THE ROLE OF NON-MOTORISED MODE OF TRANSPORTATION: A CASE STUDY OF HAND-CARTS OPERATION IN KISUMU MUNICIPALITY, KENYA.

BY

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A thesis submitted in partial fulfilment for the degree of Master of Arts (Urban Geography) in the University of Nairobi.

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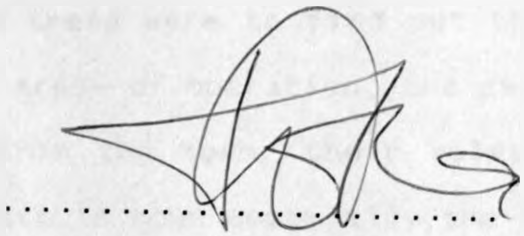
DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.



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ABSTRACT

This study was carried out in Kisumu Municipality(KM), Kenya and its main objective was to find out the role of hand-carts as an urban transport mode.

In order to understand the role of hand-carts, objectives were set for the study and these were to find out the types of goods they transport, major areas of operation, the particular group of people they serve within the town, their relationship with the other modes of transport in town especially the *matatus* which are the prevalent modes of commuter transport within the KM and their role in both the employment and income generation activities.

Some hypotheses were set up to help in the investigation of the above objectives. It was assumed that there are some land uses which were generating and attracting hand-carts trips more than others within the KM, the modes mostly move food products more than other goods, their trips mostly originate and end in bus stages and also that their operators are the urban residents below the average urban working age, that is, 15-64 years old.

The methods used in the data organization and analysis included the descriptive and quantitative techniques. The descriptive techniques included frequency distribution, and the percentages . The only quantitative technique used in testing all the four hypotheses set for the study was the X^2 (Chi Square) Statistic. A theoretical model was also used to show the interdependency existing between the non-motorised modes and the

motorised ones in achieving an efficient transport system.

In order to collect the relevant data for the study, cluster and systematic sampling techniques were used. The systematic sampling was used when interviewing the *matatu* and hand-carts operators since their population were not well listed in the Kisumu Municipal Council(KMC) records. Cluster followed by the multi-stage sampling were used to get the hand-carts hirers and business operators to interview within the study area.

The study revealed that the hand-carts mode of transport mostly move foods and generally serve markets, Central bus stop (CBS), Wholesale shops in the Central Business District (CBD) and the other open spaces such as the fish smoking areas in the KM; Chi Square(X^2) technique revealed that they moved food more than other products, their zonal trip attraction and generation varies, bus stages attracts their trips more than other land uses and that they can offer employment to people within the urban working age group (15-64 years). They were found to mostly serve businessmen both from within the urban centre (UC) and from up-country; play an important role in trip interconnection in areas having poor and narrow roads, the passenger trip interchange for those transferring to the other modes; and can offer employment opportunities.

The hand-carts operators face such problems as danger of accidents from the motorised modes of transport, congestion as the roads are narrow when shared with the other modes, neglect by the police in case of accidents, hatred between them and the motorists and lastly the design of the roads that does not favour their ease

and fast movement especially on round-abouts.

The continued increase of the modes with the development of KM shows that their demand is increasing and they will still be vital to the KM's residents in future if their operation is improved by setting separate streets and parking spaces for them, creating trip interchange points for them and motorised modes, and informing the residents of their role.

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DEDICATION

THIS WORK IS DEDICATED TO MY MUM PHENNY, A WOMAN OF WIDE VISION IN ACADEMIC LINES. HER DEDICATION TO GOD, PRAYERS AND CONTINUED ADVICE HAS BEEN THE CORNERSTONE OF MY SUCCESS TO THIS LEVEL OF ACADEMIC ACHIEVEMENT. MAY GOD CONTINUE TO BLESS YOU MUM.

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LIST OF ABBREVIATIONS AND ACRONYMS

1. KM : Kisumu Municipality
2. KMC : Kisumu Municipal Council
3. UCs : Urban Centre(s)
4. CBS : Central Bus Stop
5. CBD : Central Business District
6. EMC : Evangelistic Miracle Church
7. GOK : Government of Kenya
8. OECD: Organization for Economic Cooperation and Development
9. ILO : International Labour Organization
10. KMTLB: Kisumu Municipal Trade Licensing Board
11. SPSS : Statistical Package for Social Sciences
12. UNCHS: Habitat

CHAPTER ONE

THE INTRODUCTION

1.1 Introduction

Urban transportation system requires proper planning as it affects urban centres in terms of their expansion and the spatial distribution and nature of the activities therein. The urban transport planners should, therefore, improve roads and traffic management in order to achieve an easier movement of both people and goods. Depending on the socio-economic and environmental conditions of the urban centres, an efficient movement can only be achieved by adopting the right mixture of transport modes.

The urban centres in developing countries as shown by past studies experience a high rate of urban growth caused primarily by rural to urban migration, urban natural increase and boundary reclassification. They are also the growth centres which receive goods and migrants from rural areas and likewise produce and distribute goods within them and to their umlands. The resultant effect is the intensity of movement of both people and goods within the urban centres that calls for the use of all the available modes of transport. The generally low income levels experienced in most of them reduce the ability of the majority of their urban residents to own and use motorised modes of transport in all their trip purposes. Most of them, therefore, decide to use the other non-motorised modes of transport such as bicycles, animal drawn-carts,

hand-carts, wheel-barrows and walking, among others. This explains why the urban centres in developing countries have a greater mixture of both the fast moving motorised and the slow moving non-motorised modes of transport as opposed to the developed countries which are characterised by the motorised modes (Breese, 1966:124).

Both the motorised and the non-motorised modes variation in speed and trip purposes normally leads to such transport problems such as congestion, accidents, improper co-ordination between the modes and poor management, among others. Despite the above problems, urban transport planning should be geared towards the incorporation of all the modes, reduction of the problems and the attainment of accessibility between various land-uses. This should include the revision of the existing transport laws and regulations that affects their easier movement and proper research on the roles played by the modes in the urban centres.

In Kenya's urban centres, the potentiality of the non-motorised modes has not been fully understood, particularly the role of hand-carts. Some view them as modes suitable for use in the rural areas while others see them as a hinderance to the motorists in the urban centres. This has led to their less consideration in the urban transport planning and, on the other hand, increment of hatred between them and motorists. However, despite the knowledge of the problems by the urban transport planners, most of the previous urban transport studies in Kenya have mainly concentrated on the motorised passenger transport hence fail to establish the reasons behind the existence of these hand-

carts in the urban centres.

The study carried out in KM revealed some significant features of the hand-carts that call for their consideration in the urban transport planning. They were found to be generators of income and employment, movers of various goods between different land uses, important in trip interconnection in some parts of the KM, and are also cheap and reliable means of transport for various groups of people in the movement of goods. They are, therefore, part of a solution to transport problems facing the KM that still lacks an organised public transport system (Wera, 1981). Despite their importance, they are still regarded as secondary to the motorised modes and little is known of their role.

1.2: **The Problem Statement**

The KM is the third largest urban centre in Kenya and also the largest in Western Kenya region. It experiences a high influx of people from Nyanza, Western and parts of the Rift Valley provinces. Similarly, it is the major industrial and commercial base that produces, receives, and distributes products (goods) in Western Kenya region.

The mixture of transport modes in any urban centre is vital in the efficient movement to its residents. This means that there are some special roles that a mode can perform better than the other at various levels of movement. KM is characterised by various mixture of both the non-motorised and the motorised modes which operate daily in the movement of both people and goods. The modes include

buses, matatus, pick-ups, taxis, lorries, pedal and motor cycles, hand-carts, and walking. Some of these modes can become a nuisance to other road users if there is little or no study on their roles and the gap they fill in any transportation system. One of the aims of the study was to establish the complementary role of the hand-carts as a mode of transport amidst the motorised and the other non-motorised modes of transport in the movement of goods between different activity zones in the KM.

The land uses located in different parts of the KM, generate and attracts various trips such as the shopping, work, business and leisure trips, among others. The type of trips generated by a land use usually attracts special types of modes suitable for their activity and hence the modes concentration in them. The study was geared towards finding out the land use zones generating and attracting hand-carts trips, why hand-carts concentrate in some parts of the KM more than others, the people they serve in those areas, and the type of goods they move from the areas.

The previous urban transport studies in Kenya have mainly concentrated on passenger transport using the non-motorised and motorised modes yet little or no study has touched on the movement of goods by the non-motorised modes (hand-carts) which is one of the substantial part of the commercial(goods) traffic that causes traffic problems in urban centres of developing countries like KM (World Bank, 1972). On the same note, these studies have given partial coverage of the ability of the transport modes in reducing unemployment which is a national problem to a developing country

such as Kenya. This leaves a gap in knowledge on the key issues in transport like congestion and accidents caused by the mixture of modes and its role in employment creation. The survey tried to investigate the negative and the positive relationship that may be existing between the hand-carts and other modes and their ability to create employment for the KM urban residents.

1.3: **The Objectives**

The study was carried out in the KM to investigate the role of the hand-carts mode of transport. In order to carry out the investigations, the major objectives of the study were to:

a. find out the type of goods moved and people served by the hand-carts and the hand-carts major areas of operation in the KM;

b. investigate the interaction and the interdependence between the hand-carts and the other modes of transport in their daily operation;

c. find out the employment generation ability of hand-carts mode of transport; and,

d. suggest ways and means of improving hand-carts operation in KM's transport planning.

1.4: **Hypotheses**

The following four hypotheses were constructed and tested for their validity:

a. H_0: There is no significant difference between the number of hand-carts trips generated by various land use zones and the number of trips attracted to them.

H_1: The number of hand-carts trips generated by various land use zones and the number of hand-carts trips attracted to them are significantly different.

b. H_0: There is no significant difference between the number of hand-carts trips ending at the bus stages and the number of hand-carts trips ending at other land uses in the town.

H_1: There is a significant difference between the number of hand-carts trips ending at the bus stages and the number of hand-carts trips ending in other land uses.

c. H_0: There is no significant difference between the proportion of food products moved by the hand-carts and other type of goods moved by them.

H_1: There is a significant difference between the proportion of food products moved by the hand-carts and the other types of goods moved by them.

d. H_0: There is no significant difference between the general mean urban working age and the mean age of those people absorbed in the hand-carts operation in KM.

H_1: There is a significant difference between the general mean urban working age and the mean age of those people engaged in the hand-carts operation in KM.

1.5: The Scope And Limitation Of The Study

The study covered the entire hand-cart mode of transport in the KM specifically those operating within the old boundary. Some land uses either attracting or generating the hand-carts trips were identified. They were broadly grouped as commercial(that is, Wholesale and retail shops), transportation(that is, bus/*matatu* stages), open spaces, small scale manufacturing sheds and markets.

The hand-carts operators and their customers(hirers) were interviewed at the identified goods loading and unloading zones. The moving ones were left out since they could not easily be stopped and interviewed as they were either busy searching for customers or moving heavy goods amidst other modes. The *matatu* operators which were the dominant mode of passenger transport and mostly interacted with the hand-carts were also interviewed at their various parking spaces.

There were a number of problems encountered in the course of the fieldwork. The problems were:

(a) Location of regular hand-carts stations(terminuses)

Since most of the hand-carts operators move almost continuously in search of customers with goods, it was a little bit difficult to locate their major areas of operation for interview purposes. The problem was overcame by first carrying out a pilot study in order to identify their pockets of operation.

(b) General Suspicion/Hostility

Some of the respondents suspected us of being either central government or municipal officials sent to know their secrets and work out plans on how they could be got rid of from the KM. This sometimes led to hostility from the interviewees. The problem was overcame by free and lengthy explanations on the researcher's mission, and being friendly to them.

(c) Answer influence

The influence of the answers by the respondents was also another problem encountered in the field. Since the respondents were suspicious and mostly sat together when waiting for customers, they were, therefore, curious to know what was happening to their counterparts. They sometimes in the course of the interview got interested and started helping the respondent in answering the questions. The problem was overcome by convincing the respondent not to listen to them and his counterparts to keep away and wait for their turn.

A part from the above problems, finance was another constraint which made the researcher to cut down the days for the research and collect all the relevant data. The listed limitations did not affect the work very much as they were solved as indicated. My prior knowledge of the characteristics of the study area's community e.g their language and lifestyle also helped in solving the problems.

1.6: LITERATURE REVIEW

The chosen transportation system for any urban centre influences its nature of development. The reason being that there exists an interdependence between transport and land-use such that any change in transportation system will automatically affect the land-use characteristics of the urban centre. Therefore the decision of the urban transport planners for a given UC, will determine its nature of development. Similarly, their decision on the type of modes to move both people and goods between different activity zones within the UC will affect the location of various economic activities.

Previous studies on the evolution of urban transportation system reveal the type of interdependence that exists between the land use characteristics and transport. Before the industrial revolution, there were very few people living in the UCs and most of the economic and social activities were within the walking distances. However, the coming of the new era marked the beginning of further distribution of land-uses within the few existing UCs of the time. Blumenfeld(1971) pointed out that, this was a period of application of the scientific method to the material productions. This resulted in rising productivity, division and specialization of labour and the interdependence and exchange of goods and services. Even though the new transport system brought such changes, walking was still dominant because most of the economic activities were located at walking distances.

However, towards the end of the 19th century, some changes took place in urban transport. This was the period of technical innovation in the field of "propulsion" which people felt was a fulfilment of their dreams of carriages without horses, which had been awaited for so long(Weigelt, 1977:7). The old types of modes as the horse-drawn carts, donkey-drawn carts, bicycles and walking were now considered less important because they were slow compared to the new modes. This was the clear beginning of land-use separation, for example, the residential areas from the working places at a distance that could not be easily covered on foot. However, other transport problems such as congestion and accidents started to manifest themselves since the already constructed streets and roads were only adequate for the non-motorised modes (Davies, 1980:1).

During this "propulsion" era, the urban transport planners and engineers were now concerned with the incorporation of the new modes into the existing transport plan. This possibly included the widening of roads and streets and introduction of policies favouring the "new" modes than the old ones. These new modes were mainly designed for moving people between the residential areas and their work place because goods movement problems had not manifested themselves by then.

As pointed out above, the coming of the "propulsion" era introduced its own problems. Wingo (1960) asserted that the new facilities brought in many changes in the process of urban organization where the old trends became discontinuous and the new

trends complicated planning. Congestion, accidents and environmental pollution were now prevalent, a trend which has persisted to the present. Congestion which was increased by a high rate of private car purchases led to a slow movement as opposed to the fast movement formally hoped for. Energy was also later realised as one of the urban transport problems as there arose a high demand for fuel. Usually there is a need to minimize the use of energy, that is, fuel for it influences the total output of an urban system (Stearns, 1974:96). Since the new era began, energy has been wasted and still continues to be wasted during the peak hours when there is congestion created by the many purchased cars.

It was because of these problems of rising oil prices, accidents, environmental pollution and continuing congestion that the urban transport planners thought of reconsidering the role of non-motorised modes of transport such as walking and bicycles. There was a need to plan for segregated ways and streets for the modes to overcome some of the above mentioned problems.

The latest problems to be realized due to the expansion and functions of the UCs is that caused by goods movements. Formally goods movement was not given much attention by urban transport planners since they were mostly concerned with the passenger movement. However, the incorporation of trucks into the urban transportation system added to the other problems already realized in the UCs. The reason being that the trucks are slow and hence need a space for free movement, parking and for loading and unloading.

Daniels (1980) revealed that the first study on goods movement was done by Chinitz monograph in early 1960s on the impact of the America's transport revolution on the New York region. The study covered two kinds of freights and these were those involved in international trade through the land around the port and those which were served and generated by manufacturing industries within the region. This study acted as a substantial introduction to goods movement in a large city. The former studies on urban transport planning were mainly directed towards developing facilities for personal movement since goods movement was viewed simply as an adjunct to personal movement (Morlock, 1978:447).

Watson (1975), enumerated some of the reasons as to why goods movements is a problem in the UCs. These problems are that the pedestrians and the automobile drivers feel that the ill-smelling and fuming trucks restrict their movement and offend their senses; the automobile driver sees the truck slowing him down, loading and unloading trucks block their lanes and take up their parking spaces; the truck driver also sees the automobile driver as one who prevents him from making deliveries by clustering up the streets and by parking outside the business premises and; to the urban transport planner,it is the problem of designing the transportation system in particular and urban structure in general,in such a way as to accommodate both the movement of people and goods using the right modes.

Watson's views affirm the fact that, if goods movement is ignored in urban transport planning, an efficient transport system

cannot be achieved. The competition for space by different peoples mentioned above can lead to unworthy restrictions of other modes from movement within the UC and hence reduce its rate of development. However, due to the technological advancement in developed countries, new facilities have been invented to cater for goods movement. The facilities are the conveyor belts, computer controlled warehouses and other mechanical forms of goods handling.

There is a great contrast between the developed and developing countries in terms of their urban transportation system. This is because of the high technological advancement that the developed countries have undergone. Despite such a contrast, the developing countries have tended to adopt their transportation systems some of which they had abandoned. They, therefore, fall into the same problems that the developed countries faced and because of their economic status and low technological advancement, they cannot overcome them easily.

Even though, the developing countries adopted the former landuse theory where various activities were located at far apart, the existing modes in their urban centres have not fitted very well in it as also pointed out by Irandu(1982). Breese(1970), discovered that, traffic in developed countries is dominated by the automobile and truck traffic, majorly quite contrary to the developing countries. The developing countries are characterized by a mixture of modes which can be broadly categorized into two groups as the motorised and the non-motorised. In general, they comprise of the trucks, public buses, private cars, taxis, camel-

carts, hand-carts, donkey carts, bicycles, rick-shaws, and pedestrians, among others. The mentioned non-motorised modes are mostly suitable for short distance trips indicating that they cannot fit in the traditional zoning system where the land-uses were located far apart.

Organization for Economic Cooperation and Development (OECD, 1984) cautioned that the well tested and accepted modes of transport in developed countries and the historical sequence of their development and application, may not offer solutions for the developing countries. However, the point does not rule out the importance of the motorised modes that has encouraged the development of the urban centres(UCs) in developing countries for the past years. The fact is that these modes alone cannot meet all the urban transport demands in developing countries where the majority still walk on foot and some use even human portage in the movement of their goods; It is also important to note that not all trips are long distance trips that require the motorised modes. Research has shown that a short walk trip is the highest achievement of urban transport planning, that is, even though all activities cannot lie at walking distances but the majority should, not lie beyond except when there is bad planning(Thomsons,1977:47).

Urban centres such as Nairobi, Manila, and Ibadan have experienced and are still experiencing similar problems faced by the developed countries. The incorporation of the motorised and the non-motorised modes in the urban transportation systems, with the narrow streets and further separations of land-uses has led to

competition for space which alternatively results into congestion and accidents. The competition shows that each and every mode has a uniqueness of its own and that there are some degree of transport demands that they fulfil. Currently, it seems that the existing urban transport system in Kenya mostly favours the use of motorised modes than the non-motorised ones. However, it is important to point out that, there are roles which can be played and needs which can be fulfilled in developing countries by simple forms of transport less complex than the imported cars, vans and trucks (Barwell,1977:7).

Despite, the non-motorised modes long period service, there is still little or lack of studies on their operations in Kenya. On the other hand, it seems as if even the urban transport planners have been absorbed in the majority's negative perceptions of the non-motorised modes as Thomsons(1977:1) seems to suggests that;

> Most of the professionally responsible people for urban transport are car owners and drive to their offices everyday ...and one of the first tasks of their team of consultants engaged to undertake urban transport study is to acquire cars. It is beyond this argument that most important decisions affecting urban transport planners are made by people whose personal view point of the problem is largely behind the wheel of the car... This does not mean that the authorities are necessarily biased in their approach to the problem but they do need to make a mental effort to eradicate their personal viewpoint.

There is, therefore, a need to change the attitude towards the non-motorised modes, specifically by the urban transport planners.

The role played by the non-motorised modes in Kenya's UC's is still a neglected area of study and the same applies to urban goods movement. Even though *Kenya's Development Plan* of 1974-1979

recommended that, as a developing nation, all the modes suiting its development should be adopted. It seems still that the motorised modes have been emphasised more than the non-motorised in her urban transport planning. Similarly, most of the previous studies on urban transport in Kenya have mainly concentrated on the motorised modes and specifically those transporting passengers (Ogonda,1976; Wera,1981; Jarabi,1982; Oludo,1985; Kapila,1982; Osundwa,1987; Obudho and Aduwo, 1988 and Aduwo,1990). This leaves a gap in knowledge and hence makes it difficult to achieve a full plan of an efficient transport system for Kenya's urban centres. Similarly, previous studies carried out in Kenya on the non-motorised modes have not examined their utility in terms of goods movement and/or employment generation ability (Onyiro:1977 and Rukunga:1990).

The non-motorised modes in Kenya's UCs specifically the hand-carts are usually seen moving different kinds of goods between various activity zones. In their daily operations they are at times viewed as a problem to the motorists and just as in the 'propulsion' period others have advocated for their removal from the urban centres. *The Daily Nation* newspaper of February, 1991 commented that, "donkey-carts and the hand-carts have caused many accidents and, therefore, many people wonder why they are allowed to operate yet they pose'danger to motorists". It is interesting to note that many consider motorists to be the sole users of the urban roads and forget that the non-motorised modes are also licensed to use them. As can be noticed from the pictures inside *The Daily Nation Newspaper*, the non-motorised modes use the roads

when moving goods while the motorised transport passengers.

Currently, there is little or no study that has been carried out in KM on the role of the non-motorised modes both in passenger transport and goods movement. In KM, majority of the people are still walking to and from different activity zones except in few cases when the public means of transport is required as trip importance increases past 8 km (Wera, 1981: 81). The fact suggests that the hand-carts which are almost similar to walking as they fall under the same category of the non-motorised modes can still be important in meeting the transport demands that the motorised modes cannot fulfil in KM. The long time service rendered by these modes even in Nairobi seems to suggest further that they will be of use in Kenya's UCs in future.

1.7: JUSTIFICATION OF THE STUDY.

This study was prompted by the author's main observation of the long time co-existence of both the non-motorised and motorised modes and the transportation problems in Kenya's UCs, especially KM. Such problems are congestion of roads caused by many motorised and non-motorised modes using narrow streets, accidents involving various modes, rising transport charges affecting different urban residents and more specifically, the danger that the non-motorised modes operators experience as they use the same roads with the motorised ones.

KM as the major UC in the western Kenya region will still play

its major role as a commercial and industrial centre. This means that it also acts as the major distributor of various products to its umland and at the same time requires an efficient transport system for the distribution of various goods within it from its umland and the existing factories. It is important to note that goods movement, unlike passenger transport, should use any device known to man including man himself(World Bank,1975:125). Given the continued rising oil prices, transportation cost will steadily be increasing hence hampering the efficient movement of both people and goods. On the same note, the majority of the urban residents in developing countries are generally earning below the average income, as it has been shown in the past studies, and hence they will not possibly manage to use the motorised modes in most of their movements.

There is, therefore, a need to revise the former perception of the usefulness of the non-motorised modes in Kenya's UCs. The non-motorised modes have been found to offer the quickest and the cheapest means of transport for short journeys (Rukunga,1990 :17). At the same time, they seem to offer employment, for example the hand-carts which are owned by some people within the UC and are either hired out at an agreed daily charge or hired for goods movement by businessmen. Their improvement can be one of the solutions to unemployment problem experienced in KM and other Kenya's UCs. However, due to lack of studies on their role, it is difficult to statistically prove their significance in terms of employment generation. On the other hand, a study on their role in

goods movement revealed their importance since not all goods are moved by the motorised modes alone (OECD, 1974:4).

KM is also a suitable area for the use of these modes because of its terrain. The UC is located at the Winam Gulf of Lake Victoria and on the eastern part of it is the Kano plains. Since, the modes are muscle powered, such a terrain(plain land) is suitable for their use. On the other hand, most of KM land-uses such as, the residential areas, railway and bus-stations, supermarkets, industrial area and other commercial activities are located at walking distances. The importance of these modes in KM can be further supported by the *Kisumu District Development plan(1989/93)* which revealed that KM trade licenses and the estimated sales records between 1983 and 1987 had hawking as the leading and handcart following. This shows that the hawkers together with the hand-carts operators who normally move their goods within the UC contribute to the economic development of the UC.

The severe restriction on the operation of the non-motorised modes in Kenya's UCs can also affect their maximum contribution towards the economic development of the UC. In Kenya traffic rules, under the Traffic Act Cap.403, the non-motorised modes are recognized as vehicles, but they are allowed to operate only between 9.30 a.m. to 10.30 a.m. (*The Daily Nation*, 27th February 1991). Such a restriction, cannot allow them to meet the daily transport demands experienced in Kenya's urban centres where they mostly operate. However, since the restriction is not very much

reinforced these modes operates past that period.

This indicates that some explanations should be found on the importance of the non-motorised modes and how they can be given full priority to operate as the motorised modes. This study will contribute to the expansion of knowledge in urban transportation planning in Kenya, an area where there is little information.

1.8: **Operational Definitions**

1. Non-motorised modes:

   They are the hand-carts, wheelbarrows, bicycles, and human portage, among others. For this study it will be used to mean the hand-carts, pedestrians and human porters.

2. Motorised modes:

   They are the engine propelled vehicles used for the movement of both people and goods. In the study the ones to be considered are the, public buses, trucks, and the 'matatus'.

3. Transportation:

   It is the movement of both people and goods within an area. In this study it is used to mean the movement of goods in an urban area.

4. Urban Goods Movements:

   It is the movement of goods between different activity zones in an urban area.

5. A good:

   It can be a raw material, intermediate or a final

product. For this study a good that was considered is that which according to the owner, needed a means of transport depending on its weight and distance to be covered.

6. Activity zone:

It is an area that attracts and generates traffic. For this study this was an area that attracts and generates goods movements traffic.

7. Urban centre:

An urban centre by Kenya standard of definition is an area which contains a population of more than 2,000 people who are basically engaged in non-agricultural activity.

8. Urbanization:

(a) It is the continuous process of transformation from being rural to being urban in character and also the continuous change within the urban area itself as it grows both by natural increase and migration from other areas.

(b) The process of migration from the rural to urban areas and engaging in non-agricultural activities.

9. Cordon :

It is the perimeter put as the boundary of the study area.

10. Screenline:

This is an imaginary line established to divide the study area into parts(zones).

11. Umland :

The term was used in the study to mean the area surrounding the urban centre.

12. Dukawallas:

The word means the former Indian business operators within the colonial administrative centres.

13. Trip Interchange:

It means the transfer from one mode to another in order to end a trip from an origin to a destination.

14. Trip chain:

This is a connected sequence of trips where origin and destination are same points in space for example from house to work then back to the house.

1.9: THE THEORETICAL FRAMEWORK

The transportation system of any urban centre consists of two broad types of transport modes that is, the motorised and the non-motorised.

The accommodation of both the motorised and the non-motorised modes in any transportation system should be to encourage its efficiency. This is because the motorised ones are suitable for long distance trips while the non-motorised for the short distance trips. The incorporation of these modes in an urban centre on the

other hand encourages the mobility of both the low and high income groups as the motorised is mostly used by the former group while the non-motorised by the latter group. In KM where the majority belong to the low income group, most of their trips are still covered on foot and other forms of non-motorised modes such as the hand-carts(Wera,1981).

Of the non-motorised modes in KM, hand-carts are mostly hired by different kinds of people in the movement of goods to various destinations. The reason being that they can move heavier goods as compared to other non-motorised modes as they are mainly designed for goods movement.

The hand-carts were found to assist in passenger trip interchanges and business trip for small scale businessmen. They were, therefore, found to reduce transportation cost, that is, save time for travellers, reduce in-vehicle congestion in passenger transport modes, and move goods at reasonable charges.

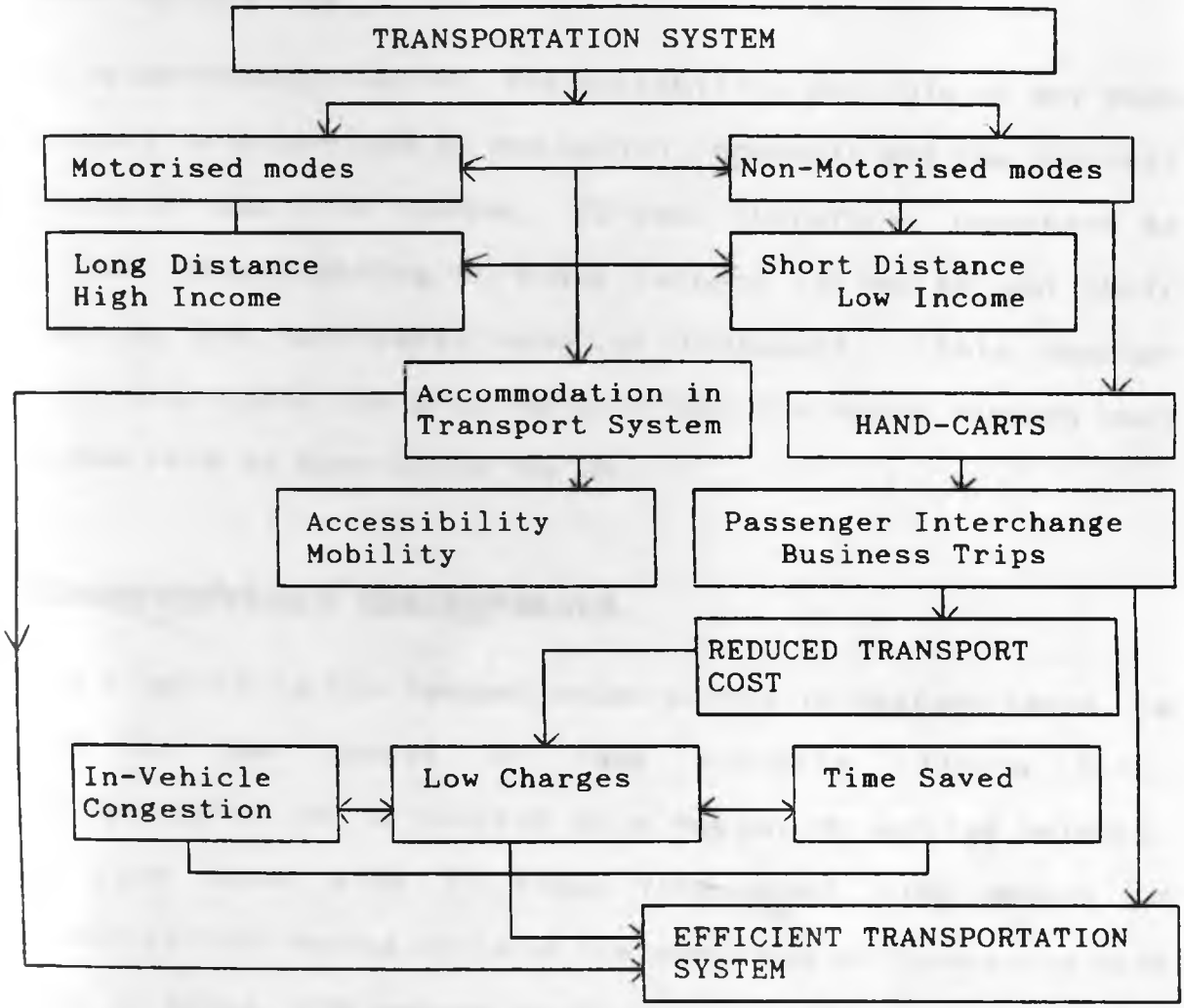
It is for this reason that hand-carts should be seen as a complementary mode to the other modes in facilitating easier and faster movement in KM but not as a problem to other motorists in the urban centres.

The efficiency of any transport system mostly depend on the co-ordination of all the modes of transport, mobility of all the urban residents, accessibility of all the land-uses by the existing modes of transport and lastly a comfortable movement (FIG 1.1).

Hence any transportation policy should be reviewed in order to know their effect on the operating modes. There is a need in Kenya

to reconsider the impact of the current transportation policy on the role of the non-motorised modes.

Figure 1:1 Model for the motorised and a non-motorised modes, and their complementary Role in the Transportation System Efficiency.



Source: Advanced from Omondi (1987).

CHAPTER TWO

THE STUDY AREA

2.0 Introduction

In urban transportation, the suitability and role of any mode of transport is determined by the social, economic and the physical conditions of the urban centre. It was, therefore, important to get a clear understanding of these factors in the KM and their relation to the hand-carts mode of transport. This chapter primarily highlights the physiographic and the human factors that favour the role of hand-carts the KM.

2.1: Geographical Background.

The KM which is the largest urban centre in Western Kenya, is situated on the shores of lake Victoria (figure 2.1). Physiographically, it is located on a region of varying heights. On the lake shore side it rises from about 1150 meters to approximately 1200 metres while on the north and north-eastern side it rises to about 1190 metres above sea level(Figure 2:2). This implies that the KM lies on a plain that can be suitable for the use of all the available transport modes in KM, that is from walking to public and private motor vehicles.

The KM experiences two major rainy seasons, that is, the long rains and the short rains. The short rains usually come between the months of September to October while the long rains fall between March and May. The remaining months are characterised by occasional showers and partial dryness. It receives an annual rainfall ranging from 876mm to 1306mm. The altitude also determines the amount of rain received within the area such that higher areas receive more rain than the lower areas (Kenya,1983).

Similarly, it also experiences a wide mean annual range of temperatures. It has a maximum annual temperature that range from 25°C to 30°C while the mean annual temperatures ranges from 18°C to 20°C (Wera:1981). The knowledge of the climatic conditions is important to transport planners since the ease of movement is usually affected by it. It normally determines the types of modes that are suitable for use at various periods and places within any urban centre.

The hand-carts mode of transport can be suitable for use in all seasons. Though some have thought that they can only be used during dry seasons, this can be disapproved by the fact that they sometimes assist the public vehicles in the transportation of passengers even in Nairobi on some impassable areas during rainy seasons.

Topographically the KM, situated on lake victoria basin, is embraced with various features on some of its sides(Figure 2:2). The northwestern part of it is covered by the Nyando and Kisian hills which is part of the extension of the Nandi hills. Lake

Victoria which covers 2/5 of KM's total area, lies to the south-western part of it, while on its eastern side lies the Kano plains. The topographical conditions of a given area normally determine the nature of development and its transportation system.

The northwestern part of the KM, embraced by Kisian-Nyando hills, does not favour some development activities such as the residential areas and, therefore, it is set a side for industrial purpose(Kisumu Town Planning Officer, 1992). Currently this part of the KM attracts various industrial establishments such as the molasses plant, soap industries and foam mattresses factories among others.

The southern part of KM is also covered by the lake and swamps and hence is only suitable for marine activities. The remaining region for development is on the eastern side which is suitable for residential location.

In relation to the transportation system of the KM, there will be a variation in the patterns of movement such that the Northwestern side comprising of the industrial area will mostly generate truck traffic and goods movement with small passenger traffic. The eastern side will be characterised by the passenger transport modes and the non-motorised modes especially the hand-carts as it is plain and will generate goods movement trips that attract their use.

In the field the study area was divided into five zones (figure 3:1). The survey results on the hand-carts trip origin and destination showed that the eastern side(zone 5) of the KM had the

highest hand-carts trips generation (table 2.1 : Figure 3.1)

TABLE 2:1 **ZONAL HAND-CARTS TRIP GENERATION**

ZONE NUMBER	TOTAL TRIPS GENERATED	% OF TRIPS GENERATED
ZONE 1	47	24.0
ZONE 2	30	15.0
ZONE 3	18	9.5
ZONE 4	20	10.0
ZONE 5	84	42.5
TOTAL	199	100

Source: **Field Survey 1991**

This zone 5 is one of the areas leading in KM urban population and also composed of such big open spaces (markets) as Kondele and Kibuye which receive and distribute various goods in the KM. It is the zone having some of the low income estates like Kondele, Manyatta and the nearby Obunga and Nyawita among others. Most of the operators were found to be living in Manyatta area because it has cheap houses and there are plenty of goods to move both in the morning and evening as they close or start their operation.

The zone will still have a higher volume of traffic as there are still plans to expand the open spaces, construct some residential houses and other small scale manufacturing industries. This implies that there will still be a demand for the hand-carts services.

2.2: The Historical Growth

The development of Kisumu town started by 1901 When Uganda railway which was being constructed reached Lake Victoria basin(Obudho and Obudho, 1972). The place was found to be strategically placed as terminus/port for both the rail and ships which were to serve the three East African countries, that is, Kenya, Uganda and Tanzania. The colonialists also found it to be suitable for settlement and hence they made it one of their administrative centres for controlling the region.

By 1903, it had expanded and acquired an area of approximately two and a half miles. Even though the UC continued to grow, its growth was not stable due to the colonialists' major concern for gaining good administrative bases other than urban development. By 1920, there were already some erected shops and the Indian *"Dukawalas"* had started some commercial activities within the centre(Obudho and Waller, 1976). There were few streets and few modes of transport as most of the trips were mostly covered by foot and other forms of non-motorised modes such as the bicycles.

However the growth of commercial activities attracted many to the centre as they could get employment and enjoy the existing social and other economic facilities. The development and the continued rising population of the UC was met by lack of proper planning and this resulted into the inadequacy of the existing infrastructural facilities (Groot, 1978). The UC mainly grew as a result of rural-urban migration. Its population almost grew

steadily with its boundary expansion. By the year 1941, the UC had a population of approximately 11,000 people with an area of approximately 15 Km^2 and by 1960 it had 24,000 urban residents with an area of about 21 Km^2. Similarly, it was awarded the status of a Municipal Board and Municipal Council in 1941 and 1960 respectively (Kenya,1992 and Obudho,1993).

The UC's boundary was extended again in 1972 which made its total land area to be approximately 417km^2. Of the its total land area 3/4 is land which currently accommodates approximately 150,000 people while 2/5 is water.

2.3: **Land use location**

Urban land use is the geographic pattern of an urban centre's function as the residential areas, commercial, wholesale and retail business, space for governmental institutions, and leisure functions among others(Blunder,1984). All these land uses are interlinked by the transportation system in the urban area.

The location of various land uses in KM is structured in the form of the traditional zoning system where the land uses location of land uses were located at walking distances, that is, between one to two kilometres. These are the CBD, the CBS, Industrial area, Kisumu pier and railway station, District and Provincial headquater offices, markets and residential area (Figure 2:3).

The CBD which is the foci of the KM, comprises various business and commercial establishments which are basically wholesale and retail shops. It is bounded by Oginga Odinga street,

Kenyatta Avenue, Otieno Oyoo Street, and Obote Road. Most of the residential areas are located both to the southern and eastern side of the CBD where the high income residential areas and both the low and medium income residential areas lie to the south and east, respectively.

The location of the land uses usually determines the type of transport modes suitable for any urban centre. Land uses located far away from each other require the use of fast moving modes such as the motorised ones and with wide streets and roads for easier movement. Since most of the land uses in KM still lie at a walking distance and are linked by narrow and poor roads (Photograph 2:1) the use of the motorised modes will still be minimal. The non-motorised modes, of which hand-carts is a part, will still play a greater role besides the existing motorised ones in the movement of both people and goods between the land uses.

Photograph 2:1 Narrow and poor in roads Kondele Estate

SOURCE: FIELD SURVEY 1991

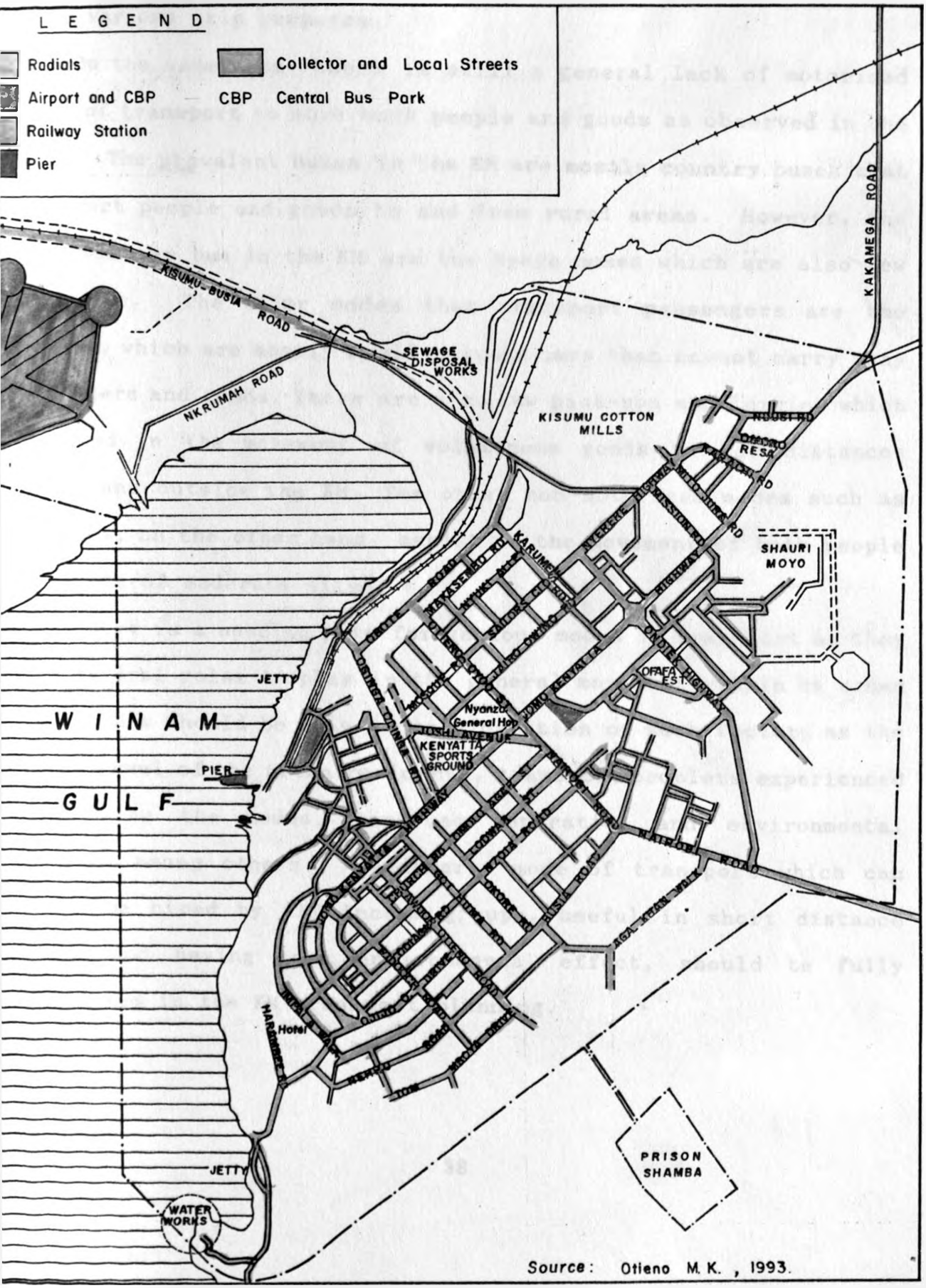
2.4: Transportation System

Transportation system encompasses road engineering and the existing modes of transport. Its major objective is to help in achieving maximum accessibility, that is, enough roads, minimized distances between different land-uses and the proper use of all the existing modes to meet the demands of both the low and high income groups(World Bank,1975).

KM two radials that is the Kisumu-Nairobi and Kisumu-Kakamega roads linking it with its umland. These are the major streets in KM experiencing huge volumes of traffic at various times of the day. There are also other minor streets and highways which link the land uses and provide service to trips of moderate lengths such as the Ang'awa Street joining the CBD to Central Bus Stop, Oginga Odinga Street to Kenyatta avenue and Accra to Otieno Oyoo, among others. There are also other collector and local streets that collect traffic from residential areas and other small land-use and channel them to the main arterial(figure 2:4).

Most of these roads were constructed in the colonial days when vehicles and the population in the urban centres was still low. Currently the urban population and modes of transport have increased in the KM yet little or no improvements have been done on roads to accommodate all the existing motorised and non-motorised modes. Despite the increase of the motorised modes in Figure 2:4 Transportation system the KM, they are still out-numbered by the non-motorised modes of transport (Wera,1981). The reason being, that most of the land-uses are still located at walking distances

2.4 : KISUMU MUNICIPALITY : TRANSPORTATION SYSTEM



Source: Otieno M. K., 1993.

and with the low income level experienced within the KM, many people still prefer to use non-motorised modes to motorised in their various trip purposes.

On the same note, there is still a general lack of motorised modes of transport to move both people and goods as observed in the field. The prevalent buses in the KM are mostly country buses that transport people and goods to and from rural areas. However, the only commuter bus in the KM are the Nyayo buses which are also few in number. The major modes that transport passengers are the matatus, which are mostly small private cars that cannot carry many passengers and goods. There are also few pick-ups and lorries which are used in the movement of voluminous goods to far distances within and outside the KM. The other non-motorised modes such as bicycles, on the other hand, assist in the movement of both people and goods of moderate sizes.

There is a need to plan for various modes of transport as they have several roles to play in the general movement within an urban area. This should be done in consideration of such factors as the income level of the urban residents, transport problems experienced when using the modes, land-use separation and environmental factors, among others. Hand-carts mode of transport which can easily be hired by all income groups, useful in short distance trips, and having less environmental effect, should be fully considered in the KM transport planning.

2.5: Socio-Economic Background

The position of KM as the largest urban centre of Western part of Kenya, earns it the credit of being the major industrial and commercial base of the region. Similarly, as the headquarters of the Nyanza Province most of the provincial offices are located there. Its commercial, industrial, and administrative position makes it attractive to many people and hence encourage rural to urban migration as one of its major process of urbanization. Most of these people migrating to the town are young men in search of employment.

KM has been experiencing a more or less steady population increase since 1948. Between the years 1948 to 1962 its population was growing at the rate of 5.7% per annum over the period while it dropped to 4.7% between the years 1962 to 1969(Wera, 1981). Between the years 1969 to 1979 and the increase has been rate of approximately 5.0% and by 1979 KM had a population of 32,643(Kenya, 1979).

The population increase has majorly been due to the rural to urban migration of those people searching for employment. This has led to addition of pressure on the existing urban facilities which alternatively calls for the utilization of all the available facilities. In terms of employment, the informal sector has been found to be an important alternative solution as source of employment that can absorb a good number of unemployed people in Kenya's urban centres such as KM.

However, the transport part of the informal sector has not been fully explored in terms of its reduction of unemployment and its suitability in employment and income generation. The hand-carts mode of transport, if properly organised and planned for, can be an alternative source of employment to some of the active population migrating to KM.

KM, apart from being an administrative and commercial centre, has a potential for industrial development. This is due to its location at the port, rail and road traffic points, the availability of electricity and the large volume of water for industrial cooling and processing (Kenya,1974). These factors have attracted many industrial developers to locate their businesses in the KM. The industries, on the other, hand offer employment and job opportunities to the KM urban residents.

However, despite the employment opportunities offered, the income level of its residents varies greatly. The *Urban Labour Force Survey* (Kenya,1986), revealed that KM has the highest number of urban residents in the low income group as compared to other urban centres. The survey showed that Thika and Eldoret had over 85%, Mombasa had 63%, and Kisumu had 94% in the lower income groups. The income were calculated using the revised income brackets (table 2:1).

The low income level, deters many from owning or fully using the existing motorised forms of transport in KM such as the matatus, buses, and pick-ups among others. The full incorporation of hand-carts mode of transport into the UC's transportation

Table 2:2 New income bracket

Income Group	Bracket
Lower	Under 2,000
Middle	2,000-7,999
Upper	8,000 +

Source: Urban Labour Force Survey, Republic of Kenya, 1986 Nairobi: Government Printer

system, will encourage the ease of movement to all urban residents despite their income level.

The hand-carts mode of transport is suitable for use within KM. Since the modes are muscle powered, they need flat and gentle land for easier movement. The topography of KM offers this type of terrain as the town is located on a flat land. Historically and economically, the KM's major activity is commerce where most of its residents are engaged in business than other activities. In such UC's most of its traffic is comprised of goods movement modes. Since small scale businessmen who cannot afford the motorised modes are the majority hand-carts is one of the suitable mode for the movement of their goods. Similarly the majority of the UC's residents are still falling in the low income group and hence cannot afford to use the expensive motorised modes for all their trip purposes. The location of land uses at walking distances in the KM also encourages the use of hand-carts mode of transport in KM.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

In order to find out the set objectives for the study, some hypotheses were formulated. To test these hypotheses, a fieldwork survey was conducted which involved sampling, personal interviews using questionnaires, collection of secondary data from both the local and central government, analysis and interpretation of the data and the presentation of the findings. This chapter specifically addresses itself to the methodological procedure of the whole study.

The study concentrated mainly on the role of the hand-carts mode of transport in the movement of goods within KM. This was done with the intention of contributing in knowledge to Kenya's urban transport planners on the existence of non-motorised modes in the UCs, their uniqueness and hence the need of their consideration in transport planning that can help in forecasting true movement pattern.

3.1: Sampling Procedure

Data collection and processing for the whole population in a study area can be expensive, complex and time consuming. For example, in transportation planning, the basic unit of data

collected is usually an individual household or a single-vehicle movement, it will be too expensive to develop a data base of every vehicle or household movement in an urban area (Meyer,1984). To overcome the problem, methods have been developed to help planners in making reliable inferences about the characteristics of an entire population based on the characteristics found in a carefully selected sample.

The sampling techniques adopted for the study were systematic and cluster samplings. According to Borg and Gall (1989), the systematic sampling technique is used to get a sample from a defined population that is placed on a list. It involves; (a) dividing the population by the number needed for the sample; (b) followed by selecting at random a number smaller than that arrived at by the division and (c) starting with that number,select every I^{th} number from the list of population. The technique was used on *matatus* and hand-carts since their population was not well listed even in the KMC records. It was applied when interviewing the *matatu* and hand-carts operators in their identified parking areas where the third arrival from the first was interviewed.

Cluster and multi-stage sampling was also used. It is a technique used when selecting groups of individuals and not individuals from a population. Usually it is used in cases where it is impractical to get a list of all members of the accessible population. When using the technique the desired area of study is divided into required blocks which are listed and numbered then the area to be sampled is drawn at random and the accessible needed

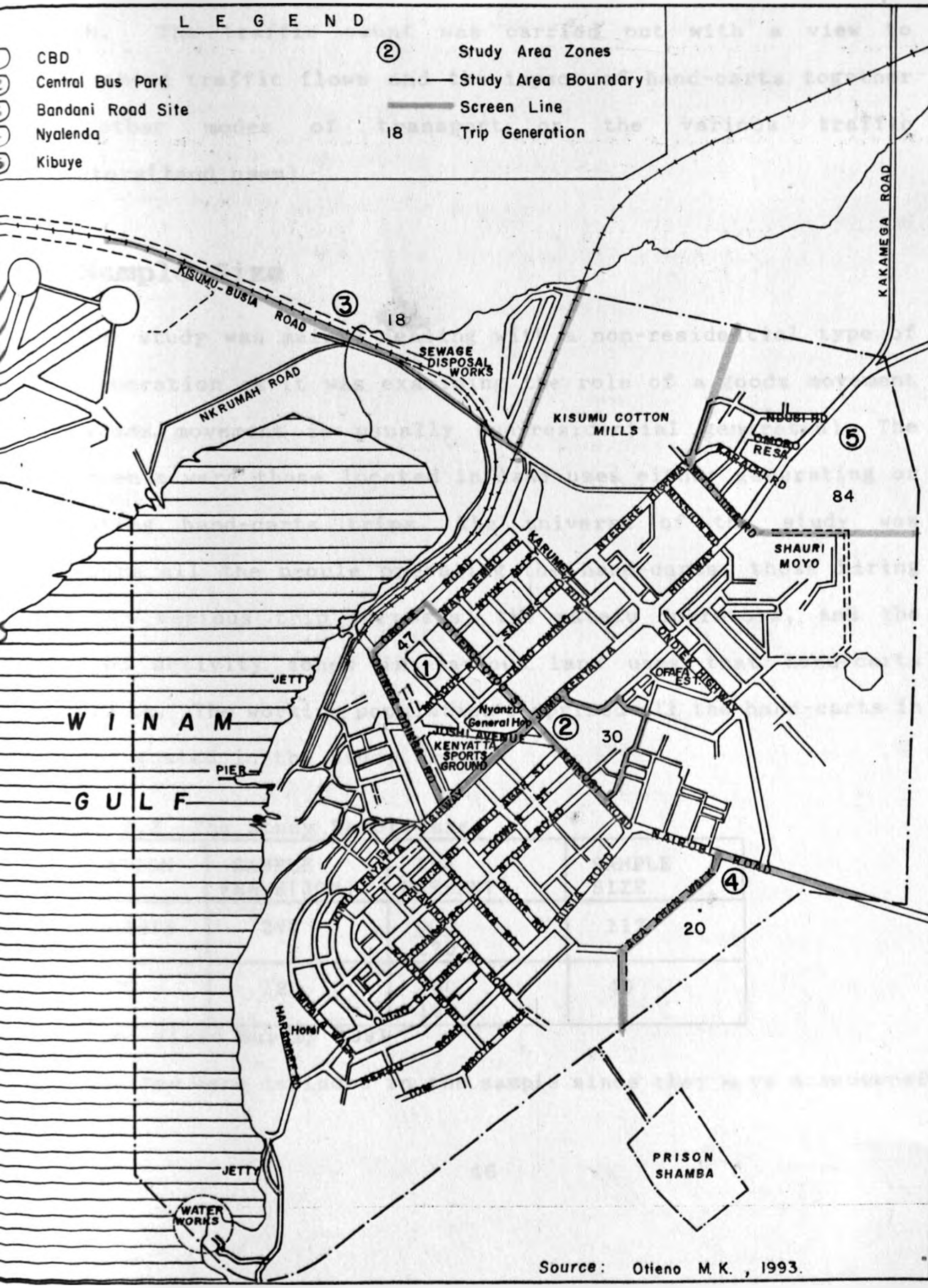
individuals studied.

In order to get the required data, transportation planners normally group data for collection and processing by geographic location or type of transportation facility (Meyer,1984). In the field the study area was first divided into blocks(zones) forming the basis for analysis of travel movement (figure 3:1). The zones were divided according to the land use boundary zones which comprised of the CBD, CBS, residential areas and markets(open spaces) which were found to either generate or attract hand-carts trips.

After dividing the study area into blocks a multi-stage sampling was applied whereby after selecting the blocks, the respondents were chosen randomly in each squared block. Since the technique was used when studying the hand-carts hirers and the business operators, particular business and bus/*matatu* stages were chosen at random within the blocks and the required number people interviewed in them.

The technique was found to be useful as it saves time and money which was one of the limitations to the study. However, its limitations are that it has some errors at different stages, some of the conventional methods for computing statistics on research data cannot be used easily in the analysis of data collected and also that the statistics are less sensitive to the population differences.

3.1 : THE STUDY AREA LOCATION, ZONES AND ZONAL HAND-CARTS TRIP GENERATION



Traffic counts was also done at the selected principal arterial (streets and highways) having high traffic volumes within the KM. The traffic count was carried out with a view to establishing traffic flows and the impact of hand-carts together with other modes of transport on the various traffic generators(land uses).

3.2: Sample Size

The study was mainly dealing with a non-residential type of trip generation as it was examining the role of a goods movement mode(goods movement is usually non-residential generated). The respondents were those located in land uses either generating or attracting hand-carts trips. The universe of the study was therefore all the people operating the hand-carts, those hiring them for various trip purposes, the matatu operators, and the selected activity zones in various land uses that hand-carts operate on. The working population comprised all the hand-carts in the designated in the study area.

Table 2.2 The Study Sample size

POPULATION	SAMPLE FRAME(30%)	Ith ELEMENT	SAMPLE SIZE
HAND-CARTS 900	270	$\frac{900}{270}$	112
MATATUS 420	120	$\frac{400}{120}$	40

Source: Field Survey 1991

The *matatus* were included in the sample since they were discovered

to be the only prevalent public transport mode in KM assisting the urban residents in both the passenger and goods movement.

Since the sample frames of the *matatu* and hand-carts operators could be found, systematic sampling was found to be the suitable method. A representative sample of 30% was taken from both hand-carts and the matatu operators populations, that is, 270 and 120 people respectively. When the systematic sampling technique was applied where the third arrival from the first was interviewed, a total of 112 and 40 people formed the sample.

A total of 220 people were interviewed of which 112 were hand-carts operators and 40 *matatu* operators, sampled systematically, while 40 of the hand-carts hirers, and 28 various business operators were randomly interviewed in the selected clusters using cluster and multistage sampling in the selected land uses.

3.3: **Fieldwork facilities**

Various facilities for fieldwork were used at the required stages. A camera was used to take photographs of the types of goods moved by the hand-carts, how they co-ordinate with the other modes, and the parts of the town they mostly operate on.

In origin-destination surveys such as for this study, transportation system base map was also used as it was found to be important in highlighting the pattern of movement of both people and goods in the study area. At the same time the study area base map was used to mark the area of cordon of the study area,

screenlines and particular zones of interviews(figure 3:1) above.

3.4: Design of Questionnaires

There were four designed questionnaires aimed at four different groups of people. They were for the hand-carts operators, those hiring them, matatu operators, and various business operators(Acronyms 1-4). The information gathered from these people by administering of the questionnaires formed the primary data.

3.5: Primary Data

This involved the preparation of the questionnaire and using it in interviews of the respondents and recording of the answers. The designed questions were aimed at getting true details on the important features of hand-carts and their operators, their hirers and their relationship with a passenger transport modes. The questions were structured with an intention of knowing such features as quantity and types of goods moved by the hand-carts, their income generating ability, the socio-economic group they serve, their relationship with other modes and land uses generating most of hand-carts trips, among others.

Some of the questions were asked in a slightly different manner (Acronym 1) in order to gain full information from the respondents because of the possible inconsistencies expected. They were left open ended in order to give the respondents an

opportunity of giving even some of the unexpected answers which might have been relevant to the study. Participant observation was also used throughout the field work to get some information on the hand-carts activities that could not be got from the administration of the questionnaires to the respondents on carts activities.

3.6: Secondary Data

Apart from raw data collected from the field, secondary data were also collected from different sources. The sources were KMC trade license records and other library materials such as the magazines and books related to the study topic (Obudho and Obudho 1982).

3.7.0 Procedures of Data Analysis

3.7.1: Data Editing

The first step taken after data collection was to edit it. In order to ascertain the accuracy of the data, possible omissions and errors detected were corrected. The wrong entries and the irrelevant answers were carefully deleted leaving the right information.

3.7.2: Coding of The Data

Since the questions were open-ended, it was necessary to code the data in order to group responses in a limited number of

categories/cases. The coding method normally assists a researcher in reducing several replies to desired categories which contain the critical information needed for data analysis(Emory,1980). The data were coded in different coding sheets and this was followed by data entry into the computer. The Statistical Package for the Social Sciences(SPSS) programme was used for analysis.

3.8.0: Methods of Analysis

3.8.1 Descriptive Analysis

The descriptive analysis mostly helps in studying how variables are distributed. It also helps in summarising a large quantity of collected raw data into a measurable one using quantitative techniques. The methods included percentages, medians and modes. Frequency distribution which shows the number of occurrence of variables in the data set was also applied.

3.9.2: Quantitative Analysis

To test the working hypotheses, the main statistical technique used was the X^2 (Chi Square) statistics.

Chi Square(X^2)

The Chi Square test evaluates the probability of obtaining a set of observed frequencies from a population having assumed frequencies. It is used to test the difference between the

observed frequency distribution and the expected one. It can also be used in both the one sample case and more than one sample cases.

Steps in Chi Square Test:

(a) Take the difference between the observed frequency and the expected or computed $(O_i - E_i)$.

(b) Square the value that is, the difference between the observed and the expected $(O_i - E_i)^2$.

(c) Divide the value in (b) by the expected value for all the categories or classes in the contingency table to get the X^2 statistic.

$$X^2 = \sum_{i=j}^{n} \frac{(O_i - E_i)^2}{E}$$

The probability of the X^2 value occurring by chance is then obtained to decide whether the observed and the expected are significantly different. This is found by using the tabulated X^2 statistic at the given level of significance. If the calculated value is higher than or lower than the tabulated then the hypothesis of no significance is rejected at the selected significance level.

In a two sample case, the analysis of observed frequencies is similar when using the contingency tables. The expected frequencies are first calculated for all the cells of the contingency. The formula:

$$E = \frac{\text{Row totals x Column total}}{\text{Overall total}}$$

This formula was used in examining the difference in the hand-carts trip attraction and generation of various land uses. The calculated expected frequencies are the frequencies that would be expected if there were indeed 'no difference' between the attractions and generations of different zones. Every *E* value takes into account the proportion of trips in each zone.

However, X^2 test has some of its limitations these are that;

(a) all data used in it must be in frequencies. It can therefore not be applied in interval scale data.

(b) its contingency table containing the observed frequencies must have at least two columns.

(c) samples are also assumed to be independent hence cannot be applied in dependant sample cases and,

(d) it is assumed that sampling is done randomly.

CHAPTER FOUR

TRANSPORT DEMAND AND THE ROLE OF HAND-CARTS MODE OF TRANSPORT

4.0.0 Introduction

The main objective of the transportation studies is to estimate the transport demand. The knowledge of the transport demand on the other hand helps in identifying the group of urban residents that will use a given mode of transport for their trip purposes. Similarly, the choice of a given mode of transport is determined by the location of the land uses, the economic activities in the UC, and the mode's accessibility.

This chapter examines the hand-carts mode of transport as one of the goods transport mode for the business operators whom they mostly serve, the type and value of goods they move and where they get the goods regularly within the KM. It also highlights the uniqueness of hand-carts amidst other modes of transport in meeting various goods transport demand.

4.1.0 Goods Movement and the Related Modes

Urban goods movement includes all the movement of goods like fuel, food, wastes, industrial supplies and both the wholesale and retail goods(Meyer,1984). In the KM there are diverse types of

goods that are supposed to be moved to various destinations and for particular uses depending on demand. These include raw materials to industries within the KM, industrial products, furniture, agricultural products from the umlands, fish from the lake and luggages among other goods. These goods mostly originate from such land-uses as the CBD, the CBS, industrial area, markets and residential areas.

The goods are transported to or distributed within the town by such modes as the pick-ups, country and urban buses, matatus, human porters, lorries, hand-carts and bicycles depending on their weight, value, and distance to be covered. However, the low income level that denies many in the KM the opportunity to purchase and use the motorised modes, also affects them in the movement of their goods as many cannot afford to hire trucks and pick-ups in the movement of their goods. Likewise, the location of the land-uses close to each other discourages many to use the such expensive modes as they consider it cheaper to use the non-motorised modes such as the hand-carts. The existing *Nyayo* buses which are the only commuter buses are not suitable for goods movement while the matatus on the other hand can only move light goods.

4.1.1 Human Porterage

This is one of the transport modes that has been used by man from time immemorial. It involves carrying light and heavy goods to a desired destination depending on the weight of the goods and

the distance to be covered. It is one of the modes mostly used in the rural areas having poor roads and general lack of both the other motorised and the non-motorised modes.

In the UCs such as the KM, human porters are different from those in rural areas. They are people seated at some points in the UC waiting for those with heavy goods who need assistance but at an agreed service charge unlike in rural areas where human porters are mostly the owner of the goods they move. Within the KM, they are minimal as there are some other motorised and non-motorised modes that can be used to move goods easily.

They mostly assist in the short distance trips of approximately not more than 50 metres and carry light goods of an average of 50kgs as shown (Photograph 4:1). Their major areas of operation within the KM is in the CBS and within the markets such as Kibuye on market days. They help in the movement of the goods mostly from a bus terminal to the customers selling stall and vice versa. Like the hand-carts operators, they also move food products in most of their trips as was observed in the field.

Photograph 4:1 A human porter at Jubilee Market

SOURCE: FIELD SURVEY 1991

4.1.2 Lorries and Pick-ups

These are motorised modes of transport mostly designed for goods movement. The modes as observed in the field, were used in the movement of goods to and from factories and wholesale shops within the CBD. Some were parked next to the shops waiting for some people to hire them to transport their goods. Those moving goods to and from the factories and wholesale shops were belonging to the owner of the firms and were specifically used in the transportation of goods to be sold to their customers. The ones for hire were few and were being used by those having many goods.

This implied that most of the KM residents do not own the lorries and pick-ups except some few who operate large businesses. On the other hand, it showed that the majority operate small businesses whose goods are moved by the hand-carts. An interview of the business operators on the role of hand-carts revealed that 100% of them specifically the large scale ones were not offering free transport for their customers as they considered it expensive. When they were asked to mention the prevalent mode their customers normally hire the majority said that it is the hand-carts.

The results of the study, on the other hand, revealed that the lorries and the pick-ups operate as the distributor of goods for the large scale businessmen while the hand-carts for the small scale operators.

4.1.3 Hand-Carts Mode Of Transport

Hand-carts as reported by their operators in the KM, owe their historical background from the Indian *"Dukawallas"* who brought the technology from India during the construction of the Kenya-Uganda railway. They started being in use as early as 1930s for the movement of both people and goods in the administrative centres where some commercial activities had begun. These modes were used frequently because of the short distance trips as most of the land-uses were not located far apart. However, despite of the development and the farther expansion of the UCs such as Kisumu, Nakuru, Nairobi and Mombasa these modes have persisted to date. This indicates that they still have a role to play in these UCs.

The hand-carts mode of transport is one of the cheap means of goods movement compared to the motorised mode as discovered in KM. When their hirers were asked why they use the mode, 45% which was the highest percentage said that it is due to its transport low charges. They are mostly seen parked in areas distributing or receiving various types of goods within the town as the bus and *matatu* terminals, next to wholesale and retail shops, open spaces(e.g. fish smoking areas) and markets, and railway station among others (Photograph 4:2). The operators of the modes normally wait for customers who may be willing to hire them to a desired destination. This depends on the transport charge negotiation between the hirer and the operator. What the operators consider most is the weight of the goods and not the distance as discovered

during the field survey. Howe(1983) points out that the hand-carts can move goods as heavy as 180 kgs at a speed of 3-5 km/h. However, from the current study it was found out that they can move goods weighing approximately 400kgs and at the above speed calculated by Howe(1983).

These modes are, therefore, suitable for businessmen, travellers, and the urban residents who are in need of moving their heavy goods for short distances at a cheaper cost.

4.2.0 The Analysis of Transport Demand

4.2.1: Modal Trip Distribution by Time Of Day

The survey results of traffic counts showed that the prevalent modes of transport in the KM are the *matatus* and vans as they accounted for 35% of all the modes. They were followed by pedal cycles which accounted for 20% and pick-ups 17% while other modes were minimal as per their distribution in the KM. However, the hand-carts were found to be ranking fourth and accounting for only 9%. It was also discovered that most of the modes trips were concentrated during the peak periods of the day as between 7.00am-9.00am, 11.00am-1.00pm and 4.00pm-6.00pm where by the peak of hand-carts trips were concentrated between 8.00am-12.00pm.

Photograph 4:2 Hand-cart parked Next to a Business Premise

SOURCE: FIELD SURVEY 1991

The traffic counts on various streets was carried with an intention of knowing the streets having the highest volume of various modes and especially the hand-carts traffic in comparison with the other modes for future planning purposes. The knowledge of the traffic flow helps urban transport planners to estimate the amount of trips generated by different types of land-uses and the type of measures to be taken in order to reduce the possible congestion and dangers of accidents that can be faced by the road users.

On the other hand, the concentration of the modes at such periods indicate the type of transport demand experienced emanating from the existing land uses and the usefulness of the modes to the urban residents. The morning and evening hours that is between 7.00am-8.00am and 4.00pm-6.00pm are characterised by the passenger trips for those going to work in the CBD and the industrial areas while evening hours for those from work. However, between 9.00am-12.00pm most of the trips are usually business trips for businessmen. The resultant effect is that during such periods the transport demand arises and different types of modes are in demand.

The hand-carts mode of transport was found to be operating mostly in the mid-morning hours. Since their main hirers were businessmen, it is at such hours that business activities are at their climax. It is when most of the wholesale and departmental stores are open, goods from within and outside the KM are being distributed to various destinations and many do their purchases of various goods.

In the early morning hours their number was also found to be a little bit higher. During these periods, hand-carts were found to be very important in the movement of different types of goods for various groups of people. This included the hawkers who rush to their normal stalls located at strategic points to start morning sales or some of them going to the wholesale market such as Jubilee Market to purchase agricultural and other products from up-country for their daily business. An interview with the hawkers revealed that hand-carts was the only mode used regularly by most of them as it was easy to get and cheap in terms of transport fare charges. It was the mode that could pass with their goods between corridors/paths like between Jubilee Market and central bus park or between the closely built stalls at Kibuye Market(Photograph 4:3). The motorised modes cannot pass through the corridors as they are wider in size.

The other group of people served by the hand-carts operation in the morning hours are the travellers who alight from various modes of transport with heavy luggages and still want to interchange to other modes of transport. Most of such travellers were observed to be those alighting from the Kisumu bound passenger train from Nairobi. They were either going to catch a bus at the central bus park to take them up-country or to the estates within the KM.

Photograph 4.3 Hand-carts Collecting Goods inside Kibuye Market

SOURCE: FIELD SURVEY 1991

The distribution of hand-carts in the time of day is important in that it relieves the other modes such as *matatus* from the in-vehicle congestion which reduces the comfort and fast travel needed by most commuters.

In the hand-carts streets distribution within the KM, Jomo Kenyatta Highway was found to be having the highest volumes of hand-carts (49%) followed by Obote Road (35%) and then Oginga Odinga Street (16%)(tables 4:1).

TABLE 4.1 SITE: Jomo Kenyatta Highway(next to Yellow Line)
INFLOW

Time	H.D.V.	P. B.	M. V.	P. Us	M. B.	P. C.	H. C.
7.00-9.00am	15	20	130	22	10	95	26
11.00-1.00pm	17	13	89	28	4	65	45
4.00-6.00pm	18	10	117	35	2	30	35

OUT FLOW

Time	H.D.V.	P. B.	M. V.	P. Us	M. B.	P. C.	H. C.
7.00-9.00am	6	12	121	8	0	21	10
11.00-1.00pm	20	41	79	28	8	37	25
4.00-6.00pm	13	22	129	25	17	79	39

Legend: **Source: Field Survey,1991**

H.D.V.->Heavy duty vehicles **P.B.-> Passenger buses**
M.V.-> Matatu Vans **P.Us-> Pick-ups**
M.B.-> Motor bikes **P.C.-> Pedal cycles**
H.C.-> Hand carts

Such a concentration revealed an important characteristic of the

hand-carts in relation to the location of the land uses in the KM. Kenyatta Avenue which had the highest concentration, is one of the arterial that is fed by all of the feeder roads from the CBD, the godowns and industrial area which generates and attracts hand-carts trips to the Southern part of the KM. The hand-carts counted were those either moving to the CBD to collect goods to the Central Bus park (or any other destination) or from other places to the CBD. Along Obote Road, the number was also high as these were hand-carts either moving to their points within the godowns from where they get goods to transport(table 4.2).

TABLE 4:2 **SITE: Obote road next to Kicomi**

INFLOW

Time	H.D.V.	P. B.	M. V.	P.Us	M. B.	P. C.	H. C
7.00-9.00am	23	30	95	43	8	40	32
11.00-1.00pm	45	35	112	65	4	23	14
4.00-6.00pm	30	12	109	51	1	15	10

OUT FLOW

Time	H.D.V.	P. B.	M. V.	P. Us	M. B.	P. C.	H. C.
7.00-9.00am	20	15	75	25	5	24	10
11.00-1.00pm	45	26	87	61	8	12	23
4.00-6.00pm	33	20	120	74	15	45	32

Legend: (as table 4.1 above) **Source: Field Survey,1991**

However, Oginga Odinga Street did not attract the use of hand-carts as compared to the other streets. This is due to the type of economic activities located there and the domination of the street by the other motorised modes. In terms of land use location, most of the buildings along the street are either offices, banks or retail shops with few wholesale shops which do not generate or attract more hand-carts trips as some of the shopping and other trips generated only require the use of such modes as matatus. It shows also that hand-carts trips is mostly generated by the commercial land use having wholesale shops and other departmental stores than other land uses. The *matatu* mode of transport was the leading in the street as it was the only one transporting people to the offices and to the retail shops. The buses counted along the street were either belonging to the parastatals, companies or country buses having their offices in that region(table 4:3).

TABLE 4:3 SITE: Oginga Odinga Road(Next to Alpha House)

INFLOW

Time	H.D.V.	P. B.	M. V.	P. Us	M. B.	P. C.	H. C.
7.00-9.00am	2	5	65	39	15	80	16
11.00-1.00pm	10	3	45	53	10	65	7
4.00-6.00pm	4	10	70	41	3	79	4

OUT-FLOW

Time	H.D.V	P. B.	M. V.	P. Us	M. B.	P. C.	H. C.
7.00-9.00am	5	10	3	35	6	48	20
11.00-1.00pm	10	1	0	43	9	34	9
4.00-6.00pm	9	5	4	38	11	56	2

Legend: (as Table 4.1 above)

4.2.2: Zonal Hand-carts Movement Pattern

The examination of the hand-carts movement patterns from various origins to different destinations showed that other parts of the KM generated or attracted hand-carts trips more than others. The study area was divided into zones 1, 2, 3, 4, and 5 comprising of the CBD, CBS, Bandani area, Nyalenda and Kibuye, respectively. According to their hand-carts trip generation, zone five was leading in the order of hierarchy followed by zones 1, 2, 4, and 3 respectively. However, in trip attraction, zone 2 was leading in followed by zones 3, 4, 1, respectively (table 4.4a: Figure 2:1)

Table 4:4(a) Hand-carts Interzonal Trip Distribution Matrix

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Row Totals
Trip Genera.	47	30	18	20	84	199
Trip Attrac.	36	90	46	30	44	246
Column Totals	83	120	64	50	128	445

The Chi square (X^2) statistic was used to test the hypothesis on the difference between the hand-carts trip generation and attraction by the various land uses. Both the null and alternative hypothesis states that;

H_0: There is no significant difference between the number of hand-carts trips generated by various land use zones and the number of trips attracted to them.

H_1: The number of hand-carts trips generated by various land use zones and the trips attracted to them is significantly different.

After calculating the row and column totals, the value for the expected (E) was calculated for each cell in the contingency table(table 4.4b).

Formula:

$$E = \frac{\text{Row Totals x Column Totals}}{\text{Overall Total}}$$

Table 4.4(b) Calculated Chi Square Expected Values For Attraction and Distribution

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Trip Genera.	37	54	29	22	57
Trip Attrac	46	66	35	28	70

After calculating the expected values, the expected frequency that would be expected if there were no difference in the attraction and generation of different zones is calculated followed by the calculation of the X^2 statistic (table 4.4c);

4.4(c) Chi Square Contingency table for Trip Distribution and Attraction

		ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5
O - E	G	10	26	9	2	27
	A	10	24	11	2	26
$(O-E)^2$	G	100	676	81	4	729
	A	100	576	121	4	676
$\frac{(O-E)^2}{E}$	G	2.7	12.5	2.8	0.2	12.8
	A	2.2	8.7	3.5	0.07	9.7

G: Generation A: Attraction

The calculated $X^2 = \Sigma \frac{(O - E)^2}{E} = 55.17$

The tabulated statistic is obtained by using $(k-1)(h-1) = (2-1)(5-1) = 4$ degrees of freedom. At 5% significance level, the tabulated statistic = 9.49, therefore the calculated exceeds the value that would be likely to result by chance if the trips to different destination was similar. Therefore the no difference hypothesis is rejected at 5% significance level. There is the confidence that the numbers of trips attracted and distributed by various land uses is different.

The zonal trip attraction and generation indicated the type of relationship that exists between the land use location and the economic activity that leads to transport demand in the study area. Zone 5, which was found to be generating the highest hand-carts trips has in it Kibuye Market and other open spaces where such activities like fish smoking, timber and second-hand clothing sales

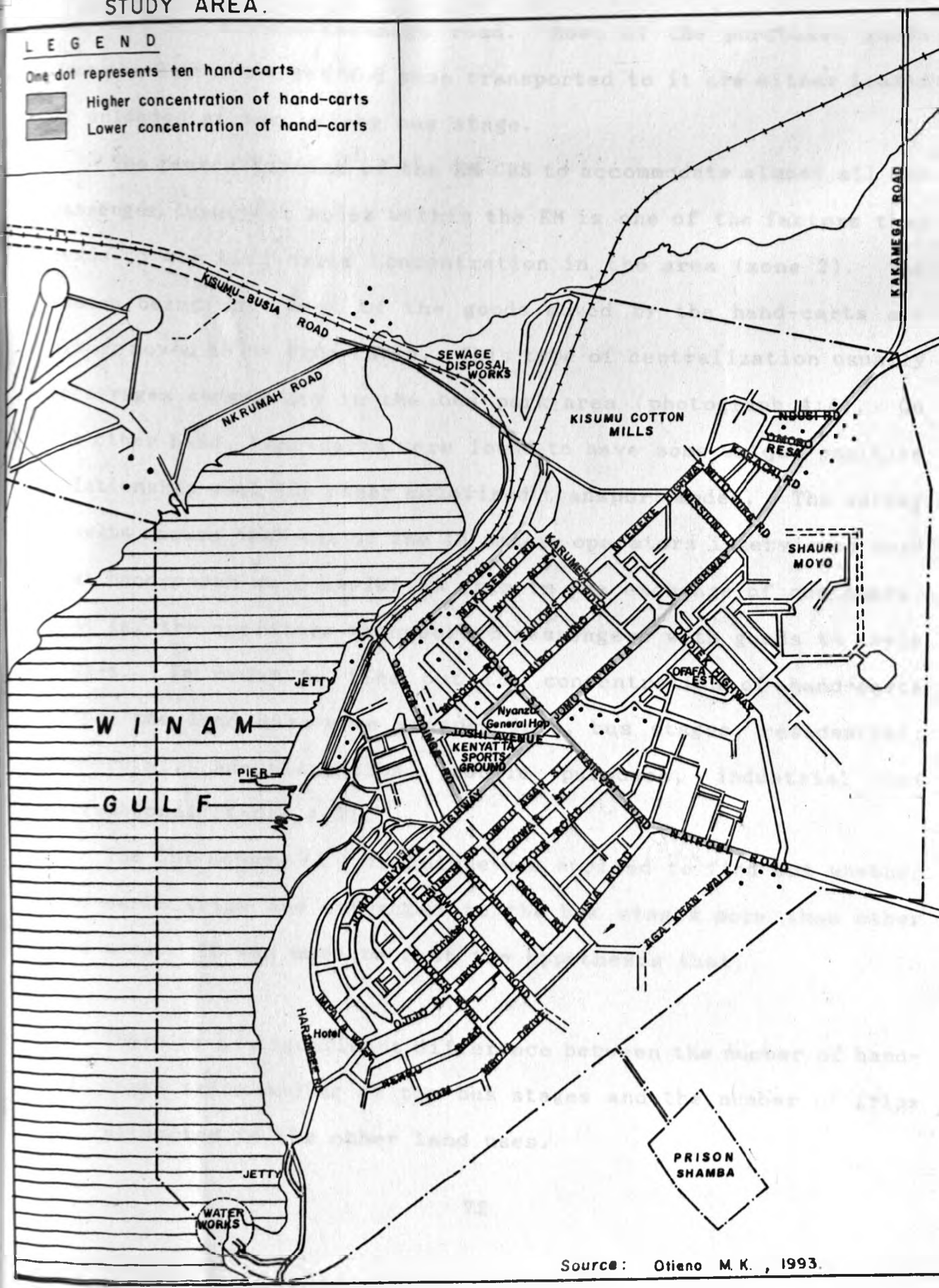
are taking place. Kibuye Market is one of the open spaces in the town where most of the agricultural and *jua kali* products are received and distributed within the KMC. These are goods from within the KM and its umlands.

The purchasers of the goods need to transport them to various points in the KM. The goods are normally moved from the markets to residential areas, CBS, other open spaces(markets), and to some hotels and retail shops in KM. Such a demand cannot be met by a single or some few modes of transport. The availability of different types of modes give the hirers a wide range of modal choice. The high volume of hand-carts from zone 5 indicate that they are one of the suitable mode of transport serving the region in the movement of goods.

The high concentration of hand-carts was found to be in zones 1 and 2, that is, the CBD and CBS, respectively (Fig 4.4a). Zone 1 is where most people especially small scale business operators do their business purchases and as a result it has a high demand of goods transportation. The specific areas where the hand-carts mostly operate are along Odera, Ogada, and Accra streets where most of the wholesale shops are located. Zone 2 which was around the CBS area, generated agricultural goods trips from the umlands.

The study of the intra-zonal trips it was found out that zone 5 had the highest number of trips followed by zones 2, 4, 3 and 1, respectively. As stated above the leading zone in intra-zonal trips have some of the open spaces(markets) where business operators purchase goods and at the same time sell them there.

Fig. 4·1 : THE TEMPORAL HAND-CARTS DISTRIBUTION IN THE STUDY AREA.



Source: Otieno M.K., 1993.

Similarly, it is located next to one of the busiest roads in the KM, that is, Kisumu-Kakamega road. Most of the purchased goods from the Kibuye Market and some transported to it are either loaded or unloaded at the nearby bus stage.

The centralization of the KM CBS to accommodate almost all the passenger transport modes within the KM is one of the factors that leads to the hand-carts concentration in the area (zone 2). The reason being that most of the goods moved by the hand-carts are either moved to or from there. This type of centralization usually encourages congestion in the bus park area (photograph 4:4). On the other hand, hand-carts were found to have some unique positive relationship with the other motorised transport modes. The survey results showed that out of the 40 *matatu* operators interviewed said that hand-carts were useful to them in the exchange of customers, that is, the operators transported passengers with goods to their stages. In order to find out the concentration of hand-carts trips, the land uses were grouped into, bus stages, residential, commercial, administration, public purposes, industrial and recreational (table 4.5).

The Chi Square (X^2) technique was applied to find out whether hand-carts trips are attracted to the bus stages more than other land uses. It was used to test the hypothesis that;

H_0: There is no significant difference between the number of hand-carts trips ending at the bus stages and the number of trips attracted to the other land uses.

Photograph 4:4 Congestion at the Entrance of Kisumu Central Bus Station

SOURCE: FIELD SURVEY 1991

H_1: There is a significant difference between the number of hand-carts trips ending at the bus stages and the number of trips ending at the other land uses.

4.5 Chi Square Contingency Table For Land uses Hand-carts Concentration.

	Frequency	Expected	O-E	$(O-E)^2$	$\frac{(O-E)^2}{E}$
Bus Stages	97	112	-15	225	2.0
Residential	35	112	-77	5929	53.0
Commercial	80	112	-32	1024	9.1
Administration	5	112	-107	11449	102.2
Public Purposes	4	112	-108	11664	104.1
Industrial	30	112	-82	6724	60.0
Recreation	1	112	-111	12321	110.0

$$\text{The Calculated } X^2 = \Sigma \frac{(O - E)^2}{E} = 440.4$$

The df is (h-1) = 6 At 5% significance level, the tabulated $X^2 = 12.60$, therefore, the calculated 440.4 reflects a far greater difference that would occur if there was no significant difference between the trips attracted to the bus stages and other land uses therefore the hypothesis is rejected.

In the examination of the hand-carts intra-zonal movement pattern, it was discovered that Zones 2, 3, and 4 had more of trips as compared to their interzonal ones. These were the operators moving goods within the markets and between the markets and the bus stages or the estates. For example, in zone 2 they were those

moving goods for businessmen between the Central Bus Park and the Jubilee Market which is approximately 10 metres away.

4.2.3 The Business Operators and Business Market Trips

White(1976) pointed out that business market trips are those trips made by businessmen who hire different modes for various business trip purposes in a given area such as the KM. The availability of the modes and their transport fare charges and the scale of the business are some of the major factors that mostly determine the utility of a mode to businessmen. In the KM, the leading economic activity is business, and specifically small scale business(Kenya, 1989). Most of these small scale businessmen have little capital that cannot enable them to hire the expensive modes to transport their goods. They, therefore, choose to use cheap modes of transport such as the hand-carts.

The survey results showed that the hand-cart modes have one of the important features that raises its utility to these businessmen. Out of the 40 hirers(users) interviewed, 88% were found to be businessmen out of which 45% said that they hire hand-carts because it is cheap in terms of transport charges. Others said that the mode is the only suitable one for the movement of their goods as they are designed for goods movement of a lesser quantity and are easier to get always as they normally park next to the wholesale shops and other land uses generating goods trips.

According to the *Kisumu District Plan Report of 1987-1993*, the number of small scale businessmen have been rising steadily with that of the hand-carts within the KM(table 4:3). This clearly indicates that, the hand-carts mode of transport will still continue to serve most of the KM's small scale businessmen.

TABLE 4:6 **Kisumu Municipal Trade Licenses & Estimated Sales: 1983-1987**

Year	1983	1986	1987
Licenses	No.	No.	No.
Hawkers	940	1,554	1,574
Hand-carts	200	620	680
Seasonal	100	160	260
Totals	1,240	2,334	2,514

SOURCE: **Town Clerk's Records, KMC**

The survey results also revealed that the number of hand-carts has been increasing almost steadily for the past six years. A sample of business operators within the zones was taken and interviewed on the role of hand-carts within the KM as perceived by them. The result revealed that hand-carts is one of the leading modes of transport that assist their customers in the movement of their purchased goods. The reason being that it is cheap and always available in any time of demand.

When they were asked whether the restriction of the hand-carts from the areas of their business location would affect their business, 78% said that there would be a possibility. The major

problem they fear can face them was the reduction in the number of their customers who might go to shops nearer to them that does not require the use of other expensive modes of transport. Some felt that even though the customers could still come, their purchasing power would be reduced as they will use more money on transport. Other business operators selling such commodities as fish (bonny Nile perch whose fillets are removed) from the fish processing factories for smoking would be very much inconvenienced as hand-carts are the only modes that can help them in the movement of their goods which the operators of other modes fear to transport as they sometimes have bad smell to them (photograph 4:5). The restriction can generally lead to the poor performance of business activities in those parts of the KM and hence the development of the municipality in general.

4.3 Hand-carts Counts and Goods Moved

Particular activity areas were chosen and the number of hand-carts moving goods from them counted, quantity and cost of goods moved estimated, the possible number of people that can benefit from the goods estimated, and the destinations of the goods from the chosen areas noted. This was done in order to verify the level of demand fulfilled by the hand-carts in goods movement. The areas selected were next to markets(open spaces) and wholesale shops as they were the land-uses found to attract and generate hand-carts trips mostly (table 4:7).

Photograph 4:5 Fish Smoking Site at Obunga Estate

SOURCE: FIELD SURVEY 1991

TABLE 4:7: Estimated Level of Demand fulfilled by Hand-carts

Area/ Origin (Zone)	Good Type	Quant of Goods	Cost in Ksh.	Total Cost	Aver. People Served	Dst. of Goods	Hand-carts Counted
Jubilee Market	Bananas	70 Bunches	40	2,800	750	Estate Market	10
Kibuye Market	Arm Chairs	200	140	28,000	200	Estates Rural areas	15
"	Maize (Dry)	30 Sacks	580	17,000	14,400	Shops in town	5
"	Metal Boxes	20	250	5000	20	Posho mills	3
Nyalenda Market	Charcoal	20 Sacks	80	1600	500	Hotels Retail seller Estate	4
Bandani Rd/Side	Bonny Fish	200 Fish	25	5000	1200	Market Rural	6
C.B.D. Accra Street	Sugar	15 Sacks	1,400	21,000	31,000	C.B.S Rural Shops Hotels	5
Kondele Market	Second-hand Cloths	20 Bales	1,000	20,000	2000	Estate C.B.S	8

SOURCE: FIELD SURVEY 1991

The table below shows clearly that hand-carts fill some level of transport demand in the KM. The goods they move can serve at least an average of 50,000 people per day within and outside the town showing also that it is one of the modes connecting the KM with its umlands. When the operators were asked the goods they

normally transported, the majority said that it is the food products. Taking into account that they mostly move food products, they can serve roughly 47,000 people in the KM per day.

When the hand-carts operators were asked on the type of goods they normally transport, 37.5% said that they normally move food products. This was followed by miscellaneous manufacture 26% and charcoal fuel 15.2% (Table 4.8). The miscellaneous manufacture were those products produced by the jua kali operators such as the metal boxes, charcoal stoves and steel chairs among others.

Table 4.8 **Frequency Distribution of Goods Moved**

Digits	Products	Frequency	Percentage (%
355	Rubber Products	1	0.9
356	Plastic Products	1	0.9
341	Paper & Paper Products	1	0.9
399	Charcoal Fuel	17	15.2
311 312	Foods	42	37.5
321 322	Textiles	6	5.4
323 332	Leather Products and Footwear	1	0.9
331 332	Wood Products and Tobacco	9	8.0
370 381	Metallic Products	4	3.6
385 390	Miscellaneous manufacture	30	26.0
TOTALS		112	100.0

Good types were recorded using the ISIC standard codes.
Source: Field Survey 1992

The test adopted for the hypothesis on goods moved by the hand-carts was the Chi Square(X^2). The set hypothesis was as follows;

H_0: There is no significant difference between the proportion of food products moved by the hand-carts and the proportion of goods moved by them.

H_1: There is a significant difference between the proportion of goods moved by the hand-carts and the proportion of other goods moved by them.

4.9 Chi Square Contingency table for Proportion of Goods Moved by Hand-carts

PRODUCTS (ISIC CODES)	FREQUENCY	EXPECTED	O-E	$(O-E)^2$	$\frac{(O-E)^2}{E}$
355	1	50	49	2401	48.02
356	1	50	49	2401	48.02
341	1	50	49	2401	48.02
399	17	50	33	1089	21.78
311 312	42	50	8	64	1.28
321 322	6	50	44	1936	38.72
323 332	1	50	49	2401	48.02
331 332	9	50	41	1681	33.62
370 381	4	50	46	2116	42.32
385 390	30	50	20	400	8.0

The calculated $X^2 = \Sigma \frac{(O - E)^2}{E} = \frac{15209}{50} = 337.8$

Using the 5% significance level, the tabulated X^2 statistic is 16.93, it can therefore be concluded that if the value of 16.93 is attributed to a chance at 5% significant level, then the calculated 337.8 reflects a far greater difference than would likely to if

there was no significant difference between the observed data and the uniform distribution of the products. The hypothesis of no significant difference is therefore rejected at 5% significant level. It proves that hand-carts move food products more than other goods.

The role of hand-carts in the movement of food products is important to the KM residents in that a delay in food distribution within the town can lead to a decrease in their purchasing power as food prices will automatically go up by a certain percentage, and time will be wasted in search of food and hence reduce the man working hours. On the other hand, if the operation of hand-carts can be terminated or delayed, business can automatically stagnate in some hotels and shops to some degree in the course of their search for the other alternative modes of transport to use.

Since transportation is important in the KM's economic growth the study results revealed the modes can move goods worth Ksh. 100,000 daily for the small scale businessmen within the town indicating that they contribute to the town's economic development.

4.4 Matatu Transport Surveys

Matatu operators were also interviewed on their relationship with the hand-carts as they are one of the prevalent modes serving the KM residents in most of their trip purposes. The *matatus* were found to be transporting passengers rather than goods. Approximately 13% of 40 *matatu* operators which was the highest said

that they had less time for loading and unloading of the goods as this would inconvenience their customers who want to reach their destination as quickly as possible. Similarly, the majority felt that it was not convenient for the passenger transport modes to move goods unless they are light ones of less than 100kgs. This is because heavy goods spoil vehicles, add weight which can result in accidents and hence the loss of many lives. Most of the matatus are small vans carrying only four people though usually overloaded.

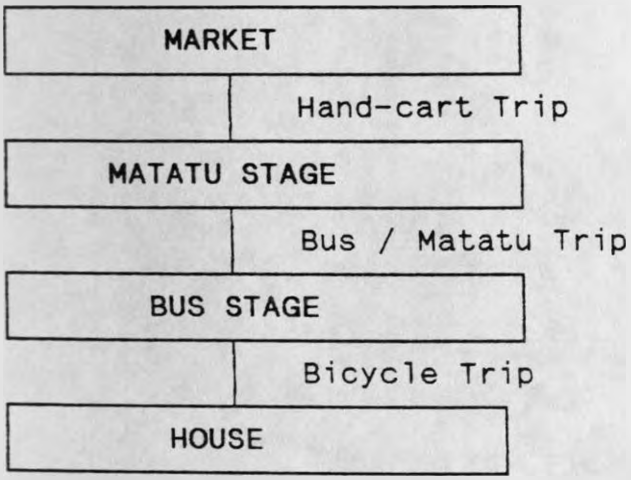
On their relationship with the hand-carts as they share the roads, most of them said that the modes were necessary in the KM's transportation system. Out of the respondents interviewed 52% said that they co-ordinate very well with the modes as they give each other customers, that is, the hand-carts either transport passengers with goods to their stages or get passengers with goods from the stages. They also pointed out that the hand-carts are necessary as they could go to parts of the KM with narrow and poor roads they cannot reach. Such a co-ordination shows the complementary role the hand-carts play in KM where there are some parts having very poor and narrow roads and at the same time lacking good means of transport.

4.5: Passenger Trip Interchanges

In passenger transport, there are a number of interchanges before one reaches the final destination from the origin. In the course of the interchanges one can transfer from one mode to another especially in areas lacking adequate means of transport.

It can involve a walk and hand-cart trip from the market to the *matatu* stage, from there to the bus stage in the CBD boarding a matatu/bus and lastly another bicycle trip from the bus stage to the house (Figure 4:1).

Fig. 4:1. Trip Interchange Model from Market to the House



Source: Developed by Otieno M. K, 1993

The hand-carts are one of the modes that assist passengers as they interchange to the other modes especially for those having heavy goods(Photograph 4:6). Since they are usually parked next to the bus and *matatu* terminals, most passengers find them to be convenient modes as their transport fare charges are low. In the developed countries, transport interchange points are well planned such that passengers do not have difficulties in movement together with their goods. There are sometimes mechanised forms of transport as the conveyor belts that assist passengers in their movement between two terminals of different modes, for example bus and taxi terminals. In developing countries where much has not

Photograph 4:6 Hand-carts Operators Assisting Passengers Interchanging From Matatu to Hand-cart to a Final Destination

SOURCE: FIELD SURVEY 1991

been done on the improvement of the passenger interchange points these non-motorised modes such as the hand-carts help a lot.

4.6: Transport Problems and the Transport Modes

There are many transport problems encountered as different types of transport modes share the roads as they move both the passengers and goods. The problem is mostly serious when both the motorised and the non-motorised modes share the same streets as the former is faster than the latter(Photograph 4:7). The congestion created by the mixture at times leads to competition for space and hence the possibility of accidents.

The study carried out in the KM revealed that even though the car ownership is still low, the problem of congestion is experienced. This was confirmed by both the operators of hand-carts and *matatus* interviewed in that 53% and 64%, respectively, said that it was a problem. The other serious problem observed was the inconveniences that the modes pose to each other. The passenger transport modes felt that the hand-carts operators were slowing them down as they were rushing for passengers while on the other hand, hand-carts operators also felt that the *matatus* were disregarding them and at times just knocking them down. This was heard by the researcher when a *matatu* conductor was shouting to the driver to knock down the slow moving hand-cart in front of the vehicle we were travelling in a long Kisumu-Nairobi road.

However, when the *matatu* operators were asked whether the hand-carts should be removed from the KM's transportation system

Photograph 4:7 Motorised and Non-motorised Modes sharing Same Road At Otieno Oyoo-Kenyatta Avenue Junction

SOURCE: FIELD SURVEY 1991

70% said no. The main reason was that the modes assisted them at times in bringing them the customers as pointed out above. The only problem arose as they shared the roads. This is because the streets and the roads are narrow. The roads in the KM like in other Kenya's urban centres, were not designed with all the non-motorised modes in mind. The only mode considered was the motorised ones and pedestrians.

There are roads having pavements which are only suitable for pedestrians, and these are Jomo Kenyatta Highway and Otieno Oyoo roads. The pavements are meant for pedestrians in that they are made of slabs which indicates that the slabs cover the sewage systems. Such a road with breakable slabs cannot be suitable for modes moving goods as the hand-carts. On the other hand, most of the slabs are broken forcing even the pedestrians to share the roads with the other modes at times.

The other serious problem as pointed out by the modes' operators was the condition of the roads. The roads as also observed from the field, lack proper maintenance and, therefore, characterised by big pot holes(Photograph 4:8). Some have thought that such type of roads are suitable for non-motorised modes but the opposite is true as discovered from the field. The motorists complained that the roads spoil their vehicles and exposed them to possible collision and overturning as spaces besides the roads they sometimes use are small and bounded by ditches. Similarly the hand-carts operators said that the roughness of the roads wreck their vehicles and sometimes leads to their overturning as they

Photograph 4:8 Rough and Pot-holed Kondele Kibos Road

SOURCE: FIELD SURVEY 1991

move the goods. They at the end of the day become losers as they are forced to repair the hand-carts and also lose customers whose goods are spoilt. The other transport problem observed in the field was that, despite the increasing number of the motorised modes and the non-motorised ones such traffic control devices as the traffic lights have not been set up especially at the round-abouts. This results in confusions and unwarranted congestions since each and every motorist runs for a space to move through. To the non-motorised modes, it gives them the opportunity to disobey the traffic rules and can go to opposite directions giving them shortcuts to their destinations. The danger with such a movement is that it lead to the increase of the accidents in the KM. Similarly the KM lacks zebra crosses that assist pedestrians to cross the roads easily. People just cross the roads at any point they feel is a short cut to their destination. The motorists, on the other hand, move at high speed as there are no signs indicating that pedestrians are crossing.

The main objective of the urban transport planners should be to make sure that the an urban centre's transportation system is an efficient one. The efficiency can only be achieved when the roads are well maintained, traffic control devices installed and all the modes of transport considered in the planning process.

The hand-carts can assist in meeting the high transport and for the business operators and travellers from outside and within the KM in both the morning and evening hours. These modes are attracted to those land uses having markets, and wholesale

shops that generate their trips. They are suitable modes for the small scale businessmen who are the majority in the KM as compared to the large scale ones. The hand-carts can also move heavier goods than other non-motorised and some motorised modes in the KM. The X2 technique used indicated that hand-carts move foods more than other products, their trips are attracted to the bus stages more than other land uses and their trip attraction and distribution varies zonally.

At the bus stages they complement the *matatus* as they can go to areas with poor and narrow roads that these prevalent modes cannot reach. They assist also in the passenger trip-interchanges especially between the bus stages and the business premises and residential areas. Despite their role, they also face such problems as danger of accident and congestion from other motorised modes.

CHAPTER FIVE

HAND-CARTS OPERATION AND EMPLOYMENT GENERATION

5.0: Introduction:

In this chapter, hand-carts operation, like the operation of other commuter and goods transport modes in the KM, is discussed as an activity that can create employment to some of the unemployed and underemployed urban residents. Since it is carried out on a small scale level, it is also viewed as an urban informal activity in the which many have not realised.

Previous studies on urban transportation have mainly concentrated on the role of various modes of transport in the movement of both people and goods between different points while their role in employment generation have been either forgotten or neglected. It should be pointed out here that as both the people and the goods are being moved, there are those needed to assist in the driving of the modes, in-vehicle orderly arrangements, and the collection of the transport charges. These people do not assume the duties voluntarily but as a source of earning a living, that is, they are employed in order to carry-out the responsibilities.

The hand-carts, like motorised modes of transport, do also offer employment to their operators in their daily operations. It is important to point out here that the type of employment offered by the hand-carts is similar to those offered by the other informal

sector activities. A close observation of the hand-carts characteristics indicates that it is clearly an informal activity. However, due to lack of studies on their role specifically on the their employment generative ability, their operation has not been known as an informal activity.

5.1: Hand-carts operation as an informal activity

It was estimated that the informal sector accounted for 25% to 30% of Kenya's total urban employment(ILO,1972 and Kapila,1982). The *Kenya's Development Plan 1989/93*, on the other hand, reveals that the sector employs between 40% to 60% of the total urban labour force and contributes between 1/4 and 1/3 of the total urban incomes(Kenya,1989).

The definition given to the informal sector activities was that they are the urban activities that escape enumeration in official statistics indicating that hand-carts operation is an informal sector activity since it does not have clear official records in their areas of operation, that is, the urban centres. According to Kapila(1982) the characteristics of informal sector activities are: (a) ease of entry (b) uses indigenous resources (c) enterprises are on family ownership (d) operate in small scale (e) are labour intensive and use adaptive technology (f) skills of operation acquired outside formal education system and (g) have unregulated and competitive market.

The hand-carts mode of transport, have almost all the above characteristics. It is operated as a labour intensive work, that

does not require much skill or any formal education. As a sub-sector of the informal sector, it can offer employment to the majority of the unemployed urban residents that does not have any or good formal education. According to the Urban Labour Force Survey 1986(Kenya, 1986: table 5:1), it was found out that, of the

TABLE 5.1 Occupation Profile Of Job Being Sought By Unemployed In Percentages

Occupation Classification	Males	Females	Percentage Totals
Professionals, Technical and related workers	6.7	7.7	7.2
Administrative, Managerial and Clerical workers	11.1	22.8	17.2
Sales workers	1.4	3.0	2.2
Service workers	4.1	11.8	8.1
Agricultural, Forestry and related workers	1.7	2.1	1.9
Production, Manufacturing and Meant workers	3.8	8.9	6.5
Smith wielders and Sheet metal workers	15.0	1.5	8.0
Packaging, Loading and Transport workers	7.9	0.2	3.9
Any Job	46.4	40.3	43.3
No Report	1.9	1.8	1.8

SOURCE: Urban Labour Force Survey, 1986

male and female job seekers interviewed, the majority did not have specific jobs they were qualified in. The survey reveals that, approximately 43% of them were ready to join any job and that males

percentage was higher than that of females by 6% (Kenya, 1980). The study conducted in KM on the role of hand-carts revealed that all the operators were men who either had been employed or had not been employed.

Approximately 85% had worked in other sectors but felt that they were either paid very low wages or not satisfied with their former jobs hence the best alternative for them was hand-carts operation. It is important to point out here that the majority of the male job seekers who are ready to join any job can be absorbed in the hand-carts operation if they are urged to do so and the sector improved.

The other characteristic of hand-carts is that they require little capital for purchase and construction. At the same time they use local resources. For example, they do not require expensive fuels used by the motorised modes, making them very suitable to a country like Kenya that has less capital for foreign resources.

In their operations, they also have an important characteristic, that is, the ease of entry and ownership which is mostly on individual or family basis. It is one of the transport activity that have less traffic regulations as other motorised modes. Any one can just start operating it or hiring it out immediately after its acquisition. The survey carried out in KM revealed that, they are only required to get the municipal trade license issued at the rate of Ksh.120 and allows them to operate for one full year.

The emphasis on the importance of the informal sector laid by

the GOK soon after the ILO report, has continued to the present. However, in transportation, the only modes that have been considered as an informal sub-sector are the *matatus* which have become formal. The next mode that should be recommended by the GOK as an urban informal sub-sector activity are the hand-carts.

5.2.0: Socio-economic Structure Of The Hand-carts Operators

Previous studies have shown that most of the urban residents have the young population as the majority. This is mostly encouraged by the rural to urban migration by the young people in search of better employment. There is, therefore, a need to study the type of activities they are normally absorbed in and the viability of the activities in the alleviation of the unemployment problems faced by the group(table 5:1). The survey carried out in Kisumu on the socio-economic profile of the hand-carts operators covered the details of their sex, age, marital status, income, level of education and ownership of the modes.

5.2.1: Sex

The Urban Labour Force Survey 1986, revealed that most of the unemployed urban working age group(15-64 years old) are females as compared to men. The variation is at the ratio of 3:1. However, the survey further revealed that most of these unemployed females

like and search for the clerical jobs and service work than packaging and loading occupation.

This study carried out in KM had similar findings in that, all the hand-carts operators were males. These are those who have failed to secure jobs in other sectors or as pointed out below choose it as the best alternative employment. Females seems to have no interest in the activity as it requires the use of muscle power as observed in the field (photograph 5:1).

5.2.2: Age

The respondents were asked questions on their current age and the year they joined the hand-carts operation. The main intention of doing that was to help in calculating the average year that most operators join the job and find out if the activity can absorb urban residents of the working age of 15-64 years. The median and mean was found to be 25, and mode 18 years below (table 5:2).

The Chi square(X^2) technique was used to test the hypothesis that: H_0: There is no significant difference between the general mean urban working age and the mean working age of hand-carts operators in KM.

H_0: There is a significant difference between the general mean urban working age and the mean age of hand-carts operators in KM.

Photograph 5:1 Loading Dry Fish into a Hand-cart at Lake Shore

SOURCE: FIELD SURVEY 1991

TABLE 5:2: **Hand-carts Operation Entry Age**

AGE	Frequency	Expected	(O - E)	$(O - E)^2$	$\frac{(O - E)^2}{E}$
20 and Below	36	40	-4	36	0.9
21 - 25	31	40	-9	81	2.025
26 - 30	21	40	-19	361	9.025
31 - 35	14	40	-26	676	16.9
36 - 40	4	40	-36	1296	32.4
41 - 45	4	40	-36	1296	32.4
46 - 50	2	40	-38	1444	36.1

SOURCE: Field Survey 1991

$$\text{The calculated } X^2 = \Sigma \frac{(O - E)^2}{E} = \frac{129.75}{40} = 3.24$$

The tabulated X^2 statistic for the value is got by (h - 1) = 6 degrees of freedom. At 5% significance level the tabulated value is 12.60 which is higher than the calculated value. The hypothesis is therefore rejected in that there is a significant difference between the general mean urban working age and the mean working age of those employed in the hand-carts operation in KM. The negative values on the difference between the expected and the observed shows that the majority of those people engage in the hand-cart operation in KM are still very young people who probably might have rushed to the town to get employment. It further confirms that the majority are primary school graduates of below 20 years of age.

5.2.3: Education

The findings on the level of education of the hand-carts operators was as shown on table 5:3. It was discovered that of all the respondents interviewed, 12% had no formal education, 78% had primary education, and 11% had High School education.

Table 5.3: Operators level of Education

Level Of Education	No. of Respondents	% of Respondents
None	13	12
Primary Level	88	78
High School Level	11	10
TOTALS	112	100

Mode: Std. 7
SOURCE: Field Survey 1991

Most of the hand-carts operators were found to be standard seven and eight school leavers who dropped out of school either due to lack of school fees or any other reasons.

5.2.4: Marital Status

The results on the operators marital status showed that 78% of the respondents were married while 22% had not married. Of the married group, the majority had children some of which were going to school. Approximately 54% of this married group said that they were the sole bread winners of their families as their children and wives were not employed anywhere.

This shows the supportive nature of hand-carts operation as a source of employment to some of the married KM urban residents.

5.2.5: Income

The respondents income estimated was their average daily income. They were asked to state the possible highest and the lowest daily incomes as they could not calculate their monthly income. Of the total number interviewed, the majority said that

Table 5:4 Daily Incomes

Income Group (Ksh)	No. of respondents	% of respondents
Ksh.50 and below	27	24
Ksh.51-100	59	53
Ksh.101-150	22	20
Ksh.151-200	4	3
TOTALS	112	100

Mode: Ksh.100 Mean: Ksh.90
SOURCE: Field Survey 1991

they normally get of Ksh.100 as indicated by the mode with an average daily income of Ksh. 90 (table:5:4) above.

The interpretation of the results can be that if an operator can get Ksh.100 or Ksh.90 daily for 30 days then he can be earning Ksh.3000 or Ksh.2700 respectively per month. According to the revised income brackets (table 2.2), these operators fall in the urban middle income group. This implies that if the operation of the hand-carts is encouraged by the GOK, then it can be a good

source of income and employment. When the operators were asked whether they had worked anywhere before joining the job, 85% said that they had worked in such places as in construction sites, Indian shops and other domestic jobs from which they were underpaid.

5.3.0: Employment Generation And Hand-Carts Operation

Unemployment is one of the serious urban problems currently faced due to the continuing mass rural to urban migration in developing countries. Most of these people are semi-illiterate or illiterate having less skills for skilled employment. Ways and means are worked for by the urban planners on how unemployment problem can be reduced as it affects the urban economy and hence its development in general. The other alternative source of employment to the urban residents can be the transport sector.

The hand-carts as a mode in the transport sector has the ability to offer employment to some urban residents. KM had 1,200 hand-carts operating within it by the end of 1991. However, this figure given by the *Kisumu Municipal Trade Licensing Board(KMTLB)*, is not accurate as pointed out by the licensing officer that most of the operators evade to pay the license fee hence they do not have them in record. There is, therefore, a possibility that the number is slightly higher than that given. On the other hand, when the annual records for the past five years were studied, it was

found out that there has been a steady increase in the number of hand-carts within the town (table 5:5).

The steady increase of hand-carts shows that many people have found it as an alternative source of employment. It is important to point out that these modes are usually operated pulled) by one person but because of the heavy goods they move, the operators normally hire others to help them (photograph 5:2).

Table 5.5 Rate of hand-carts increase in Kisumu(1987-1991)

Year Of Record	No. Of Hand-Carts	% Rate Of Increase
1987	400	-
1988	410	0.3
1989	600	5.2
1990	960	9.8
1991	1300	9.2

SOURCE: KMTLB, 1991

When operators were asked whether they normally pull the modes alone, 71% said that they engage others to assist them when the goods are very heavy. The people engaged are those hanging-on next to the departmental stores or wholesale shops waiting for any paid job that can by. Some of them are those who fail to get a hand-cart from the owners when there is a high demand from the daily hirers.

When they were asked on the number of people engaged regularly, it was found out that it is mostly between one to two persons who are given Ksh.10 per trip. If it is taken for example

Photograph 5:2 Hired Men Assisting an Operator to Move Goods

SOURCE: FIELD SURVEY 1991

that each and every hand-cart is used everyday by the operators then they offer employment to more than 1,200 people in KM. Similarly if they also engage at least one person everyday then hand-carts seems to be offering employment to approximately 2,400 KM urban residents. When the number of operating *matatus* was investigated it was discovered that there are approximately 400 matatus within the KM. The operation of the matatus within the KM was found to be different from those in other urban centres like Nairobi in that their conductors were either the ones controlling parking spaces or those undergoing illegal driving training but posing as conductors helping the drivers. However, in most cases it was the drivers who were observed to assume all the responsibilities.

When the employment generation ability of the *matatus* is investigated, then still it will be found that hand-carts can still offer more job opportunities than matatus. For example, if taken that each and every *matatu* employs two people then they only absorb 1/3 of those employed by the hand-carts. Apart from those employed in the hand-carts operation (pulling), there are also their owners and repairers who earn from hand-carts operation.

5.4 **Hand-carts Ownership**

In the study it was discovered that of the hand-carts operators(pullers), the operator-hirers and owner-operators accounted for 87% and 13% respectively (TABLE 5:6).

TABLE. 5:6 Hand-carts Ownership

Ownership	No. Of Respondents	% Ownership
Owner-operator	14	13
Operator-hirer	98	87
Total	112	100

SOURCE: Field Survey 1991

The owner-operators were found to be fewer than the operator hirers. The main reason found to determine ownership was the expenditure of the money received daily. Most of the hand-cart owners were either those who have done the work for a number of years while saving their daily incomes and are either still operating the purchased hand-carts or operating some other business within the town.

It was discovered that many do not save their daily incomes as they use most of it in drinking and the purchase of the daily food. Some of them having their wives and children were found to be the only bread winners to the family and with the continued inflation they cannot save part of their money to purchase the hand-carts. It is for this reason that some advocated for financial assistance to enable them purchase the hand-carts.

The operator-hirers give the owners an average of Ksh.15 per day's hire, in cases of the modes breakdown, it is upon the hirer to pay for the repair. This sometimes is burdensome to the hirers but since the break downs are rare, the operators-hirers did not feel it as a major problem. At the end of the day they get an

income of approximately Ksh.90 daily. This was calculated by asking them the highest and the lowest amount they normally get daily and the average found.

Those owners having many had an average of between one to four hand-carts hired out daily. In some cases it was discovered that some had as many as 100 hand-carts(Photograph 5:3). This implies that hand-carts can offer self employment to some of the residents. Similarly their repairers and manufacturers are also employed in the activity as they are paid for the service they offer.

In planning for transportation system and the relevant modes of transport, the planners should not only concentrate on it as a means of facilitation of movement alone. Dimitriou(1984), asserted that transportation should be a means of offering employment to the urban poor, the non-motorised modes as the rick-shaw and cycles can offer employment to their operators and repairers. On the same note, the World Bank (1972-82) stressed that in future the main emphasis will be laid on low-cost public transport providing access to job opportunities.

Hand-carts operation can be said to be one of the urban informal activity in the transport sector that is able to create employment to the unemployed urban residents. The activity can only create employment to men because it is a labour intensive one, that is, it is a muscle powered job. Those that can be absorbed in the hand-carts operation are mostly the primary

Photograph 5:3 A Person owning a fleet of Hand-carts

SOURCE: FIELD SURVEY 1991

graduates who fail to get chances in other sectors offering employment. Those employed in hand-carts operation are not very old men but those falling under the urban working age group.

The operators were also found to be earning roughly Ksh. 2000 indicating that they belong to the middle income group in KM. It is because of the good income it generates to the operators that seems to attract many to the activity. This has resulted to the steady increase of the hand-carts in the town at a rate of 9.2% for the past two years.

CHAPTER SIX

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.0 Findings

The overall problem investigated in the study was to establish the complementary role of hand-carts mode of transport in helping to solve both the transport and socio-economic problem in KM, and the possible problems they face as they operate. The study aimed at finding out the types of goods moved by these modes as they are designed for goods movement, the interaction and interdependence between them and the other modes in KM, if they can offer employment to the urban residents and lastly to suggest ways of improving their operation in the KM's transport planning.

Some hypotheses were set and tested to help in the investigation of the problems. It was hypothesised that the trips of hand-carts are normally distributed within the KM, they the proportion of food products compared to the other products moved by them is equal, and that there is no significant difference between the average age of their operators and that of the urban working age.

However, the study revealed some of the hidden important transport roles that hand-carts as a mode play in the UC. Using the Chi square (X^2) technique in testing the hypotheses, it was discovered that the hand-carts move food products more than other

products between different activity zones, where the calculated value was found to be 337.8 and tabulated 16.93. These are some of the agricultural products(foods) from rural areas arriving in KM in the early morning hours. These products used regularly by the urban residents and the population in its umland, meaning that hand-carts are one of the modes interlinking the urban centre with its umland. On the other hand, their trips were found to be not to be residential generated like the passenger transport modes but are mostly transport and commercial generated. This implies that they fall under the urban commercial modes as the trucks and pick ups used in the movement of various goods from the goods generating land uses. They were also found to act as the interlinking modes between the commercial and the transport land uses.

In the examination of their interzonal concentration, the Chi square technique used revealed that they are not similar, the calculated value was found to be 55.17 while the tabulated 9.49. On the other hand, the leading land uses in the attraction of their trips was found to be the bus stages. There were other land uses in the KM which are repulsive to the operation of the hand-carts. The modes operate mostly on commercial land uses, that is, those having retail and wholesale shops and markets ; transport land uses, and in the low income residential areas. The high class residential areas, offices and banks, industrial area does not attract the hand-carts as services required there are fulfilled by other transport modes like the trucks, pick-ups, bicycles, *matatus* and buses.

The results of the study also revealed that the operation of the modes can be one of the employment sources in the urban areas that needs more emphasis as it can absorb even young school leavers who have failed to get employment in the other sectors. All the hand-carts operators in KM belong to the urban working age group (15-64 years) with their average age being lower than the average the general urban working age. This was revealed when Chi square technique was used in the examination of the difference in the age averages, the calculated value was 3.24 well below the tabulated 12.60. The attributes of the modes on the other hand, indicate that it is one of the Kenya's urban informal sector activities currently offering employment to the majority of the unemployed urban residents.

Similarly the modes were discovered to be playing an important role in passenger trip interchanges. Their operators helped those on transit and having heavy goods off-loaded at a stage far a way from the stages they want to catch a bus to their last destinations. They sometimes helped in guiding those unfamiliar with their respective bus stages in order for them not to be confused (Height and Cresswell, 1979).

The service of hand-carts does not reduce with the development of the urban centre but increases with it as shown by their increasing number in the KMC. The increase, on the other hand, corresponds with that of businessmen especially the small scale group. In the KM, one of the most important economic activity is business. It is, therefore, necessary to find ways and means

through which the activity can be expanded. Cheap transport offered by various modes of transport, can be one of the solution to the success of the activity. Hand-carts as one of the cheap modes of transport will still assist the development of the business sector in the UC.

The hand-carts were found to be one of the suitable modes in the urban centres in environmental quality control. The modes do not emit by-products that pollute the environment as the motorised ones.

The problems experienced by the hand-carts operators can also reduce their level of service. As the study revealed, the design of roads in Kenya's urban centres does not favour the efficient movement of the non-motorised modes as they were constructed for the motorised modes alone. The motorists realising the privileges they seem to have been given, decide not to recognise these non-motorised modes as important and same to the traffic police.

In the KM, where even the traffic control signs are not visible, the non-motorised modes are exposed to danger always. Apart from the motorists the urban transport planners also seem to have forgotten the roles of these modes hence they have not come up with new plans and designs on how to incorporate them. They too end in the motorists view of possibly advocating for their removal from the urban centres. In the field, it was discovered that even the traffic police officers were having negative attitudes towards the non-motorised modes specifically the hand-carts. The resultant effect is that in cases of accidents as reported by the operators,

they were always victimised, however right they were. Because of the bias felt by them, they alternatively decide to behave rudely to the motorists hence the problem of congestion/obstruction arises.

6.1: CONCLUSION AND RECOMMENDATIONS

The hand-carts mode of transport will still be of great importance to the KM urban transport system. Their concentration in land uses generating goods traffic is important in that they offer the hirers with goods a wide degree of modal choice meaning that they ease mobility in the KM. Economically they increase the utility of these goods especially the food products and promote business in these zones.

The operation of the modes as informal sector activity will still help in alleviating unemployment of the young people rushing to the urban centre in search of employment but with no proper education or professional qualification.

They will still fill the gap on short distance trips not covered by the motorised modes within the KM and offer a wide range of modal choice for the small scale business operators. Similarly, their role in passenger trip interchanges will be still important in KM where there are no passenger interchange modes.

The increase of the number of hand-carts in the KM at the rate of 9.2% with the development of the town and the additional number of the motorised modes disapproves the former theory that the number of non-motorised modes decrease with the development of the

KM as most of the trips go beyond the walking distance.

Recommendations

The study revealed some of the hidden important roles of the hand-carts that proves that their operation in the urban centre is inevitable. The failure to incorporate these modes in the transportation system, can result into the immobility of some urban residents and goods and on the other hand, destabilise the UCs economic system.

One of the first step that should be taken by the GOK and the general public is the total change of attitudes towards these modes and the other non-motorised modes. They should not be viewed as a problem or inferior but as a solution to the transport system and as important modes to the urban standards. The culture of motorisation should be revised in the urban centres where all modes of transport are viewed in terms of motorised modes, that is, all suitable urban transport modes should be the motorised ones.

The modes operation as a source of earning a living if emphasised by the GOK can offer employment to the majority of the unemployed young people rushing to the UC in search of employment. The emphasis should include the organization of the operators to form association through which they can voice their problems, get financial assistance and purchase their own modes, find ways and means of improving the quality of the modes and encourage the operation as a small scale enterprise.

There should also be separate moving and parking spaces set a

side for them in their major areas of operation so that they do not become a nuisance to the other modes of transport in KMC. The parking spaces set a side for them can be constructed by charging them a small fee on their regular routes or parking spaces as done to the motorists within the KMC.

The informal sector artisans should also be encouraged to come up with new models of hand-carts that are easier to move and are cheaper to purchase.

The development of any urban centre involves its population growth and the expansion of its economic activities. The resultant effect is the high demand of movement for both people and goods between different land uses. This high demand can only be achieved if the land uses are accessible, that is, if they are arranged such that there is a good means of transport to serve them.

Black(1981) pointed out that the location of land uses far apart with poor connections, results in low accessibility while those located close together with better transport connections results in high accessibility. The long distant location of land uses was introduced when motorisation age came. It was thought that this will encourage faster movement and also a high accessibility but this has not been fully achieved as it has led to congestion which is the opposite of what was expected.

Currently the developed and the developing countries are encouraging the former transportation system where land uses were located at walking distances and most of the trips are covered on foot rather than motorised modes. It is upon this new approach

that former urban transport policies should be revised so that the non-motorised modes together with the motorised be properly incorporated in their urban transportation systems.

In Kenya the transport policies affecting all modes of transport and especially the non-motorised should be revised in order to achieve maximum accessibility to the modes and between different land uses. The government of late has been emphasising the decentralization of the CBD for traffic congestion to be reduced in the inner area, an action which will encourage the use of the non-motorised modes. This is because most of the land uses will be located at walking distances that can easily be reached by the less expensive non-motorised modes.

It is important to point out here that the source of congestion has been due to the further distribution of land uses such that the work places and commercial land uses are concentrated in one place while the residential areas located far away such that the use of the motorised modes is encouraged. This type of planning has led to the rise of high motorised modes purchase and alternatively the reduction of space for movement in the streets as they were formally not planned to accommodate many modes as currently seen. On the other hand, the further expansion of the roads seems to be not possible due to lack of funds and space as building construction is also rising with the continued development of the urban centres.

The other major problem that has led and will still create more transport problem is the haphazard location of land use

activities within the CBD This is where the departmental stores, wholesale and retail shops, and offices among others generating both the passenger and goods trips attracts various mixture of transport modes. This results into slow movement as all compete for the little space either for movement or loading and unloading.

On the other hand the variations in the income levels such that the majority earns below the average and the high rate of unemployment in the urban centres reduces their ability to either use or own the motorised modes. The obvious result is the existence of the non-motorised modes used by the low income group as the alternative cheap means of transport and as a source of income. The other major problem has been the exclusion of the transport users' contribution in the transportation planning, such that policies have been set mostly by those not directly affected by the transport problems.

Recommendations For Urban Transport Planners.

In order to reduce some of these urban transport problems currently experienced in Kenya the following factors should be considered in the development of the urban transport policy, by the urban transport planners:

a. Location of land uses in a homogeneous manner in the CBD that is offices, residential, transportation and commercial land uses located separately but, close to each other;

b. The offices, residential areas, and the markets should be

located close to each other in the expanding parts of the urban centre as most of the urban trips comprise of shopping and work trips. This can reduce congestion especially within the CBD caused by the private modes used in commuter transport;

c. Revise the former regulations on the movement of the non-motorised modes so that they are also recognised as important fulfilling the urban transport demand that should use the roads as other motorised modes;

d. Creation of linkages and terminal points for various motorised and the non-motorised modes of transport which include parking spaces, loading and unloading spaces, and moving spaces;

e. Preference should be given to the transport mode users contribution in transport decision making when planning for an efficient transportation system in any urban centre;

f. The income and employment generation ability of the modes should be considered especially when incorporating both the goods and the passenger transport modes in the urban centre;

g. Organise for seminars and conferences for both the motorised and non-motorised operators by the urban transport planners in order to educate them on traffic rules and the possible co-ordination that should exist between them; and

h. The utility of modes of transport to be incorporated in the urban centre in the general urban development should also be considered.

6.2 Suggestion for Future Research Areas

The findings of this study have highlighted some areas in urban transport that calls for further research. The importance of the non-motorised modes and specifically the hand-carts mode of transport in Kenya's urban centres needs a detailed investigation.

a. Studies similar to this one should be conducted in the other Kenya's urban centres to find out the particular roles played by these non-motorised modes in the urban centres. This will assist the urban planners in knowing the suitability of the modes and hence plan for them;

b. Urban goods movement as discovered from the study, is still a neglected area of study since many have been concentrating on the passenger transport. Studies should be carried out in the Kenya's urban centres to find out the relationship between goods movement and the location of land-uses in C.B.D;

c. Studies should also be carried out on the possibility of creating goods and passenger transport interchange points in the UC. Such a study can be of great importance to both the urban transport planners and urban residents as it will reduce congestion caused by mixed modes of transport;

d. Since the study found out that most of the hand-carts operators are primary school graduates. Further research should be conducted to find out if the sector can continue to absorb the group and even the secondary school graduates migrating to the urban centres. This is important as many will possibly be employed if the sector is improved by the GOK.

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ACRONYMS

ACRONYM 1.

QUESTIONNAIRE FOR THE OWNER/HIRER OPERATORS

1. Zone number..... Date..... day of the Week.....
2. Sex: (1) Male..... (2) Female.....
3. Age.....
4. Mode type.....
5. Where do you live within the town?(specify).....
6.(a) Are you married? Yes/No
   (b) If yes, how many children do you have?.....
   (c) How many of your children go to school?.....
   (d) How many are working?.....
7.(a) Did you go to school? Yes/No
   (b) If Yes, what level of education did you reach?
      (i) Standard..... (ii) Form.....
8. When did you start doing this job?.....
9. Why did you decide to do it?.....
10. Had you worked anywhere before joining it? Yes/No
    If yes, approximately how much money were you earning from the former job per month/day? Ksh.....
11. Ownership....(1) Owner-Driver..... (2) Driver.....
    (a) How many do the owner(you) own?.....
    (b) What was the main purpose of purchasing many.....
    .....
    (c) Approximately how many are hired out per day.....
12. How much do you give the owner per day's hire? Ksh.....
13. Do you drive/pull this mode alone always? Yes/No
    (a) If no, when do you engage others to assist you?.....
    .....
    (b) Averagely how many do you engage to assist you in such cases?.....
    (c) Can you approximate the amount of money you give them per trip? Yes/No, if yes, then how much? Ksh.....

(d) Averagely how much money do you get at the end of the day in this job of yours? Ksh.....

(e) Approximately how much money do you spend per day? Ksh.....

14. Which type of goods do you move regularly?

(1).....

(2).....

(3).....

15. Which particular parts of the town do you get more work?

(1).....

(2).....

(3).....

(a) On what days of the Week do you get such a work?

(1).....

(2).....

(3).....

(b) At what time of the day do you get such a work?.....

.....

(c) What transport problems do you face at such hours?.....

.....

16. From these areas you get more work, do you have specific routes/streets you follow? Yes/No

(1) If yes, which ones are these? (mention two)

(2) When using these streets/roads where does your trips normally ends?.....

(3) Can you think of a destination you can move goods to more than once daily? Yes/No, If yes, then specify.....

17. Do you have any laid dow goods movement charging rates? Yes/No

(1) If no, how do you charge the owner of the goods you offer service for? According to:

(i) goods volume

(ii) distance taken

(iii) weight of goods

(2) Can you approximate they give you for the above category? Yes/No, If yes, then how much? Ksh.....

18. Can you remember the farthest/shortest distance you have moved goods to? Yes/No,

If yes then (i) shortest.....

(ii)farthest.....

19. (a) Which people are your usual customers/hirers?

(1) Businessmen (2) Travellers

(3) Construction companies (4) Others(specify)

20. From these areas you get more goods to move, are there other modes which move similar goods you move to different destinations? Yes/No

(i) If yes, which modes are these?.....

(ii) At which particular areas in town do you assist(or you be assisted by) these modes?.....

(iii) Is there any competition among you in you daily business? Yes/No

If yes, how do you overcome it.....

If no, what is the main reason.....

21. Can you remember two distinct places(zones) that you normally make more trips? Yes/No

If yes, then between which places are these?

(i)Between.....and.....

(ii) Between.....and.....

(iii) Between.....and.....

22. Can you approximate the number of trips you can make per day between those places mentioned above? Yes/No

If Yes, then how many are these?

Places	No. of Trips
(i) Between.....and.....	.....
(ii) Between.....and.....	.....
(iii) Between.....and.....	.....

23. Approximately how much money do you get per trip? Ksh.....

24. Is this mode of yours licensed to use the road as a vehicle by the government? Yes/No

(1) If yes, how much are you charged by the Municipal Council/Government? Ksh.....

(2) Is this fee: (i) Fair..... (ii) High.....
(iii) Too high.....

(3) What fee would be fair for you? Ksh.....

(4) What periods of the day are you allowed to operate?.....

25. Can you mention one of the serious problems that you normally encounter in the town's transportation system? Yes?No
If yes, then which ones are these?

(i).....

(ii).....

(iii).....

26. What are some of the things do you think if done by the Government/Municipal Council can improve your service here in town?.....

27. What are some of the improvement would you want to be done to the town's current transportation system? .....
.....

ACRONYM 2.

BUSINESS OPERATORS QUESTIONNAIRE

1. Zone number.....
2. Location of the business.....
3. Type of the business.....
4. Type of goods it sells/distribute.....
5. Where do you receive the goods from?.....
6. Which transport modes do you use in bringing of the goods?
.....
7. Which particular mode is mostly used in distribution of your goods?.....
8. Of the modes mentioned above how do you rank hand-carts in their frequency in the movement of your goods?
(a) First.... (b) Second..... (c) Third..... (d) Fourth....
9. Which group people are your usual customers?
(a) Wholesalers..... (b) Retailers.....
(c) Direct consumers... (d) Others(specify).....
10.(i) Do you offer those customers free transport to their

destination within town? Yes/No

(ii) If no, which modes do they normally use?.....
.....

(iii) Were you offering free transport such customers formally? Yes/No

If yes, why did you stop the offer?.....

11.(i) Approximately, how many customers do you receive per day?
.....

(ii) What is their average purchasing power? Ksh.....

12. Why do you think your customers hire hand-carts as one of their transport mode?

(a) Cheap..... (b) Security purposes.....

(c) only good mode..... (d) Others(specify).....

13. How many employees do you have?.....

14. What is your firm's average Monthly income? Ksh.....

15. Approximately how much money do you get per day

(i) when there are more customers? Ksh.....

(ii) when there are few customers? Ksh.....

16. Do you think that any restriction of the hand-carts from this part of the town can affect your business? Yes/No

If yes, how can the action affect it?.....
.....

17. According to your views are hand-carts suitable for use here in town? Yes/no

(i) If no, what are the reasons?.....

(ii) If Yes, what do you think if done by the Government/Municipal Council can improve the efficiency of the modes here in town?.....
.....

ACRONYM 3.

HIRERS(USERS) RECORDING SCHEDULE

1. Zone number.....

2. Name..... Sex.....(i) Male (ii) Female

3. Residential area.....(specify)
   (i) up-country
   (ii) within town
4. Occupation.....
5. If a businessman what is the scale of your business?
   (i) Wholesale..... (ii) Retail.....
   (iii) Wholesale/Retail..... (iv) Others(specify).....
6. (a) Apart from business do you have any other income generating activity? Yes/No
   If yes, which one is it?.....
   (b) What is your average monthly income? Ksh.....
7. (a) Where are you moving these goods to?.....
   (b) Where have you moved these goods from?.....
8. What are they for?
   (i) home use..... (ii) business.....
   (iii) building construction.... (iv) Others(specify)
9. Do you have a truck? Yes/No
   If Yes why did you decide not to use it?.....
10. Why did you choose to use this mode?
   (i) cheap (ii) security purposes
   (iii) Reliable one (iv) Only mode there
11. How regularly do you hire this mode here in town?
   (i) Daily (ii) Weekly
   (iii) Monthly (iv) Yearly
12. How much did the handcart operator charge you for transporting these goods? Ksh.....
13. How much do you think matatu/bus can charge you for the same quantity of the goods? Ksh.....
14. (a) Apart from this mode, which other modes do you sometimes hire for the transportation of your goods?.....
   (b) Which type of goods do you normally transport with these other type of modes?.....
15. Which other mode will you board(or you want to hire) after unloading the goods?.....
16. What is your normal average purchase of goods that makes you

hire this type of mode? Ksh.....

17. (a) Which part of the town do you normally do your purchases?
.....
(b) Along which street is this?.....

18. What major transport problems have you faced on the road as your goods are being moved by this type of mode?
(1).....
(2).....
(3).....

19. What do you think if done by the government/Municipal Council can improve the efficiency of these modes here in town?
(1).....
(2).....
(3).....

THANK YOU FOR YOUR HELP AND COOPERATION

ACRONYM 4.

MATATU BUS OPERATORS QUESTIONNAIRE

1. Name..... Age..... Sex.....
2. Mode type.....
3. Ownership..... (i) Owner-driver (ii) Driver
4. Do you have specific routes you follow daily as you transport passengers? Yes/No
If Yes, which routes are these?.....
5. (i) Do you like transporting goods also? Yes/No
(ii) If yes, which type of goods are these?.....
6. At which particular points in town do you get these goods to transport?.....
7. How long do you like waiting for the loading and unloading of the goods?.....
8. At which particular areas/points do you normally unload these goods transported?.....
9. Do you accept to unload the goods at the passenger's wishes irrespective of your regular stages? Yes/No

10. If, no which other modes do you normally see assisting the to their final destinations?

    (i) hand-carts (ii) human porters

    (iii) taxis (iv) bicycles

11. Do you have goods charging rates? Yes/No

    If no, how do you charge the goods?.....

12. Do you accept to collect a passenger's goods which are far away from your regular routes? Yes/No

    If no, what is the main reason?.....

13. Do you think that the modes transporting passengers should move heavy goods also? Yes/No

    If no, can you give reasons?.....

14. Do you think that hand-carts are one of the suitable modes for moving such goods here in town? Yes/No

    If yes, why do you think they are suitable.....

15. Do hand-carts operators or you assist each other as you transport both people and goods? Yes/No

    If yes, then how do you assist each other?.....

17. What are some of the problems that you have noticed when sharing the same road with the hand-carts?

    (i).....

    (ii).....

    (iii).....

18. What are some of the improvements would you like to be done in the town's current transportation system?

    (i).....

    (ii).....

    (iii).....

THANK YOU FOR YOUR HELP AND COOPERATION