards developing motorised or non motorised sectors that facilitate mobility of the workers.

Although this study is to be carried out in Sameer Park EPZ Area of Nairobi's Industrial area, the findings of the study can be used to explain workers travel behaviour in other industrial zones in the country that have similar geographic and modal alternatives, in this sense building on travel behaviour analysis.

The study could also impact on urban development practice; this is because it can be used to explain the continued growth and existence of informal settlements in the city of Nairobi. The poor are most likely to cut down on work travel costs by choosing NMT i.e. walking and cycling. The poor will most likely live close to their work destinations so that they can use NMT. Thus the growth of informal settlements is enhanced. For instance informal settlements

close to Sameer Industrial Park include Mukuru Village and Kwa Njenga. The study sought to find out the number of workers who reside in these informal settlements and the means of transport that they use to get to Sameer Industrial Park. Affordable transport has the ability to reduce the growth of informal settlement. This is important in achieving sustainable urban development.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This section is divided into two parts. The first is the theoretical literature review which focuses on the approaches underlying travel behaviour and modal choice. This section reviews travel behaviour from a socio-economic and psychological perspective. On the one hand travel behaviour is generally conceived to be rational. Modal choices are made after rational considerations. Modal choices can also be influenced by socio-economic factors. The psychological perspective notes that changes in the transport environment can lead to changes in travel habits. These changes may have long term or short term impact on travel habits.

The second part covers the empirical literature which is divided into three sub sections. The first section is a brief understanding of paratransit fares which mainly focuses on matatu fares in the Kenyan context as well as paratransit fares in other developing countries. The second part reviews empirical studies on work travel behaviour and modal choices. The main focus is to highlight other socio-economic factors that can influence modal choice to work destinations. The final section seeks to link the effects of paratransit fares on modal choices to work. This is by focusing on similar studies that have examined the same variables.

2.2 Theoretical Literature Review

2.2.1 Travel Behaviour and Modal Choice

Demand for urban transport is a derived demand. It is not an end in it self, but rather it is applied by people and firms to satisfy a need at their destinations (Aligula et al. 2005). People travel in order to satisfy needs. For instance demand for transport becomes high when people

desire to get to their work destination on time. Faulks (2007) argues that people move from an origin to a destination to add utility and value. This can for instance be seen in the analysis of work trips where people will move from their residential location in order to add utility and value in their working locations. This behaviour is assumed to be based on rational considerations (Prillwitz, 2008). Travel behaviour is concerned with understanding what people do over space and how people use transport. A central feature of travel behaviour that this theoretical review will focus on is travel mode choice for work trips.

According to Clifton and Handy (2001), the study of travel behaviour as it has evolved over the past half century has yielded critical insights into the choices that individuals and households make about their daily travel. These insights have contributed to the development of increasingly sophisticated models based on rationality in explaining and predicting changes in travel behaviour response to changes in the transport system. Consequently travel behaviour analysis has been based on rational choice theories (Prillwitz, 2008). Rational choice is based on the assumption that patterns of behaviour in societies reflect the choices made by individuals as they try to maximise their benefits and minimise their costs. In other words, people make decisions about how they should act by comparing the costs and benefits of different courses of action (Simon, 1955). As a result, patterns of behaviour will develop within the societies that result from those choices (Nau, 1999).The selection of particular constraints and the rejection of others for incorporation in the theory of rational choice involves implicit assumptions as to what variables the rational organism "controls" - and hence can "optimise" as a means to rational adaptation (Ben-Akiva and Bierlaire, 1999). In its application to travel behaviour, Gorr (1997) sees the attractiveness of a means of transport – defined by travel time, travel costs and quality – as the main factors for travel behaviour decisions. Rational choice theory has been used to develop discrete choice models which are

statistical procedures used to determine and predict which mode of transport will be used for various travel demands.

Based on the data on Nairobi's modal split, modal choices of the industrial worker in Sameer Park would include motorised means such as the buses or paratransit mode whereas non-motorised means of transport would include walking or cycling to get to the work destinations (Aligula et al, 2005). Paratransit mode has the advantage of saving time when there is little or no traffic on the road as well as saving energy. It however has the disadvantage of having high fare levels and fare fluctuations. Rational approach implies that an individual commuter must have information on the costs and benefits of all alternatives available. Therefore the industrial worker in Sameer Park must have information on the costs and benefits of all the modal choices available to him in order to make a decision. As an application to this study rational choice could dictate that the decision to use paratransit should involve weighing costs such as the fares charged against the benefits such as time and energy saved. In this case if fares outweigh the benefits then the individual decision maker may have to consider another alternative.

One of the main criticisms of the rational approach to travel behavior choice questions the rationality of human choices and argues that because of different limiting factors like incomplete information or influence from passion, people are only able to make subjective decisions (Prillwitz, 2008). For instance an individual's liking for a particular mode of transport could influence modal choice. Another limitation is that individual decision makers do not always have all the information or access to information on all possible alternatives. Furthermore the extent to which decisions are made on a daily basis or upon every need to

travel is questionable. Opponents of rational choice theory have argued that there is no empirical evidence of rationality in decision making what is observed is randomised decision making. That individuals' decision-making violates the central assumptions of Rational Choice under certain circumstances. According to Kahneman and Tversky (1979) the context within which a choice is made, and the way in which choices are framed, influence the decision-making process. Despite these limitations this classical rational choice remains useful to this study because it puts the individual at the centre of travel decision making. It acknowledges the presence of alternatives which are important in making choices.

Focusing on travel behaviour from a psychological perspective, Hartgen (1974) on the one hand contends that the urban traveler's mode choice results from his evaluation of the perceived attributes of alternative modes, within situational constraints imposed on the individual and his household. To him modes are evaluated on the basis of attitude, expressed as the liking for modal attributes and weighed by the value placed on these attributes. The traveler's liking or preference for modal attributes stems from his awareness and perception of the level of each attribute. It is determined by personal experience with modes and external information sources. These perceptions vary for different situations. On the other hand Garling and Axhausen (2003) have argued that travel choice is habitual thus habit is a key factor in analysing travel behaviour. This is based on the empirical fact that travel behaviour patterns tend to repeat themselves from day to day. Thus habitual travel choices are made by commuters to get to their destinations. Davidov (2007) however argues that changes in the environment will influence travel habits. He notes that when an individual is faced with a change in the environment, behaviour is not determined by past habits, but by the amount invested in information on the best option. In the case of the industrial worker in Sameer Park the habit to use paratransit may be disrupted by a change in fare levels or variations or

perhaps a change in weather. This does not necessarily imply that a new long term travel habit will be formed. The change could be long term or short term in nature. A decision to change residential locations also has the effect of changing previous travel habits because they may not be applicable in the new residential location (Garling and Axhausen, 2003). Information on the available alternatives becomes important in order to shape travel behaviour. What remains central here is that a changing environment will influence habitual travel mode-choice and this is done through rational considerations.

2.2.2 Factors influencing modal choice

According to Jou et al. (2010), there are key measurable factors that influence mode choice. These are trip times, trip costs and socioeconomic characteristics of individuals as well as availability of parking for private cars. The authors contend that changes in these factors can lead to a change in modal choice. Linking social factors with travel habits Davidov (2007) asserts that socio-economic characteristics reflect either different preferences for habitual public transport use, which do not seem to be equal among individuals in contrast to economic theory, or additional restrictions. For instance he notes that people with different levels of education might have different preferences for the use of public transportation. This is derived from the analysis that people with higher levels of income tend to have better paying jobs. This in turn allows them to seek private motorised means of transport.

These factors according to Hartgen (1974) can also be seen as being situational. Thus a changing situation will influence modal choice. Situational factors refer to those constraints within which an individual reacts to. They include the social environment, socioeconomic characteristics of the individual, his residence, and the particular trip situation i.e. in terms of time spent or costs.

In this study key factors that will be studied include; residential location and socio-economic characteristics (age, gender, nature of employment, marital status etc). These factors could assist in determining travel mode choice. For instance workers who reside at a distance from their work destination could make long-term decision to reside close to their work destinations in order to cut down on travel costs. This decision could influence the mode of transport that they use to get to work. The concern of this paper will be primarily the influence of fares on modal choices. However based on theoretical support the influence of these other factors will also be considered.

2.3 Empirical Literature Review

2.3.1 Paratransit Fares

This section is concerned with the fare levels and variations of paratransit operations. Balcombe et al. (2004) contends that fares are probably the most intensively studied transport demand factor. This is because fares and changes in fares are relatively easy to identify and quantify, and are the most readily and probably the most frequently adjusted factor. The major source of revenue for public transport operators is derived from fares. According to Illes (2005) fares constitute the principal source of funding for all transport operators. Illes stipulates that in general terms the level of fares, rates and charges should be such that total revenue earned by a public transport service is sufficient to cover the total cost of providing it.

The unregulated nature of most paratransit operations in developing countries can result in high levels of fares (Cervero, 2000). For instance in a study in Chile by Darbera (1993) that aimed at investigating the impact of deregulation of public transport in Chile, it was found that the government directive of deregulating public transport lead to a substantial increase in

fare levels. This was because cartels took up the role of setting fares. Generally, fares of urban paratransit modes vary widely. This can be caused by changes in operational costs or peak times (Khayesi, 1999). According to Kimani et al (2004) in a study that sought to find out the economic costs and benefits of the matatu industry in Kenya, operational costs are a key determinant for setting matatu fares, i.e. the fare box has to cover all the costs. The study also recorded that returns from matatu had to meet initial costs as well as fuel charges and salaries for drivers and conductors. High levels and variation in matatu fares would therefore occur due to changes in costs. Based on Khayesi (1999) in a study that sought to investigate stakeholder influences in the matatu means of transport in Kenya, the matatu sector was found to have unpredictable pricing. Variations in matatu fares were determined by the time of the day, part of the month (prices were inflated at the beginning and end of the month), weather conditions, prevailing transport demand and fares charged by buses. Khayesi (1999) contends that the main reason for variations of fares by matatu operators in Kenya are to attract passengers at off peak due to low demand for travel, to out compete the buses and to increase financial gains to meet the many monetary demands placed on matatu by a wide range of stakeholders.

Matatu fares are perceived to be expensive. According to Mitullah and Makajuma (2009) in a study of Non-Motorised Travel conditions on the Jogoo Road Corridor in Nairobi, many commuters categorised matatu as an expensive means of transport. For this reason a significant proportion of commuters used NMT to get to their work destinations. In this study the decision by a commuter to use a matatu was determined by their state of being in a hurry implying that time was an important factor to consider when deciding to ride a matatu or not.

Khayesi (1999) and Kimani et al. (2004) propose that paratransit fares can be described as being unpredictable. They give insight into understanding fare levels and variations and according to Balcombe (2004), if public transport fares are increased patronage will decrease. The study by Mitullah and Makajuma (2009) highlights the perception of commuters on paratransit mode. These authors have however not delved into the impact of matatu fares on the individual commuter modal choice which is central concern of this study.

2.3.2 Work Trips and Commuters' Modal Choice

The study of how people get to work has been at the centre of transport planning in many developed countries (Vega and Reynolds-Feighan, 2007). This has led to the development of discrete choice models in understanding and predicting individual work travel behaviour (Prillwitz, 2008; Nau, 1999; Ben-Akiva and Bierlaire, 1999). In the developed world, transport planning has also been shaped by studying route choice in modelling work travel behaviour. The main emphasis with both approaches has been on understanding and regulating traffic so that people get to their work destinations on time (Bovy, 2009). Route choice analysis has in many circumstances focused on private motorised means used to get to destinations.

In the developing world studies on work travel have not focused much on route choice. Modal choices have been the main focus. This is based on the socio-economic context, where in some studies the variables of incomes and residential area have influenced work trips modal choices. The main idea is that populations with low incomes are unable to afford regular use of public transit (Carruthers et al, 2005). For instance Salon and Gulyani (2008), in a study on travel choices of slum residents in Nairobi, found that most slum residents had only one modal choice and this was walking. The authors state that the poorest people in

cities like Nairobi do not enjoy reduced transit fares; they are forced to live close enough to employment centres so that they can walk to their work destinations. Although the study by Salon and Gulyani focused on slum residents in Nairobi, it concludes that these residents only had one modal choice. This study used the multinomial logit model to determine the poor's modal choice. Salon and Gulyani stress the difference in modal choice in terms of gender but this is strictly based on an exploratory analysis.

Empirical evidence from both developed and developing countries propose that socio-economic characteristics such as level of education could impact on ones travel mode choice. According to Davidov (2007) in a study of travel mode choice in Stuttgart, Germany, it was found that people with higher levels of education tended to use public transport less often. This was because a higher level of education was related to a higher income. This enabled one to purchase a car. Davidov used this evidence to explain preference for car use as a status quo. In his study he concludes that public transport was mainly used by the poor. Salon and Gulyani (2008) also probe into the influence of level of education on modal choice. Here they note that education has a positive effect of use of motorised transport by all slum dwellers.

In Mumbai a study by Baker et al. (2005), investigating urban poverty and transport, noted that poor people had to make trade offs between costs of commuting, earnings and working in different parts of the city. The high transit fares of Mumbai had the effect of determining where people lived and where they worked. Their residential area had implications on the distance they would have to cover to get to their work destinations. A greater distance would warrant the use of motorised means. Therefore in order to cut down on high commuting costs most poor residents in Mumbai resided close to their work destinations. This resulted in the spur of slum dwellings. The modal choice used to get to work destinations was non-motorised transport. Workers walked to their work destinations because they were close by.

This in turn impacted on their ability to access better paying jobs that were located at a distance from their homes so they could not walk (Baker et al, 2004). Perhaps the most striking feature of this study was the travel behaviour in Mumbai based on the distribution of commuting distances. The commuting distance with the highest frequency was only 1-2 km; more than 40% of workers (50% of poor workers) commuted less than 2 km to their work destinations. Approximately 19% of all workers and 11% of poor workers commuted more than 10 km, demonstrating that few poor individuals chose to live far from their work destinations. This advocates that the closer the work destination the higher the tendency to use non-motorised transport.

These studies suggest on the one hand is that proximity to work destinations i.e. in terms of distance covered to work destinations, gender as well as level of education are key factors that could affect work trip modal choice. On the other hand the route choices of the NMT users have not been analysed and this especially missing in the study by Salon and Gulyani. Furthermore the influences of the environment on travel habits (e.g. change of weather) as well as basic characteristics e.g. age, have not been explored by these authors. These studies however imply that apart from commuting fares there are other factors that influence modal choice in developing countries.

2.3.3 Links between Paratransit Fares and Commuter's Modal Choice

The concept of price elasticity of demand is a measure of the extent to which demand changes as the result of a change in price, or fares (Illes, 2005). This is key in analysing the extent to which paratransit fares influence modal choices. Price elasticity of demand is determined principally by passengers' ability to pay, their need to use the services and the cost and availability of alternative means of transport. This has for instance been demonstrated in Wuhan China, where according to Shuiying et al, (2003) in a study on

transport and poverty, high fare levels tended to subject the people of Wuhan to a lifetime of walking. The demand for public transport was low due to the high fares charged. This study made use of existing data sets to analyse the characteristics of Wuhan's poorest population. This information was used to select study informants. Using focus group and case study techniques, the study was able to determine the poor's transport mode use for routine and non-routine situations; priority problems with each mode were outlined and preferred improvements suggested. One of the key findings was that the high flat fare structure tended to penalise short distance commuters. Poor resident of Wuhan would therefore use public transport when they had to cover a distance that was longer than two hours. They limited their trips to what was within walking distance (2-4 km) or chose the cheapest transport mode available such as bicycles, and moto-taxis. The price they paid was not monetary – it was their time, their energy, their safety, their comfort and their convenience that was lost. For instance those who used NMT to get to their work destinations very early in the morning faced high security risks (such as the risk of being mugged). This was mainly experienced by women and the old.

In a study on urban public transport in East Africa, Howe and Bryceson (2000) sought to find out how poverty affects the ability to pay for transport use to work destinations in various urban towns in Kenya and Tanzania. They recorded that many poor households in Eastlands area of Nairobi as well as Temeke area of Tanzania could only afford public transport during the initial weeks of the month, when they had just been paid; afterwards they walked to work. The study also recorded that walking affected their productivity because they arrived at their work destinations tired. The study concluded that an affordable fare rate as well as increased income would help fulfil the mobility needs of these workers. Although this study focused

more on fares for bus transport rather than paratransit mode it still demonstrated that activities of the poor, especially accessing their job destinations were affected by high fares.

From the three sections of the empirical literature suggest that fares could impact on modal choices to work destinations as has been observed in China, Mumbai, Tanzania and Kenya. In addition socioeconomic factors could also be important in understanding travel behaviour and modal choice. These studies have however focused on the household as the unit of travel behaviour analysis. They have not explored other distinct individual characteristics such age and nature of employment. As stated in the previous section the route choices of commuters have also not been taken into account. And this is important when analysing the travel behaviour of NMT users. The empirical studies above do not delve into differences between various means of public transport. As a result the effects of paratransit fares are generalised together with other public transport fares. This is despite the distinct characteristics of paratransit mode.

2.4 Theoretical Framework

The grand theory that will be used in this study is the classical rational choice theory. This is because analysis of travel behaviour is based on individual rationality. This approach presupposes that patterns of behaviour in society reflect the choices made by individuals as they try to maximise their benefits and minimise their costs. In other words, people make decisions about how they should act by comparing the costs and benefits of different courses of action (Simon, 1955). Consequently, patterns of behaviour will develop within the societies that result from those choices (Nau, 1999). As an application to this study rational choice approach would dictate that the decision to use paratransit should involve weighing costs such as the fares charged against the benefits such as time and energy saved. In this case

if fares are high then this could out weigh the benefits such as time and energy saving. The individual decision maker will have to consider another alternative.

Rational choice theory however has limitations with regard to subjectivity in decision making, difficulties in accessing all the information on all alternatives as well as the difficulty in assessing whether decisions are made on a daily basis or on each travel need. Opponents to this approach state that empirical evidence of rationality is limited what is observed is randomised decision making.

However if travel behaviour is defined as habitual then **changes in the environment could lead to changes in habitual mode choice** (Davidov, 2007). In the case of the industrial worker in Sameer Park the habit to use paratransit may be disrupted by a change in environment such as change in fare levels or variations. This could have short term or long term impacts on modal choice. What remains central here is that a **changing context will influence habitual travel mode-choice and this is done with rational considerations.**

Jou et al. (2010) generalises that there are key measurable factors that influence mode choice. These are: trip times, costs and socioeconomic variables (Income, residential location, preference). These scholars contend that **changes in these factors will lead to a change in modal choice.** In this effect a change in trip costs i.e. paratransit fares could result in a change of modal choice. The socio-economic characteristics of the industrial workers can also influence modal choice and this is based on empirical evidence from both developed and developing countries. This study will use these specific generalisations to determine the effects of paratransit fares on modal choice among industrial workers in Sameer Park.

2.5 Conceptual Framework

Dependent variable: The dependent variable in this study is the modal choice in accessing to employment destinations. It will be observed as a pattern. Modal choice will be operationalised as the means of transport that an individual worker decides to use to get to his work destination.

Independent Variables: The main independent variable for this study is the paratransit fare. This will be operationalised as the amount paid for paratransit use per trip. Paratransit fares vary depending on operational costs and peak times.

Based on the theoretical and empirical literature, other factors such as; the socio-economic characteristics of the commuters, distance from residential area to work destination and environmental effects on travel habits (e.g. changes in weather) could also influence modal choice.

Decision Rule and Modal choice

Among industrial workers in Sameer Park the decision to use a particular mode of transport may be caused by changes in paratransit fares or influences from these other factors. Modal choices that are common to all Sameer Park workers include: NMT as well as Paratransit. Hypothetically individual decision rule concerning influence on fares on modal choice in this study could be based on a short term basis (modal choice decision may change often). The decision rule concerning short distance and modal choice could be based on a long term basis (if an individual lives close to the work place modal choice is tentatively least likely to change, the modal choice may be long term). This framework is captured in the schematic diagram 1 below.

Figure 2.1: Conceptual Analysis

```
┌─────────────────────────────┐        ┌─────────────────────────────┐
│    PARATRANSIT FARES        │        │      OTHER FACTORS          │
│                             │        │  . Commuter's               │
│        • Fare levels        │        │   socio-economic            │
│                             │        │    characteristics   . Environmental
│        • Fare variations    │        │                        effects on travel
│                             │        │  . Distance from       habit e.g. changes in
│                             │        │   work destination          weather
└─────────────────────────────┘        └─────────────────────────────┘
                 │                                    │
                 │                                    │
                 └──────────────┐      ┌──────────────┘
                                ▼      ▼
                    ┌─────────────────────────────┐
                    │    INDIVIDUAL DECISION      │
                    │          RULE               │
                    └─────────────────────────────┘
                                │
                                ▼
                    ┌─────────────────────────────┐
                    │  MODAL CHOICE TO WORK       │
                    │       DESTINATION           │
                    │                             │
                    │        • NMT                │
                    │                             │
                    │        • Paratransit        │
                    └─────────────────────────────┘
```
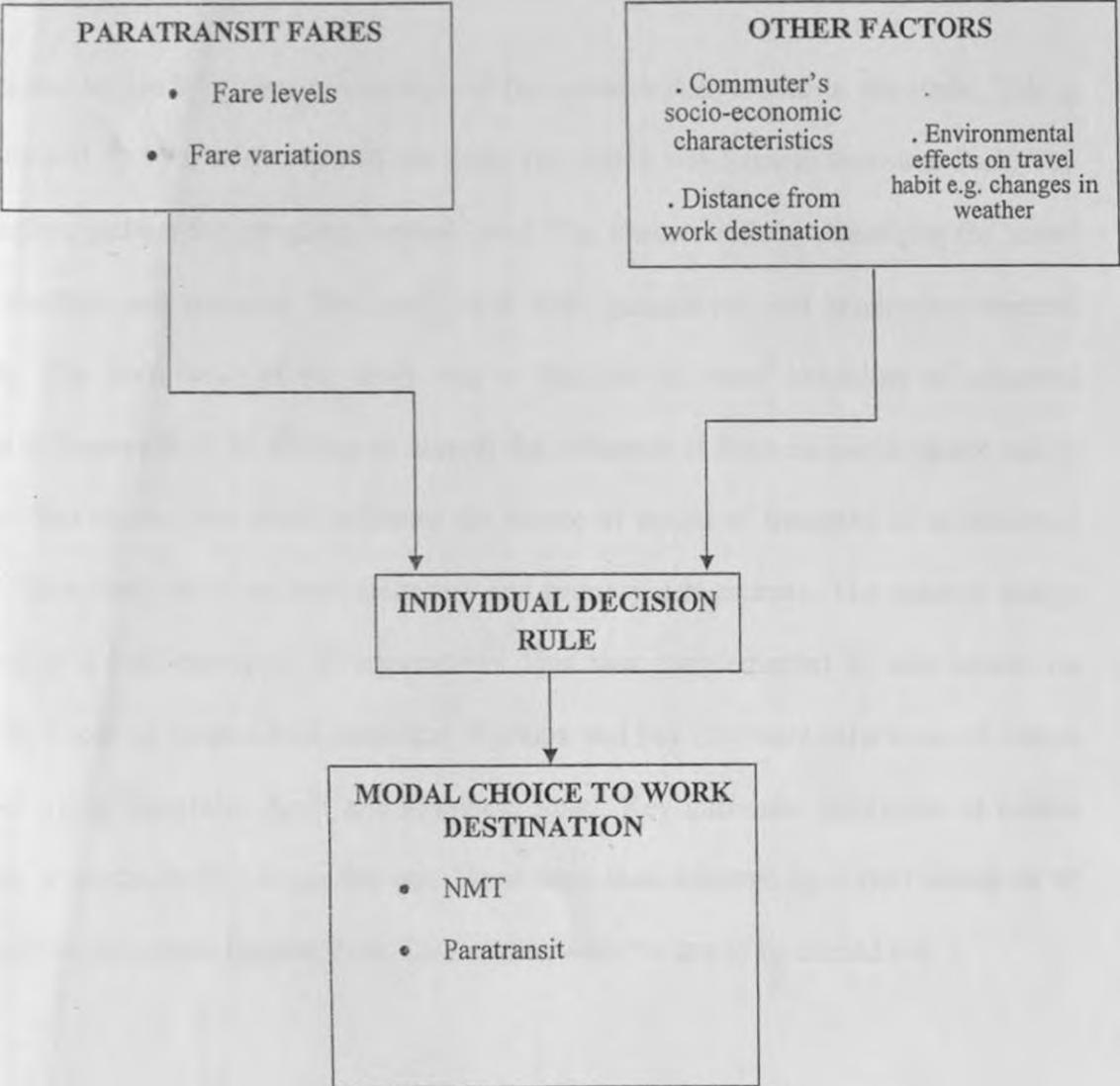
Source: Author's Conceptualisation

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter begins by giving an overview of the research design used in the study. This is then followed up by a description of the study site which was Sameer Industrial Park. The third section outlines the sampling methods used. The chapter ends by describing the actual data collection and analysis. The study used both quantitative and qualitative research methods. The main focus of the study was to find out the travel behaviour of industrial workers in Sameer Park by seeking to unravel the influence of fares on modal choice and to explore other factors that could influence the choice of means of transport of an industrial worker. This study relied on both secondary and primary data sources. The research design consisted of a field survey of 60 respondents. This was complemented by case studies on travel behaviour of Sameer Park Industrial Workers and key informant interviews of matatu operators along Enterprise Road and Mombasa Road. Key informant interviews of matatu operators were the first to be carried out. These were then followed by a field survey of 60 Industrial Workers from Sameer Park. Case studies were the last to be carried out.

3.2 Site Selection

The study took place in Sameer Industrial Park EPZ. The industrial park is located in Nairobi's Industrial Area close to the junction of Mombasa Road and Enterprise Road. Sameer Industrial Park was purposively selected primarily because of its location and the varied means of transport that can be used to get to the site. The industrial park is located close to low income and middle income residential areas. Low income residential areas that were key to this study include Mukuru Kwa Njenga, Mukuru Kayaba, Mukuru Kwa Reuben, and Pipeline. The residential location of the respondent was deemed important because there

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was need to investigate proximity to work place as a factor that would influence modal choice. In terms of means of transport, the industrial site is as stated earlier located close to two major roads. This was important to the study because it demonstrated that industrial workers from various parts of Nairobi could use either road to get to the Industrial Park. It also gave an array of modes that could be used by the industrial workers. Sameer Park was also selected because of accessibility of the study respondents. Over the years informal food stalls have cropped up next to the industrial site. Workers from Sameer Park and other industries frequent these food stalls during lunch hours. Therefore the researcher was able to get access to the respondents. All these conditions combined to make Sameer Industrial Park a suitable area to study the travel behaviour of the industrial workers.

3.3 Sampling Procedure

The unit of analysis in this study was the individual industrial worker at Sameer Park. According to the EPZA Annual report of 2008, there are approximately 4000 workers in the industrial site. The study included all the industrial workers in the Sameer Park who had their lunch at the nearby informal food stalls from the 7th of June 2010 to the 17th of June 2010. From observation it can be estimated that about 1500 industrial workers have their lunch at the nearby food court between the times of 12.00 noon to 3.00pm. Sampling began by selecting the food stalls from which the respondents would be obtained. This involved visiting the study site and drawing a map of the food stalls (see Map 3.1). There were 28 food stalls in total. Numbers were then assigned to the food stalls and simple random sampling using lottery method was used to select the food stalls from which the respondent would be sampled. This resulted in the selection of 14 food stalls (Table 3.1). Workers have their lunch sitted on the benches provided by the food vendors. A food stall can accommodate about 10

to 15 workers. From observation, it takes about 10 minutes for an industrial worker to have his lunch.

Table 3.1: Stall Number and Respondents by Interviewing Date.

Interview Date	Stall Number	Respondents(n)
Monday 14th June 2010	6	5
	11	3
Wednesday 16th June 2010	16	4
	2	1
	20	5
Thursday 17th June 2010	3	6
	22	7
Friday 18th June 2010	28	4
	19	5
Saturday 19th June 2010	4	3
	13	7
	24	2
Monday 21st June 2010	26	6
	17	2
Total	14	60

MOMBASA ROAD

SAMEER INDUSTRIAL

PARK

ENTERPRISE

ROAD

GATE

4

1

2

3

5

6

7   8   9

10   11

12   13   14   15   16   17   18   19   20

25   24   23   22   21

28

27   26
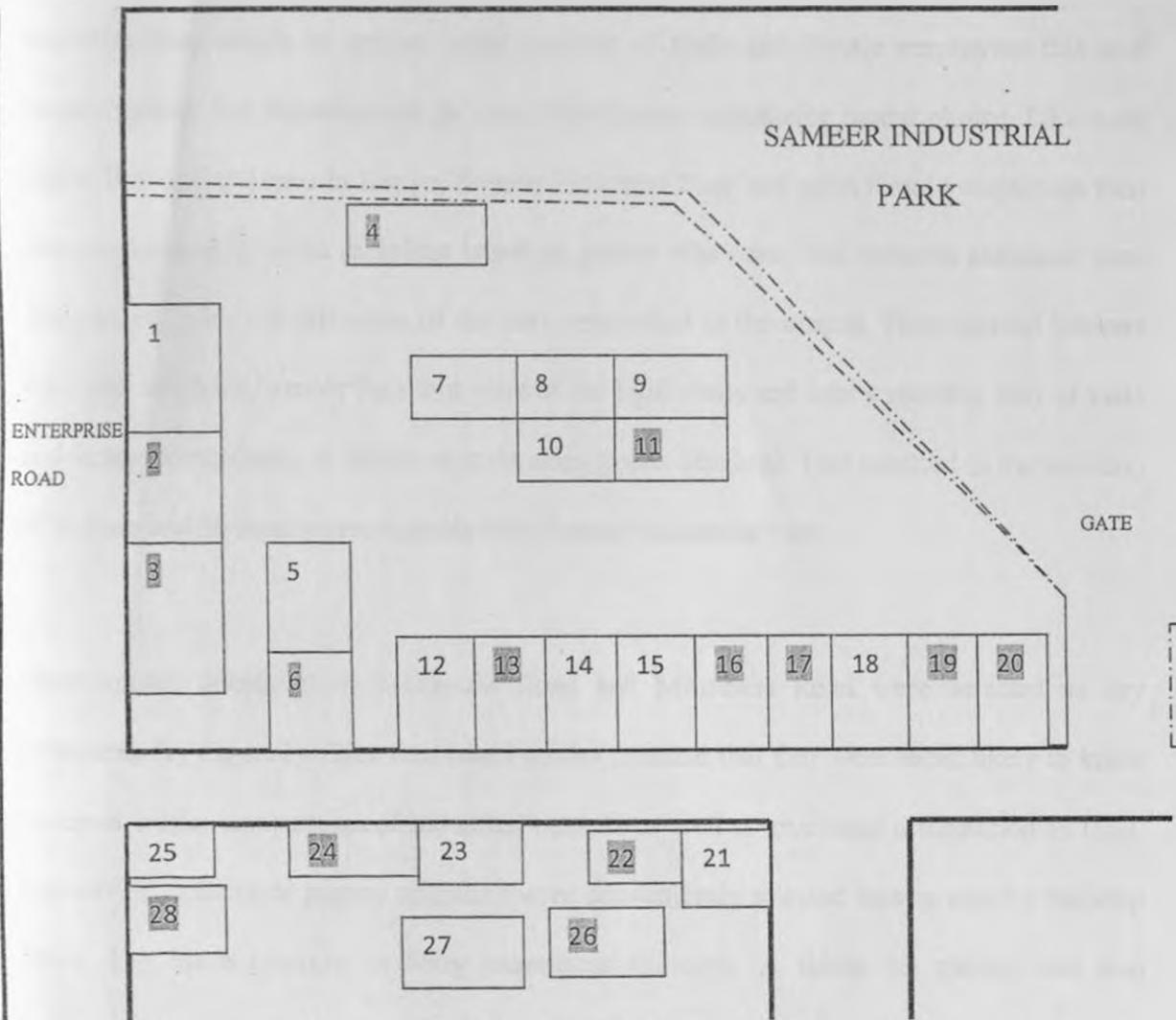
(Map not drawn to scale)

Key

-Food Stalls

-Boundary Wall

Source: Field Research 2010

So as to limit bias, the industrial workers were selected using systematic quota sampling. To establish a random start, lottery method was used. To accomplish this, there were five pieces of folded paper numbered 1 to 5. Five pieces of folded paper were used so as to ensure the

researcher got the maximum number of respondents at each food stall. The paper numbered 2 was randomly selected; this resulted in the selection of every second respondent. The researcher also sought to get an equal number of male and female employees this was because gender was hypothesised as one of the factors influencing modal choice. Like most Export Processing Zones in Kenya, Sameer Industrial Park had more female employees than male. Consequently quota sampling based on gender was done. The research assistants were instrumental in the identification of the next respondent in the sample. They omitted workers who were not from Sameer Park but were at the food stalls and kept a running tally of male and female respondents, to ensure a quota sample was obtained. This resulted in the selection of 30 male and 30 female respondents from Sameer Industrial Park.

Three matatu operators on Enterprise Road and Mombasa Road were selected as key informants for the study. This was based on the premise that they were most likely to know the travel modes and patterns of industrial workers as well as give basic information on fares. The two Hillocks route matatu operators were conveniently selected from a near by bus stop where they were queuing to ferry passengers to town. A Route 33 matatu was also conveniently selected from a nearby bus stop along Mombasa Road.

Respondents for the case studies were selected using purposive sampling based on the modes the respondents use to get to work. This information was obtained from the survey that was first carried out. The field survey questionnaire was used to select one respondent who always used non-motorised Transport, another respondent who only used motorised transport and finally two respondents who combined both motorised and non-motorised transport. This was done to supplement the information obtained from the survey and also give in-depth

information on the travel behaviour of the industrial workers in Sameer Industrial Park. This resulted in the selection of a female respondent who always walked to work, a male respondent who always used a matatu to get to work and finally one male and female respondent who used both motorised and Non-Motorised means of transport

3.4 Data Collection

Primary data collection methods used in this study included; key informant interviews, a field survey, observation and finally carrying out of case studies. The main primary data source was the industrial workers in Sameer Park. Three matatu operators were selected as key informants to give information on fare levels and variations as well as the travel behaviour of industrial workers generally. Observation method was also used to supplement the information obtained from the other methods. Secondary data was collected from documented literature on travel behaviour. This entailed reviewing relevant empirical literature on travel behaviour.

3.4.1 Key Informant Interviews

Key informant interviews of matatu operators along Enterprise road were carried out on the 7th of June 2010. Three Nissan type matatus were selected from bus stops that were located close to Sameer Park. The selected matatus at Enterprise Road and Mombasa Road bus stops were queuing to pick passengers and ferry them to town. One key informant guide was used to obtain information on paratransit fares and the general travel behaviour of industrial workers from these operators (see Appendix 2). Each interview took an average of 10 minutes to complete. The researcher did the actual interviewing as the research assistant took down the notes. The matatu operators were generally co-operative during the interviews.

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Some gave additional information on fares and the routes that they sometimes use when they want to avoid traffic.

3.4.2 Field Survey

A survey questionnaire was used to gather quantitative and qualitative data on the specific research questions. These questionnaires were administered to the industrial workers from Sameer Park using face to face interviews. Before moving to the field for the actual field survey a pre-test of the questionnaire was done on the 7th of June 2010. Pre- testing was done so as to ensure coherence of the survey instrument as well try out the sampling technique to be used. Testing of the questionnaire was done after mapping out and selecting the food stalls from which the samples would be obtained. Ten workers from Sameer Industrial Park were selected for the pre-test. These respondents were obtained from the stalls that had not been selected for the field survey. Doing a pre-test of the sampling method also revealed that the researcher had to closely work with the research assistant to obtain the respondents for the survey. The pre-test of the sampling method also showed that the researchers would be unable to control where the respondent would sit to have their lunch thus resulting in the bias of selecting a respondent twice. This bias was reduced by getting the name of the respondent so as to omit them if they are selected twice. The pre-test revealed that some questions in the instrument were not very easy to answer due to the use of technical words. These errors were rectified and a final draft of the survey instrument was developed (See Appendix 1).

The field survey started on the 14th of June 2010 and ended on the 21st of June 2010. Throughout the 6 field days, respondents from Sameer Park were selected from the food stalls in the order of which they were sampled. The role of the research assistant was to

approach the second respondent from the last and ensure that they came from Sameer Park. Some respondents from companies in Sameer Park were easy to identify because of their uniforms and overalls which were labelled. Respondents from Kencall BPO in Sameer Park were also easy to identify because they did not wear uniforms. Thus they stood out from other workers in the food stalls. The research assistant also had the task of persuading respondents from Sameer Park to take part in the survey. The research assistant would then inform the researcher on the next respondent to interview. The researcher did the actual interviewing of the respondents. Face-to-face interviews were done guided by the survey questionnaire. Since it was a short instrument some respondents took as little as 10 minutes to answer the questions. This was because they were in a hurry to get back to work. Others took as long as 15 minutes to answer the questions.

Overall a total of 14 food stalls were selected and 60 respondents from Sameer Park were selected (see Table 3.1). The minimum number of respondents the researchers were able to interview in a day was 8 and the maximum was 12. Some respondents expressed that they did not want to take part in the survey during their lunch hour because they wanted to rest. They however stated that they would take part in the survey after their working hours at 5.00pm. The research assistant thus had the task of obtaining their names and mobile numbers and contacting them at 5.00pm. This resulted in the researchers remaining at the study site up to 6.00pm on three consecutive days. By the Saturday the 19th of June the required 30 male respondents had been obtained. This resulted in the selection of only female respondents on Monday the 21st of June. Female respondents tended to be shy and feared that they might get into trouble if they were caught talking to the researcher.

Challenges experienced during data collection included instances where an interview had to be cut short to allow the respondent to get back to work. This was because some workers had only 30 minutes to have their lunch and get back to work and by the time the researchers got to such respondents they only had 5 minutes left. In these cases, the research assistant wrote the contact details of the respondents and the interviewing was completed at 5.00 pm when they had left work. On the second day of the field survey there were some occurrences of industrial workers from other companies inciting the workers from Sameer Park not to take part in the research if there was no monetary payment. Despite this incitement many respondents were willing to participate in the research without being paid. Incitement however resulted in the interviewing of only one respondent in a stall that had seven respondents from Sameer Park.

A third challenge that the researcher faced was on how to collect data on the distance the respondents covered to get to work. This was however solved by the use of internet satellite maps. The researcher used Google Earth to measure the distance from the respondents' residential location to Sameer Park. The only limitation of this method was that it measured distance using the main roads rather than the walking routes used by some of the respondents. These measurements were therefore taken as estimates.

3.4.3 Observation

Observation method was used as a complementary method of data collection. It was used to corroborate what the respondents of the field survey had said and what they actually did. For instance since the researcher had to remain at the study site up to 6.00 pm, the researcher was able to observe the modes that the industrial workers used for their trips back home. It was

observed that some of the respondents who said that they used bicycles to get to work actually had bicycles. Observation method was also used to collect information on the walking routes and the matatu routes that the workers from the industry used. In cases where the researchers had to stay late in the field, matatus from the Hillocks route or Mombasa Road were used to get back to the CBD. The researcher was therefore able to observe the fare paying system as well as some of the challenges faced by matatu users. In some cases the researcher boarded these matatus with respondents from Sameer Park. It was observed that although there was no reference to the motor bike mode of transport by the respondents, there were a lot of motor bikes operators along Enterprise Road. The extent to which the users were from Sameer Park could not be determined.

3.4.4 Case Studies

The case study interviews took place on the 20th of August 2010. This was because the researcher had to review the data obtained from the field survey in order to select suitable respondents. Case study respondents were selected on the basis of the modes used to get to work. Three interview guides were prepared for the case studies (see appendix 3, 4, and 5). For these interviews to take place the researcher had to telephone the interviewees and book an appointment with them. The respondents were willing to take part in the case studies. The interviews took a minimum of 20 minutes to be completed. Among other questions, case study respondents were asked to give the most important reason why they chose the means of transport that they use for their work trips. The respondents were able to give additional information on the links between industrial workers characteristics and their modal choices.

3.5 Data Analysis

All data collected was cleaned to ensure completeness, consistency and accuracy before entry and subsequent analysis. At end of every interview day, the researcher with the help of the research assistant went over all the questionnaires answered to ensure completeness. Since the researcher had used both Kiswahili and Sheng[2] in filling some questionnaires, some responses had to be translated to English. Since the closed ended questions in the questionnaire were pre-coded, the researcher only had the task of coding the open ended questions. This was done using MS Word tables where responses were sorted based on emerging themes (La Pelle, 2004). These themes were then coded. Once coding was completed data was entered into SPSS for analysis.

The first stage of analysis involved generating of descriptive statistics. These were frequency tables and charts to review general findings on the specific research questions. Measures of central tendency and Measures of dispersion were used on quantitative variables such as age, travel time, paratransit fare levels and variations. Analysis of Variance was used to calculate the differences in mean ages between male and female respondents. The second stage involved both bivariate and multivariate data analysis. Cross tabulations and Chi-Square tests of various independent variables were carried out against modal choice. Multinomial logit analysis was finally carried out to measure the influence of significant independent variables on the modal choice of the respondent. This resulted in an array of findings which are discussed in the next chapter.

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[2] Sheng is a Swahili-based patois or slang-based language, originating in Nairobi, Kenya, and influenced by the many languages spoken there. The word is coined from the two words - (S)wa(h)ili and (Eng)lish.

CHAPTER 4: STUDY FINDINGS AND DISCUSSION

4.1 Introduction

This section presents findings of the field research in four subsections. The first identifies the basic characteristics of the industrial worker in Sameer Park EPZ. The second presents findings on the modes and routes that industrial workers in Sameer Park use to get to their work destinations. The third discusses paratransit fare levels and their variations. The final section presents findings on the analysis of factors influencing Modal choice. Charts and tables have been used to illustrate the findings.

4.2 Basic Characteristics of the Industrial Worker in Sameer Park

This section presents the findings on the basic characteristics of the industrial workers. The characteristics that were investigated included the age of the respondents, their area of residence, distance they cover to get to their work destination, the nature of their employment, marital status and family size.

4.2.1 Age

Like most EPZ companies where majority of the workers are in their youth (Mireri, 2000), Sameer Industrial park was found to also employ a youthful population. About 80% of the sampled respondents were 30 years of age and below. The age bracket with the highest frequency was found to be between ages 25-29. The mean age of the workers at Sameer Park was found to be 28 years (see Chart 4.1). ANOVA tests further revealed that there was no significant difference between the age of male and female workers in the industrial park, $(F (1, 58) = 2.282. p > 0.05)$.

Chart 4.1: Age of Respondents
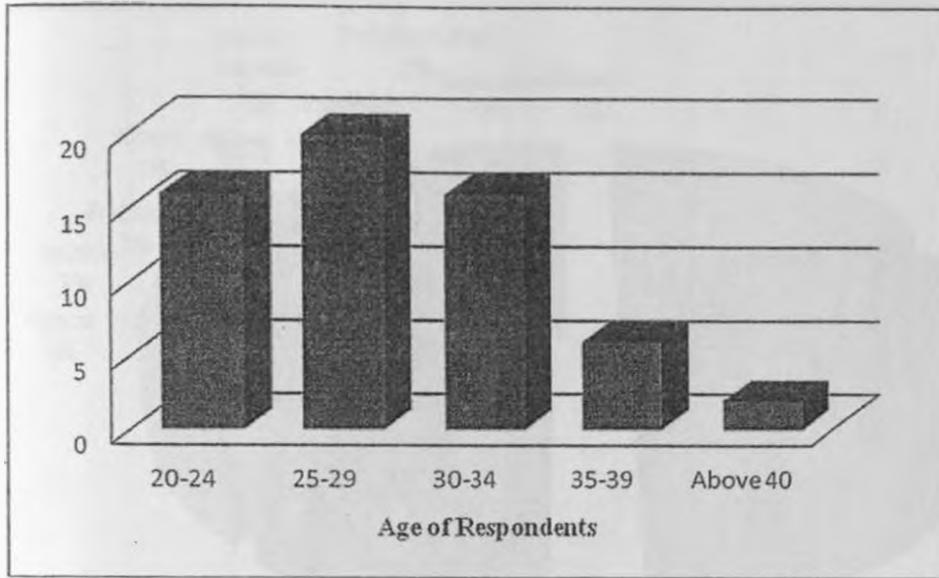
Source: Field Research, 2010

4.2.2 Area of Residence

On the residential area of the respondents it was found that about two-third (66.7%) of the respondents resided approximately 1-3 kilometres from the Industrial Park. Of these 25% reside at Kwa Reuben, 20% resided in Pipeline, 7% in Mukuru Kayaba and 12% in Mukuru Kwa Njenga (see Chart 4.2). Gomide et al (2004) emphasises that people with low income tend to reduce their transport costs by residing in informal settlements that are close to their work destinations. If one considers workers residing in Kwa Reuben, Kwa Njenga and Mukuru Kayaba, one would see that more than half of the respondents sampled reside in informal settlements which are close to Sameer Industrial Park. Only 5% of the respondents were found to reside more than 9 kilometres away from the industrial site. These were from residential areas as far as Ngong and Kahawa Sukari.

Chart 4.2: Areas of Residence of Sameer Industrial Park Workers

Pie chart titled "Area of Residence" with the following segments:
- Mukuru Kayaba 7%
- Kahawa Sukari 2%
- Saika Ruai 2%
- Kaloleni 2%
- Eastleigh 2%
- Kibera 2%
- Ngong 2%.
- Embakasi 5%
- South B 3%
- Hamza 2%
- Kwa Njenga 12%
- Mlolongo 3%
- Pipeline 20%
- Kayole 5%
- Kwa Reuben 25%
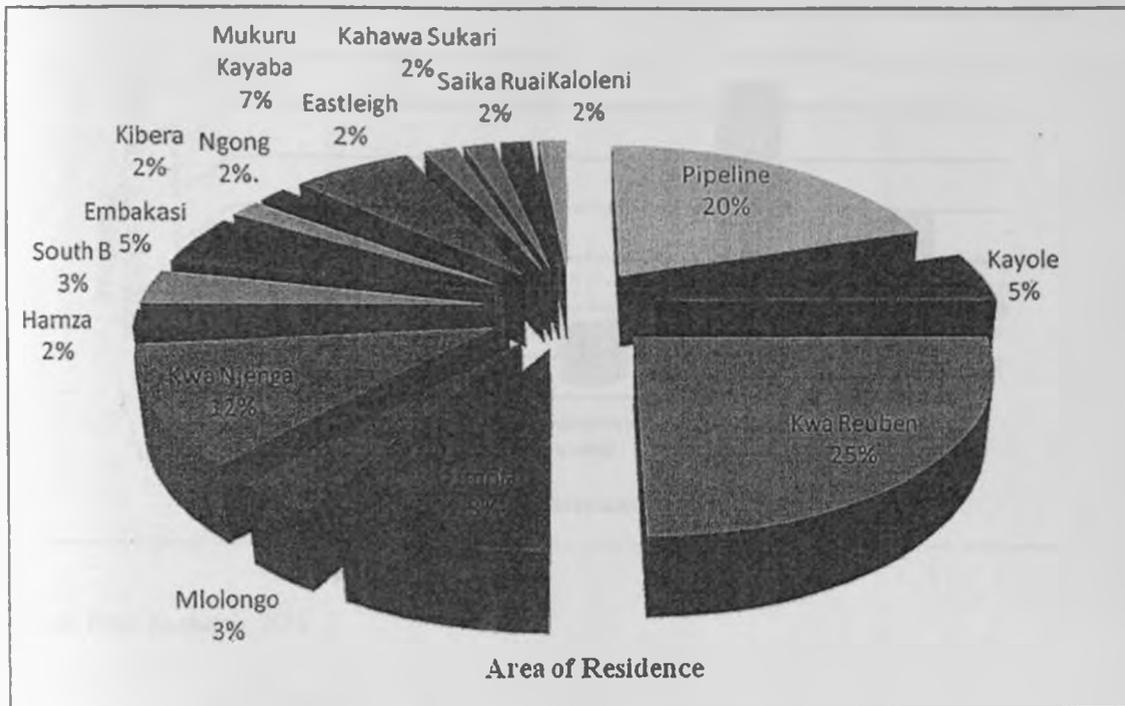
Source: Field Research, 2010

4.2.3 Level of Education

On the highest level of education attained 75% of the respondents were found to have completed their secondary school education. Of this group 26.7% had attained tertiary training as their highest level of education. The remaining 25% consisted of those who had not completed their secondary education (8.3%), those who had completed primary level education (15%) and those who had not completed primary level education (1.7%) see Chart 4.3.

Chart 4.3: Highest Level of Education Attained
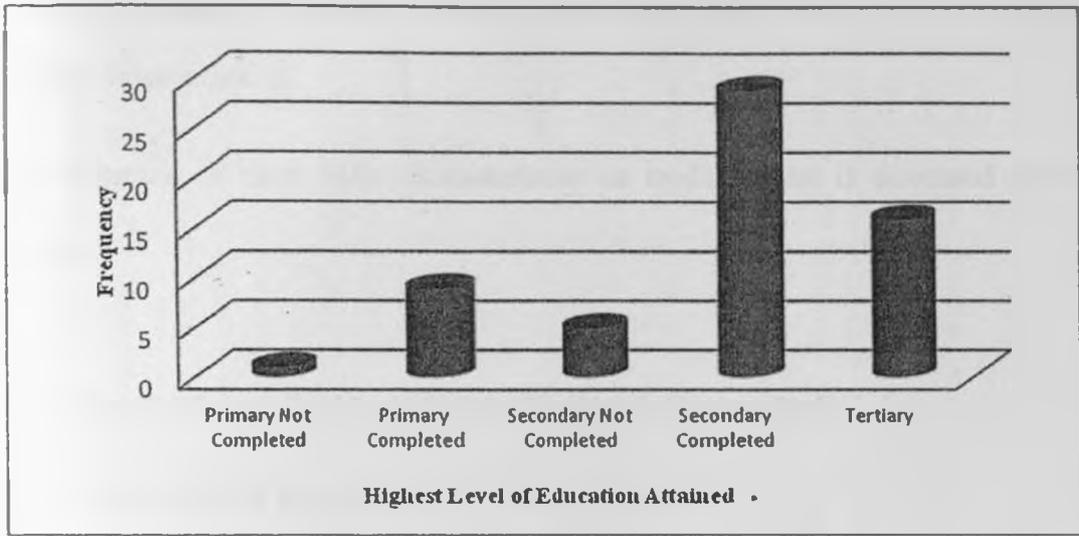
Source: Field Research, 2010

4.2.4 Nature of Employment

On the nature of employment it was found that 55% of the respondents had permanent contracts of employment whereas 45% of the sampled respondents had casual contracts of employment. Case study respondents revealed that permanent contract employees earned more than the casual contract employees. Although nature of employment was used as a proxy for income in this study, sampled case study respondents stated that the income of the worker determined his ability to afford to use matatus for work trips. One case study respondent stated that it was mostly workers from Kencall BPO that had the luxury of using matatus. This was because they had better incomes than other workers in the Industrial Park.

Case studies that were carried out revealed that there were also other characteristics apart from the ones mentioned above that were important in investigating the modal choices of the industrial workers. Case study respondents stated that the marital status and family size were

important characteristics to investigate. This was because many of the casual workers who were married and had families tended to walk more than those who were single with no families to take care of.

The influence of these basic characteristics on modal choice is discussed in subsequent sections.

4.3 Modes and Routes Used by Industrial Workers in Sameer Park

4.3.1 Modes Used for Work Trips

Survey respondents were asked about the modes they use for their work trips. Multiple responses were given to this question. This was why there were a total of 87 responses to this question despite the sample size of 60 respondents. There were many industrial workers who combined various modes of transport to get to work. Almost half of the respondents (49.4%) were found to use matatus for their work trips. This ranged from those who used matatus for daily trips and those who used matatus once in a while. Another 41.4 % of the respondents stated that they walked to work. This category consisted of those who walked daily and those who walked less frequently. There were also a few respondents who used buses for their work trips (4.6%). These were mainly respondents who lived at a distant far from the Industrial Park. Cyclists were few with only 3.4% using bicycles for the work trips. Some respondents stated that they sometimes had night shifts or early morning shift and this forced them to use company vehicles to get to work. This was represented as other and only 1.1% of the respondents used this means to get to work (see table 4.1).

Table 4.1: Modes Used for Work Trips

Modes Used for Work Trips

Modes	Responses		Percent of Cases
	N	Percent	
Matatu	43	49.4%	71.7%
Bus	4	4.6%	6.7%
Walking	36	41.4%	60.0%
Cycling	3	3.4%	5.0%
Other	1	1.1%	1.7%
Total	87	100.0%	145.0%

Source: Field Research, 2010

A question was asked on how often an industrial worker used a particular means of transport to work. About a quarter (26.7%) stated that they always used a matatu for their work trips. Others stated that they always walked to work (26.7%). Those who mostly walked and rarely used matatu consisted of 16.7% of the respondents. Another 8.3% stated that they mostly used matatus and rarely walked to work. Only 5% of the respondents stated that they cycled to work. Some stated that they use matatus mostly and buses rarely (5%). Others stated that they used matatus and walked interchangeably (3.3%). One respondent stated that 60% of his monthly trips were made on foot where as 40% by matatu. Another respondent who used both matatu and walked to work stated that he used matatu in the morning because they did not want to be late and walked in the evening. A respondent stated that he used matatu for the first few weeks of the month then he reverted to walking. Other respondents stated that they mostly walked in the middle of the month when they did not have money to use a matatu (8.5%). They used it during end month period when they had been paid. Matatu drivers who were key informants in the study stated that there was lower ridership in the middle of the month compared to the end of the month. This was noted by the difference in the time they had to wait for a matatu to load at peak hours during the middle of the month and at the end of the month. These findings are similar to Howe and Bryceson (2000) analysis of the effects

of poverty on the ability to pay for urban transport, where in both Tanzania and Kenya there was reduced use of public transport during the mid-month period.

Respondents who stated that they always used matatu were asked why they always used this means of transport. Respondents gave multiple responses to this question. About a third (37.5%) stated that matatu was the most regular means of transport. Others stated that it was impossible to walk from their residential locations to the Industrial Park because it was too far (34.4%). Only 9.4 % responded that they could afford to use matatus everyday. These were mainly workers from Kencall BPO. A few respondents stated that they used matatus in order to save on time (9.4%). While others stated that they used matatus because of security reasons (6.2%). Respondents expressed that the routes that they used were not very secure early in the morning. Thus they had to use matatus for their work trips. One respondent stated that he had to go for evening classes in town. This forced him to use a matatu to town and back (3.1%).

More than a third of the respondents (40%) stated that they used matatu a few times in a week and that they did so when they were late. About a third (30%) stated that they only used matatu when they had money. Some respondents expressed that they used matatus only when it was raining (20%). A few respondents (10%) stated that when they got tired of walking then they used matatus. For those who never use matatu for their work trips, more than a half (52%), stated that they lived close by. Similar to Mitullah and Makajuma (2009) study which stated that NMT users rarely used matatus because they were expensive, industrial workers in this study also stated that they did not use matatus because matatus were expensive and they lacked money (40%). One respondent stated that he had a bicycle thus he did not use matatu. Another stated that there were no matatu reaching her residential location

and this was why she walked. Following these responses, sampled respondents were further categorised into those that only used motorised means (Matatu), those that only used NMT and those who combined both motorised and non-motorised means of transport. It was found that 36.7% always used motorised means (matatu), thirty percent of the respondents always used non-motorised means of transport and 33.3% combined both motorised and non motorised means of transport to get to work.

In an attempt to understand the effects of contextual changes on habitual travel modes, respondents were then asked whether they once in a while changed the means of transport they used to get to work. Davidov (2007) assumptions that contextual changes influence habitual travel mode-choice were supported. About two-thirds (65%) of the respondents stated that they once in a while changed the means of transport they used to get to work. Of those who changed their means of transport once in a while, more than a fifth (22.4%) stated that when they did not have money to use a matatu then they walked. Another 22.4% stated that they were forced to seek other means of transport when there was a matatu strike. About a quarter i.e. 26.5% stated that they had used other means of transport especially when they were late for work. Some respondents stated that rainy season made them opt for a different means of transport to get to work (18.4%). Three respondents stated that they changed the means of transport that they usually used when they were tired or sick (6.1%). A cyclist expressed that when he had bicycle problems then he had to walk (2%). Another stated that morning shift forced him to use the company vehicle to get to work (2%).

4.3.2 Routes

NMT Routes

Just over half of the respondents (51.4%) who walk to work use the Mombasa Road route (see Chart 4.4). This route is mainly used by the industrial workers who reside in Kwa Njenga and Pipeline. Respondents stated that there was no direct route to the industrial park. They had to use short cuts through Imara Daima Estate to the railway bridge before getting to Mombasa road. Those that walk along Enterprise Road are those who reside in Kwa Reuben and Mukuru Kayaba (45.9%). One respondent (2.7%) who resides in Umoja stated that he had to walk from Umoja to Buru Buru in order to get a matatu to town. This was because matatus from Umoja to town were rare in the morning and there was heavy traffic jam along Outering Road to Donholm round about.

Chart 4.4: Walking Routes commonly used by NMT users in Sameer Industrial Park
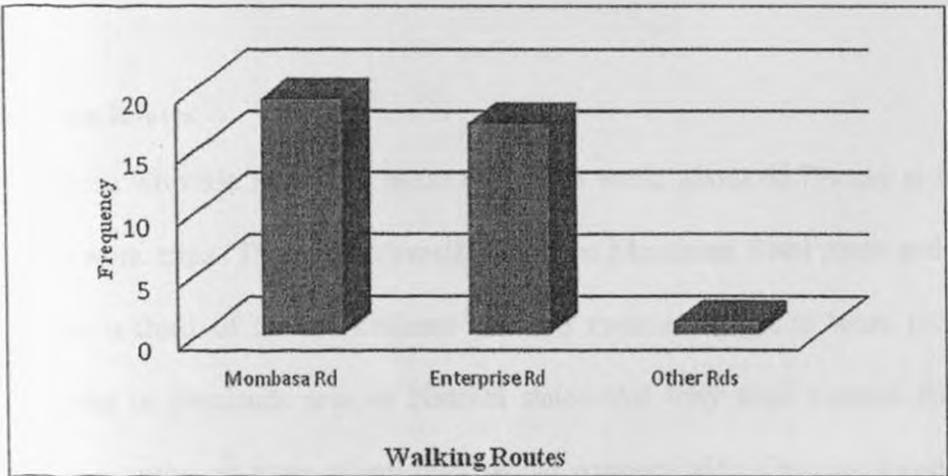
Source: Field Research, 2010

Respondents were asked whether they faced any challenges using other means of transport apart from matatu. Almost three-quarters (70%) of the respondents stated that they did in fact face many challenges. About 41.4% of the respondent complained of improper NMT

infrastructure. They stated that the routes were impassable during rainy season and they would arrive very dirty to work during both rainy season and dry season. Similar to the residents in Wuhan, China (Shuiying et al. 2003), NMT users in Sameer Industrial Park also complained of insecurity as one of the major challenges that they faced while using NMT (24.3%). A case study respondent stated that the short cut to Mombasa Road route was dangerous very early in the morning. The respondent stated there had been a lot of muggings along this route and that women were mostly targeted. This made them opt to use a matatu. Some respondents complained that daily use of NMT made them very exhausted and this affected their performance at work (15.7%). Other respondents complained of misconduct of matatu operators and other motorists (12.9%). They complained that these drivers tended to drive on the foot paths during traffic jams. This agrees with Mitullah and Makajuma's (2009) analysis of non-motorised travel conditions along Jogoo Road, which demonstrated that matatus were known to invade NMT sidewalks with impunity. Only 5.7% complained of arriving late to work when using NMT.

Matatu Routes

Of those who use motorised means to get to work, about 66.7% use at least one matatu for their work trips. These were mostly from the Mombasa Road route and the Hillocks route. About a third of the respondents use two matatus to get to work (33.3%). Respondents residing in Eastlands area of Nairobi stated that they used matatus from their residential location either to town where they would connect with a matatu going to Sameer Park or alight at City Stadium to get a Hillocks matatu to Sameer Industrial Park. The matatu route labelled other in the table 4.2 represents matatus from various residential areas of Nairobi City such as Buru Buru, Kayole, Umoja, Eastleigh, Kahawa Sukari etc.

Table 4.2: Matatus used for Work Trips

Matatu Routes	Responses		Percent of Cases
	N	Percent	
Hillocks	10	17.9%	23.8%
33 Msa Rd	30	53.6%	71.4%
Other	16	28.6%	38.1%
Total	56	100.0%	133.3%

Source: Field Research, 2010

Respondents were asked whether they faced any challenges using matatu for their work trips. About three-quarters (70%) of the respondents stated that they indeed faced various challenges while using matatu for their trips to work. Survey respondents gave multiple responses to the kind of challenges they faced when using a matatu. Respondents complained of fare hikes (44.8%). They stated that matatu operators arbitrarily raised fares without considering the passengers budget. This forced some respondents to use NMT when they could not afford to use matatus. About a third of the respondents (31.3%) complained of traffic jam (31.3%). Respondents stated that sometimes the traffic jam was so bad that they had to alight from the vehicle and walk so that they don't arrive late to work. About a fifth i.e. 20.9% complained of rude conductors. Conductors were seen as not being customer friendly. They were seen to harass passengers especially ladies. Only 3% complained of matatu strikes and theft from fellow passengers while using a matatu.

4.3.3 Travel Time

The average travel time for industrial workers was 30 minutes, 45 minutes, 33 minutes and 40 minutes for the matatu user, bus user, cyclist and the pedestrian respectively. About a half (53.3%) of the industrial workers stated that they had to report to work by 7.00 am. Those that had a very early morning shift were picked by their company vehicle. These were mainly workers from the Ken Call BPO company.

4.4 Paratransit Fare Levels and Variations

4.4.1 Standard Fare Levels

Key informant interviews revealed that the standard fare level at off peak times for matatus plying the Hillocks Route as 20 Kshs. At peak time this fare rose to 30 Kshs. For the Mombasa Road route key informants stated that the off peak fare level was 30 Kshs whereas the standard fare level at peak times was 50 Kshs. Almost a third of the respondents stated that they only used 20 Kshs in the morning for a trip to work using a matatu (31.7%). These were mainly respondents using only one matatu to get to work. On the extreme end some respondents were reported to use 120 Kshs to get to work. This constituted of 1.7% of the respondents who used more than one matatu to get to work. The lowest amount paid for matatu use in the evening was 10 Kshs and this was mainly recorded in respondents that used the Hillocks matatu route. Only 1.7% of the respondents stated that they used 120 Kshs for the trips back home. As in the case of the morning trip, this was mainly recorded by those respondents who lived at a distance from the industrial park and used two matatu to get to work.

4.4.2 Fare Variations

On the highest fare variations, more than a third of the respondents (41.9%) paid between 21 Kshs to 40 Kshs for their work trips while 23.3% paid between 41 and 60 shillings. A tenth of the respondents (10%) stated that the highest fare paid was between 61 Kshs and 100 Kshs. Others paid more than 100 Kshs when the fares increased (11.6%). Only 9.3% continued to pay 20 Kshs for their work trips (see Chart 4.5). The highest amount ever paid for matatu use by the industrial workers was 150 Kshs.

Chart 4.5: Highest Fares Paid for Matatu Use
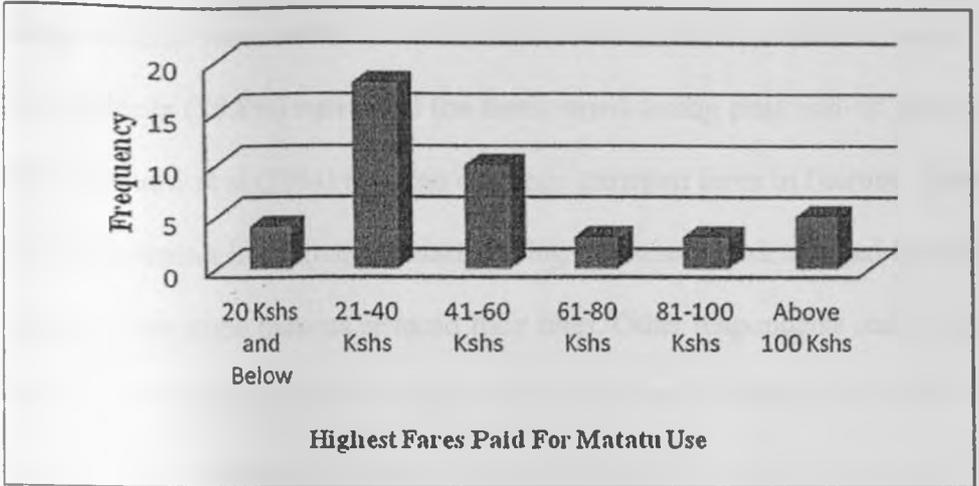
Source: Field Research, 2010

About three quarters of the motorised users (72.1%) stated that the lowest amount of fare they had ever paid for a single matatu trip to work was 20 shillings. More than a fifth (20.9%) paid between 21 and 40 Kshs while 2.3% paid between 41 and 60 shillings. Only 4.1% paid more than 60 Kshs (see Chart 4.6).The lowest amount of fare ever paid for a single trip was 10 shillings.

Chart 4.6: Lowest Fares Paid for Matatu Use
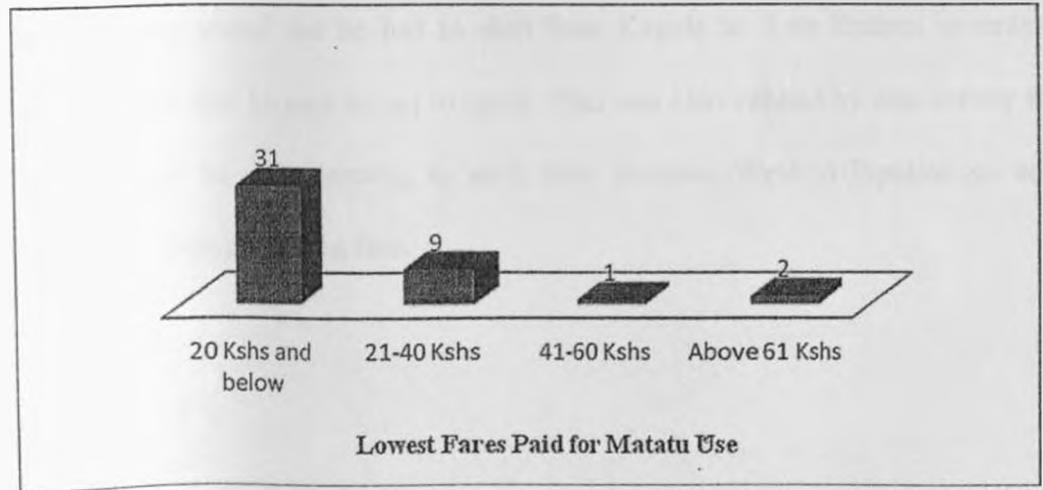
Source: Field Research, 2010

4.4.3 Matatu Fare Increase and Variations

Respondents were asked to state when matatu fares increase or vary. About half of the respondents (50.8%) stated that the fares varied during peak and off peak times. This concurs with Kimani et al (2004) analysis of public transport fares in Nairobi. Respondents stated that in the morning hours many matatus going to Sameer Park charged high fares whereas in the evening the same matatus reduced their fares. Other respondents stated that peak and off peak times were dependent on the route where one was travelling. It could be peak time on one side of the road and off peak on the other side of the road. For instance, for a trip to town using Mombasa road in the evening could be considered as off peak time. This was because there was a higher demand to ferry passengers from town to the residential areas than vice versa.

On fare increase 40.7% of the respondents stated that the fares increased during the rainy season whereas another 6.8% stated that fare increase was seen during matatu strikes when there was a scarcity of matatus. A respondent who resides in Ngong stated that he frequently had to pay 150 shillings for a matatu trip back home during rainy season. One case study respondent stated that he had to shift from Kayole to Kwa Reuben in order to reduce the amount of fare he paid to get to work. This was also echoed by one survey respondent who stated that he was planning to shift from Kahawa West to Pipeline so as to reduce his monthly expenditure on fare.

4.5. Analysis of Factors Influencing Modal choice

This section seeks to present the relationships between various independent factors and the modal choices of the industrial workers.

4.5.1 Effects of Paratransit Fare Levels and Variations on Modal Choice

Respondents were asked whether matatu fare levels affected their decision to use a matatu for their work trips. More than half of the respondents (58.3%) stated that their decision to use a matatu was affected by the level of matatu fares. These respondents included those who only used non-motorised means of transport to get to work and those who combined both motorised and non-motorised means of transport. The rest of the respondents stated that their decision to use a matatu was not affected by the paratransit fare levels (41.7%).

Of those who stated that the levels of matatu fares affected their decision to use a matatu, 60% had casual contracts. More than three quarters (76%) of the respondents who were not affected by fare levels had permanent contracts of employment. A large majority (87.5%) of those who stated that their decision to use a matatu was affected by matatu fare levels lived within 4 kilometres from Sameer Park whereas the 68% of respondents who were not affected lived more than 4 kilometres away from the Industrial Park (see chart 4.7)

Chart 4.7: Do paratransit Fare Levels affect Industrial Workers' Decision to Use a Matatu by Distance
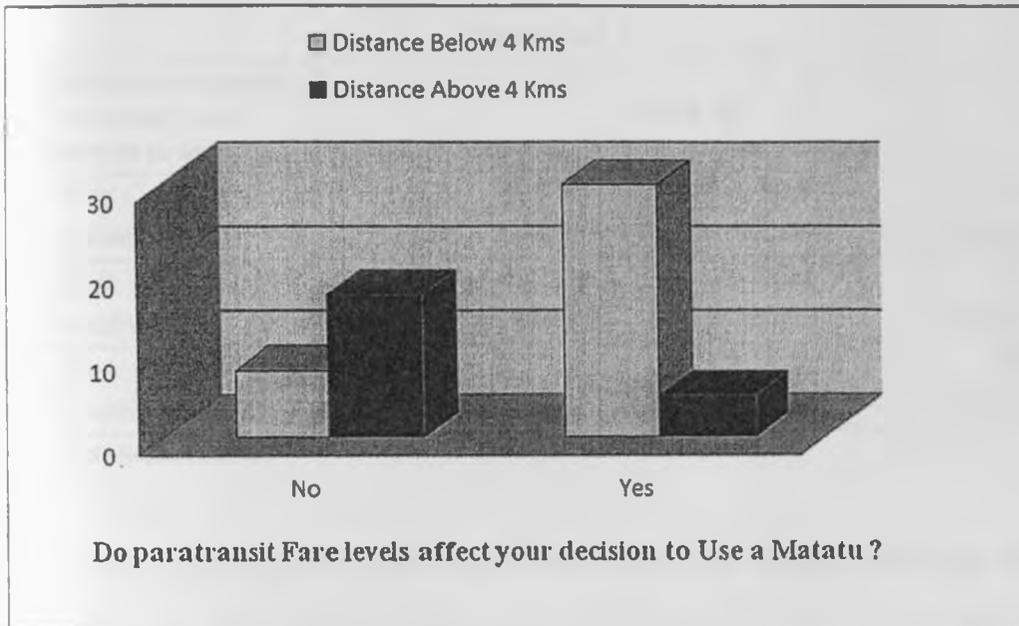
Source: Field Research, 2010

Respondents were asked whether variations in matatu fares affected their decision to use a matatu. More than a half of the respondents (58.3%) also stated that the fare variations affected their decision to use a matatu. Of this group 34.3% were regular NMT users; 14.3% were motorised transport users whereas 51.4% combined both NMT and motorised transport for their work trips. The rest of the respondents stated that matatu fare changes did not affect their decision to use a matatu (41.7%). About a third (34.3%) of these respondents were NMT users, more than two-third (68%)of the respondents were motorised users and only 8% combined NMT and motorised transport for their work trips (see Table 4.3)

Table 4.3: Influence of Matatu Fare Variations on Decision to Use a Matatu by Modes Used for Work Trips

	Do changes in matatu fares affect your decision to use	NMT	Motorised	NMT and Motorised	Total
		Modes Used			
Yes	Count	12	5	18	35
	% within	34.3%	14.3%	51.4%	100.0%
No	Count	6	17	2	25
	% within	24.0%	68.0%	8.0%	100.0%
Total	Count	18	22	20	60
	% within	30.0%	36.7%	33.3%	100.0%

Source: Field Research 2010

Nearly half of the respondents (48.3%) of those who were affected stated that they opted to walk. However, 19% stated that they had no option but to use a matatu. Some motorised transport users explained that they had to wait for a cheaper matatu when there were matatu fare hikes (12.1%). There were also those respondents that opted to cycle (8.6%) and others who stated that fare changes had no effect on their decision to use a matatu (8.6%). A few stated that they opted to use a bus because bus fares rarely changed (3.4%).

The main hypothesis of the study was that paratransit fares do influence the modal choices of the industrial workers in Sameer Park. The standard paratransit fare level was determined by the fares charged at peak time by matatus plying Enterprise and Mombasa Road as well as those plying various residential areas. Low fare levels (below 30 Shillings) indicated that NMT or one matatu could be used to get to work. High fare level (above 90 shillings) indicated that two matatus had to be used to get to work. Fare levels was analysed against the modal choices of the respondents. It was found that 100% of those who used NMT as the only means of transport were categorised as using less than 30 Kshs in a day. Actual data showed that they in fact did not use any money on transport since they solely relied on NMT.

More than two-third (63.6%) of those who used motorised means used more than 90 shillings in a day for their work trips. Whereas 70% of those who combined motorised and NMT used between 30-60 Kshs per day for their work trips (see Table 4.4). Chi square tests revealed that there was a relationship between the paratransit fare levels and modal choices. The null hypothesis that there was no relationship between fare levels and modal choice was rejected. This agrees with Jou et al (2010) findings that trip costs (in this case fares) are one of the key measurable factors that influence modal choice.

Table 4.4: Total Paratransit Fare by Modal Choice

Modal Choice		Total Fare Category				Total
		Below 30 shillings	30-60 shillings	60-90 shillings	Above 90 shillings	
NMT	Count	18	0	0	0	18
	% within Modal Choice	100.0%	.0%	.0%	.0%	100.0%
Motorised	Count	0	5	3	14	22
	% within Modal Choice	.0%	22.7%	13.6%	63.6%	100.0%
NMT & Motorised	Count	1	14	4	1	20
	% within Modal Choice	5.0%	70.0%	20.0%	5.0%	100.0%
Total	Count	19	19	7	15	60
	% within Modal Choice	31.7%	31.7%	11.7%	25.0%	100.0%

(Chi-square=77.73, p< 0.05, df = 6)
Source: Field Research, 2010

4.5.2 Other Factors Influencing Modal Choice

During the survey, respondents were asked to rank the factors that mostly influenced their choice of means of transport. These factors included their incomes, the distance they cover to get to work, weather (rain), preference and other. A response category of other factors was inserted in the questionnaire so as to include factors that were seen as important by the respondent but were not in the questionnaire. About a half of the respondents (55%) stated that distance was the most influential factor when choosing the mode to use to get to work.

Respondents that used NMT stated that since they lived close by they walked because the distance was short. Respondents who lived at a distance from the industrial park stated that their choice of mode was dictated by the distance they had to cover each morning to get to work.

More than a third of the respondents (35%) stated that income was the most influential factor when choosing the mode to use to get to work. Casual worker respondents stated that since their income was low they could not afford to use motorised means every day of the month. A case study respondent stated that it was those with higher incomes that had the luxury of using motorised transport. That those with low income had to live close to the industrial site in order to cut down on travel expenses. Three respondents (5%) stated that changes in weather patterns i.e. rainy season was the most influential factor. This was because rainy season affected the habitual travel choice. For instance NMT users stated that they sometimes had to use motorised means during rainy season because it was impossible to walk or cycle. Matatu users also stated that fare increase during rainy season forced them to pay higher fares. This forced them to wait for buses which did not hike fares. A small minority (3.3%) stated that there were other factors apart from the ones stated in the questionnaire that could influence modal choice. These included travel time and availability of matatus. Unlike the emphasis of preference as a factor influencing modal choice in developed countries (Hartgen, 1974), preference is ranked as the fourth most influential factor after distance, income and changes in weather. Only one respondent (1.7%) stated that preference was the most influential factor on modal choice (see Table 4.5)

Table 4.5: Other Factors that mostly influence Modal Choice

	Most Influential	2nd Most Influential	3rd Most Influential	4th Most Influential	5th Most Influential	Total
Other Factors Influencing Modal Choice						
Distance	33	15	11	1	0	60
%	55%	25%	18.3%	1.7%	0%	100%
Income	21	28	10	1	0	60
%	35%	46.7%	16.7%	1.7%	0%	100%
Weather	3	35	11	11	0	60
%	5%	18.3%	58.3	18.3%	0%	100%
Other	2	2	1	0	55	60
%	3.3%	3.3%	1.7%	0%	91.7%	100%
Preference	1	4	3	47	5	60
%	1.7%	6.7%	5%	78.3%	8.3%	100%
Total	n=60					100%

Source: Field Research, 2010

Based on empirical literature (Jou et al, 2010; Salon & Gulyani, 2008; Baker et al, 2005), this study also sought to carry out an analysis of other factors that influence modal choice. This resulted in the analysis of the basic characteristics of industrial workers in Sameer Park against their modal choices.

Gender

This study sought to test the hypothesis that there would be a significant difference in modal choices between male and female respondents in the study. Of those who only used NMT, 61.1% were found to be women and the rest men. About two-thirds (65%) of those who

combined both NMT and Motorised means of transport were found to be men (see table 4.6).

Unlike findings by Salon and Gulyani (2008) supporting a difference in modal choice among slum residence based on gender, chi-square tests revealed that there was no association between gender and modes used for work trips in Sameer Park. The null hypothesis that there was no relationship between gender and modal choice was accepted. This was perhaps because both male and female employees were subjected to equal opportunities of employment unlike the slum residents in Salon and Gulyani (2008) study.

Table 4.6: Modal Choice by Gender

Modal Choice		Gender		Total
		Male	Female	
NMT	Count	7	11	18
	% Within Modes Used	38.9%	61.1%	100.0%
Motorised (Matatu)	Count	10	12	22
	% Within Modes Used	45.5%	54.5%	100.0%
NMT & Motorised	Count	13	7	20
	% Within Modes Used	65.0%	35.0%	100.0%
Total	Count	30	30	60
	% Within Modes Used	50.0%	50.0%	100.0%

(Chi-Square = 2.871 p> 0.05 df =2)
Source: Field Research, 2010

Age

About three-quarters of the respondents aged between 20-29 years (72.7%) were found to be regular motorised transport users. The remaining respondents (27.3%) who used motorised means belonged to the age category of 30-39 years (see Chart 4.8). The research hypothesised that there was a relationship between respondent's age and their modal choice. The null hypothesis was that there would be no relationship between the respondent's age and their modal choice. Chi-square test revealed that there was indeed no relationship between respondent's age and the modal choice (Chi-Square=0.238 p>0.05 df=4). The null hypothesis was therefore accepted. |nul reserct|

Chart 4.8: Respondents' Ages by Modal Choice
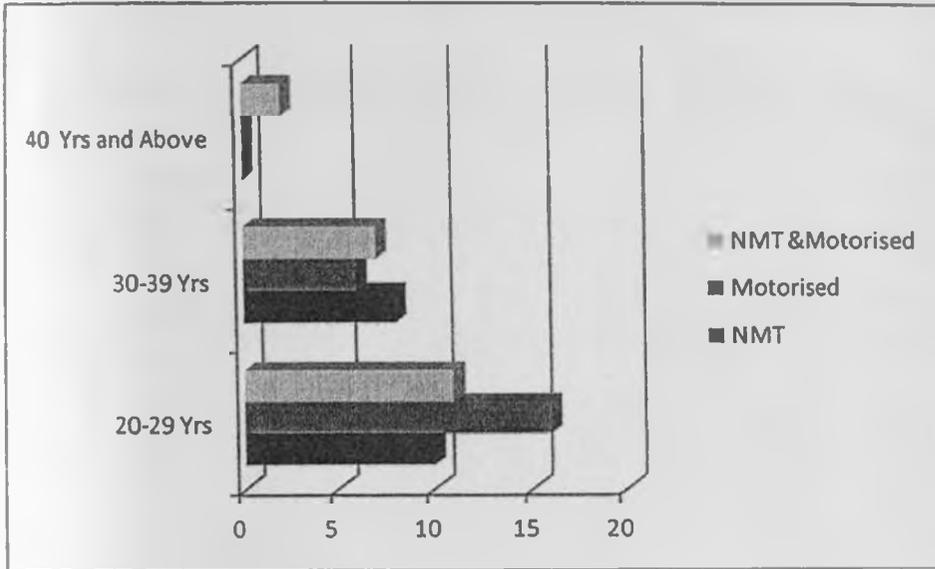
Source: Field Research, 2010

Level of Education

On the highest level of education 22% of those who used NMT had primary education as their highest level of education. Whereas 61.1% of those who used NMT had secondary education as their highest level of education (see Table 4.7). Based on empirical evidence (Salon and Gulyani, 2008) the research hypothesised that there was a relationship between level of education and modal choice i.e. it sought to find out if respondents with higher levels of education tended to use motorised means more than those who had lower levels of education. Chi-Square test showed that there was a significant relationship between the highest level of education of the industrial worker and the modal choice. However due to the sample size, some cell had less than the minimum expected count.

Table 4.7: Modal Choice by Highest Level of Education Attained

Modal Choice		Highest level of Education attained					Total
		Primary Not Completed	Primary Completed	Secondary Not Completed	Secondary Completed	Tertiary	
NMT	Count	0	4	2	11	1	18
	% within Modal Choice	.0%	22.2%	11.1%	61.1%	5.6%	100.0%
Motorised	Count	0	3	1	5	13	22
	% within Modal Choice	.0%	13.6%	4.5%	22.7%	59.1%	100.0%
NMT & Motorised	Count	1	2	2	13	2	20
	% within Modal Choice	5.0%	10.0%	10.0%	65.0%	10.0%	100.0%
Total	Count	1	9	5	29	16	60
	% within Modal Choice	1.7%	15.0%	8.3%	48.3%	26.7%	100.0%

(Chi-Square= 22.1, p<0.05, df =8).

Source: Field Research, 2010

Nature of Employment

Nature of employment in this study was used as a proxy for income. It was found that 72.2 % of those who used NMT for their work trips had casual contracts where as 81.8% of those that used motorised means for their work trips had permanent contracts (see chart 4.9). Chi square test revealed that there was a relationship between nature of employment and modes used for work trips. Therefore employees with casual contracts were more prone to use NMT than those with permanent contracts. And that those with permanent contracts were more prone to use motorised means of transport than those with casual contracts. (Chi-Square= 11.984 p<0.05 df = 2)

Chart 4.9: Nature of Employment of Industrial Workers and Modes Used for Work Trips
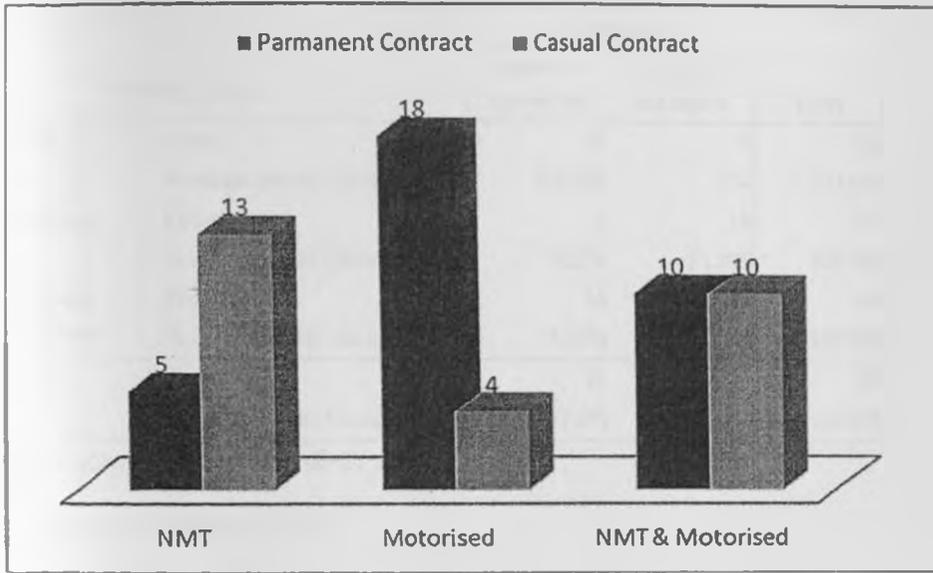
Source: Field Research, 2010

Area of Residence

In order to measure the association between modes used for work trips and the distance covered, distance categories were collapsed. Of those who always used NMT for their work trips, 100% resided within 4 kilometres from their place of work. Of those who used motorised means of transport for their work trips 81.8% lived more than 4 kilometres away from Sameer Industrial Park (see Table 4.8). Chi-square test revealed that there was an association between distance from work place and modes used to get to work. This concurred with the findings of Baker et al (2005) that the distance covered to the work destination influenced modal choice. Industrial workers who resided within a distance of 4 Kilometres from Sameer Park were more prone to use NMT than those who resided more than 4 Kilometres from the park.

Table 4.8: Modal Choice by Distance from Sameer Park to Area of Residence

Modal Choice		Distance		Total
		Below 4 Kilometres	4 Kilometres and above	
NMT	Count	18	0	18
	% within Modal Choice	100.0%	.0%	100.0%
Motorised	Count	4	18	22
	% within Modal Choice	18.2%	81.8%	100.0%
NMT and Motorised	Count	16	4	20
	% within Modal Choice	80.0%	20.0%	100.0%
Total	Count	38	22	60
	% within Modal Choice	63.3%	36.7%	100.0%

(Chi-Square=32.127 p<0.05 df=2)

(Source: Field Research, 2010)

Following the analysis of modal choices and independents variables above, nature of employment, distance, and fare levels were found to have a significant relationship with modal choice. These are according to Jou et al (2010) the key measurable factors that influence modal choice. Multinomial logistic regression was used to measure the relationship between these variables and modal choice. In this analysis, the null hypothesis that there is no difference between the model without independent variables and the model with independent variables was rejected (Chi-Square=98.78 p< 0.05 df =6). The existence of a relationship between the independent variables and the dependent variables was supported.

Due to the sample size there was evidence of numerical problems in the solution. This was due to convergence failures in the logistic regression. Convergence failures were caused by quasi-complete separation. Standard Errors and Wald Statistics were therefore not used. Likelihood ratio tests revealed that there was a significant relationship between fare level and modal choice (see Table 4.9).

Table 4.9: Relationship between Selected Independent Variables and Modal Choice

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	23.286	.000	0	.
Fare Level	78.579	55.293	2	.000
Distance	26.561	3.275	2	.194
Nature of Employment	24.321	1.035	2	.596

Source: Field Research, 2010

No significant relationships emerged between modal choice and the other two variables. Perhaps this may have been caused by the use of distance estimates rather than actual distance measurements or the use of nature of employment as a proxy for income instead of actual income values. Perhaps a larger sample size could have also yielded more significant results.

CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

This study set out to investigate the effects of paratransit fares on commuters' modal choice among industrial workers in Sameer Park EPZ. This was based on evidence that despite the growth in numbers by matatus a significant proportion of Nairobi residents continued to use NMT for their work trips. The study was guided by the following specific objectives: to find out the basic characteristics of the industrial worker in Sameer Park EPZ; to find out the modes and routes that industrial workers in Sameer Park use to get to their work destinations; to find out the paratransit fare levels and variations that occurs in these routes; to investigate the extent to which paratransit fares determine industrial workers' modal choice in accessing employment destinations and to find out other factors that could influence industrial workers' modal choice.

Quantitative and qualitative techniques of data collection and analysis were used in this study. A descriptive analysis of the specific study objectives was first carried out. This was followed by an analysis of the relationship between paratransit fares and modal choice. The analysis of the relationship between other factors (gender, age, level of education, distance and nature of employment) that had been identified in the empirical literature and modal choice was also carried out. A synopsis of the main research findings is given below.

5.1.1 Basic Characteristics

Like most EPZ companies Sameer Industrial park was found to employ a youthful population. About 80% of the sampled respondents were 30 years of age and below. It was

found that about two-thirds of the industrial workers (66.7%) resided approximately 3 kilometres away from the Industrial Park. These were mainly from residential areas such as Kwa Njenga, Kwa Reuben and Pipeline which are informal settlements close to Sameer Industrial park. Only 5% of the respondents were found to reside more than 9 kilometres away from the industrial site. These were from residential areas as far as Ngong and Kahawa Sukari. Industrial workers that resided within a distance of 4 kilometres from Sameer Park were more prone to use NMT than those who resided more than 4 kilometres from the park.

Comparing modal choice to nature of employment and distance, it was found that there was an association between the nature of employment and the modal choice of the industrial workers. The research also found that 72.2 % of those who used NMT for their work trips had casual contracts where as 81.8% of those that used motorised means for their work trips had permanent contracts Although nature of employment was used as a proxy for income in this study, case study respondents stated that the level of income was critical in determining ones modal choice. People with higher incomes were more likely to use motorised means than those with low incomes. The study also showed that there was a significant relationship between the highest level of education of the industrial worker and the modal choice. Most of the respondents with tertiary education as their highest level of education tended to use motorised transport.

5.1.2 Modes and Routes Used by Industrial Workers in Sameer Park

An analysis of the modes used by industrial workers in Sameer Park showed that there were many industrial workers who combined motorised and non-motorised means of transport for their work trips. Of this group 65% were found to be male respondents. Almost half of the

respondents (49.4%) were found to use matatus for their work trips. This ranged from those who used matatus for daily trips and those who used matatus once in a while. Another 41.4 % of the respondents stated that they walked to work. Matatu operators along Enterprise Road and Mombasa Road stated that there was lower ridership in the middle of the month compared to the end of the month. Some respondents also stated that they used matatus at the end of the month after they had been paid. For those who never use matatu for their work trips, more than a half (52%), stated that they lived close by thus they did not need to use a matatu. However other expressed their inability to pay for matatu use because they lacked money (40%).

Of those respondents who use non-motorised means of transport, just over half (51.4%) walk to work use the Mombasa Road route. This route is mainly used by the industrial workers who reside in Kwa Njenga and Pipeline. Of those who use motorised means to get to work, about two-thirds (66.7%) use at least one matatu for their work trips. These were mostly from the Mombasa road routes and the Hillocks route. About a third of the respondents use two matatus to get to work (33.3%). Respondents stated that they used matatus from their residential location either to town where they would connect with a matatu going to Sameer Park or alight at City Stadium to get a Hillocks matatu to Sameer Industrial Park.

5.1.3 Paratransit Fare Levels and Variations

Matatu operators plying the Hillocks Route stated that the standard fare level was 20 Kshs and off-peak and 30 Kshs as peak time. For the Mombasa Road route matatu operators stated that the off peak fare level was 30 Kshs where as the standard fare level at peak times was 50 Kshs. Almost a third of the respondents stated that they only used 20 shillings in the morning

for a trip to work using a matatu (31.7%). These were mainly respondents using only one matatu to get to work. Other respondents were reported to use as much as 120 shillings to get to work. This constituted of 1.7% of the respondents who used more than one matatu to get to work. The lowest amount paid for matatu use in the evening was 10 shillings and this was mainly recorded in respondents that used the Hillocks matatu route. On fare variations the highest amount of fare ever paid for a single trip was 150 Kshs whereas the lowest amount ever paid was 10Kshs.

5.1.4 Factors Influencing Modal Choice

On the influence of paratransit fares on modal choice of the industrial workers, the researcher found that more than a half (58.3%) of the respondents stated that their decision to use a matatu was affected by the level of matatu fares. The study found that there was a significant relationship between paratransit fare levels and modal choice. About two-thirds (63.6%) of those who used motorised transport (matatu) spent close to 90 Kshs in a day. Furthermore more than a half of the respondents (58.3%) stated that fare changes affected their decision to use a matatu. Nearly half of the respondents (48.3%) of those who were affected stated that they opted to walk. Multinomial logistic analysis demonstrated that there was a significant relationship between the independent variable paratransit fare levels and the modal choice of the industrial worker.

5.2 Conclusions

Paratransit fares do affect the modal choices of industrial workers and this is seen by the coping strategies that they take up against these fares. Many of the industrial workers who are affected by paratransit fare levels opt to use other means of transport. For those who cannot afford matatu fares, NMT becomes the main mode of travel. Other industrial workers are able to cope with these fares by not using matatus ever so often. There is therefore a mix of matatu use and NMT for work trips.

A key coping strategy against paratransit fares that has been cited in empirical literature and is seen among industrial workers in Sameer Park is the settlement of industrial workers in informal settlements which are close to Sameer Industrial Park. Almost half of the industrial workers who took part in the study reside in Kwa Njenga, Kwa Reuben and Mukuru Kayaba which are informal settlements less than 3 Kilometres from Sameer Park. This is so as to enable them to use NMT. Such strategies have exacerbated and sustained the growth of informal settlements in Nairobi.

The study also concludes that apart from the effects of fare levels on modal choice, factors such as the distance covered to the work destination, the nature of employment and the level of education are also other factors that influence modal choice. This is because significant relationships have been found between these factors and modal choice. For instance; NMT users are mostly industrial workers who live less than 4 kilometres from Sameer Park whereas those that mostly use motorised means of transport live more than 4 kilometres from the Park. Industrial workers with permanent contracts of employment are the main users of motorised transport. This is largely because many of them earn more than casual contract

employees. Industrial workers with tertiary level of education tend to use matatus more than those with lower levels of education. This is because they are mostly permanently employed therefore they earn more than those with lower levels of education.

5.3 Recommendations

The study has established that low income industrial workers are mostly affected by paratransit fares and that there is need to mitigate against the negative effects of these fare. There study therefore recommends:

First, the Government in collaboration with all public transport stakeholders should establish a Public Transport Fare regulatory board which will be tasked with the setting of all public transport fares. Fare regulation will ensure that fares are not arbitrarily raised as is the current state. Unfortunately, the sessional paper on Integrated National Transport Policy does not recognise the need for a fare regulatory board. Emphasis has instead been placed on reforming matatu operations.

Second at the institutional level, trade unions such as COTU should also focus on the travelling conditions of industrial workers. Trade Unions are known to mainly lobby for better working conditions of workers but there is also need to lobby for better transportation for their workers. On the one hand trade unions could coerce employers to factor in travel allowances as part of the wages of the industrial workers. On the other hand employers could provide company transport for their employees. This could increase the modal choices available to industrial workers.

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Date of Interview:

Questionnaire No:

My name is **Marilyn Ommeh**; I am a student of the Institute for Development Studies University of Nairobi. I am conducting a research on the effects of matatu fares on choice of means of transport for industrial workers in Sameer Industrial Park. I would like to assure you that the information collected will be used for research purposes only. I will be grateful if you could spare some time to answer a few questions.

Background

1. Gender

Male		1
Female		2

2. Age ....

3. Area of Residence ....

4. Level of Education

Primary	Completed		1
	Not Completed		2
Secondary	Completed		3
	Not Completed		4
Tertiary			5

5. When do you report to work? ....

6. When do you leave work? ....

7. Nature of Employment

Permanent Contract		1
Casual Contract		2

Choice Mode of Transport and Route

8. What means of transport do you use for your work trips?

Matatu		M
Bus		B
Walking		W
Cycling		C
Other		O

If 'other' specify

9. About how often do you use this means of transport?

10. Which route(s) do you use for your work trips?

Matatu Route No.	
Bus Route No.	
Walking/ Cycling Distance (1 Way)	
Other	

11. What was your choice of means of transport for the previous week?

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
To work							
From Work							

M= Matatu   B= Bus   W= Walking   C= Cycling   O= Other   X= No work

If other specify

12. Why do you use matatu (always /...times a week/ never?)

_____

_____

13. Have you ever changed the means of transport you use to get to work?

Yes		1
No		2

Under what circumstances did you change the means of transport you use to get to work?

_____

_____

14. How long does it take you get to work using (any of the following means of transport) from you residential area.

   i.   Matatu

   ii.   Bus

   iii.   Bicycle

   iv.   Walking

   v.   Other

15. Do you ever stop over at a change point?

Yes		1
No		2

If 'Yes' why?

_____

_____

16. Do you face any challenges while using matatu for your work trips?

Yes		1
No		2

If 'yes' what challenges to you face while using matatu for your work trips

_____

_____

_____

17. Do you face any challenges while using other means of transport (apart from matatu)?

Yes		1
No		2

If 'yes' what challenges do you face while using other means of transport?

_____

_____

_____

Paratransit Fare Levels and Variations

18. How much do you pay per trip for matatu use?

    i.   In the morning.............................

    ii.   In the evening.............................

19. Does this fare change?

Yes		1

No		2

If 'yes' when does it change?

_____

_____

20. What is the highest amount of fare you have ever paid to use a matatu to or from work?

_____

21. What is the lowest amount of fare you have ever paid to use a matatu to or from work?

_____

Other Factors

22. The following is a list of some factors that might influence your choice to use a specific means of Transport. Please place 1 next to the factor that mostly influences your choice of means of transport, 2 next to the factor that has the next most influence and so on.

a.	Income level	
b.	Distance from work place	
c.	Change of weather	
d.	Preference	
e.	Other	

If 'other' specify

Links between Paratransit Fares and Modal choice

23. Do levels of matatu fare affect your decision to use a matatu?

Yes		1
No		2

Why?

_____

24. Do changes in matatu fares affect your decision to use a matatu?

Yes		1
No		2

Why?

_____

_____

_____

NB: If you would like to participate in an in depth interview concerning effects of matatu fares on choice of means of transport please leave your contacts below.

Name: ....

Mobile No: ....

Appendix 2: Key Informant Interview Guide for Matatu Operators

My name is **Marilyn Ommeh**; I am a student of the Institute for Development Studies University of Nairobi. I am conducting a research on the effects of matatu fares on choice of means of transport for industrial workers in Sameer Industrial Park. I would like to assure you that the information collected will be used for research purposes only. I will be grateful if you could spare some time to answer a few questions.

Date.. Interview Guide No............................

Route Information

i. What is the matatu trip starting and ending point?

Fares

ii. How much do you charge during off peak?

iii. How much do you charge during peak hours?

iv. What determines fare levels?

v. What would cause changes in fares apart from peak times?

Modal Choice

vi. In your opinion what is the pattern of matatu use by workers who alight at Sameer Industrial Park?

Appendix 3: Case Study Interview Guide (NMT User)

My name is **Marilyn Ommeh**; I am a student of the Institute for Development Studies University of Nairobi. I am conducting a research on the effects of matatu fares on choice of means of transport for industrial workers in Sameer Industrial Park. I would like to assure you that the information collected will be used for research purposes only. I will be grateful if you could spare some time to answer a few questions.

Date..   Interview No......................

Background section

i.   Where do you live?
ii.   How long have you lived in this place?
iii.   Where did you live before here?
iv.   Why did you move here? (If applicable)
v.   How long have you worked in Sameer park?

Travel Behaviour and Modal Choice

vi.   Describe your journey to work and from work.
     (Prompt: Is it the same of different?
                Time of leaving home in the morning
                Conditions of travel (Rainy Season, Early in the morning)
                Do you travel alone or with company?
vii.   Who do you think are the kind of people to walk to work?
     (Prompt: What are their characteristics?
                Why do they use this means)
viii.   Who do you think are the kind of people to use a matatu to work?
     (Prompt: What are their characteristics?
                Why do they use this means of transport)
ix.   What is the most important reason why you choose to walk?
x.   Do you spend any amount of money on transport in a month? (How Much)
xi.   How important is the level of fares to your choice not to take a matatu?
xii.   Is there any other issue about your journey to work that has not been mentioned and you would like to discuss?

Appendix 4: Case Study Interview Guide (NMT& Matatu User)

My name is **Marilyn Ommeh**; I am a student of the Institute for Development Studies University of Nairobi. I am conducting a research on the effects of matatu fares on choice of means of transport for industrial workers in Sameer Industrial Park. I would like to assure you that the information collected will be used for research purposes only. I will be grateful if you could spare some time to answer a few questions.

Date..   Interview No.........................

Background section

   i.   Residential area

   ii. How long have you lived in this place?

   iii. Where did you live before here?

   iv. How long have you worked in Sameer park?

Travel Behaviour and Modal Choice

   v.   Describe your journey to work and from work.

        (Prompt: Is it the same of different?

                Time of leaving home in the morning

                Conditions of travel (Rainy Season, Early in the morning)

                Do you travel alone or with company?

   vi. Who do you think are the kind of people to walk to work?

        (Prompt: What are their characteristics?

                Why do they use this means)

   vii. Who do you think are the kind of people to use a matatu to work?

        (Prompt: What are their characteristics?

                Why do they use this means of transport)

   viii. What is the most important reason why you choose to use matatu?

   ix. What is the most important reason why you choose to walk?

   x.   On average how much do you spend on transport in a week/ month?

   xi. How important is the level of fares to your choice not to take a matatu

   xii. Is there any other issue about your journey to work that has not been mentioned and you would like to discuss?

Appendix 5: Case Study Interview Guide (Matatu User)

My name is **Marilyn Ommeh**; I am a student of the Institute for Development Studies University of Nairobi. I am conducting a research on the effects of matatu fares on choice of means of transport for industrial workers in Sameer Industrial Park. I would like to assure you that the information collected will be used for research purposes only. I will be grateful if you could spare some time to answer a few questions.

Date...   Interview No.....................

Background section

i. Where do you live?

ii. How long have you lived in this place?

iii. Where did you live before here?

iv. How long have you worked in Sameer park?

Travel Behaviour and Modal Choice

v. Describe your journey to work and from work.

   (Prompt: Is it the same of different?

   Time of leaving home in the morning

   Conditions of travel (Rainy Season, Early in the morning)

   Do you travel alone or with company?

vi. Who do you think are the kind of people to walk to work?

   (Prompt: What are their characteristics?

   Why do they use this means)

vii. Who do you think are the kind of people to use a matatu to work?

   (Prompt: What are their characteristics?

   Why do they use this means of transport)

viii. On average how much do you spend on transport in a week/ month?

ix. What is the most important reason why you choose to use matatu?

x. Is there any other issue about your journey to work that has not been mentioned and you would like to discuss?