

**PLANNING FOR BICYCLE PUBLIC TRANSPORT IN RURAL
AREAS: A CASE OF BUTULA DIVISION, BUSIA DISTRICT.**

BY

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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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and organizations which the work would not have been possible without their
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for allowing me the freedom during the period.

DEDICATION

To my late mother Priscilla Nafula and to my dear son Enos Adieri Bwibo. May he grow up
to write a more superior Thesis than his mother.

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ABSTRACT

The study intended to provide a rational basis for the development of practical rural transportation policies. Until recently, it had been assumed that the expansion of a rural road network and the acquisition of motorized transport would eventually provide an effective transport system. It has however, become clear that majority of the rural population are not directly linked to a conventional road, much less be able to afford to have access to a motorized vehicle. This recognition has led to the efforts to look into alternative forms of rural transport and hence alternative rural transport strategies.

The study was carried out in Butula Division, Busia District with an aim of covering boda boda operations (bicycle taxis) along the Mumias-Port Victoria Road, which forms the main corridor in the division. The boda boda were found to be operating along the main corridor and off-corridor.

The main study objective was to identify the factors that have promoted or hindered the use of bicycles in the division. Other objectives were; to assess the viability of bicycles as a mode of transport, to evaluate the potentiality of bicycles in job creation and income generation, the problems faced by boda boda operators and users, and to formulate policy recommendations on how best the mode can be used to supplement the other public transport modes.

Various research method techniques were employed for use in data collection and analysis.

The households, bicycle operators, users and repairers and matatu operators formed sampling

units. Bicycle operators, users, repairers and households were interviewed using random sampling while matatu operators were interviewed using systematic sampling.

The findings of the study indicate that boda boda increase efficiency and minimize the burden of walking (including headloading and backloading). They are reliable, affordable, frequent, comfortable and convenient. The boda boda offer both complementary and supplementary services to other modes of public transport. They also compete with matatus along the main corridor up to 10 kms.

In the process of offering the transport services, there arise conflicts among the Boda Boda Registered Associations. This has led to organizational and management problems which have called for planning intervention. On the other hand, the government through the various ministries has not recognized boda boda operations as a Transport Sub-Sector. In reality, the bicycle is offering the services that other public modes of transport are not able to offer. Therefore the study recommends that boda boda as a viable of transport should be planned along side other modes of transport. In order to strengthen the Associations, the study recommends for a Corridor Association, which will deal with the management and organization of all the Market Center Registered Associations and the Sub-groups. There should be a close collaboration between the Ministry of Transport and Communication, Roads and Public Works, Busia County Council, provincial Administration, the Police and and the Center Associations. If the recommendations will be considered, then this will ensure promotion of bicycles as a convenient, affordable, reliable and a fast mode of transport in the rural areas.

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ABBREVIATIONS

BBTG	Butula Boda Transport Group
BBYG	Bumala Boda Youth Group
BTG	Buhuyi Transport Group
CBO	Community Based Organization
GOK	Government of Kenya
IFTRTD	International Forum for Rural Transport Development
IT	Intermediate Technology
KIE	Kenya Industrial Estate
LDCs	Less Developed Countries
MBBT	Murumba Boda Transport group
MVs	Motorized Vehicles
NCKK	National Council Of Churches of Kenya
NMT	Non Motorized Transport
UNCHS	United Nations Centre for Human Settlement
UN	United Nations

CHAPTER 1: INTRODUCTION

1-1 OVERVIEW

The growth of modern transportation facilities has been marked by significant technological developments while sophisticated systems have evolved in respect to land, sea and air transportation (UNIDO, 1979). Such developments encompass movement of goods and passengers between activities separated in space. Walking, cycling and other modes are all appropriately the subjects that the broader term transportation is concerned with. Internally, in several developing countries, there has been considerable resource allocation for transport particularly for urban transportation including urban roads and the needs of motorized transport following conventional pattern of developed economies. Expenditure on the construction of roads in most LDCs has largely been concentrated on the construction of roads for motorized modes of transport.

In rural areas, moving from place to place consumes a lot of time and effort for people. Often people have to travel long distances to reach water sources, health facilities, schools and markets (UNIFEM, 1993). In order to address the above problem, most developing countries have extended long distance transportation networks, with a view of ensuring that those who live in rural areas have access to markets for their products and to social services (Barwell, 1986). Consequently, the needs of rural transportation has been given comparatively little attention while rural communities have continued to be dependant upon traditional modes such as headloading, handcarts, animal drawn carts and bicycles. Traditional transport planning has focused on the transport system, tending

to limit its assessment to traffic using the network of main roads and railways. Much of rural people's transport and travel is in and around their village and may make little use of the formal road network and motorized transport. Therefore, traditional planning tends to overlook their transport requirements from rural households perspectives (Dixon-Fyle, 1990). If transport is perceived as the movement of people and goods, whatever the mode of transport used then transport becomes a far more evident and important feature in people's lives (UNIFEM, 1993).

The government of Kenya in recent years has shown increasing recognition of the need to evolving an appropriate strategy for rural transportation and emphasis has largely been given to the construction of roads to meet rural needs. This perspective was reflected during the planning period (1970-1974), when rural transport policy was formulated with emphasis on secondary and agricultural feeder roads which were to enable the rural population to travel more easily and get their crops to markets more cheaply (GOK, 1974). At the same time, the government, during the 1974-1978 planning period, pursued objectives that were supposed to encourage transportation of bulky and homogenous goods by railway to other areas/regions of the country (Obiero, 1977). However, little attention has been given to the design and manufacture of alternative and appropriate means of transport-both non-motorized and motorized, specifically to meet rural transport demands. Such demands are consequently being met by traditional modes of transport.

With increased emphasis placed by the government on agriculture and the programs for integrated rural development and hence the emphasis on rural transport, many trips in

these areas are also associated with day to day activities. They include access to social services such as government offices, health and educational facilities, non-agricultural economic undertakings like commerce and other occupational activities. Many of these activities are in such quantities and are sited in diverse locations that in majority of cases, it is not possible to optimally serve them with motorized transport.

On the other hand, studies on rural transportation indicate that major part of rural journeys is local-in or around the village or along paths, tracks and riverways (Nalo, 1993). It is clear from the Kenyan situation that most of these roads are inaccessible due to poor conditions and uncoordinated transportation linkages (Lea, 1986). Most of the roads in the rural areas are of earth and gravel and as such are always dusty during dry seasons and wet, muddy and impassable during the rainy season. In this respect, there should be a transport system that is catered for by the non-motorized modes such as walking, bicycles, animal drawn carts, headloading and backloading. Indeed, these modes are considered as the back bone of the rural transport systems especially for short to medium distances that range between 1 to 15 Kilometers. These modes, in most cases, act as feeder services to the motorized transport vehicles that operate on major transport corridors.

As seen from above, the transport policy and programs are purely in terms of roads but the rural transport problem manifests itself in varied ways, to which road development only makes a limited and specific contribution. For any rural transport planning to be effective, the provision of suitable transportation facilities should constitute an essential

infrastructure prerequisite for rural economic development. Instead of the planners worrying completely about wear and tear on vehicles, they should also worry about the strain on people. Significant emphasis should be put on affordable means of transport such as wheelbarrows, bicycles and animal-drawn carts that are used by a large section of the rural population.

In order to increase accessibility and mobility for the rural people beyond formal roads, the government has tried to promote the use of appropriate means of transport. This was stipulated in the 1994-1996 and 1997-2001 National Development Plans. Its intention was to promote, develop and encourage greater utilization of non-motorized transport in both urban and rural areas in order to supplement the existing motorized transport. Still, rural areas have not received the appropriate attention required. For example, a recent initiative undertaken by the government concentrated on the urban infrastructure, an aspect of the Sub-Saharan African Transport Program (SSATP). It focused on the improvement of roads, strengthening the management and ensuring adequate availability of finances for maintenance of urban roads in Nairobi, Kisumu and Eldoret. This clearly indicates a bias against rural transport in favour of urban transport (Heierli, 1993).

Therefore, it is essential for the Kenyan government to give necessary focus to the design, production and use of appropriate modes of transport, which would be within the economic capacity of the average rural people. The consideration of appropriate modes of rural transport will need to take into account the pattern and construction of rural roads. This will include standard and specifications and developments in respect to human

portage, handcarts and wheelbarrows, bicycles, animal drawn equipment and motorized vehicles.

1-1.1 Bicycles: Appropriate Transport Mode for Rural Areas

Bicycles have been used for many years in certain parts of Europe and Asia as a convenient, simple and cheap means of transporting loads in both urban and rural areas. In Africa, Kenya in particular, a bicycle has not been formally acknowledged as a modern means of transport, let alone to be considered worthy for a study. Nevertheless, despite the prevalent attitude the bicycle continues to survive. Pannilage (1995) gives a number of factors that have contributed to the popularity of a bicycle. They include: -

- Transport services are less available and the bicycle may often be the only alternative to walking.
- In rural areas, much of the local travel in and around villages is on paths and narrow tracks, which are only accessible by single-track vehicles such as bicycles and wheelbarrows.
- The majority of travel is associated with carrying goods and the bicycle significantly increases load carrying capacity over head, shoulder and back carrying.
- The carrying of goods is often associated with economic activities and the bicycles therefore provide a means of increasing income generation.
- A bicycle transports passengers and their goods right to the doorsteps.

Bicycles remain the most accessible mode of transport in the rural areas especially where motorized transport is hard to come by and yet the transport demands are high.

Narrowing down to Busia District, the bicycle has been in use for the last 60 years (since 1940). Initially chiefs and other reknown personalities in the community owned and used the bicycle for their daily travel. However, the perception of the bicycle as being a *social good* has been changing over time. As such most households in the district have converted their bicycles into *an economic good, which*, is used as mode of public transport (for transportation of passengers and goods). The flat terrain of the district allows for the greater use of bicycles.

Therefore, there is a definite need to study and understand the bicycle as a mode of transport in rural areas. From general observation, Butula Division as a case study exhibits characteristics of being a rural area that is mainly agricultural while the bicycle forms a major mode of transport for both passengers and goods. Secondary roads, agricultural feeder roads and unclassified roads that consist of narrow paths and tracks, mainly characterize the road network. This being the scenario, the bicycle (both as a private and public mode of transport) has taken the center stage in Butula Division, but its appreciation and planning has not been well developed.

1-2 STATEMENT OF THE STUDY ISSUE

The availability of suitable means of transport is essential to many activities in rural areas. Agriculture, which is the basis for any rural economy, requires transport for inputs such as fertilizers and farm produce to homes and to the market. Transport is also needed to bring firewood, water and purchased goods to homes, to get access to medical and education facilities and for personal travel to social gatherings and markets. However, in

rural areas, the network of surfaced roads suitable for motor vehicles is limited. Thus, many journeys, for movement of goods or passenger must take place along tracks and narrow footpaths. In such a situation, the only modes of transport are walking and bicycle.

In Kenya, one of the areas where bicycle taxis (boda boda) are used extensively is Busia District. The operation of this transport system originated in Uganda in the 1970s and has been spreading rapidly in many parts of Western Kenya and Rift Valley especially in areas where the flat terrain is suitable for their operations.

As it was indicated in the introduction, the bicycle as a mode of transport has many advantages. The bicycles can be used for both passenger and goods transportation. They are cheap to maintain especially for the rural majority who are unable to own motorized modes of transport due to low levels of income. The bicycle is the only most convenient alternative mode to walking as a bicycle is about four times efficient than walking. Consequently, a person can travel a lot faster on a bicycle (15 km/h) than on foot (3-4 km/h) (IT, 1997). A greater advantage of the bicycle is that it can be used on narrow paths and tracks (UN, 1979). From the general observation, they are a source of income and employment for most people in the study area.

In the study area, boda boda (bicycle taxis) mainly links the off-corridor transportation routes which, are found in the interior of the division with the town/market centers (origin and destination points) and the main transport corridors-bus/matatu routes. Given

the above advantages, the bicycle is widely used in the division for personal travel and for movement of goods and passengers.

Although the bicycles have advantages and a greater potential to grow, its growth has been hampered by lack of proper organization and management hence operational problems. On the other hand, there is no clear national policy guideline on how this transport mode can be organized and managed to promote rural transport. Therefore, this study aims at generating such information in order to aid policy formulation for rural transport especially bicycle transport thus reducing concentration on the motorization culture only.

1-3. RESEARCH QUESTIONS

Arising from the problem statement identified, the study set out to provide answers to these research questions.

1. What are the main transport and development problems/needs in Busia District and Butula Division in particular?
2. What is the role and capacity of bicycles as a mode of transport in rural areas?
3. What is the potential of bicycles in creation of employment and income generation in rural areas?
4. What are the main problems that bicycle operators and users encounter?
5. What are the best strategies that can be formulated to enhance the use of the bicycle in rural transport?

1-4 STUDY OBJECTIVES

The main study objective was to identify the factors, which affect the use of bicycles as a mode of transport in the study area.

The Specific Objectives are:

1. To assess the viability of bicycles as a mode of transport in Butula Division. (This will help to determine their viability in relation to other modes of transport and to determine their viability in meeting transport demands in the study area).
2. To evaluate the potential of bicycles (boda boda) taxis in creation of employment and income generation in the division.
3. To identify the major problems experienced by bicycle (boda boda) operators and users in the division.
4. To formulate policy recommendations on the use of bicycle taxis in the division.

1-5. STUDY ASSUMPTION

The main study assumption is that bicycles in general and boda boda in particular are an important mode of transport for rural areas. They are used for both on-farm and off-farm transportation. On-farm includes movement around the farms while off-farm includes movement of farm produce to the markets. Other than that, they are also used to meet other transport needs like going to the market, for social trips and work. In addition, since the bicycle is emerging as a mode of transport in the division, it is offering both complementary and supplementary services to other modes especially on the off-road transportation.

1-6. JUSTIFICATION OF THE STUDY

The common interpretation of transport and development is that it encompasses road transport, rail transport, marine transport and air transport. In rural areas, roads and other types of transport are often of little relevance to large sections of the population, many of whom are not directly reached by the network, and even if they are, find it beyond their reach to own or use conventional means of transport.

In this case, bicycles, as a mode of transport is a growing industry in many parts of Kenya. They occupy a niche in the transport system that is very important in rural development of this country. Bicycles are used regularly in Butula Division because of the favourable terrain of the area, low-income levels and the social value attached to bicycles. They are used for on-farm (agricultural activities) and off-farm (commercial activities, school, health facilities, market, and other social trips). In Butula division, most people have resorted to bicycle transport because it is a source of income and employment. The factors that have contributed to this situation include lack of industries, lack of cash crops in the region hence low level of employment.

Boda boda (bicycle taxis) seem to offer a service that cannot be viably and optimally be provided by motorized public transport such as buses and matatus. This is evidenced by the fact that the poor state of roads has really discouraged the operation of motorized transport especially along the off-corridor routes. Therefore the bicycles are the only modes that can use narrow paths and muddy roads and as such bicycles transport enhances mobility in places that cannot be accessed by other modes of transport.

Commenting on the importance of bicycles, Barbara (1986) observed that the energy and materials required to manufacture a medium size car could be used to manufacture 100 bicycles. On the other hand, the carrying capacity of a car is 1.5 persons while 100 bicycles can carry 100 people or even more. She further asserts that if a bicycle can carry goods between 100-150 kilograms then 100 bicycles will transport about 10000-15000 kilograms. This is very important for the rural economy that is dependent on agriculture and yet the transportation system is not efficient.

The findings should provide a basis for transport planners to come up with an appropriate mix of transport modes for rural areas. This is because the previous transport approaches have ended to place more emphasis on roads and motorised transport (Omwenga, 1991). The findings will also lay a basis for further research since there has not been a major study on bicycle mode of transport in rural areas more specifically in the study area.

1-7 SCOPE OF THE STUDY

The research was based on a case study of Butula Division, Busia District. The research concentrated along the Mumias – Port Victoria road as it traverses the division for a distance of 30 Kilometers. This road forms the main transport corridor on which the major centers and other facilities are located. The major centers which were used for the study were - Bumala 'A' Murumba/Khunyang'u, Butula and Buhuyi (Map 1-1). All these centers attract traffic into and out of the division. Basing on the main corridor, the study took transacts of the feeder roads. This was meant to capture transportation activities in the hinterland of the division. The study also sought information from the households to

establish the socio-economic characteristics, production systems and ownership of modes.

1-8. RESEARCH METHODOLOGY

This section specifically addresses the methodological approaches, which were adapted in this study. The study was based on the available literature concerning bicycle transportation in the world, Kenya and the study area in particular. The aim of this section is twofold. First, it offers a theoretical background to the methodology with discussions based on the design of the research, sampling techniques adapted, methods of data collection in the field such as administering the questionnaires, key informant interviews and observations. Second, how data was analyzed, presented and interpreted.

1-8.1 Types of data collected

The main types of data included: -

Relevant geographical and physical characteristics of the division; socio-economic activities of the division including household details; transport network and services; socio-economic characteristics of the bicycle operators and user; and human settlements and its relevance to transportation system in the division.

1-8.2 Sources/Methods of Data Collection

Application of a variety of tools was used to properly address the objectives of the study. Two main sources of data were used. These were secondary and primary data. Secondary data formed the early stage of the research and it included an intensive review of

Literature on Transportation Planning and on the bicycle as an alternative mode of transport in rural areas. The materials used included journals, government publications and other sources with relevant literature related to the study and the study area.

Primary data was obtained through field survey. These consisted of socio-economic characteristics of the households, bicycle operators and users.

The main survey techniques for primary data were:

Administering of the questionnaires, scheduled interviews with key informants, observation, photography and traffic counts. The study employed two methods in administering the questionnaires. These were structured and unstructured questionnaires.

1) Structured Interview Method: Questionnaires were prepared and pretested before the study commenced. The study had five different questionnaires; they included household, bicycle operators' and users', repairers' and matatu operators' questionnaires. Each type of the questionnaire was divided into different sections. For instance, the household questionnaire was divided into three sections-socio-economic characteristics, ownership of vehicles, perception, and attitude towards bicycle transport. The sub-division was made in relation to the set objectives. This also enabled the study to unearth the different roles played by bicycles in the general economy of the division and the strategies that have been employed by different stakeholders in the transport system to ensure suitability, efficiency and sustainability of bicycle transport.

2). **Unstructured Questionnaire Interview.** This method was used in situations where the respondents appeared uneasy especially on matters related to their incomes and land sizes. This method was justifiable because land issues in the division are very sensitive owing to the fact that sons or fathers dispose off land without the knowledge of their wives. There were other incidences where the respondents would not reveal some of the information especially concerning the ownership of the bicycles. The researcher had to create a good rapport with the respondents so that they could gain confidence with the researcher. This method was also applied in cases where the bicycle users and operators were tensed up, unco-operative or not genuine. This method enabled the study to gather as much information as possible.

3). **Key informant interviews** included interviews with the traffic police, local, central government officers, and Bicycle Association officials. This group forms a very important part in the transport system because they are concerned with law and order. The information that was gathered from the stakeholders is crucial in aiding policy formulation for bicycle transport in the division.

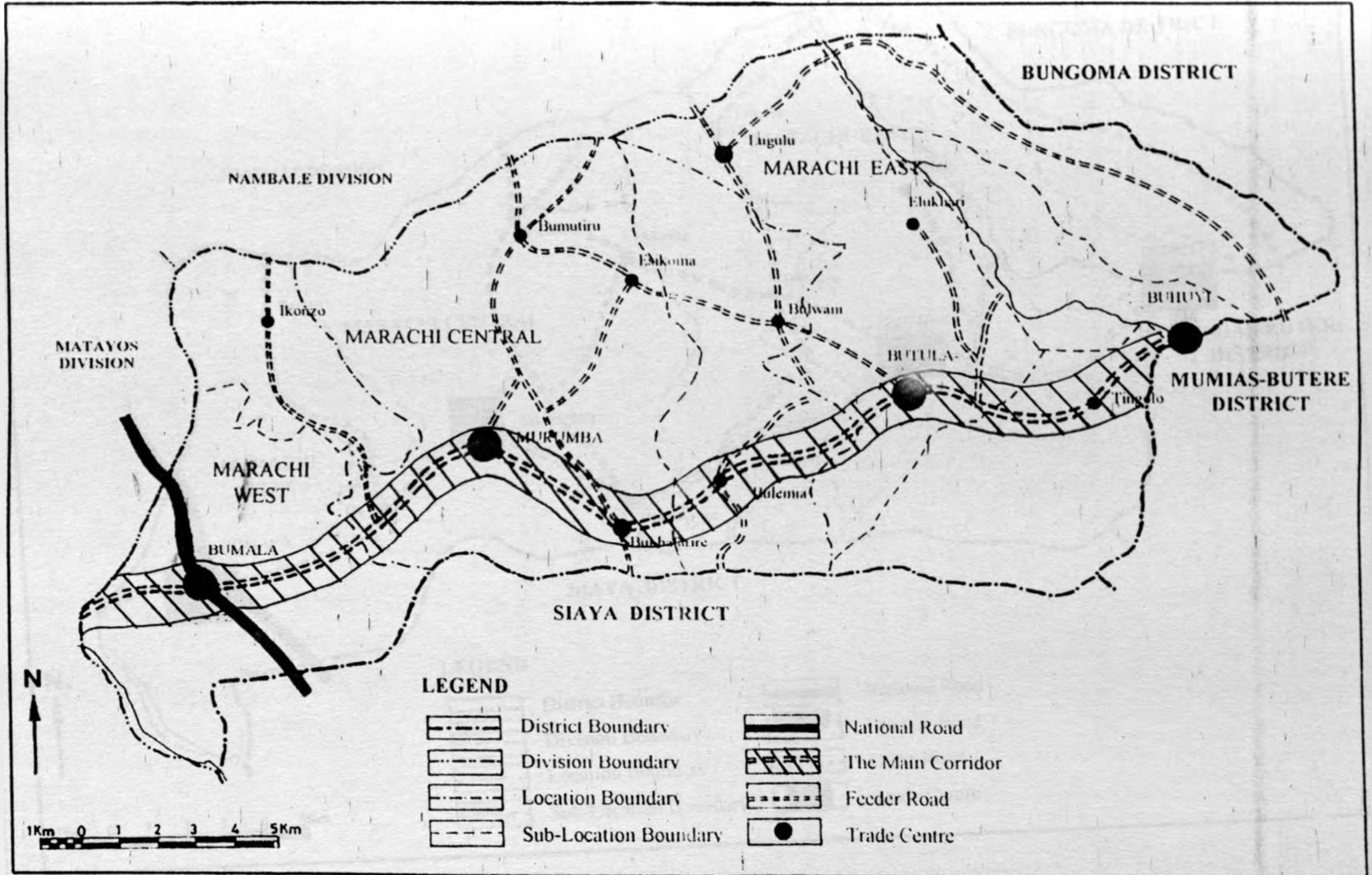
In participant observation, the information was collected by observing and recording activities of the boda boda operators, users and repairers.

4) **Traffic Counts:** Traffic counts serve as an indicator of the extent to which people travel by which mode. The traffic count was carried out to record traffic flows of all vehicles at the four major centers and the variations in traffic flows at different times of the day.

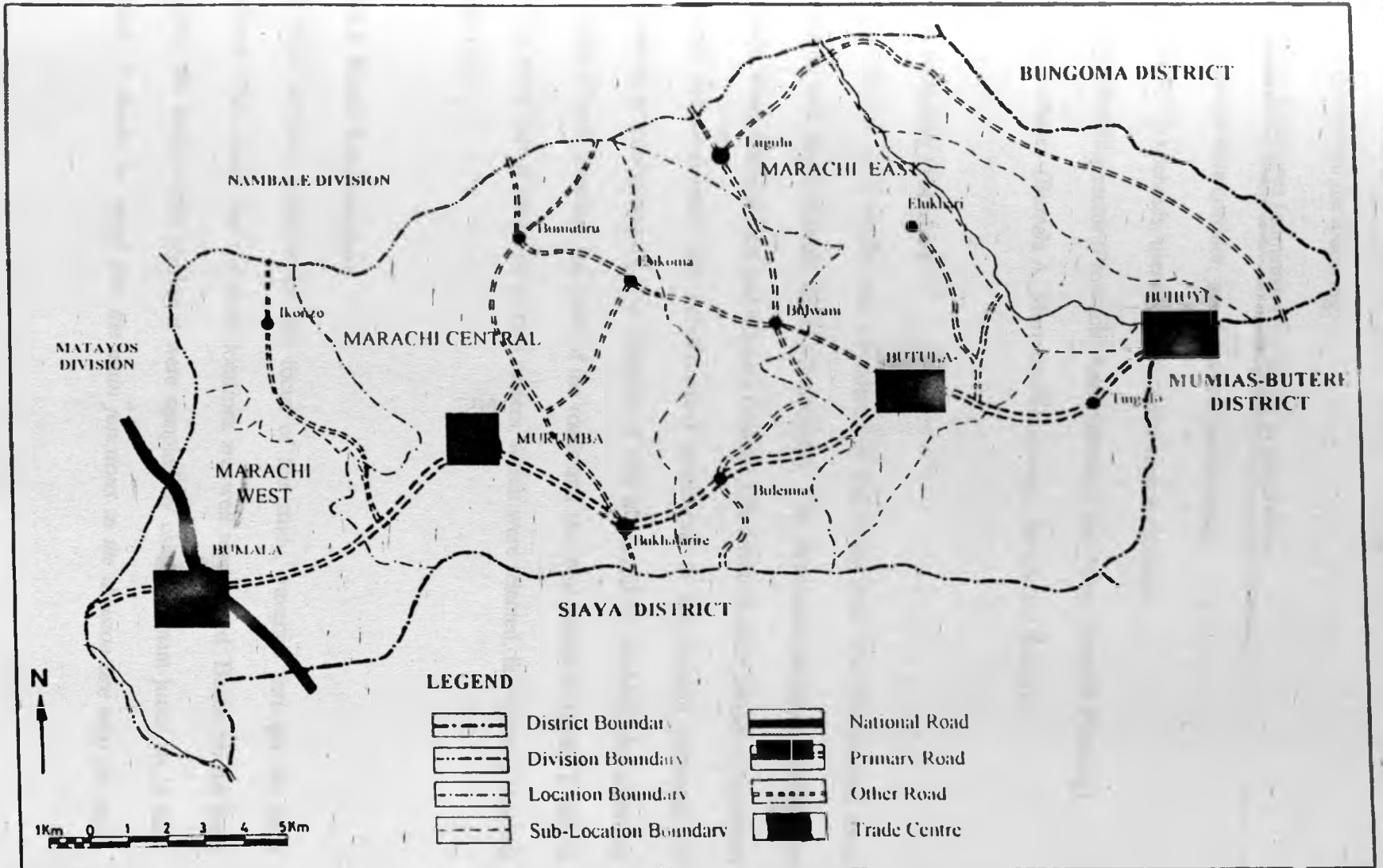
With the help of three research assistants, traffic counts were conducted on market and non-markets days. Two counts were conducted on market days; these were Saturday at Bumala and Sunday at Butula. At the same time, a similar count was carried out on non-market days-Friday at Murumba and Tuesday at Buhuyi. The main cordon points were Buhuyi, Butula, Khunyangu and Bumala (Map No.1-2). The count was conducted between 7.30 a.m. to 9.30, apart from Butula where the count was conducted as from 6.30 a.m. to 8.30 a.m., 11.00 a.m. to 1.30. P.m. and then 4.30.p.m. to 6.30 p.m. Each research assistant was responsible for one directional traffic flow (either from Mumias or from Bumala). This was meant to capture both the in-bound and out-bound modes. The count was essential as it enabled the study to establish the intensity of different modes on both market and non-market days. The count was also necessary so that the study could be able to establish whether the bicycle is a viable mode of transport in the study. By also comparing business on the market and non-market days, the count assisted the study to come up with a list of different categories of vehicles and at the same time identify the type of vehicles, which occupy the highest proportion at the centers and along the main corridor.

Focus group discussion was used to obtain information from the Bumala, Murumba, Butula and Buhuyi Boda Boda Associations. The discussion with these officials was very important because the researcher was able to get information on how the associations are organized and managed and the activities that they are engaged in.

Map No. 1-1 The Main Corridor and the Feeder Roads



Map No. 1-2 The Main Trade Centers and the Cordon Points



1-8.3. Sampling Size and Procedure

The study covered the following:

- Total spatial area (administrative areas) of the division.
- Roads-the main corridor, junctions and feeder roads.
- People –Households, users, operators and bicycle repairers
- Administrative sector (Provincial Administration, the Police, Physical Planning).
- Trade centers (Bumala A, Murumba/Khunyangu, Butula and Buhuyi).

1-8.4. Sampling Procedure

Butula division as a whole was considered as the study area. The division has three locations with approximately 20,832 households. The three administrative locations are Marachi West, Marachi East and Marachi Central. The locations were chosen to represent different socio-economic and infrastructural conditions of the division (although the population is homogeneous). For instance, it was important to establish the economic activities of each location, the state of the roads and the most preferred mode. It should also be noted that at least one or two centers, which were selected, fall within a location (Map 1-1).

1-8.4.1. Roads and Junctions

The main corridor, which forms the focus of the study, traverses through the three locations. This means that the three locations are well represented. Based on the main corridor, the feeder roads joining it were sampled by using the main junctions in each location. *It should be noted that the main junctions in the division are also the main*

centers. Consequently, they act as origin and destination junctions or centers that filter traffic from and to the hinterland of the division (*Map 1-2*).

In addition, the main social infrastructure, administrative centers and other facilities are located along the corridor and the feeder roads (*Map 3-5*). Sampling for household interviews was done along the corridor and feeder roads.

1-8.4.2. Trade Centres

As already indicated in section 1-7, four trade centres were sampled for a detailed survey. These included Bumala, Murumba/Khunyangu, Butula and Buhuyi. The reasons as to why these centres were selected are that each of them has its unique characteristics. For instance, Bumala is one of the biggest centers in the division but is basically a commercial and an intersection centre. Murumba functions due to the government health centre that has been in operation since 1961. On the other hand, Butula is the divisional headquarters; it has various institutions and a very active periodic market. Buhuyi is referred to as *one centre in two* because it serves population from Butere-Mumias and Busia district and Siaya District.

1-8.4.3. People

The following were considered as the units of observation and they included households, bicycle users, bicycle operators, bicycle repairers, matatu operators and the business community.

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(a) Households

The household refers to a group or family living together, contributing to and drawing from a common source and with competing needs and aspirations (Omondi, 1993). The total number of households in the division is 20832 (CBS 1999). The dogma in research states that if the total population is more than 1000, then an effective representation should be 10 per cent (Cooper and Emory 1991). Therefore, 10% of 20832 is 2083. From the population size and projections, East Marachi constitutes 40% (5367) of the total division's households, Central Marachi constitutes 35% (9999) of the total divisions households while West Marachi constitutes 25% (5466) of the total divisions households. Therefore, 2083 households were supposed to be a representative sample for the whole division.

However, due to the problems experienced in the field, the researcher was able to administer the following number of households in each location: 17 households in Marachi East, 21 in Marachi Central and 15 in Marachi West giving a total of 53 households.

The study used random sampling to get the households who stay along the main corridor and along the feeder roads. This was meant to capture the households who stay in the interior of the division. This also enabled the researcher to establish the type of modes that they use to the hinterland and the type of problems that they experience while using these particular modes (Map 1-1).

(b) Operators

The estimated population of operators is 1350. In order to get a representative sample for the whole population, trade centers were used as nodal points. This is because the trade centers are points of origin and destination for both bicycle operators and users. They are also the main junctions.

The operators were interviewed using random sampling at each centre. In total, 33 Boda boda operators were interviewed; 7 were interviewed at Buhuyi, 9 at Butula, 8 at Murumba and 9 at Bumala. The variations came about because the study was basing on the number of registered operators. Bumala and Buhuyi had the largest number, because they are the biggest centers in the division they are crossroads and their catchment population comes from as far as Bungoma, Butere-Mumias and Siaya districts.

(c) Bicycle Users

A total of 22 users were interviewed using random sampling procedure at the major origin and destination zones, therefore giving each a chance of being interviewed. The trade centers were used as the nodal points to capture the transport users.

A total of 11 bicycle repairers were interviewed randomly at the four centres. Similarly, five matatu operators were interviewed using systematic random sampling where the second from the first were interviewed. The interview was at Bumala since it is the main origin and destination centre for Matatus.

(d) Administration Sector

This targeted the district officer of Butula Division Headquarters, Chiefs, Police officers, Physical Planner, a representative from Red Cross, which is the main sponsor of Busia Town Boda Boda Associations, Boda Boda Association Officials and other relevant informants. This was meant to establish the institutional and legal arrangement towards the operation of boda boda.

Therefore, findings from the stakeholders were very important in assisting policy formulation for boda boda operation in the division as well as the whole district.

1-9. METHODS OF DATA ANALYSIS AND PRESENTATION

The following were employed to analyse and present data collected from the field. An SPSS package was used to process primary data collected during the field survey. Frequencies, charts, plates, maps, mean and percentages were used to present data results. In relation to the set objectives, the following methods were employed to analyse the data that was collected from the field.

1. Objective 1: Analysis of the viability of bicycles in satisfying transport needs in the study area. The above was analysed by the use of:
 - a) Analysis of the household, operators and users questionnaires to establish the generators of traffic in the division.
 - b) Use of tables and bar graphs to determine traffic composition along the main corridor.

c) Use of diagrammatic models and pie charts to show whether the bicycle is a viable mode of transport.

2. Objective 2 and 3- Use of tables, graphs and pie charts.

1-10. LIMITATIONS OF THE STUDY

In the process of the study, a number of problems were encountered, some of which are worthy mentioning. First, the time constraint made it necessary for the researcher to reduce the sample size and the length of fieldwork. Time constraint also prevented the team from pretesting the questionnaire. Therefore to minimise the effects of not pretesting the questionnaire, the research assistants underwent a thorough pre-field training and their numbers was increased from one to two assistants to cover the agreed sample. Secondly, the study also experienced financial problems due to increased number of research assistants and as such the budget that was provided for proved completely inadequate. Despite the above-mentioned problems, the study collected adequate data to fulfil the needs of research and address the issues as indicated in section 1-3 and 1-4.

1-11 DEFINITION OF TERMS

- Nodal points-a nodal point represents a junction or a center. They serve as origin and destination points.
- Boda boda. This is a common word that is used to refer to bicycles, which specifically deal passenger and goods transportation.
- Feeder Roads. Link access to the major road network. They are accessible by motorized vehicles.

CHAPTER 2: TRANSPORTATION SYSTEMS IN RURAL AREAS

2-1. OVERVIEW

Transportation has numerous linkages with the socio-economic development of any society (UNHCS, 1985). Past experiences have shown that improvement in transportation systems directly leads to the efficient movement of people and goods and at the same time lowers the cost of transport for instance agricultural production, commerce, industry among others. With the increasing significance of rural development as a strategy to bring about socio-economic transformation in the life style of the poor majority of the population, rural transportation has become one of the priority components of overall development programs. For rural development, transportation is considered an integral part of the agricultural production process. It can assist in creating producer surpluses by lowering transport costs of farm inputs and income produce. Moreover, as a provider of access to social services and non-farm economic activities, rural transportation systems can significantly affect the well being of rural population. Thus, improvements in rural transportation have the potential to stimulate changes in agricultural yield, cropping patterns, non-agricultural economic activities and quality of life for rural inhabitants and hence enhance rural development.

As such, it can be stated that rural transport is one of the important components of rural development. In this respect, any study that examines the role of transport has to start with a review of rural development.

2-1.1. Rural Development

In the Sessional Paper No. 10 of 1965 on African Socialism and its Application to Planning in Kenya, the government committed itself to certain economic objectives. These included universal freedom from want, disease, and exploitation and equal opportunities for advancement including a high and growing per capita incomes, which is equally distributed among the population (GOK, 1974). The basic strategy and objective was to direct increasing share of the resources towards the rural areas. The government believed that it was through accelerated development of rural areas that balanced economic development could be achieved. Rural development was seen in the light of growth of agriculture. Emphasis was placed on land adjudication and registration and extension of credit to the smallholder farmers. Transport development was related to agricultural development since the speed, ease and economy of movement would determine how agricultural inputs could reach the market. The government on the other hand encouraged the use of railways and inexpensive transport channels responsive to the changing needs of the Kenya's producers and consumers. Major emphasis was directed towards secondary and minor roads in the rural areas that were projected to absorb about 54% of all the road development while 46% was devoted to trunk infrastructure. In addition, rural development was seen in the light of growth of commercial activity through a large number of small trading centers as focii of trade, social services and communications that serve the surrounding farm areas. Therefore, this left a very big gap as there was no mention of appropriate modes of transport that are suited for movement in the rural areas.

2-1.2. National Policy on Rural Transport

The major concern of the government has been provision of basic transport infrastructure. The specific objective of Kenya's regional development policies has been formulated to promote rural development (Njenga, 1996). It was estimated then that more than 80 percent of Kenya's total population reside in rural areas but a proportion of the total labour force is directly or indirectly employed in the agricultural sector. In addition, about 78 per cent of the micro and small-scale enterprises in Kenya are based in rural areas, employing about 1.5 million people as compared to about 0.5 million people employed by the same in urban areas. These factors have been instrumental in shaping government policies that give priority to rural development (Njenga, 1996).

Rural development, which is appropriate and responsive, requires a balanced transportation system. In Kenya, extensive transport system that is mainly central government activity focussed on the investment in the road network with orientation towards motorized transport. The pattern of road network composes of minor, secondary, primary and trunk roads (GOK 1974). The general rationale is that road infrastructure development would support the growth and development of activities such as agriculture, industry and commerce with efficient movement of people and goods throughout the country. This belief is a historical one with biased notion that transport facilitates and speeds up the movement of primary products to export markets. Another function of the system was to ensure the availability of fast, safe and economical transport service. This was a response to the needs of a growing and changing economy and to enhance economic and social growth consistent with the proper national goals. The other aim was

that a sufficient transport network was to enable the movement of food to growing urban centers and the links of a nation-wide system of judicial and administrative services. The mid 1970s witnessed a shift from critical roads to secondary feeder roads (Nalo, 1993). This was a response to the increased priority being attached to small-scale agricultural production and opening of rural trading activities. The government has implemented a number of programs like Rural Access Roads Programs, minor roads programs among others. It was also believed that rural transport planning and investment in roads would lead to increased use of conventional motor vehicles and which in turn would stimulate household demand for travel.

On the contrary, studies in the recent past have indicated that rural areas have multidimensional nature of problems. According to Nalo, (1993), most of the rural population are not directly reached by the road network and even if they are, find it beyond their reach to own or use conventional means of transport. He further argues that inadequate means of transport and inappropriate transport system causes many problems. For example, income-generating activities such as marketing crops are severely hampered while essential goods are expensive or non-existent. People are unable to reach facilities such as hospitals; schools and shops while women must spend long hours carrying fuel and water. Another study indicates that about 70 percent of all journeys in rural areas are made on foot, 7 percent by public transport and 2 percent by private vehicles (Ongolo 1996). Therefore, for any transport system to be effective, planning should start at the rural household. To be sure, of the potential that a road offers, people need: -

- Access to the road; and
- To be in position, whether financially or technically to be able to use the inputs that a road can provide.

But the mere fact of constructing a road does not guarantee good transport, since other inputs such as vehicles, money and roads that enable people to respond to the opportunities provided by the provision of a road. Thus, it is insufficient to plan rural transport as it was only concerned with roads. Rural people do not generally live next to a road and if they do, they may not afford the vehicles that travel on them. The fact that transport needs of most rural people do not relate to the use of the road, they are concerned with basic activities such as collecting water and firewood, obtaining food and going to the grinding mill, going to the market, health and schools and other social visits.

In reality, a road or a motor vehicle is per se not important in meeting transport needs as stipulated by the government. Most people do not use them in their daily travel largely but we are not saying that roads are not important. They are important as they help people channel their goods from markets and deliver goods and services to rural areas. Work done in Africa and elsewhere indicates that transport in rural areas is a major problem because of:

- Walking and carrying loads is predominant,
- Ownership of vehicle is low,
- Transport involves movement of small loads over short distances,
- Trips for selling produce are few,

- Most of the transport burden falls on women, and
- The public and private transport systems are unreliable.

Barwell, et al (1985) argues that one of the major barriers, however, to the formulation of alternative strategies is lack of knowledge of the transport needs of rural communities by transport planners. Their transport needs are assumed to be taken into account within the overall framework of transport provision. Therefore, it is important when planning for rural transport to consider the most appropriate and affordable means of transport such as wheelbarrows, bicycles and carts available to a large number of people. On the same note, paths and tracks should be improved to ensure accessibility both to local facilities and to the primary network.

2-2 ROADS, VEHICLES AND THE RURAL POOR

For most of the rural poor the predominant methods of goods movement is head or back loading with the shoulder pole as a less common movement. Bicycles, handcarts, animal drawn carts are used to a lesser extent. Although all these means of transport are used in rural areas their existence and indeed importance is yet to be acknowledged in the statistics of most developing countries. Therefore how can the past transport strategy be modified to serve the needs of the rural poor? Kwiligwa (1994) notes that a country's transportation infrastructure network consists of all transport related works in airfields, railroads, harbours, all roads, tracks, trail and paths. Planning for improving transportation infrastructure network in a country should take cognizance of the overall transportation system. Unfortunately, in Kenya, rural tracks, trails and paths have

historically been omitted from national considerations and they are regarded as a separate network. Beenhakker (1987) gives the complete hierarchy of transport network in rural areas as follows;

- Paths and tracks along which 80 percent (domestic and agricultural) of the travel and transport requirements of the households take place mainly by walking and using intermediate means.
- Feeder roads (usually earth roads) connecting village centers to district and regional roads. The village godowns and crop collection/buying centers are usually located along these roads. The major transport modes are walking/portage, bicycle, animal carts among others. Motorized transport is rare and in most cases limited to tractor, trailers pick-ups and Land rovers during the market days.
- District roads (mostly earth) connecting divisional centers to district headquarters and in some cases served with some kind of scheduled bus service.
- Regional roads (mostly gravel) connecting district headquarters to the national road network usually served with scheduled bus services and for inter-district/regional crop movements.
- Trunk road (usually all-weather) serving long distance traffics that in most cases has no real significance to the local population (Fig 2-2).

We note that these hierarchies are important as they assist people to channel their goods and services to rural areas. Beenhaker further asserts those rural tracks; trails and paths have been historically omitted from national consideration of transport infrastructure because they are often considered as a separate, unidentifiable network, which operates

outside the national interests in transportation. Even as the concern for the rural poor has increased, the government has attempted to improve rural transport mainly through the increase of conventional roads for motorized roads. The track, trail and path segments of infrastructure has not been properly acknowledged or recorded, because it is so difficult to gather data on.

Dennis et al (1995) note that lack of adequate transport is one of the less obvious but none the less important factors in vicious circle of poverty. Poverty limits access to transport and greatly increases the burden in time and effort of the poor to acquire their everyday needs of food, water and firewood. Time taken up in transporting basic necessities in turn reduces the effort that could be put into more productive activities such as farming to improve output. Lack of transport further restricts development by restraining income-generating activities of trading and marketing and by limiting access to health and educational facilities. The problem is made even worse because much of the transport in rural areas takes place away from the formal road network on paths and tracks where access to motorized vehicles is restricted and at times impossible. Even where access is reasonable, few people can afford to own or even use motorized transport. This situation seems likely to continue for the near future and will be little affected by conventional planning for improved highway systems and motorized traffic.

2-3. TRAVEL MODELLING FOR RURAL TRANSPORT PLANNING

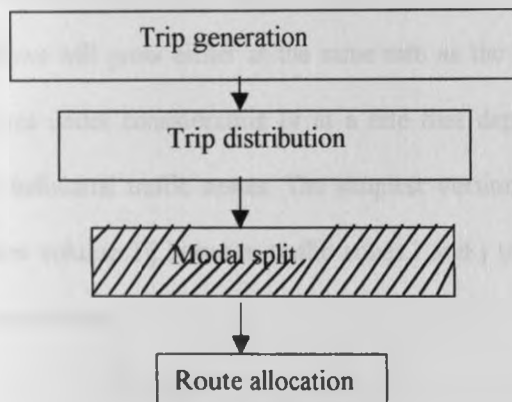
Mathematical modelling as a tool for synthesising the interrelations between land use, traffic, or trip making behaviour and casual factors are well-established technique in

transport planning. Some of the models, which are relevant to the study, include four sequential modelling, and models of modal split

2-3.1. Four Step Sequential Modelling

This includes trip generation, trip distribution, modal split and trip assignment. They can be applied for planning of high traffic volume rural roads only.

Fig 2-1: Four-Step Sequential Modelling



Note: Modal Split is the central goal of this study

1). Trip Generation

According to Werner (1985) travel patterns consist of individual movements merging with and then leaving traffic flows, only to join other flows until they eventual terminate at some point. What then causes trip making, production or attraction of traffic? Residential areas generate 80-90 percent of the trip and the basic trip-generating unit is the individual household. The number of trips generated depends on family size, number of vehicles, income and other characteristics.

Trip distribution

Trip generation models presented above only estimate the number of trips having one or more trip ends in a particular traffic zone. It is the purpose of trip distribution models to estimate the other trip ends, that is, the destinations of the trip originating in a given zone and the origins of the trips attracted to that traffic zone. This model assists a planner to know the transportation demand pattern in the years to come so as to be able to anticipate inadequacies of the transportation system and take corrective measures ahead of time. The planner further gives earliest and simplest approaches to estimation of the number of trips between different zones are called factor models. They are based on the assumption that inter-zonal flows will grow either at the same rate as the total trip number generated in the overall area under consideration or at a rate that depends on the growth of traffic generated in individual traffic zones. The simplest version of these models assume that future flow volume T_{ij} between traffic zones i and j to grow at the same rate as the traffic for the entire area:

$$T_{ij} = t_{ij} \cdot G$$

where

T_{ij} is the trip volume between i and j projected for some future time

t_{ij} is the current trip volume

G is the growth factor, defined as the ratio of the projected and the current number of trips in the entire area

Weaknesses

- The estimates it produces usually do not match up with the input figures of trips generated in the individual zones or the entire area.
- It cannot accommodate underdeveloped traffic zones earmarked for future growth because there may be any current flows to and from these areas that could be adjusted by means of growth factors.

After identifying the weaknesses of factor models, intervening opportunity models were developed to fill in the gaps. Individual trip making behaviour depends not only on the attractiveness of the intended destination and the distance that has to be overcome to get there but also on the availability of opportunities elsewhere that are competitive and can satisfy the purpose of the planned trip. The concept of intervening opportunity is widely applied in decision-making. Planners study the quality and distribution of supply and demand so that intervening opportunity, be it by easier access, cheaper prices or better services, thereby diverting part of the existing consumer flows away from their destinations. However, human decision-making does not seem to follow any simple, optimising pattern. In particular, people do not always choose the closest supply place, the lowest bidder or the fastest routes. Moreover, opportunities and attractions are only that they influence but do not determine human decision-making

3). Hinterland Analysis

The hinterland of any center is the area within the center's zone influence for provision of goods and services. The shape and size of a center's zone of influence will depend

directly upon its population, range of functions, degree of concentration of administrative and socio-economic activities and the level of transport access to hinterland. Thus, the hinterlands of small centers are nested within those of larger ones, following the hierarchical pattern of settlements. The notion of hinterland is a dynamic one, because it varies over time with changes in transportation network and technology (Habitat 1985). Hinterland Analysis requires an understanding of linkages and flows between centers for each type of service and commodity and by which mode of transport.

2-3.2. Relevance of the Models to the Study

The four sequential modelling which includes trip generation, trip distribution, modal split and trip assignment is relevant to the study as they indicate:

What are the main generators of traffic? Where is the origin and destination of the journey made? Why do people prefer a certain mode to another? People use different modes for different trip purposes. Therefore, the most important aspect of this study is modal split.

The hinterland analysis is also important as it indicates that transportation is an essential factor in determining the linkages between urban centers and the hinterland. It also enables one to appreciate the fact that an urban or a market center can only be active if it has a direct link to its hinterland. This is brought by if the transportation system is efficient.

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The hinterland analysis is also important as it indicates that transportation is an essential factor in determining the linkages between urban centers and the hinterland. It also enables one to appreciate the fact that an urban or a market center can only be active if it has a direct link to its hinterland. This is brought by if the transportation system is efficient.

2-4. TRANSPORT DEMAND

The magnitude of travel demand and the nature of its distribution in space are essential inputs in planning for transportation especially in rural areas. The location, capacity and design of every element of transportation system are determined based on travel demand analysis. (Fisher and Ruston 1979). The main purpose of carrying out travel demand analysis is to understand the interrelations between existing travel (both passengers and goods). Once the factors influencing and constraining travel behaviour interrelations or demand are identified and their interrelationships understood, the impact on rural development policy decisions, such as pricing, road building, provision of public transport, access or extension of credit for purchase of vehicles, can roughly be foreseen. Similarly, a travel pattern study can provide broad estimates of the traffic that can be expected to occur. While a specialized body of knowledge normally exists in Kenya on the planning and building of roads very little or none exists on the appropriate choice of transportation demand. Whereas rural transportation is considered, it is always from the viewpoint of roads and motorized vehicles. However, a transportation policy should consider the people and goods to be moved and the prevalent conditions, which often do not include the existence of roads.

UNIDO (1979) asserts that improving the transport capabilities of rural population must provide a selection of vehicles whose performance matches demand and whose cost is sensible in relation to income. The achievement of this objective requires a fundamental change in policy to ensure that rural transport planning includes an explicit appraisal of the needs of the small farmer and constraints within which a choice must be made. The

first step would be a specific analysis of the magnitude, frequency and duration of transport demand and of the distances over which movements are required.

2-4.1. Factors Influencing Transport Demand

The most significant transport needs of the rural population are those that are related to agricultural activities (NCAER, 1981). These activities are divided into two categories: on-farm and off-farm. Transport is required for both crop production, for instance movement of seeds, fodder, fertilizer, insecticide agricultural implements, harvested crops is required each season as part of normal farming operations (Beenhakker et al, 1987). The major domestic activities that involve transport are water and firewood collection as well as processing food crops at grinding mills. This is called on-farm activities. These trips are short and frequent, approximately 1-2 kms for agricultural activities, increasing as much as 13 kms for firewood and water and the loads are small between 20 – 150 kilograms. This justifies why bicycles are required in rural areas as they carry small quantities of loads over short distances. Somewhat surprisingly, on-farm transport needs have been almost totally neglected by those with planning of transport systems to the extent that very little is known about them (Heirli 1993).

According to Zhi Lui (1997), off-farm transport is conventionally understood to mean movements between farm and market. Many small farmers live in the remote part of the village away from the motor vehicle road system and their off-transport is between farm and roadside and between roadside and collection point/market. In most cases rural people do not understand what he means by such terminologies like 'on road' to mean at

the roadside or within a few hundred meters, 'near road' to mean up to half a day's walk from the road and 'off road' to mean in more than half a day's walk. In rural areas, plots can be as small as 1-2 hectares but are capable of generating yearly demands. This type of transport is ignored when analyzing transport demand or when making decisions about how scarce resources should be used to improve the standard of living and increasing the productivity of the rural poor (Dennis and Smith, 1995).

Nevertheless, transport demands in rural areas are agricultural trips but people travel to market, health facilities, education facilities and other social gatherings. It is important to consider transport demands in totality to include on-farm, off-farm and other transport demands in rural areas.

2-5. MODELS OF MODAL SPLIT

As it is indicated in Fig 2-1, the most important aspect of this study is the modal split, which incorporates the application of trip generation and provides a so-called origin and destination. A number of different modes; walking, public transport, transportation meet transportation needs by bicycle among others. The most important factors, which determine modal split, are socio-economic and transportation related parameters. The first set including employment, income and population figures and the second to include costs and time for both transit and automobile between the two traffic zones. In determining the modal choice, Quandt (1970) came up the *Theory of Abstract Modes*. This theory is characterized by the values of several variables that affect the desirability of the mode's service to the public. This includes speed, frequency of service, reliability,

comfort and cost. The choice of a mode by a traveller as well as the decision to undertake travel can be regarded as depending on;

- Absolute performance level of the best mode
- The performance level of each mode relative to the best mode
- People choose among modes purely based on their characteristics and not based on what they are called. Clearly, demand for travel along any mode in a network and a particular (abstract) mode will depend upon the characteristics of that mode and a number of variables. They can be considered as exogenous except over very long periods of time.

The Abstract Mode model not only predict the flow volume of a particular mode for a given pair of traffic zones, but also will permit calculation of its growth or decrease if one of the mode's performance parameter is changed, (for example, if bus fares go up by 10 per cent). Moreover, the model will also predict what impact the performance change of one mode has on the others, and how the overall travel volume will change. The model also predicts how much traffic a new mode will attract, even if this mode is completely different from all conventional modes and its performance values are known. Whenever a new commercial mode is introduced, the model permits the choice of an appropriate price to maximize profit or to ensure that the capacity of the new mode is in line with the ridership it will attract.

However, the model has weaknesses in that it does not have a standard planning tool and as such its data requirements are substantial and its predictive capability has repeatedly been disappointing.

2-6. THE ROLE OF CONVENTIONAL MOTOR VEHICLES IN RURAL TRANSPORT

For many years, a belief has been fostered in what might be termed the economics of modernity (Wachana 1999). Motor vehicles are more economic than men and beasts. The clear implications is that *Primitive is slow and expensive* (UNIDO, 1979) that *modern is fast and cheap* and that a road will lead to a better life for a community as a whole. In most cases allowance has never been made on how much it costs a society to maintain a track over which loads are carried on head, by animal drawn carts on bicycle, but a conventional mode will cost thousands of shillings to construct. In reality, different modes of transport are frequently in direct competition. Physically, it is impossible for motor vehicles to traverse certain terrain that a donkey or bullock cart or a bicycle would do with ease.

In countries like Asia, Japan, the Netherlands and several other European nations, transport does not require total motorization but rather the appropriate integration of walking, non-motorized vehicles and motorized transport. In Europe and Japan, walking and cycling make 30 to 60 percent of trips, as such non-motorized vehicles have an important role to play (Replogle 1989). However, a look at Kenya's rural transport policy as earlier indicated, has been phasing cycling as a salient agenda but we find the policy has been geared towards improving NMT in urban areas of Nairobi, Kisumu and Eldoret.

2-6.1. Review of the Alternative Modes of Transport in Rural Areas

Various alternatives are related to the distance over which goods and materials have to be transported; their size, weight and the frequency of trips as well as the terrain. The rural transportation should aim to cover short distance movements either around the farm or between farms and markets and vice versa. Short distance transport can take place by various means ranging from human portage and animal transportation to muscle powered transport such as bicycles to motorized vehicles. Nyasulu (1993) gives a number of non-motorized means of transport, which are suitable for rural areas.

1). Human Portage

Human portage continues to be a common form of transport in poorer rural areas where roads do not exist, and is used primarily for bringing small quantities of agricultural and other rural products to village and semi-urban markets (Wells 1975). Better alternatives need to be evolved for reducing the burden of such portage, whether the goods are carried on the head, shoulder or back. Carrying methods have been dictated by local customs and marginal improvements have been made for example Cheeke in Korea. Cheeke (Cheogy), is an improved frame for back loading, which easily can be converted to a wheeled carrier.

2). Hand Drawn Carts

In Kenya, hand drawn carts are largely used to transport bulky goods such as maize, beans, carrots, furniture but only short distances. Depending on the weight of load carried they can be drawn by one, two or more persons. In the major urban centers, they are

commonly seen at the wholesale markets for food products, at the bus parks and railway stations. In the rural areas, they are confined to a certain radius around the local market centers. Occasionally, they may be used in the farming areas during harvesting. Although there is a market for this mode, it has not accorded any official policy status. The most important aspects of this mode of transport are that almost all of its parts are fabricated locally hence; it provides backward linkage that is a crucial element in supporting local industry on sustainable basis.

3). Animal Drawn Carts

Unlike hand drawn carts, animal drawn carts are predominantly found in the rural areas. Functions performed by these carts include both freight and passenger transportation. In Kenya, they are used mainly for purposes of fetching water in the rural areas, transporting building materials and merchandise to the market centers. Usually the animal drawn carts have higher carrying capacity than the hand drawn carts. This form of rural transport similarly supports local industry as carts are usually fabricated locally.

While some of these functions can be performed by motorized transport, the scales of operation render the use of motorized transport uneconomical hence the justification for the use of NMT.

2-6.2 Emergence of Bicycles

According to Carter et al (1978), the bicycle preceded the automobile as a mode of individual transportation for a larger number of people in Europe. It was through a

concerted effort of the cyclists that road reconstruction and paving programs were inaugurated in the last quarter of the 19th century to replace the horse drawn carts. They continued to gain popularity from the time of their intervention up to 1940 especially in countries where the topography is flat. However, from the mid 1950, due to rise of motorized vehicle ownership, the bicycles popularity began to decline, the reason being that motorized vehicles are faster than bicycles (Otieno, 1996). In North America, the advent of mass-production of car relegated the bicycle to children's toy and transportation to school and as a recreation outlet for a selected group of enthusiasts. However, Motorized Vehicles are associated with rise in the number of accidents, traffic jams, and low car ownership among others. These factors have led to re-consideration of the bicycles as an alternative mode of transport (Njenga, 1996). Since 1970, transportation function for the bicycle has been recognized in many countries like China, India, Japan, and Netherlands among others as harmonious with solving energy conservation and environmental pollution problems.

According to the Bicycle Manufacture's Association of America, sales of bicycles in the US exceeded those of automobiles from 1972 through 1974; during this three span, over 40m bicycles were acquired and by the end of it an estimated 75m bicycles were in use. Nevertheless, in the developed countries a bicycle is looked as a child's toy or a mode, which should only be used during leisure time. On the other hand, in Africa, a bicycle is the appropriate and convenient mode of travel in and outside the village.

2-6.2.1 Uses of Bicycles for Rural Transport

IFRTD (1999) comments that different modes of transport have a major contribution to make to the livelihood of the poor people. In order to reduce half of the proportion of the people suffering from material poverty by the year 2015, the achievement of primary education for all by 2005, the reduction of infant mortality to one quarter of the present rate by 2015, improvements in mobility and management of the transport sector will play a very role in achieving each of them. A true situation of rural areas is that many deaths occur due to inaccessibility especially by the motorized vehicles, which for a long have been the focus of the Kenyan government.

In the recent year's deterioration in the road network on most Kenyan roads in rural has been alarming. Less well known but of equal or greater significance is, the stagnation or more likely in the motor vehicle fleet per capita. Under such circumstances, stagnation and contraction of motorized transport availability is a way ahead to what has been happening to NMT specifically, the bicycle. (Pannilage 1995) draws case studies from various parts of the world to demonstrate that the bicycle can and does play a significant economic role in resource-constrained environments. Considering the local level demand for bicycles, it seems legitimate to inquire about the policy stance taken towards them by the government. Has the government shown awareness of the bicycle's economic utility under the present economic conditions as well as its special potential as a mode of transporting benefiting the poor stratum of society in both urban and rural areas or does it continue to be overlooked, if not actually discriminated against in a variety of ways?

While emphasis has for long time been placed on the development of road transport infrastructure which focuses on the development of roads for use by motor vehicles, the government has recognized the important need to increase accessibility and mobility beyond formal roads (GOK, 2000). This entails the development and use of transport systems that adequately respond to the immediate needs of rural people. Such transport systems comprise of the following:-

- ◆ Provision of infrastructure beyond the conventional roads including village access roads and paths, cycle paths, bridges and tracks.
- ◆ Promotion of NMT such bicycle use, use of drought animals, ox- carts and hands carts.
- ◆ Promotion of intermediate technology in the production of NMT equipment through the application of appropriate technologies easily accessible to small-scale Jua kali artisans.

However, the focus has been on urban infrastructure, an aspect of the Sub Saharan Africa Transport Program (SSATP). The main objective was the improvement of roads, strengthening the management and ensuring adequate availability of finances for maintenance of urban roads in Nairobi, Mombasa, Kisumu and Eldoret. Similarly, Mmbai (1999), Rukunga(1990), and Mbogoria (1994) carried researches on the viability of the bicycle as a mode of transport in urban areas. They concentrated in Kakamega, Nairobi and Busia Towns. Also Infrastructure Improvement Pilot Surveys on NMT have been conducted in selected towns; this indicates a bias against rural transport. (Heierli et al, 1993).

In rural areas where motorized transport is not always available, bicycles serve as an alternative. As opposed to motorized transport, bicycles require a minimum of a good path, but are equally handy on bitumenized road (Nalo 1993). The use of bicycles in rural areas is more appropriate since the infrastructure alluded to it is predominantly of gravel and earth standard. It should be noted that this mode is appropriate in certain areas where the region is flat. Nalo (op cit 1993), note that bicycles are very important in certain transport corridors specially the feeder roads where motorized transport is hard to come by and yet there is a high transport demand. For this case, individuals have converted idle bicycles into productive modes of transport. A study carried out in Nyando reveal that Ahero is located along international trunk road and its hinterland includes Ahero Rice Irrigation Scheme. This is a high potential agricultural zone along Lake Victoria where bicycles have been used more effectively as taxis to transport goods and people to and from the hinterland.

Heierli (1993) argues that the popularity of the NMT especially the bicycle should not be discarded in the rush towards motorization. He describes in his work credit schemes for the purchase of bicycles in India, Bangladesh and Columbia, the case of industrial bakery replacing 200 trucks with 800 tricycles is cited. He adds that there are many examples of the indigenous ways in which the carrying capacity of bicycles and other vehicles have been increased. There is also a large number of unknown facts about speed carrying capacity and potential for job creation. The crucial factor is that should such potential means of transport be left without any enabling environment or should it take part in supporting the developments?

Barwell (1993) commenting on bicycle usage whether it is a prestige or utility indicates that travel in rural areas is for transporting goods. The surveys show that households in rural areas of Tanzania spend an average of 2500 hours per day on transport, moving goods to the extent of 90 tons per kilometer. The bulk of this transport (80-90 percent) is on foot. If one considers that bicycles have about 5 times the load carrying capacity of human portage (say 50 kg at 8 to 10 km/hour as compared to 25 kg at $\frac{3}{4}$ km/hour), it is clearly evident that even a relatively small increase in the use of bicycles would produce a significant reduction in the transport burden of rural households.

The actual proportion of household goods carried by bicycles varies from region to region, but on average is probably 2-3 per cent. Bicycles are used seldom for the major household tasks such as fetching water, firewood and for shopping which make up to 50-70 per cent of the transport load, probably because these tasks are mainly carried out by women (Werven, 1991). The bicycles in most cases tend to be used more for trips outside the village taking produce to the market and collecting inputs like seeds and fertilizers to the farm.

2-6.2.2. Uses of Bicycles for Income Generation

Rural households only invest in a vehicle if it can be used to increase their income. For example if it can carry more goods to markets or an indirect benefit such as reducing the time spent in improving crop production. These are factors that are often quoted as reasons for purchasing a vehicle but it is difficult to quantify these benefits because of the problems of collecting relevant data. The income generating potential of bicycles is more

clearly shown when they are used by small traders or for hire purposes. A common sight around centers are cyclists riding or pushing bicycles heavily laden with goods such as firewood, charcoal or farm produce which they are taking to the market (IT, 1998). Traffic counts carried out in the Mbale and Tororo districts showed that bicycles outnumber vehicles by 1.5 to 1 for town having good access roads and up to 6 to 1 where access roads are poor. Cyclist earns a living by fetching goods and people between the out laying villages and the market centers (Malmberg-Calvo, 1992).

IFRTD (1999) asserts bicycles are a source of employment in rural areas. This is because in both rural and urban areas employment is a very serious problem. Thus bicycles as a sub sector in the informal transport is absorbing the growing labor force in the study area.

Werven (1991) advocates for bicycles as a mode of transport, which is cheap to buy and maintain as compared to, motorized vehicles bicycles are ecologically friendly as they do not emit obnoxious fumes and also do not pose danger to other cyclists or pedestrians. Bicycle use is also convenient and economical over short distance. But despite these enormous advantages, rural transport planning has continually ignored the role played by bicycles as a mode of transport in rural areas.

Replogle (1989) indicates that bicycles should be encouraged as the most efficient transport mode for short trips and also consider the income levels of the rural poor, particularly for trips too long for walking and too short for express public transport services. Bicycles are most important for personal transport but also accommodate light

good hawking, being capable of carrying loads of 100 to 180 kilograms. In addition, travel timesaving offered by the bicycle attracts many people of all income levels to use bicycles. Public transport reliability makes bicycles competitive at longer trip lengths due to their flexibility, convenience, and greater reliability. He further notes that essential barriers to the use of bicycles are:

- Government attitudes towards bicycles and excessive and inappropriate regulation of bicycles.
- Lack of access to commercial credit is a major barrier to greater use of bicycles.

Therefore, it is important to support institutional changes, which are appropriate to create or strengthen capabilities for supporting appropriate use of bicycles including training of personnel and strengthening data collection on rural transport. Bicycles should be recognized as a viable mode of transport and should be given its place in the overall transport mix. It would seek an end to all exploitation and harassment by the motorized vehicle users.

2-7 WOMEN'S ROLE IN TRANSPORTATION

According to the National Poverty Eradication Plan, women have been recognised as the most vulnerable group. They bear a disproportionately large share of domestic and agricultural work. It has been estimated that their working days are on average two hours longer than those of rural men. Their contribution to family farm income is usually considerable; they are responsible for planting, weeding, cultivating and food crop

harvesting. They are responsible for food crop harvesting while their male counterparts specialize in profitable cash crops. They are responsible for childcare, housework, wood and water collection and food preparation—none or few of which create cash incomes.

Over a quarter (26.2% according Welfare Monitoring Survey II) of all rural households are headed by women and they are the key domestic, farm managers and contributors of family labour (Replogle 1987). Some of the women are widows while some head their families when their husbands migrate in search of wage work. In Nyanza and Western provinces, the rates of effectively female-headed households are high. In Busia district, (one of the high priority for poverty eradication), over 95% are female headed households. This being the scenario, women have not been considered in the overall transportation planning.

2-8 SYNETHSIS OF THE RURAL TRANSPORT PROBLEM

As one considers rural transport in general and bicycle use in particular, it becomes clear that the planning framework is inappropriate. This has been brought about by several factors including;

Inappropriate planning framework, inadequate national policies and attention to rural problems, insufficient development of appropriate technology, inadequate attention to gender needs in rural transport, lack of accessibility, traffic safety and bicycles and transport demand in rural areas.

2-8.1. Inappropriate Planning Framework

In Kenya, planning is highly centralized and therefore there is lack of knowledge on how to address rural transport issues. Planning in most cases is done sectorally and not multi sectorally. This has led to lack of integrated and co-ordinated approach to rural transport.

2-8.2. Inadequate National Policies and Attention to Rural Problems

While national policies have been put on sectoral, there has been little effort that has looked into the development of rural transport policies as a sub sector. The absence of such policies is partly due to lack of data on rural transport to effect policy formulation.

2-8.3. Insufficient Development of Appropriate Technology

Technologies in rural transport include mechanized and non-mechanized transport, means that could either be motorized to NMT means. While every effort is being made to disseminate information on existing and new technologies in other sub-sectors like trains, buses, big trucks, airplanes and bitumerized roads, such efforts are almost non-existent when it comes to available technologies in the rural transport sub-sector. The main contributory causes are lack of data on such technologies and insufficient extension services and other mechanisms for rural transport promotions.

2-8.4. Inadequate Attention to Gender Needs in Rural Transport

In most cases, very little attention has been paid to gender needs in rural transport. For instance, despite the fact that a greater proportion of the rural transport is borne by women, various transport interventions constrain women's effective participation in

development. The problem is partly due to cultural prejudices and attitudes prevalent in the designing and implementation of such transport interventions. In rural areas women are engaged in agricultural work, collecting of firewood and water, they make more trips for educational, health and other purposes. Their essential trips are therefore more dispersed in time and location than men are.

2-8.5. Lack of Accessibility

The basic concern for the rural people is accessibility to both local facilities and to the primary network. But the scenario in most rural areas in Kenya is that the network of subsidiary (now primary) roads, classified roads, paths and tracts are not recognized in the national policies on transport. We note that these are very important as they allow the flow of pedestrians, cycles and animal drawn carts.

2-8.6. Traffic Safety and Bicycles.

Throughout the literature, none of the authors has looked at traffic safety and bicycles. As much as bicycles play a vital role in the rural economy, the incidences of traffic accidents and fatalities have not been mentioned. The factors that require to be addressed are traffic flows, traffic speeds, and speed differentials and facility design. These factors lead to sharp differences in traffic safety patterns between bicycles and motor vehicles.

2-8.7. Transport Demands in Rural Areas

Over years, transport demand has been associated with agricultural production and transport of farm produce to the market. But in reality, transport needs for rural people is

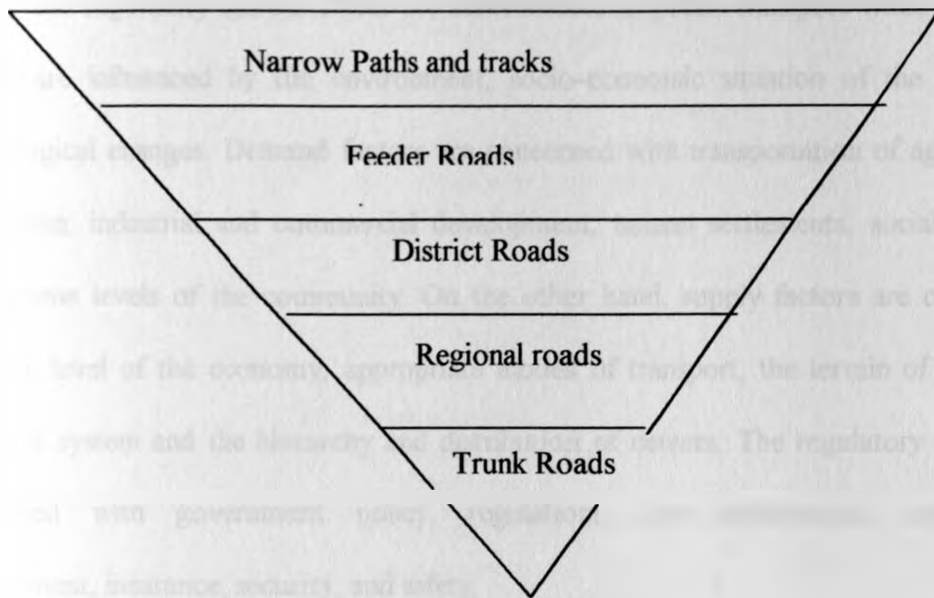
more than agricultural production because they have to access facilities like schools, hospitals, markets, churches which are sparsely placed.

2-9. CONCEPTUAL FRAMEWORK

Transport is an important input/component for any type of development including rural development. In rural Kenya, apart from the Lake waters, the backbone of the transport system is the highway system that consists of the network (roads), bicycle tracks and footpaths and services/modes. The main modes can be classified into two groups:- private modes which include motorized vehicles, bicycles and handcarts) and public transport which includes buses, matatus and bicycles (boda boda).

As already indicated in section 2-2 above, about 80% of the movements and transport needs in the rural areas use narrow paths and tracks. This contradicts what the government and other Transport Planning organizations have put forward. The assumption has been that when roads and motorized vehicles are made available to the rural population, accessibility will be much more easier. However, in rural areas, most of the travel takes place away from the classified roads. Therefore, for efficient rural transport, narrow paths and tracks should be a priority. Therefore, non-motorized modes and unclassified roads constitute an important component of the rural transport system (Fig 2-2).

Fig 2-2 Significance of Non-motorized Systems in Rural Transport

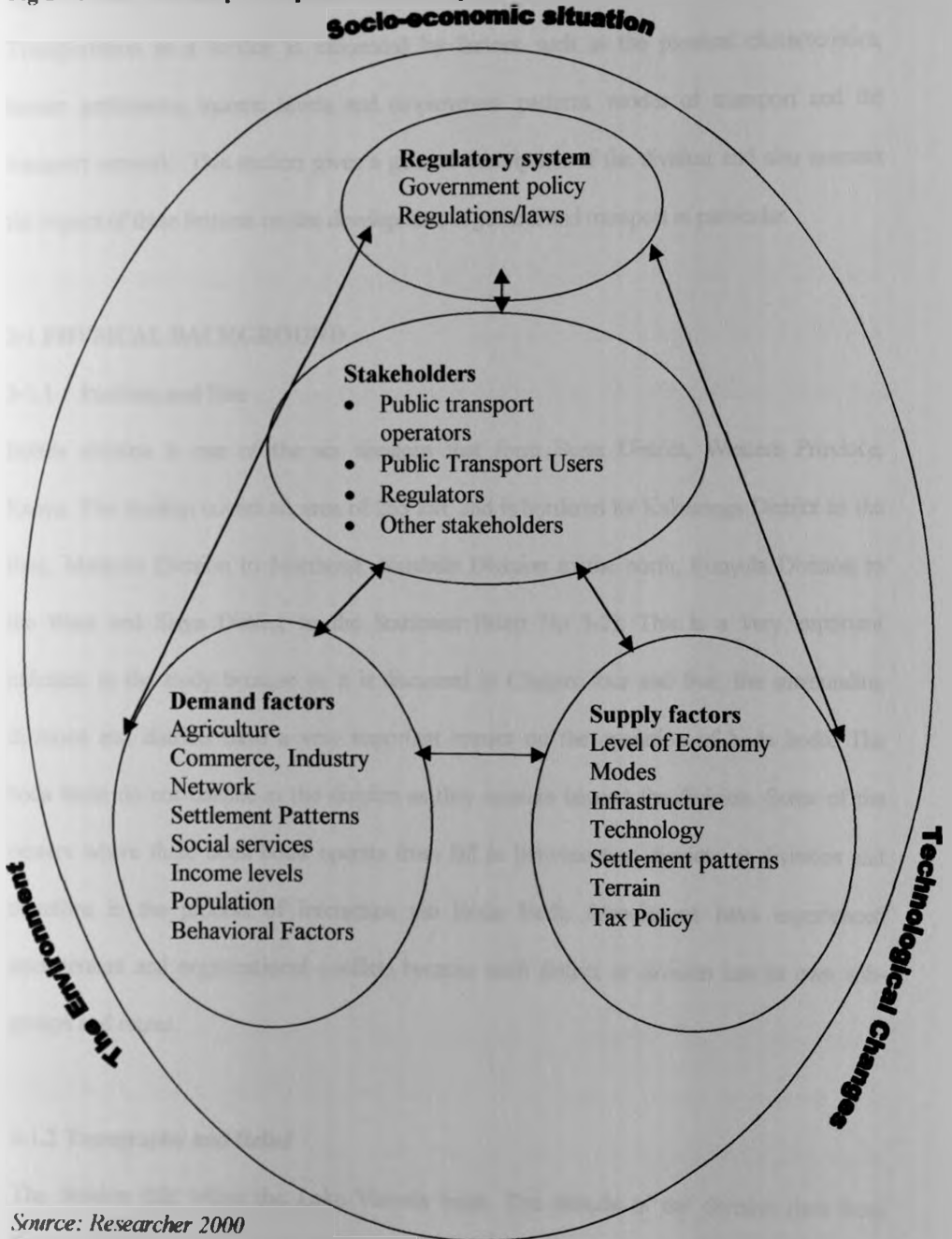


Source: Adapted from Beenhakker, 1987

As it was indicated in the statement problem, one of the issues is lack of proper policy guidelines for managing public transport especially the operations of boda boda. In order to generate policy for the proper operation of any mode of public transport, it is pertinent to analyze the components of the transport system. The most crucial component can be considered public transport users, operators, regulators and other stakeholders like the bicycle repairers. These interested parties can group together as stakeholders in a transport system. The operator who is supplier of the transport services is one of the most important stakeholders. He is the basic provider of capital for the construction, maintenance and management of transport services. The government on the other hand is charged with the responsibility of providing the infrastructure, regulating the services through the police and other administrators. This is meant to ensure that security and

safety is provided for both the operators and users of the service. Demand factors, supply factors and regulatory system affect the stakeholders in public transport while the three factors are influenced by the environment, socio-economic situation of the area and technological changes. Demand factors are concerned with transportation of agricultural production, industrial and commercial development, human settlements, social services and income levels of the community. On the other hand, supply factors are concerned with the level of the economy, appropriate modes of transport, the terrain of the area, transport system and the hierarchy and distribution of centers. The regulatory system is concerned with government policy, regulations, law enforcement, operational management, insurance, security, and safety.

Fig 2-3: Public Transport Operational Components



Source: Researcher 2000

Conceptualised from literature Review

CHAPTER 3: STUDY AREA- BUTULA DIVISION

Transportation as a service is influenced by factors such as the physical characteristics, human settlements, income levels and employment patterns, modes of transport and the transport network. This section gives a general description of the division and also assesses the impact of these features on the development in general and transport in particular.

3-1 PHYSICAL BACKGROUND

3-1.1 Position and Size

Butula division is one of the six divisions that form Busia District, Western Province, Kenya. The division covers an area of 265 km² and is bordered by Kakamega District to the East, Matayos Division to Northeast, Nambale Division to the north, Funyula Division to the West and Siaya District to the Southeast (Map No 3-2). This is a very important indicator in the study because as it is discussed in Chapter four and five, the surrounding divisions and districts have a very important impact on the operation of boda boda. The boda boda do not confine in the division as they operate beyond the division. Some of the centers where these boda boda operate from fall in between two districts or divisions and therefore in the process of interaction the Boda Boda Associations have experienced management and organizational conflicts because each district or division has its own sub-groups and routes.

3-1.2 Topography and Relief

The division falls within the Lake Victoria basin. The altitude of the division rises from 1128 to 1463 meters above the sea level. The surface consists of wide, flat land of

approximately uniform level (Map 3-3). The flat terrain of the division makes construction of roads less expensive. The flatness is also attractive and suitable for bicycle transport as less energy is required for cycling hence more trips are made.

3-1.3 Climate

The division falls within the high rainfall Savannah ecological zone with generally well-distributed rainfall throughout the year. The division experiences two rainy seasons-the long and the short rains. The long rains start in March and continue into May while the short rains start in August and continue into October. The dry spells extend from December through February. The mean annual rainfall is 1500mm with most of the parts receiving rainfall between 1270mm and 1790mm. During rainy season, transportation is impaired especially for motorized transport along the main corridor and the off-corridor routes. These modes are forced to relocate their operations to other routes like Mumias - Nambale- Busia and Busia-Kisumu. Therefore during rainy seasons, the only available means of transport are bicycles since they can move more easily through the routes where motorized vehicles get stuck.

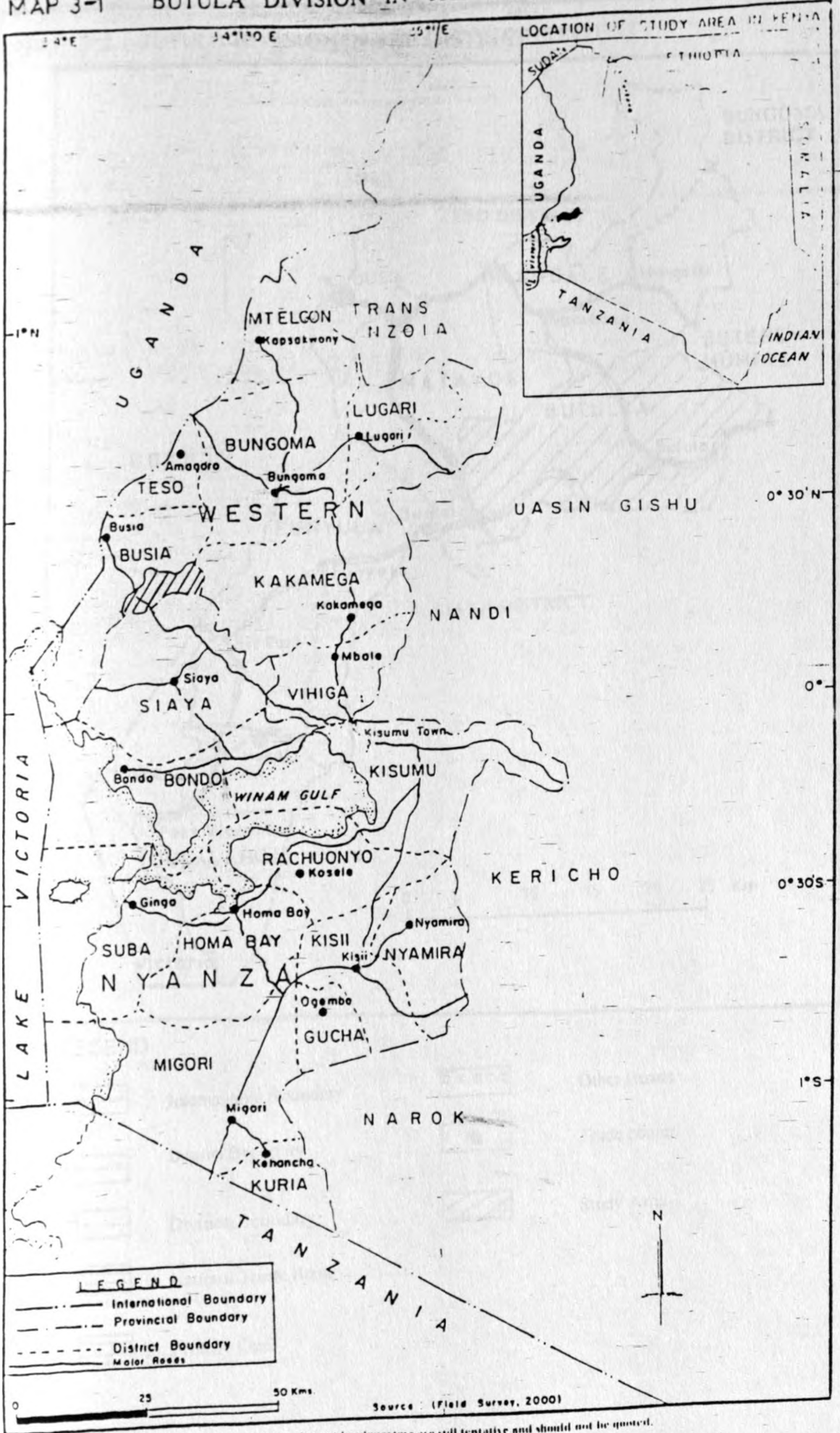
The mean maximum annual temperature ranges from 26°C and 30°C while the annual mean minimum temperature varies between 14°C and 18°C. The months between April and July tend to have lower temperatures while December to February tend to have higher temperatures. Lower temperatures are favourable for boda boda operators for they can cycle for a long time. On the other hand, higher temperatures are not favourable for both cyclist and users as fewer trips are generated. As it will be discussed later, adverse weather affects boda boda operations negatively. For example, the users prefer to use bicycles in the

morning hours and late in the evening when the temperatures are slightly lower. Also dry weather is favorable for bicycles as it gives them an opportunity to move with ease, as there is no major impediment such as mud, which causes frequent damages to the bicycles.

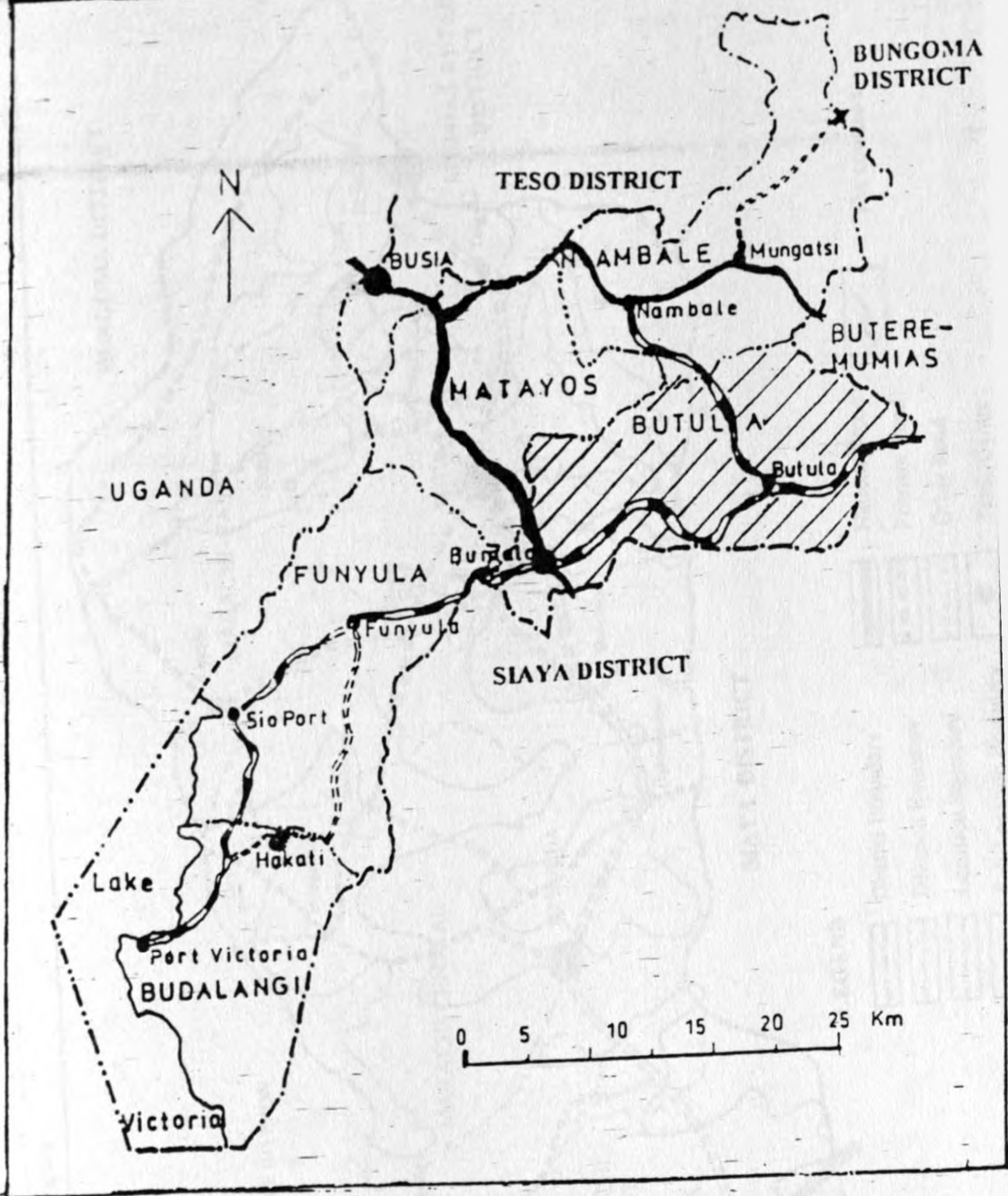
3-1.4 Soils

Soil properties exert strong influence on the manner in which roads are constructed and the modes to be used. It is therefore necessary to examine not only how land and soils are presently used but also how they can be used and managed in favour of the type of transport modes that can be used in the division. Swamp soils occupy the Southern part of the division. They are divided into two: seasonal and permanent swamps. The seasonal swamps are slightly on the higher ground. The permanent swamps consist of medium to heavy clay with clay contents varying between 45% and 80% of organic content. They are poorly drained and very dark, grey or black in color, soft and sticky and generally deep. They flood during rainy seasons but crack deeply during the dry season. This has an implication on the transport system especially as regards the type of modes that can be used in such an area. In most cases the only alternative modes are walking and bicycle. The areas to the north of the division are of dissected peneplains and uplands. The soils are well drained, deep brownish, sandy clay to clay with somewhat high natural fertility. These soils are suitable for crops such as tobacco, millet, maize, pineapples, sorghum, sunflower, bananas, and cotton. The ferralsols or latosols with murrum occupy the areas around Butula. They are dark brown sand loam's (podsollic soils), which are humic. The soils are well-drained deep and range from friable to firm sandy clay to clay. The type of soil has encouraged the use of bicycles since they are light and can be used on all weather roads including narrow paths and tracks (Map No 3-4).

MAP 3-1 BUTULA DIVISION IN THE REGIONAL CONTEXT



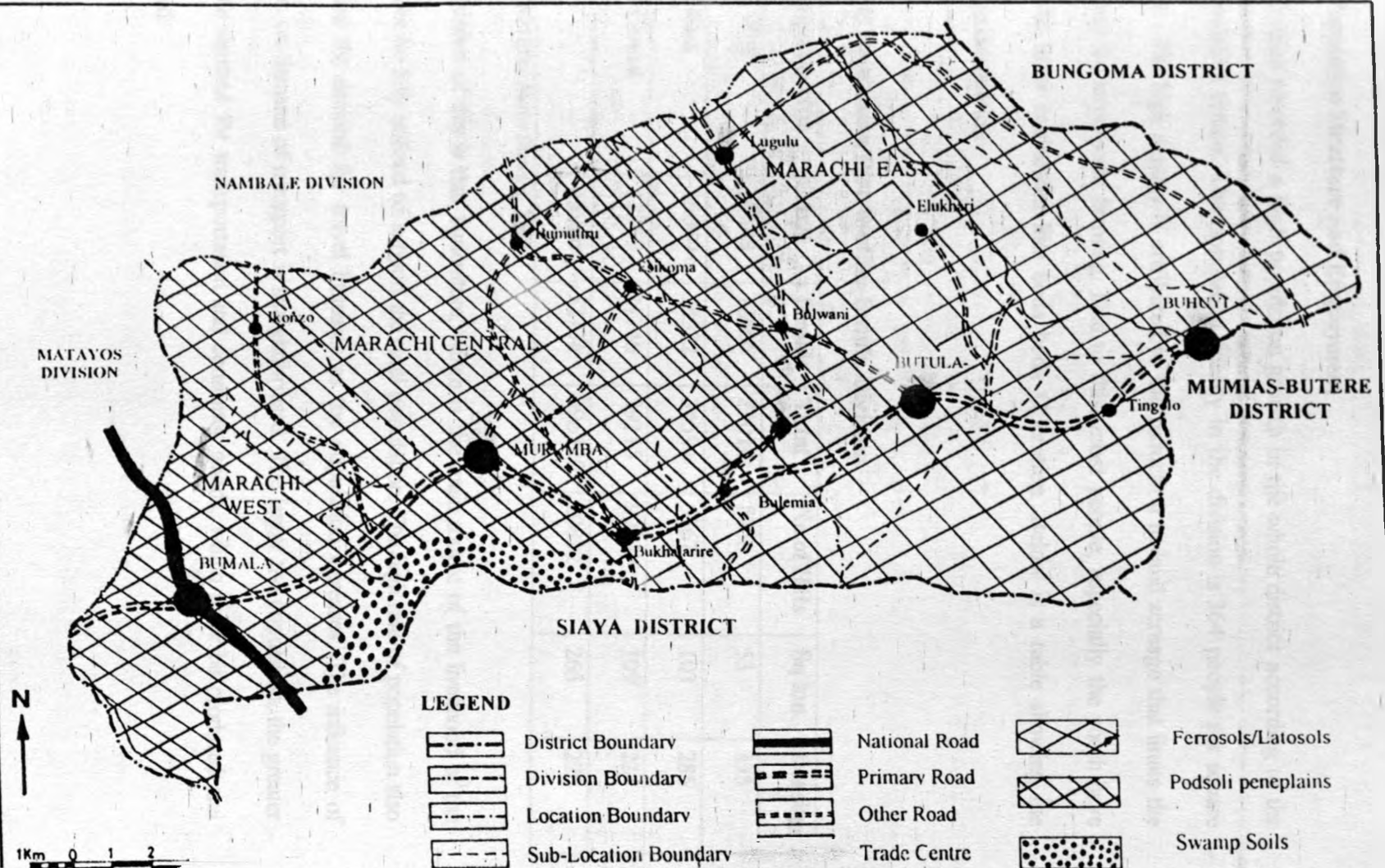
MAP 3-2 BUTULA DIVISION IN THE DISTRICT CONTEXT



LEGEND

- | | | | |
|--|------------------------|--|--------------|
| | International Boundary | | Other Roads |
| | District Boundary | | Trade center |
| | Division Boundary | | Study Area |
| | National Trunk Road | | |
| | Primary Road | | |

Map No. 3-4 The Type of Soils



3-2. SOCIO-ECONOMIC CHARACTERISTICS

3-2.1 Population Structure and Employment

Butula division recorded a high population growth in the whole district according to the 1989 population census. The population density in the division is 364 people per square kilometer. The high density is attributed to the reduction to land acreage that limits the opportunity for large-scale farming. Due to this, most people, especially the youth have resorted to other businesses like boda boda Operation. Below is a table showing the population distribution

Table 3-1: Population Distribution-Butula Division

Administrative area	Male	Female	Total	No of HHs	Sq km	Density
Marachi West	10548	12466	23014	5466	53	335
Marachi East	16069	18522	34591	5367	103	285
Marachi Central	17369	21746	39115	9999	109	224
Total	43986	52734	996720	20832	265	270

Source: DDO Office Busia District, 2000.

The implication of this is that agriculture, which is the main source of the livelihood of the area, cannot be fully utilized to support the rural population. The high rate of population also implies that the demand for travel increases as the population increases. The influence of population on demand of transport is straightforward. The larger the population, the greater will be the demand for transportation and consumer goods, which must be produced and transported.

3-2.2. Employment and Income

In 1999 the total labour force (15-59 years) in the division was estimated at 45389 of which 18629 males and 26760 females. Labour force continued to grow at a very high rate leading to unemployment rates. Since the industrial sector is not well developed in the division, most of the labour force has been absorbed by the agricultural sector, commerce, trade and boda boda. Women generally provide the bulky of labour force that cultivates the land for agricultural production (DDP 1997). In the division there is high agricultural to a large number of female population who are actively involved on on-farm activities. However, the probability of female headed household rises with high female population.

3-2.3. Wage Employment

Since independence, there has been considerable growth in the wage employment in the modern sector mostly in the urban areas. Wage employment in rural areas was meant to provide additional incomes for some groups, which are engaged smallholdings and small-scale rural enterprises and employment in the formal sector (ILO 1972). Nevertheless, the minorities of the economically active inhabitants are engaged in the traditional sector. The growth of jobs has not kept pace with that of the population especially in the rural areas. The lack wage employment in the study area has necessitated people to resort to other petty employment such as hawking, bicycle repair among others.

Wage earners form less than 6 per cent of the total labour force. They include civil servants, teachers and those employed by the business enterprises. According to the

Welfare Monitoring Survey II Report of 1994, the averages wage earnings for the study area for those aged 15 years and above is Ksh 1208 for males and Kshs. 547 for females. This indicates that majority of the population especially females live below poverty lines.

3-2.4. Informal Sector

Informal sector is characterised by its positive attributes for employment creation, for utilization of local resources and as a producer of cheap everyday consumer goods, services and agricultural implements. By supporting the activities in the informal sector, it would be possible to increase employment, improve the balance of payment situation, slow down rural-urban migration and support the supply of cheap consumer goods for the poor in both urban and rural areas (Carlen 1980).

This is a very active sector and it includes people engaged in various activities such as bicycle taxis, furniture making, and bicycle repair and second hand dealers. The level of their incomes depends on the type of business ventures, the season of the year and income levels from other sectors such as agriculture. Income from boda boda taxis range from Kshs 50-400 per day but it is not constant and largely depends on the availability.

3-3. Agriculture and Livestock Production

Agriculture is the main source of employment and livelihood of the people of Butula. The main crops grown in Butula Division are maize, groundnuts, sweet potatoes, sorghum, millet, bananas and cassava. A non-food crop grown for cash is sugar cane. Cotton and sunflower used to be grown but due to poor marketing and pricing policies, they were

neglected or uprooted. Table 3-2 shows agricultural production and the yield as from 1995-1999.

Table 3-2: Crop Production 1995-1999

<i>Crop</i>	<i>Yield (000) Kgs</i>				
	1995	1996	1997	1998	1999
Maize	2152	2385	1527	2275	2285
Sorghum	659	439	577	716	742
Finger Millet	230	243	211	116	196
Beans	651	243	343	166	403
Cassava	7314	9542	2763	800	811
Sweet Potatoes	1618	1864	924	862	654
Groundnuts	32	42	32	42	51
Cotton	570	737	217	312	61
Coffee	6	7	5	7	7
Sugar cane	97467	97467	63800	205274	231856

Source: Butula Division Agricultural Office, 2000

According to the table, there was a general decline in the production of all types of crops between 1995-1997, and this can be attributed to the effect of prolonged drought that afflicted the country. As for food crops, particularly cereals, the table reveals an upward trend between 1995-1997. However, for maize, the staple cereal in the division, it should be noted that this trend might not continue for long, as farmers in the maize producing areas have taken up sugarcane production. The yield of sugarcane increased from 97467 tons in 1995 to 231856 tons in 1999, following expansion of the hectarage to supply the proposed Busia Sugar Factory.

Of the food crops indicated in table 3-2, maize, sorghum, beans and the root crops play an important role in the food security of the district, but quantities produced are insufficient to satisfy the division's demand. Because of the low-level current production of food crops, very little quantities enter the market to earn the farmers cash income. This means that only sugarcane and to a limited extend, cotton and beans are the main sources of income. However, the role of cotton in the division's cash economy has been declining over the recent years due to problems of associated with marketing and supply of inputs.

In the process of farming, farmers are experience problems in obtaining inputs such as seeds and fertilizer and labour. Also with the introduction of sugar cane as a cash crop, food production has been neglected. Many youths have resorted to boda boda business so that they can earn a living other than farming. Bicycles also play a very vital role for on-farm and off-farm transport. They are used to transport farm produce from the farms to home and then to the local markets, as there are limited motorized vehicle services from the hinterland of the division to the market centers.

Like crop agriculture, livestock production is an important economic activity. The division has the potential for a number of livestock activities. These include dairy farming, poultry keeping, zebu cattle, goats and sheep rearing. Table 3-3 presents livestock production trend from 1995-1999.

Table 3-3: Livestock Production Trend 1995-1999

<i>Type of Livestock</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>
Zebu Cattle	21556	20043	20277	20555	20376
Grade Cattle	426	500	558	750	838
Sheep	2500	2615	2744	2884	3029
Goats	3476	3615	3830	4000	4209
Local Poultry	58271	53414	55571	56571	57142
Exotic Poultry	1395	1500	1814	2142	2364
Donkeys	8	8	10	11	12

Source: Butula Division Agricultural Office 2000

The population of dairy cows has been increasing steadily since 1995 when a Finland Sponsored Project Development Program (LDP) was started in the division. The population increased from 426 in 1995 to 838 in 1999 an increase of about 50%. This increase is attributed to direct importation of dairy cows from Trans Nzoia District and reduced mortalities due to improved disease control measures. On the other hand, the number of zebu decreased between 1998 and 1999 mainly because of trypanosomiasis, which hit the northern part of the division. These animals are not good producers of milk, therefore, owing to the low production of milk, boda boda taxis are used to transport milk from the neighbouring districts of Bungoma and Butere-Mumias. They also transport animal feeds to few farmers who keep dairy animals and practice zero grazing. Donkeys, which are used as a mode of transport in some parts of rural areas, are being adapted in the division. As it is shown on the table above, there are about 12 donkeys in the division. They are used to transport farm produce and water especially on the big centres.

3-4 Other Economic Activities in the Division

This is a non-traditional industry based along River Lelekwe in Esikoma Sub-location. It manufactures armchairs from papyrus reeds (*Amachuru*) and the branches of the *Isiola* tree. The chairs, both single and double sizes are well designed and strong. They are made in several styles. The bicycles are used to transport them especially on market days.

3-5 CENTERS

The market centers provide marketing services to the people of Butula. There are a number of services offered by the existing centres including wholesale and retail trade, livestock auction facilities, periodic and daily markets in major local markets. (Map No. 3-5).

Table 3-4. Service Centers in the Division

<i>Centre</i>	<i>Number</i>
Rural	1
Market	4
Local	14
Total	19

Source: GOK 1978

As shown in table 3-4, the division has 19 designated centers of which one is a rural center, four market centers and fourteen local centres. But the concern of the study was the four centers that are located along the main corridor. They include Bumala, Murumba/Khunyangu, Butula and Buhuyi. In addition, these centers attract traffic into and out of the hinterland to and from the main corridor. In the main commercial rural and market centers of Bumala and Buhuyi respectively, the main activities are wholesale and retail trade and a fenced open air market which deals with all sorts of agricultural

produce, fish products and manufactured goods. The full range of activities is covered in Chapter four below.

3-6.DISTRIBUTION OF EDUCATION AND HEALTH FACILITIES IN THE DIVISION

Education is the basic human development indicator that is crucial in determining the quality of life (GOK 1983). It is the key to empowering individuals and communities with the awareness and knowledge to make the informed decisions about themselves and the world around them.

In the division, there are 70 pre-primary, 70 primary and 8 secondary schools (Map 3-6). Quite a number of schools are located along the main corridor, the feeder roads and are close to the centres. These schools are well distributed along the main corridor with a walking distance of 1-5 kms. In the interior of the division the schools are not well distributed and as such pupils walk for a distance of upto 8 kms. As it is indicated in Table 4-3 below, the schools, which are within a walking distance, of between 1-5 kms, the prevalent mode used is walking with a few households who contract boda boda taxis to take their children to school.

The division has 5 health facilities of which 3 are health centers (2 government and 1 mission health centres) and 2 dispensaries. Generally Butula is poorly served with health facilities and this is an indication that people have to walk for long distances to seek medical attention. Therefore, boda boda taxis become handy especially when they

are used to transport sick people to hospital. In most cases the health facilities may be as far as between 5-10 kms (Map 3-6).

3-7. PREVALENCE OF HIV/AIDS IN THE DISTRICT

AIDS is believed to stand at 13% in Busia District compared to the national figure of 7.7%. The figure is higher in certain risk groups. The possible factors that could have contributed to these high incidences are:

- Proximity and interaction between Kenya and Uganda, since the whole of Busia District, from North to South borders the Republic of Uganda.
- Two busy border towns: Busia and Malaba
- Traditional practices such as wife inheritance
- General low employment opportunities in both Uganda and Kenya that has forced many women to work in bars and restaurants where they engage in commercial sex to earn a living.
- People's gradual change in attitude and practice towards sexual behavior.

Socio-economic effects of the disease

It is now increasingly recognized that AIDS constitutes a development problem as it affects people beyond the health sector into the social, economic and cultural shares of the district. One of the most adverse effects of the disease is on the labour force. HIV is most prevalent in the productive age group (20-49 years), the disease brings serious implication on the district's economy in terms of loss of incomes, savings and investment.

- ◆ Many children have been left behind by their parents, engage into boda boda operation so that they earn a living and at times, income from the operation is used to pay fees for the younger brothers and sisters.
- ◆ On the other hand, lack of fees has forced many school going children to drop out of school to venture into other businesses.

3-8. TRANSPORTATION AND COMMUNICATION

Since early colonial times, the division has been an area to pass through from the more important centres of Mumias and Bungoma to Uganda. The division has major roads that include the class that links Kenya with the neighboring countries. The division is also traversed by Mayoni-Bumala-Port Victoria Road, which is classified as C30 to. The Class D and E roads account for 33.2 and 23.4 kilometers respectively in the whole division. The total road length in the division is 92.6 kilometers.

Table 3-5: Road Classification and Length

<i>Road Classification</i>	<i>Road Length</i>
B	6 Kilometers
C	30
D	33.2
E	23.4
Total	92.6

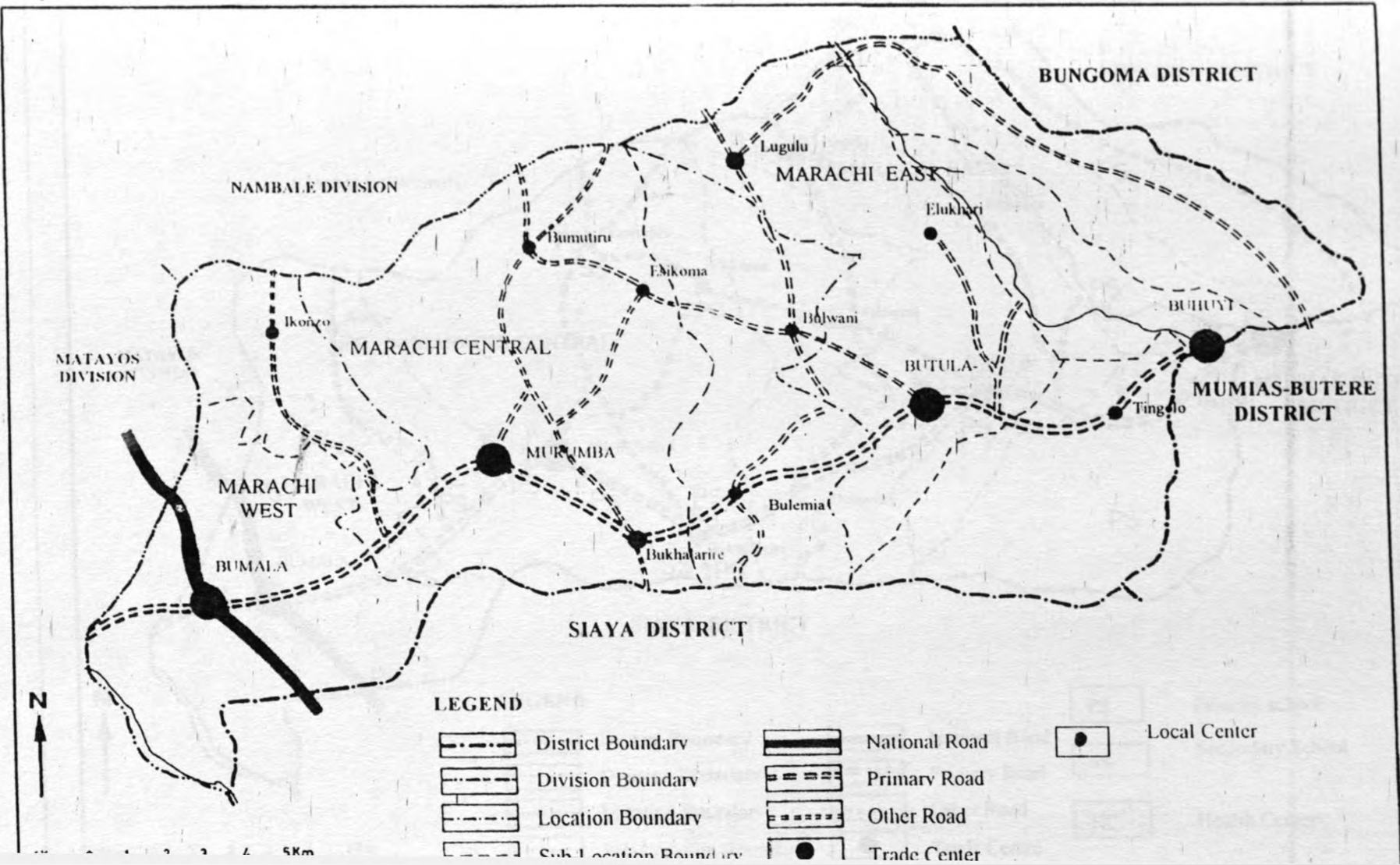
Source: Field Survey 2000

Rural access roads are insufficient and lack maintenance. Physical features affect the network of access roads especially in the southern part of the division. This has made long

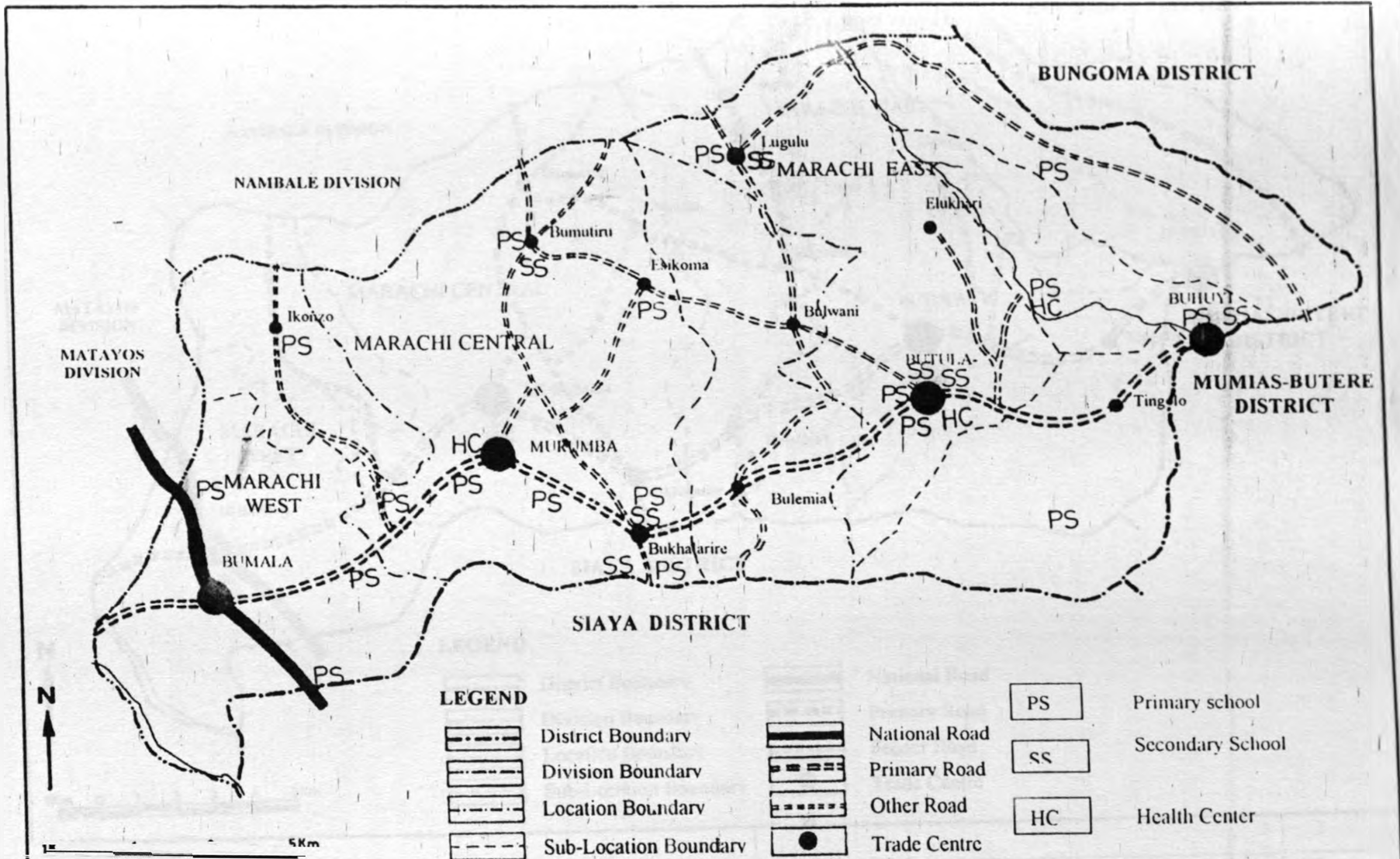
detours necessary for vehicle traffic. Such features do however not deter footpaths and bicycle travel is the most convenient.

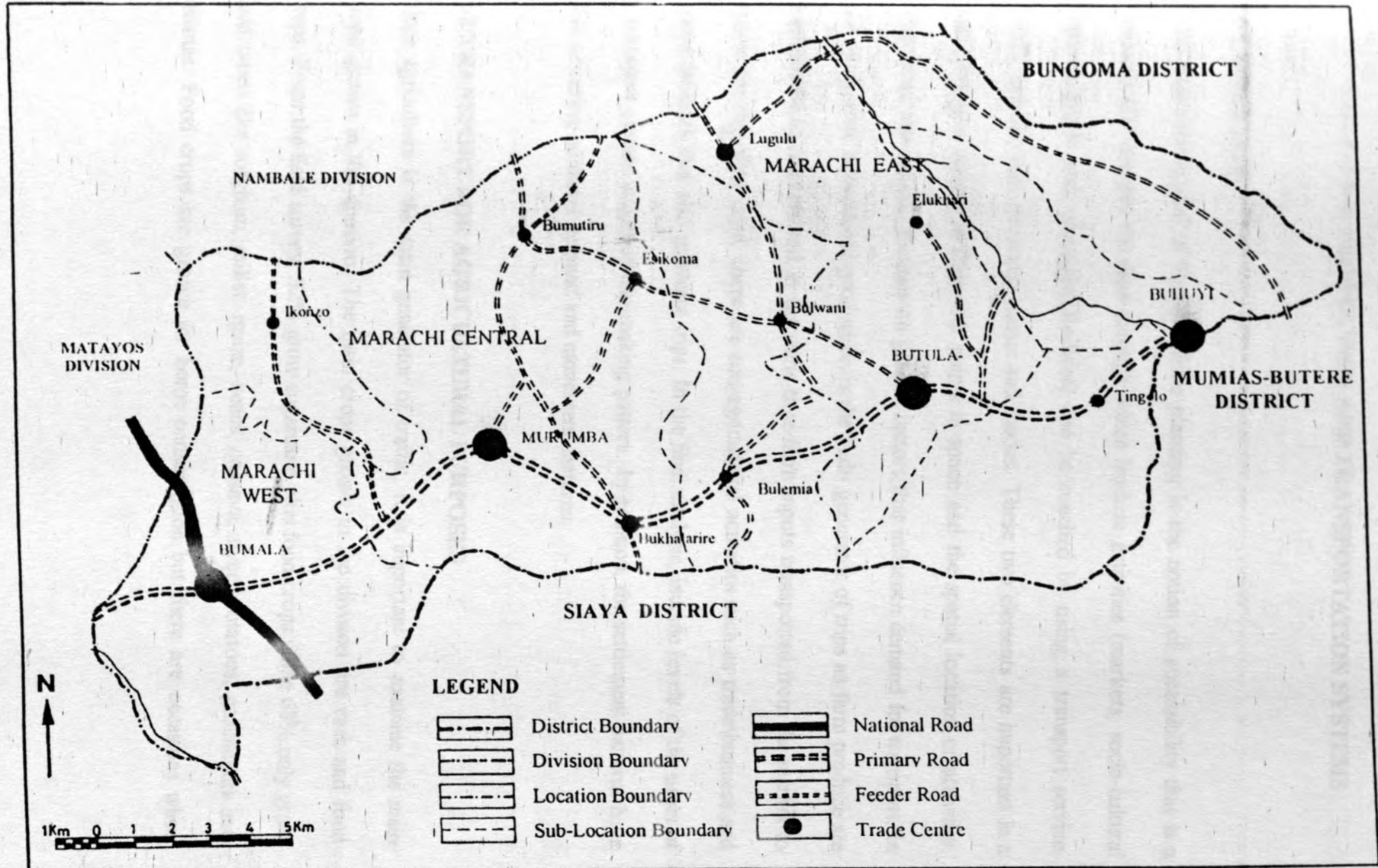
The transport services are not well developed except for the large centre like Bumala. Elsewhere, buses and even matatus are rather few and at the same time they charge exorbitant fares thus encouraging passengers to use bicycle taxis and boda, which are cheaper and convenient. There is a wide spectrum of transport modes in Butula division ranging from bicycles to many different types of animal and human powered devices to head loading.

Map No. 3-5 Distribution of Market Centers



Map No. 3-6 Distribution of Health and Education Facilities





BUNGOMA DISTRICT

NAMBALE DIVISION

MARACHI EAST

MATAYOS DIVISION

MARACHI CENTRAL

MARACHI WEST

BUIHUYI

MUMIAS-BUTERE DISTRICT

BUMALA

MURIAMBA

BUTULA

Ting'lo

SIAYA DISTRICT

Bulemia

Bukharire

Bumutiru

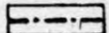
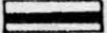
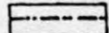

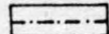

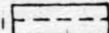

Esikoma

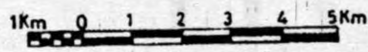
Bujwani

Ikorizo



LEGEND

- | | | | |
|---|-----------------------|---|---------------|
|  | District Boundary |  | National Road |
|  | Division Boundary |  | Primary Road |
|  | Location Boundary |  | Feeder Road |
|  | Sub-Location Boundary |  | Trade Centre |



CHAPTER 4: PRODUCTION AND TRANSPORTATION SYSTEMS

4-1. OVERVIEW

The main central goal of transportation planning is the notion of accessibility that is a measure that denotes the ease through which landuse activities (markets, socio-cultural centers, health and education facilities) can be reached by using a transport service, which includes two elements; routes and modes. These two elements are important in a transportation system as they link points in space and the spatial location of activities. Therefore, this chapter focuses on general factors that influence demand for transport. In the study area, agricultural production is the main generator of trips as farm produce are transported to markets and at the same time farm inputs transported from the market to farms. On the other hand, there are non-agricultural activities such as trade\business and social facilities that also generate trips. In the final analysis, income levels of the users of a transport system influence trip-making pattern. In addition, the settlement patterns have also a bearing on travel demand and movement patterns.

4-2 TRANSPORT FOR AGRICULTURAL PURPOSES

Since agriculture is the main generator of traffic, it is important to examine the main crops grown in the division. The main crops grown in the division are cash and food crops. From the field survey, 32% grow sugarcane plus food crops while 68% only grow food crops like sorghum, millet, maize, beans, cassava, sweet potatoes, groundnuts and bananas. Food crops are grown for home consumption but there are occasions when

farmers sell a portion of their produce even when they do not have a surplus to raise money for other basic family needs.

The integration of rural areas into the national economy can only be achieved if there are linkages between the farms and markets; therefore there is need for a network that facilitates these flows. In Butula division, farmers to meet their transport demands use a variety of transport modes. In most cases, small loads (10-200 kgs) characterize goods over relatively short distances (1-25 kms). It was found out from the household survey that for on-farm transport, headloading accounts for 71%, 17% transport their produce on wheelbarrows; the reason behind this is that farms are within 200m radius. Animal drawn carts or sledges, private bicycles and boda boda taxis accounted for 8%. Farmers who have other farms away from their homesteads use the three. The importance of Sugarcane to a farmer in the study area is that it is the only cash crop grown in the division therefore provides him with a source of income. At the same time sugar production does not influence other modes of transport because Mumias Sugar Factory supplies all the farm inputs while tractors to the factory that is about 20 kilometers away transport the harvested cane.

In rural areas, agriculture is the mainstay for the majority of the population and transport demands arise from agricultural activities. Transport system can be divided into on-farm and off-farm. On-farm activities include agricultural inputs such as manure, fertilizers and other farm implements as well as movement of harvested farm produce that are

moved from the farms to homesteads. Table 4-1 shows on-farm activities, distance and mode used.

Table 4-1: On-farm activities, distance and mode used

Activity	Distance	Mode used
Farm	300m	Walking
Water	500m	Walking
Firewood	1 km	Walking

Source: Field survey 2000

Findings show that on-farm activities include movements related to domestic needs such as going to farm, fetching water and firewood. It is also characterized with the movement of small loads of between 10-30 kgs. The most prevalent mode for on-farm activities is walking (which implies headloading and backloading). This means that on-farm activities take place away from a formal road.

4-3. OTHER TRANSPORT DEMANDS

Off-farm transport means movements of farm produce from the farms to the markets and farm inputs from the markets to the farms. It also involves travels to social gathering health and education facilities. Table 4-2 shows off-farm activities, distance and mode.

Table 4-2: Off-farm activities, Distance and Mode used.

<i>Activity</i>	<i>Distance</i>	<i>Mode used</i>
Hospital	5 km	Bicycle
Market	7 km	Bicycle
School	3 km	Walking/bicycle

Source: Field Survey 2000

Off-farm activities are generally longer but few are over 15 km. In most cases, the households use private bicycles for trips over 3-km. Transport demand are not only related to agricultural production but also to non-agricultural activities. Among the non-agricultural activities, transportation of firewood, water, construction materials make a substantial part of the transport needs in the division. Information from the field survey indicates that significant numbers of trips are made to markets, schools and health facilities. Table 4-3 shows the percentage of trips purposes and modes used.

Table 4-3: Percentage of Trip Purposes and Mode used

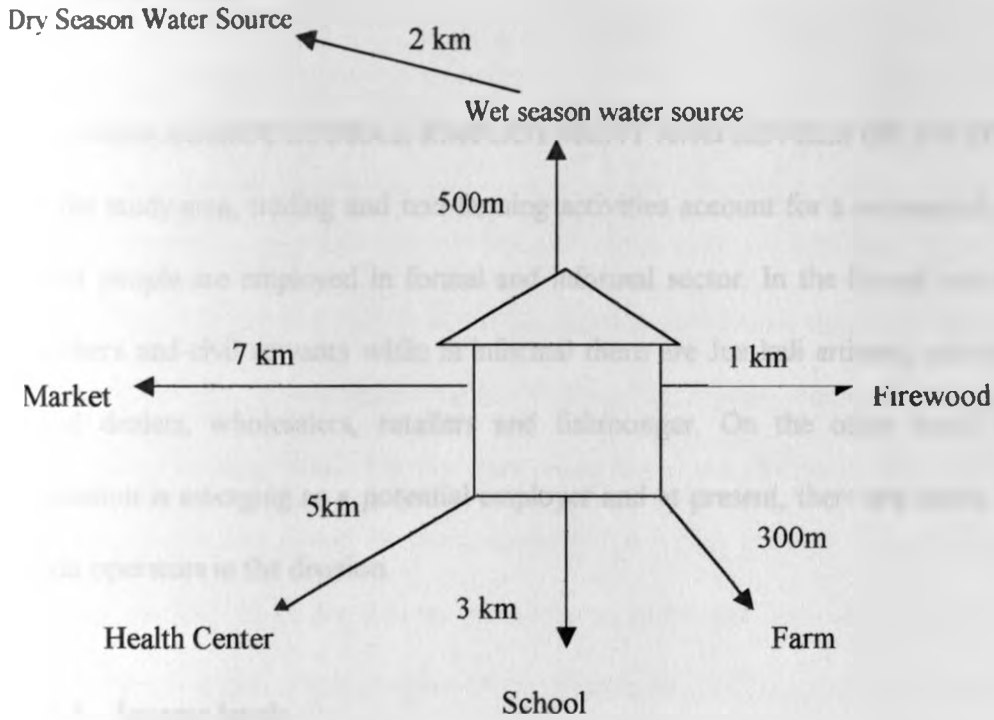
<i>Mode</i>	<i>Water</i>	<i>Firewood</i>	<i>Hospital</i>	<i>School</i>	<i>Farm</i>	<i>Market</i>
Bicycle	6	4	72	35	8	58
Walking	68	70	18	65	71	32
Personal car	-	-	-	-	2	-
Matatu	-	-	10	-	-	10
Wheelbarrow	26	26	-	-	17	-
Tractor	-	-	-	-	2	-

Source: Field Survey 2000

From the table, the respondents use different modes for various trip purposes. Walking is the prevalent mode for water fetching, firewood, school, and farm because these purposes are within a radius of three kilometers (mostly along narrow paths and tracks). Majority of the respondents use bicycles for hospital (72%), market (58%), school (35%) on contractual hire, while the bicycle satisfies less other purposes such as fetching water, firewood and farm activities because they within a radius of 3 kms. This shows that major part of the rural travel is within. However, this is an area that has been ignored for along

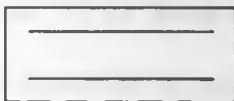
time by the transport planners. The information from tables 4-1, 4-2 and 4-3 are summarized in Fig 4-1.

Fig 4-1: Demand for Transport in the Division

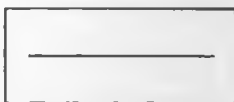


Main Corridor

Legend



Main Corridor



Paths and Narrow Tracks

Source: Field Survey, 2000

According to Figure 4-1, the main generator of trips in the study area is residential. People go to different places for specific trip purposes. For instance, they have to fetch water and firewood, go to school, seek medical attention, go to the market among others and most cases they use narrow paths while the prevalent mode of transport is either walking or bicycle.

4-4. NON-AGRICULTURAL EMPLOYMENT AND LEVELS OF INCOME

In the study area, trading and non-farming activities account for a substantial percentage. Most people are employed in formal and informal sector. In the formal sector there are teachers and civil servants while in informal there are Jua kali artisans, salonists, second hand dealers, wholesalers, retailers and fishmonger. On the other hand, boda boda operation is emerging as a potential employer and at present, there are about 1,350 boda boda operators in the division.

4-4.1 Income levels

The study indicated that 38% are smallholder farmers, 20% are boda boda operators 17% are businesspersons, 15% are civil servants while 5% are Jua Kali artisans. According to the Welfare Monitoring Survey of 1997, Busia District was classified as one of the poorest district in the country. WMS II gave an average income as Ksh.1208 for males and Ksh 547 for females. This is categorized as absolute (overall) poverty line. Table 4-4 shows household income distribution.

Table 4-4: Household Income Distribution Per Month

<i>Income (Kshs)</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Cumulative Percentage</i>
Below 800	4	7	7
801-1000	5	9	16
1001-3000	23	43	59
3001-5000	12	23	82
5001-7000	3	5	87
7001-9000	2	4	91
9001 and above	4	9	100

Source: Field Survey 2000

From the table, majority (82%) of the households earn below kshs 5000 while 18% earn above Kshs 5001. To confirm what the Welfare Monitoring Survey has put across about the income levels in Busia District, this study found out that majority of the people live below poverty line. Going by the household size of six persons, a household head that earns Kshs.7000 and if six persons divide the same income, then each will get about Kshs 1400. The situation is even worse for the female-headed households whose incomes are as low as Kshs580.

Table 4-5: Indicative levels of income by sector.

<i>Sector</i>	<i>Income</i>
Small holder farmers	2,500 per year
Sugar cane farmers	20,000 per year
Businessmen \traders	5,000 per month
Bicycle Repairers	4,500 per month
Bicycle Operators	4,800 per month
Civil Servants	6,000 per month

Source: Field Survey 2000

Note: This table does not add to 100% because these occupations overlap.

According to table 4-5, smallholder farmers who are the majority earn less than Kshs 2,560 while farmers who grow sugarcane earn on average Ksh 20,000 per annum. Businessmen and traders fall in different categories in that there are those engaged in wholesale and retail, fish mongering, fruit and vegetable traders among others. On average, they earn about Ksh.5000 per month. Bicycle repairers and operators earn between Ksh 4,500 and 4,800 per month respectively. This is a very important indicator since the study set out to assess whether bicycle operation has a potential for income generation that is covered in Chapter 5.

4-5. CENTERS

One of the fundamental objectives of the government of Kenya has been emphasis on channelling resources towards the rural areas. Rural people are supposed to be provided with basic services such as health facilities, markets, sanitation, water, power, and education among others. These facilities should be concentrated in selected centers so that the local population can save time, energy and money that could otherwise be used to scattered services around (GOK, 1978).

In the study area, there are centers, which have been designated as local, market, rural and urban centres. Four centers were sampled for the study, they include; Bumala, Murumba, Butula and Buhuyi. Each centre has its unique characteristics especially as it interacts with one another through transportation linkages (section 1-7).

4-5.1. Bumala 'A'

Bumala 'A' is one of the biggest centres in the division. It was designated as a rural centre in 1978 but at the moment it is a small town which serves a larger population catchment from Siaya District, Funyula and Matayos divisions (Map No. 3-2). Bumala is a unique centre as 70% of the activities are commercial. It has approximately four hundred shops that include wholesales, retail shops, salons, hotels and spare parts shops. It is also served by telephone services, power and a sub-post office. Therefore, this center has a potential for industrial development. Bumala has a very active periodic market that mostly deals with livestock sales. The customers and sellers do not only come from the division but from as far as West Pokot in Rift Valley Province, Uganda, Kisumu and other parts of Western Province. This has really had an impact on the growth of the centre even if it does not have institutions such as schools to support it.

Other than commercial activities, the centre plays a very important role in transportation because it is a crossroad and a major junction (Map No.3-4). It links Kisumu to Busia through the National trunk road; it also links Funyula division to Butula division through the main corridor (Mumias-Port Victoria Road). Therefore, Bumala serves as an origin and destination center- passengers drop from one mode and pick another one (interchange for different modes) (Plate No 4-2).

4-5.2. Murumba Centre

Murumba was classified as a market centre. It is about 10 kms from Bumala 'A' centre. A health centre, a sub post office, several shops, Jua Kali sheds, electricity mains and a very active periodic market serve the centre. The center's importance is recognised by the

fact that for a very long time, it has been the only centre in the division with a government health centre which was started way back in 1961. A boy's boarding school has also had an impact on the centre as it has increased the number of permanent residents. In addition, Murumba being a major junction filters passengers from the interior to the main corridor and then to Bumala. It serves as a terminal for boda boda taxis.

4-5.3 Butula Centre

Butula was classified as a market centre. Compared to Bumala, which mostly deals with commercial activities, Butula serves as both a commercial and a service centre. It is the divisional headquarters with a comparatively high component of civil servants. It also houses several NGO organizations like KREP. It has about 100 shops which are off the main corridor but what makes Butula kick as a centre are institutions like the girls' boarding, boys' boarding, mixed primary schools, girls' high school and boy' high school, youth polytechnic and a school for the mentally handicapped children. There is also a big Catholic Church, a sub-post office, Telkom Manual Exchange and is on electricity mains. In terms of transport, Butula is a thoroughfare for Matatus but a very important junction for corridor-feeder services (Fig 5-24 and 5-25). On the other hand, it is a terminal for other smaller centers like Tingolo, Muruka, Bulemia and Uholo in Siaya District. As it will be discussed later, this has led to organizational and management problems among different Boda Boda Sub-groups.

4-5.4 Buhuyi Centre

Buhuyi was classified as a market centre but just like Bumala it has a bigger catchment population from Nambale division, Mumias-Butere, Siaya and Bungoma Districts (Map No 3-4). Buhuyi has unique characteristics because it has *two centres* in one. The centre falls into two districts and as such has two periodic markets; Thursdays are always bigger markets days for Mumias-Butere District while Mondays are periodic markets for Busia District. It is also the only centre, which falls within the Mumias sugarcane zone, and as such, it is used as a centre for paying sugarcane farmers. It has a Boy's boarding school and several primary schools for both districts.

In terms of transportation, Buhuyi serves as a crossroad and also as a main junction for the Eastern part of the division but it only serves the hinterland of the above-mentioned districts. There are Registered Associations that serve different districts, for instance Mumais, Nambale and Butula Boda Boda Associations. This being the case, there have arisen many conflicts amongst the Boda boda sub-groups, therefore this calls for a planning intervention.

4-6 TRANSPORTATION SERVICES

Transportation can be described as a service or facility and is distinguished from commodities produced in primary sectors like agriculture. As a service, transport satisfies demand of those who want to move and those who want their goods to move. It is thus a service rendered to both consumers and producers. Nevertheless, these demands cannot be made by a single mode, there should be multiple modes, which compliment each other

to ensure efficiency and faster transport services. In the division, there is a range of modes, which satisfy transport needs; they include matatus, bicycles, tractors, buses, and other NMT modes. They are used to transport both passengers and goods.

4-6.1 Prevalent Modes of Transport

There is a wide spectrum of transport modes in Butula, ranging from motorized (buses, matatus pick-ups and tractors) to non-motorized modes, which include bicycles, animal drawn carts, handcarts and human portage. Transport needs or demands such as going to school, hospital, and market, traveling to the bus stop and to the main transport corridor are satisfied by these modes but people can make mode choice. In most cases, there are demand factors that affect modal choice and they include convenience, frequency, reliability and in-vehicle time. The most prevalent modes in the division are bicycles and matatus.

4-6.1.1 Buses and Matatus transport services

Long distance trips (Nairobi, Kisumu, Kericho, Nakuru) in the division are met by buses. They operate along the Kisumu-Busia road which transverses the division by only 6 kms. Their services are limited particularly along the Mumias-Bumala corridor where there is only one bus that plies the corridor (from Port Victoria – Bungoma in the morning and Bungoma-Port Victoria in the evening). Therefore, buses previously the backbone of transportation in Butula, have declined as other modes have come into use (matatus and bicycles). The two provide complementary and supplementary services to buses in that bicycles filter passengers from the interior to the corridor while matatus take the

passengers to the main National Trunk Road (Busia-Kisumu Road). Similarly, passengers who alight at Bumala center from buses take bicycles for convenient travel to the interior.

The other motorized modes are matatus. They also meet transport needs on comparatively long distance trips. The matatus in the division ply Bumala-Mumias route as it traverses the division but they are also limited just like buses, as they do not operate along the feeder roads. The reasons given are that the feeder roads are impassable especially during rainy seasons and there are no major centers in the hinterland of the division, which can attract matatus operations

It was also found out that passengers prefer boda boda to matatus because the former are associated with delays at terminal points (takes about, 1-2 hours to fill one matatu), thus passengers opt for bicycles which are convenient and takes one up to his or her destination. The matatu operators who were asked to comment on delays cited the problems of stiff competition from boda boda taxis and fewer passengers especially on non-market days.

From the field survey, at least 58% of the households in the division own bicycles, 28% wheelbarrows, 7% handcarts, 2% pick ups, 2 % personal cars and 3% donkeys. None of the household owns a tractor because tractors belong to Mumias Sugar Factory, which is in charge of transporting sugar cane from individual farms to the factory. There are ten matatus, which ply along the main corridor. Their origin or destination can be either Bumala or Bungoma town and in few cases, Mumias. It was established from the field that matatus meet some of the transport needs especially along the main corridor. There

are three types of matatus, which have different carrying capacities – mini buses, Nissan matatus and Peugeot 504 (25, 18 and 14 seaters respectively). Their services are higher on market days; end of the month and during December holidays. On such days, one matatu makes an average of three trips between their origins and destinations. Users (60%) who were interviewed preferred matatus for long distance trips (over 10 kilometers), 20% said they like matatus especially during dry and rainy seasons as one of was assured of protection from the rains and hot sun while 20% said that matatus are faster as compared to bicycles (corridor service).

On the other hand, users complained that matatus take too long to fill especially on non-market days thus inconveniencing them (the mean waiting time of a matatu is two hours). The matatus are also limited as they only offer the corridor services and as such many people do not rely on them for the full trip. There are also many delays when the matatu agents have to repeatedly count fares collected from the passengers. At the same time, matatus are not well maintained, therefore can break down in the middle of the journey thus causing many delays. Matatus are unpredictable in that at certain times of the day especially in the evening, users cannot be sure whether they will come back from Bungoma.

4-6.1.2 Bicycle Mode

Bicycles are predominant types of vehicle in many parts of Busia district. On average, the bicycle meets about 45% of all personal trips including trips to work, business trips and social trips. At the same time, bicycles offer a range of services to both passengers and

goods; therefore they play complementary services to other modes of transport especially on the feeder roads.

(i) The Bicycle as a private mode of transport

The bicycle in the study area is looked at as a '*social good*'. Most households own bicycles not solely based on the economic benefits but on the status that a family attaches to owning a bicycle. It is used for different trip purposes like going to the market, hospital, school, social trips like weddings, and funerals among others (Plate No. 4-1).

Plate 4-1: Bicycles at Butula Center



(ii) The Bicycle as a Public Mode of Transport (Boda Boda)

The bicycle is used as a public mode of transport for movement of goods and passengers in the division. The activity started in the Southern part of Tororo in Uganda. During the existence of the East Africa Community (1964-1977) there was unrestricted travel between the member countries. Ugandans who wished to travel from Kampala to Busia found it more convenient to board a bus bound for Nairobi and cross the Malaba border East of Tororo town into Kenya rather than go directly to Busia. The passengers would get off in Kenya, from where they would cross back into Busia.

On the Kenyan side motor vehicles could travel up to the border while on the Ugandan side there was a distance up to the town area where motor vehicles were not allowed to operate. It was in this area that the boda boda transport service originated. The travelers to and from Busia offered to be transported to the border by the bicycle riders who called out their message to attract the clients- '*Border Border I will take you to the border*'.

At the same time there emerged a different transport system where bicycles were used to smuggle goods from Uganda through the border to Kenya. Other than cross border business, there also emerged another form of bicycle transport called "*Kenya Runda*" which specifically dealt with maize transport from Uganda through the Busia Border to Mumias, from Kitale to Bungoma – Mumias. It is on this basis that most authors have looked at a bicycle as mode, which transports goods but not passenger. The idea of passenger transport has been adopted and this has spread to other parts of Busia including the study area. In the 1980s owing partially to the collapse of the public transport system,

population growth and the poor state of roads, the boda boda transport has been adopted in Busia District and the surrounding districts.

Along the main corridor (Mumias-Bumala), there are matatus, which ply the route, but people still opt for bicycles. The reason that the users gave as to why they prefer boda boda to any other modes are, the travel time savings offered by bicycles is for much better than matatus which have to wait for passengers to fill before it leaves. On the same basis, there is the issue of perception whereby someone would feel at peace in a moving vehicle no matter how slow it might be than sitting in a vehicle that has to wait for passengers to fill before it leaves. Public transport unreliability makes bicycles competitive especially along the main corridor and feeder roads because of their flexibility, convenience and greater reliability. The operation of boda boda as a public mode of transport has contributed substantially to employment growth and informal industry development (bicycle repairs, fabrication). The bicycles have also played a major role in getting passengers the other public transport services especially buses to the interior of the division (Plate no 4-2). In the division, bicycles are mainly used for travel outside the village such as going to work or for a social visit. They are used to transport them to markets for further sale. They also take goods and passengers to their final destinations both within and without the division. Why do people prefer a particular mode and in this case boda?

There are other modes of transport especially non-motorized as donkey drawn carts. It is not prevalently used as it only accounts for 3% ownership. In most cases, it is used to transport farm produce for farmers who have other pieces of land far from where they

stay. The advantage with carts is that they are able to transport about 500 kilograms of any load.

Plate 4-2 Boda Boda at Bumala Center



CHAPTER 5: BODA BODA WITHIN THE TRANSPORTATION SYSTEM

5-1 OVERVIEW

Transportation needs are met by a combination of modes and routes (section 4-1). The modal structure of a transport system is always influenced by a region's terrain, the structure of its economy and its growth and development (World Bank, 1972). Factors such as basic supply and demand for goods and travel are significant in determining mix of transport modes in the network. Within any transport system, modes complement and compete with each other. The complementary aspects include movement of people and goods from points of origin to final destination. For example, bicycles get passengers from the hinterland to the main corridors and in turn, they take matatus or buses to their final destinations. In addition, complementarity arises because land uses are not located in one space. For instance markets, social places, work places and farms are sited in different places and as such require different modes of transport to get people to their final destination. On the other hand, modes compete with each other due to services they offer, their frequency, convenience, reliability and connectivity (point to point services).

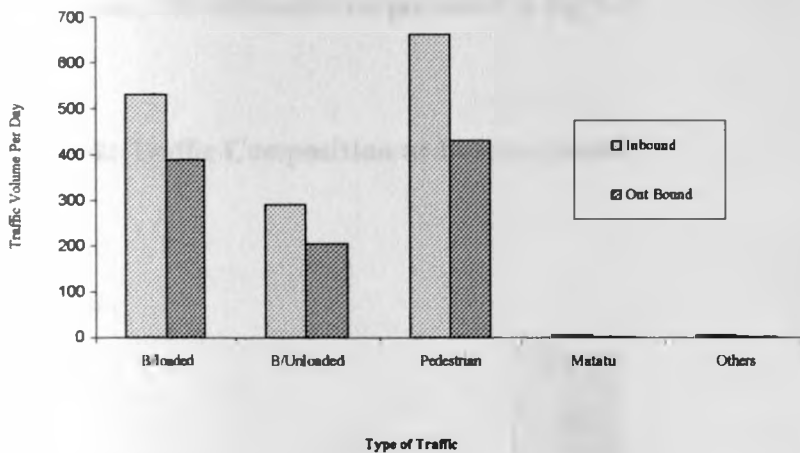
5-2 TRAFFIC COMPOSITION

In order to determine the viability of boda boda as a mode of transport in relation to prevalent modes of transport, a traffic count was conducted at four major centers (Bumala A, Murumba, Butula and Buhuyi). These centers link the hinterland to the corridor. The count was conducted on different days and at different times of the day as it was indicated in section 1-8.2.

5-2.1 Traffic Composition at Bumala Market

A traffic count was conducted on a Saturday, which is always a market day. Strategic points were picked to capture all in bound and out bound modes. Fig 5-1 shows traffic composition at Bumala.

Fig 5-1: Traffic Composition at Bumala Center



Source: Field Survey 2000

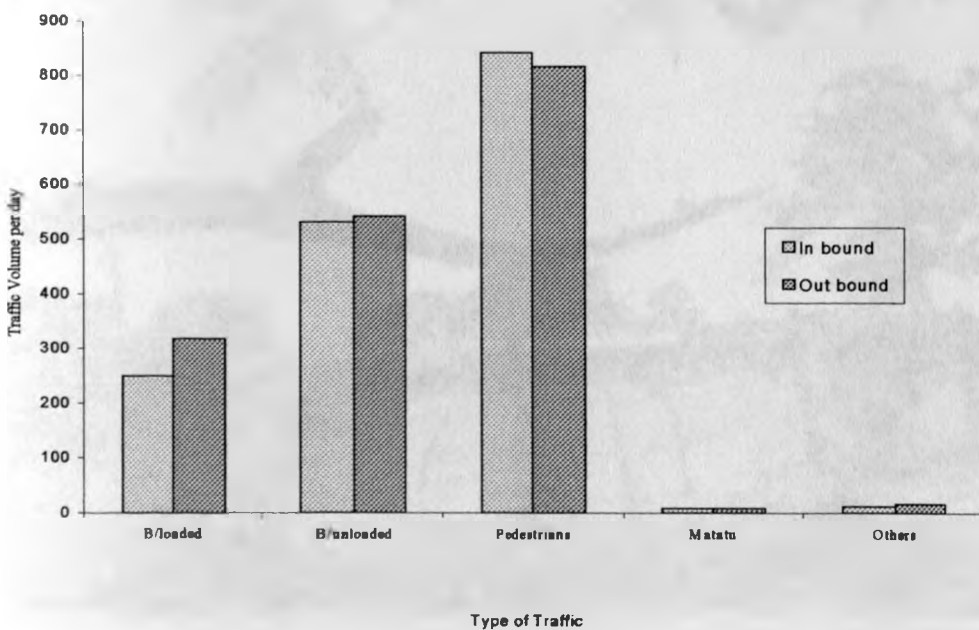
The consequent results obtained at this center show that the bicycles exceeded the number of pedestrians and other. The bicycles recorded the highest percentage (56%) followed by walking (42%) while other modes only accounted for 2%. From Fig 5-1, it is evident that the loaded bicycles were more than the unloaded bicycles. This means that the majority of the people use the bicycles for daily travel especially going to the market.

The high intensity of their movement is explained by the fact that on market days, traders contract the operators to transport their merchandise to the market.

5-2.2 Traffic Composition at Butula Center

The cordon point for this center was located at Butula – Lugulu Junction (Plate No 5-2). This junction caters for traffic from Lugulu (feeder road) and along the main corridor. As it was indicated in section 1-8.2, the count was conducted between 6.30 a.m.–8.30 a.m, 11 a.m and 4.30 – 6.30 p.m. Butula turns out to be a unique center as the periodic market on Sunday starts at 6.30 a.m. This also coincides with a church service, which starts at the same time. The information is presented in Fig 5-2.

Fig 5-2: Traffic Composition at Butula Centre



Source: Field Survey 2000

From the study, the results indicate that walking commanded the highest percentage (50%), bicycles accounted for 49%, while the other modes accounted for only 1 %. Butula center has unique characteristics because the bicycles, which were unloaded, were more than the loaded bicycles. The reason is that many households go to church using their private bicycles. These were mostly people from the neighbouring villages such as Bulwani, Tingolo, Bulemia, which is within a radius of 3 kilometers. The number of pedestrians exceeded the number of bicycles and the reason behind is that most people walk to church regardless of the distance. Therefore, it can be concluded that most households use their bicycles for social trips such as going to church. As it will be seen later, private bicycles are used over a short distance (below 3km).

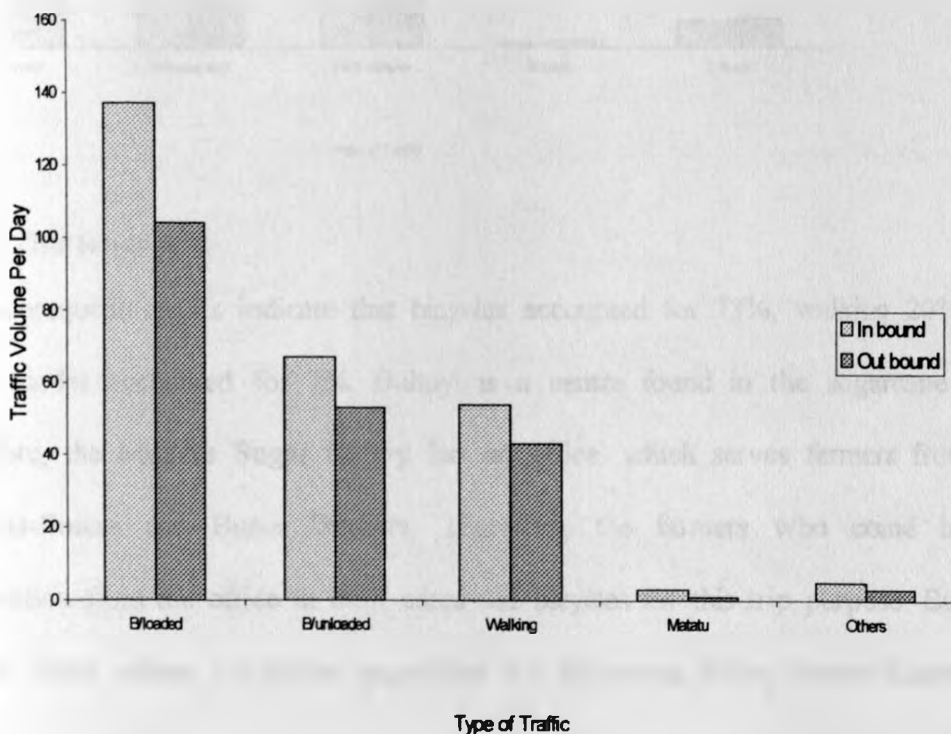
Plate 5-1: Butula Centre/Junction



5-2.3. Traffic Composition at Murumba Market

The cordon point for this center was along the main corridor. The results show that bicycles commanded the highest percentage 76%, walking 21% while other modes accounted for 3%. Bicycles mainly operate along the main corridor and Murumba acts as an origin and destination center. As much as it is also a junction to Nambale, the traffic volume of bicycles is very low along the Murumba-Nambale Route. It mostly caters for traffic from Butula and Bumala 'A'. Murumba is one of the few centres in the division with an established health center so most people make trips to seek medical attention. As it was indicated in table 4-3, the bicycle is the most preferred mode when going to hospital. Modal split at Murumba Center is presented in Fig 5-3.

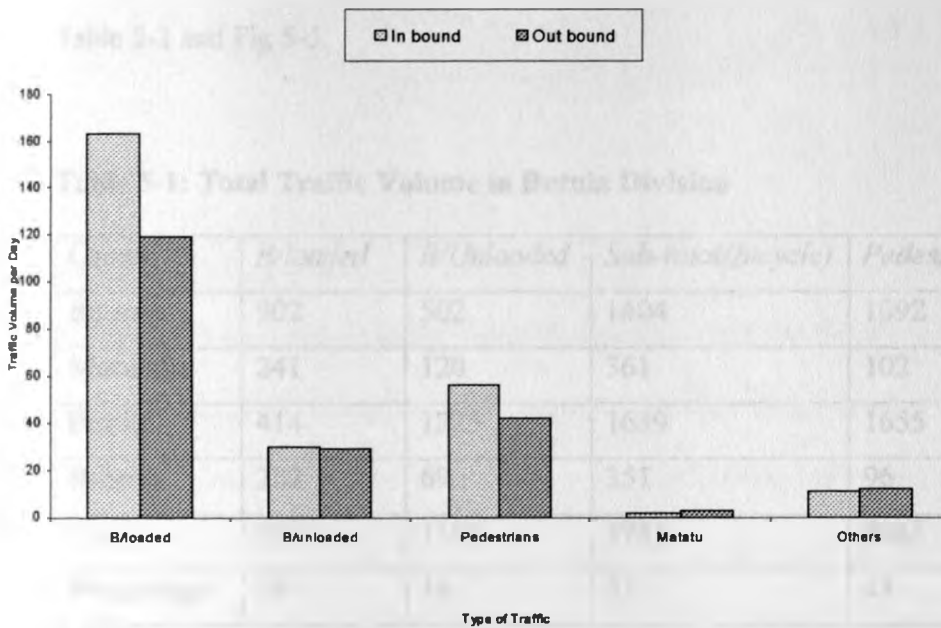
Fig 5-3 Traffic Composition at Murumba Center



5-2.4 Traffic Composition at Buhuyi

The cordon point was located at the main junction (Nambale-Mumias junction). This was meant to capture traffic from both directions that were leading to Buhuyi centre.

Fig 5-4 Traffic Composition at Buhuyi



Source: Field Survey 2000

The subsequent results indicate that bicycles accounted for 73%, walking 20% while other modes accounted for 7%. Buhuyi is a centre found in the sugarcane zones, therefore, the Mumias Sugar factory has an office, which serves farmers from both Mumias-Butere and Busia Districts. Therefore, the farmers who come to seek information from the office in most cases use bicycles for this trip purpose. Buhuyi is also a center whose catchment population are Bungoma, Siaya, Butere-Mumias and

Busia Districts. This implies that a lot of business is transacted at center and the mode that people prefer is the bicycle as it is convenient and fast.

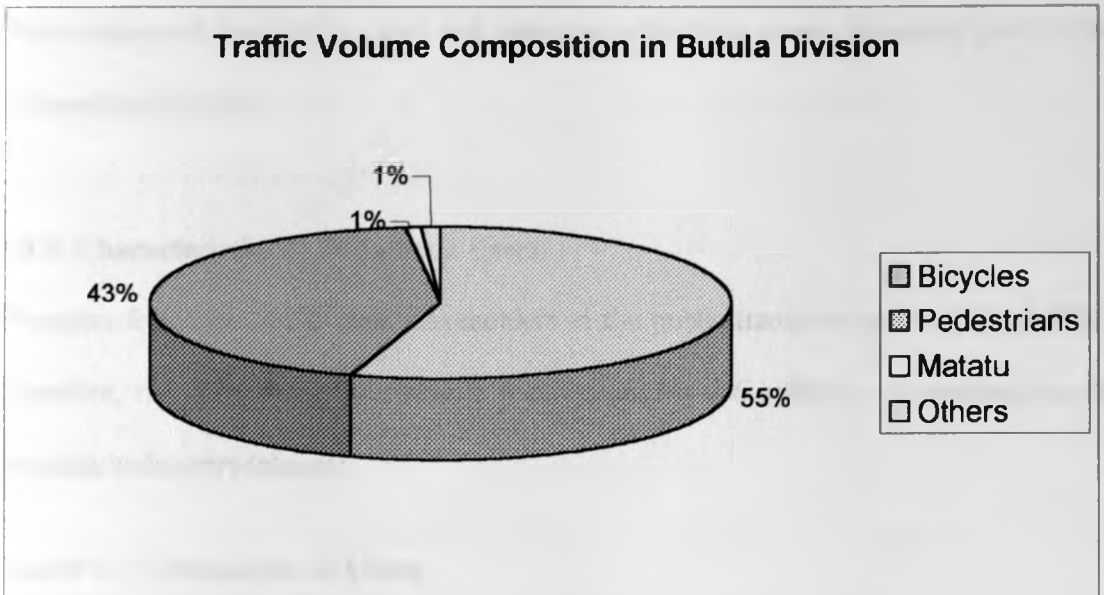
5-2.5 Total Traffic Composition at Butula Division

Traffic Composition from all the four centers was condensed together and the results show that bicycles commanded the highest percentage (55%), followed by walking (43%), matatus and other modes accounted for only 2%. This information is presented in Table 5-1 and Fig 5-5.

Table 5-1: Total Traffic Volume in Butula Division

<i>Center</i>	<i>B/loaded</i>	<i>B/Unloaded</i>	<i>Sub-total(Bicycle)</i>	<i>Pedestrian</i>	<i>Matatu</i>	<i>Others</i>
Bumala	902	502	1404	1092	16	33
Murumba	241	120	361	102	4	8
Butula	414	1225	1639	1655	16	27
Buhuyi	282	69	351	96	5	24
Total	2650	1105	3755	2945	41	92
Percentage	39	16	55	43	1	1

* *B-Bicycle*

Fig 5-5: Total Traffic Composition in Butula division

Source: Field Survey 2000

The findings obtained from the study clearly show that the bicycle is the most prevalent mode of transport along the main corridor and the feeder roads. Walking is also an important mode, which should not be overlooked. Motorized modes ranked the lowest. This is a direct opposite of what has been advocated over the last 30 years that the construction of roads will definitely lead to a greater use of motorized vehicles. However, the situation on the ground shows that NMVs in rural areas are the most prevalent modes

5-3. CHARACTERISTICS OF BODA BODA USERS AND OPERATORS

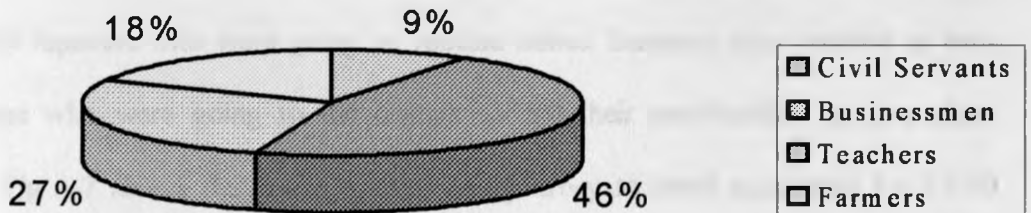
The most important factors that determine modal choice are socio-economic and transportation parameters. From the study, these factors include employment and income levels of the households and frequency, reliability, comfort, cost, speed and convenience of a mode.

The element of heavy bicycle traffic volume raises a concern as to what has promoted the use of the bicycles in the study area. Therefore, it is important to examine the characteristics of boda boda users and operators who form a very important part in the transportation system.

5-3.1. Characteristics of Boda boda Users

The users form one of the main stakeholders in the public transport system (Figure 2-3). Therefore, this group that the research focused on. Fig 5-6 indicates the occupations of the boda boda users (clients).

Figure 5-6: Occupation of Users



Source: Field Survey 2000

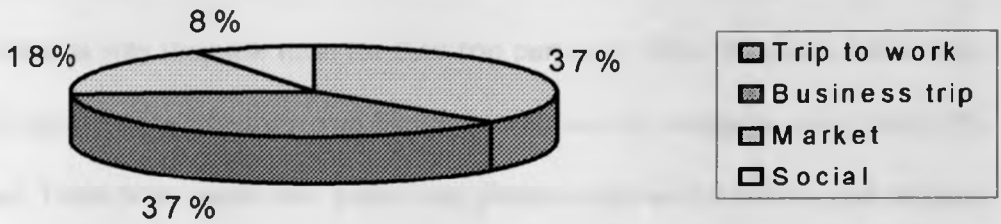
Information got from the respondents revealed users from different occupation and income levels use boda boda for their trip purposes. It was established that 46% are businesspersons including jua kali artisans, 9% civil Servants, 18% farmers and 27% teachers. In relation to table 4-2 and 4-3, it is clear that boda boda users fall into different

income levels. Income levels determine the choice of a mode but in the division, users from different occupations and different income levels use boda boda. The reasons that the users gave as to why they use boda boda are reliability, convenience, comfortability and frequency. It was found out that some of the teachers and businesspersons have contracted the operators to be picking them in the morning and drop them back to their homes in the evening. For the businessmen, boda boda picks their goods and delivers them on a market and in the evening they get the goods back to the businessman's home.

5-3.2. Purpose of Trips

The focus of transportation planning has always been based on journey to work. In the past, this trip typically involved daily movement from home to work. The scenario in Butula is different. Trip purposes were classified and grouped in four categories; trip to work – this refers to teachers, medical staff and Jua Kali artisans like barbers, carpenters and bicycle repairers who were going on routine duties. Business trips referred to men and women who were going to the centers to sell their merchandise or open their business. Fig 5-7 shows that business trips and journey to work accounted for 37 % respectively while trips to market and social functions accounted for 18% and 8% respectively.

Fig 5-7: Purposes of the Trip

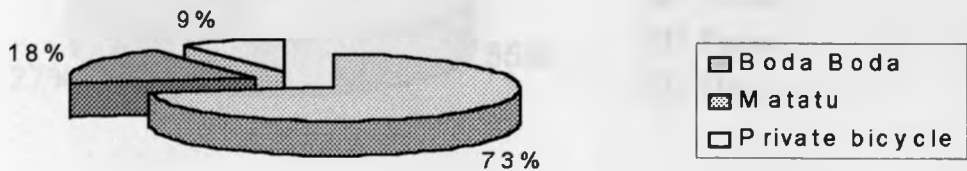


Source: Field Survey 2000

5-3.3. Modes Used for different trip purposes

Transportation needs are met by a combination of modes and routes. Therefore, modes are very important in meeting different transport needs in the region. Figure 5-8 summarizes modes used by users in satisfying their transport demands/needs, which are outlined in Section 5-3.2. and Figure 5-7.

Figure 5-8: Modes Used for Different Trip Purposes



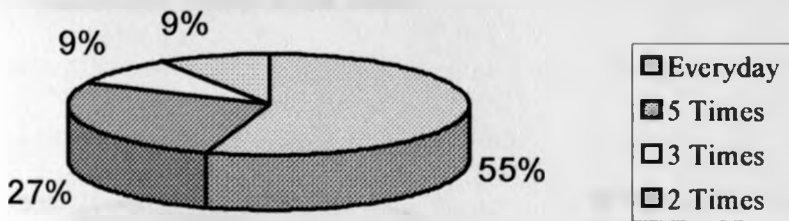
Source: Field Survey, 2000

From the total traffic volume in the division, it is clear that the bicycle commanded the highest percentage. Therefore, if the results are compared with the analysis in Fig 5-8, it is evident that the most prevalent mode of transport in the division is boda boda. Majority of the users (73%) affirmatively asserted that boda boda offer a very important transport service and that is why they use them for their trip purposes. Other than boda boda other users (18%) preferred to use their own bicycles to cut on the transport costs, while 9% use matatus. These were users who make long distance trips and therefore find matatus more convenient and fast.

5-3.4. Frequency of the Trips

The analysis so far explains why people prefer bicycles to other modes of transport. Reliability and frequency of a mode determine trip-making behaviors of the commuter.

Fig 5-9: Frequency of the Trips



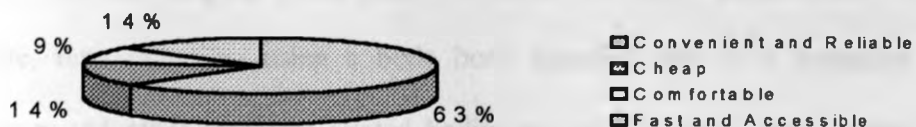
Source: Field Survey

From the field findings, 54 per cent of the boda boda users travel everyday. This is an indication of the type of occupation that they are engaged in (Fig 5-6). The businessmen were found to be traveling everyday either to sell their merchandise, or buy goods from the wholesales and take them to their retail shops in the interior of the division. Results show that 27% make five trips in a week; these were found to be teachers and civil servants who work for 5 days in a week. Those who make three trips in a week (9%) were found to be farmers who take their farm produce to the market and also get farm inputs from these markets. This implies that majority of the users prefer boda boda for daily travel. As such, boda boda operation offers a very important service that cannot be viably provided by other modes of transport.

5-3.5. Reasons Why Users Prefer Boda Boda

In any transport system, it is very important to refer to both time and income because they determine modal choice. Modal choice results from the following elements: price, in-vehicle time, frequency, reliability and comfort. This being the scenario, then why do users prefer boda boda to other modes?

Fig 5-10: Reasons for Using Boda Boda



Source: Field Survey 2000

The study revealed that 63% of the users prefer boda boda because they are reliable and convenient. Reliability is important in that one is assured of a boda boda at any time of the day (between 6.30 a.m. to 7.30 p.m.). While convenience means that other than getting a boda boda, they will drop you at the doorstep regardless of the route being a feeder or a minor road. A further analysis show that 14 per cent of the users considered boda boda to be cheap especially along the feeder roads where matatus cannot access. At the same time 9 per cent said that boda boda are comfortable because they are fitted with a padded cushion over the rear rack in order for the passenger to travel more comfortably. Waiting time was cited as an important factor for using boda boda. For the civil servants and teachers who have to travel to and from place of employment, the economic benefit of using a boda boda is saving in time rather than wasting it on walking or waiting for a bus or a matatu. An interview with a teacher revealed that he takes a maximum of 45 minutes for a distance of 10 km when he uses a boda boda while for the same distance he takes about 2 hours on foot or if he has to wait for a matatu. This confirms the information, which was got from other respondents who said that the mean waiting time of a boda boda is less than ten minutes at the terminal point. The matatus on the other hand take 1 to 2 hours at an embarkation point in order to get the required passengers while boda boda have an added advantage of carrying only one passenger. For this case, boda boda do not stop at every stage but takes one upto his/her final destination. Therefore, time saved by using a boda boda justifies why it is important for the government and other transport related bodies to invest in boda boda operation as an alternative mode of transport in the rural areas.

5-3.6 Gender and Transportation

In the literature review, one of the major gaps that was identified was inadequate attention to gender needs in rural transport (section 2-7.4). Information from the household survey indicates that women bear a burden of transportation especially short distance trips. Table 5-2 summarizes the activities that women and men are engaged in and modes of transport used.

Table 5-2: Percentage of Male and Female activities

<i>Gender</i>	<i>River</i>	<i>Firewood</i>	<i>School</i>	<i>Hospital</i>	<i>Market</i>	<i>Farm</i>
Male	7	6	70	33	44	48
Female	93	94	30	67	56	52
Total	100	100	100	100	100	100

Source: Field Survey, 2000

According to table 5.2, it is clear that 65% of women are engaged in daily travel like fetching water, collecting firewood, going to hospital, market and farm while male's daily travel only accounts for 35%. On the same basis, the mode used for various purposes by women is walking. This contradicts the issue of ownership of modes where at least 58% of the households own bicycles. Culturally, the male members of the household who use them on areas outside the village monopolize bicycle ownership and use. Consequently, women are forced to carry out basic duties over long distances without any kind of assistance (Table 4-1 and Plate 5-2).

A further analysis indicates that apart from daily transportation chores by women, it was found out that women are engaged in other activities out of the home (off-farm activities). From the user's questionnaire, it was revealed that 77% of boda boda users

were women while 23% were men users. Women users who were interviewed said that they were engaged in businesses like selling fish, maize, fruits, vegetables, second hand clothes, among others (Plate 5-2).

An interview with the operators revealed that women formed the highest percentage (48%) of the regular customers. The cyclist further asserted that the businesswomen always contract them to pick goods in the morning and drop them at the woman's home in the evening. This is in agreement with the issue of bicycle ownership where men are the regular users of the bicycle while women either walk or board a boda boda. In the division, women are allowed to ride bicycles. However, an interview with women revealed that they are not accessible to bicycles as most of the time they are ridden by the male members in the family. Furthermore the bicycles are not female friendly because of the long bar.

Plate 5-2: Women Selling Fruits at Bumala Center



Plate 5-3: Bicycle Accessing a Narrow Path



5-4. CHARACTERISTICS OF BODA BODA OPERATORS

In any transportation system, operators play a vital role as he provides capital for the construction of a transportation mode and for its satisfactory operation (section 2-1).

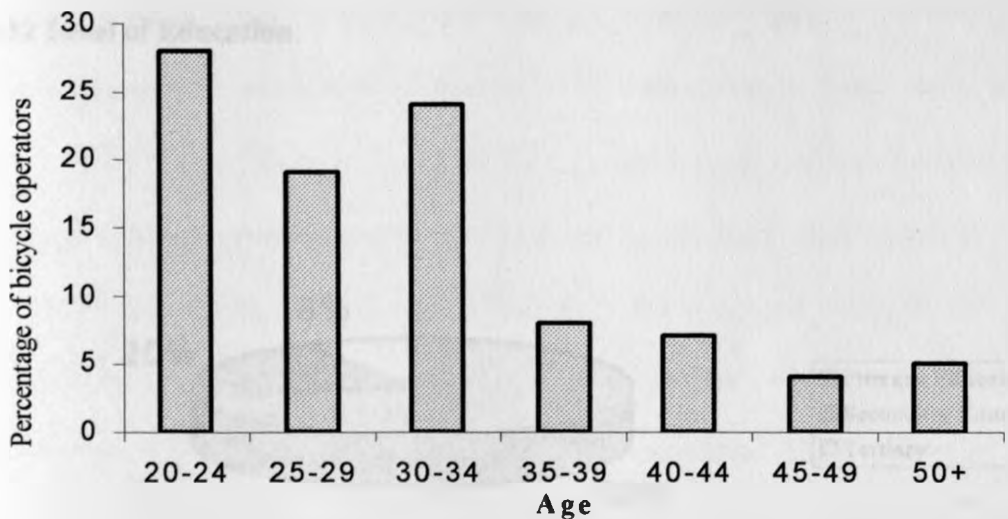
5-4.1 Sex, Age and Level of Education

Field Survey findings revealed that 100% of boda boda operators are men. This is because cycling requires a lot of energy and strength. There are no female riders although boda boda services are intensively by women. It should be noted that unlike other areas, in Busia District women are not culturally or socially prohibited from riding a bicycle, but the community especially male passengers may not be comfortable with female

cyclists, as they are believed to be weak and unsteady. In addition, bicycles have been designed in such a way that they favour male cyclists than their female counterparts.

Boda boda operators are dominated by young men whose ages range from 20-50 year with an average of 30 years. According to figure 5-11, majority of the operators (28%) fall in the age bracket of 20-24 years, followed by 30-34 years (24%) and the least are those who fall in 45-49 years age brackets. This is a very important indicator as it shows that the active age group is being absorbed in the operation of boda boda. Therefore, planning should intervene to ensure that the operation remains sustainable.

Fig 5-11: Ages of Bicycle Operators



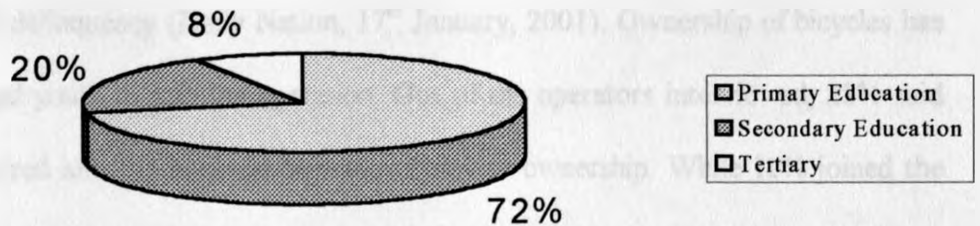
Source: Field Survey, 2000

The educational levels of the operators vary. The dominant type of education received by the operators is primary level. However, as unemployment has eaten into the educated youth, secondary and even tertiary education leavers are getting an increasing proportion.

It was established from the field that 72 percent of the operators have attained primary education, 20% secondary education while 8% have been trained in different professions. This implies that people who are the semi-skilled (considering their level of education) flood the job market every year to look for employment. Boda boda operation at this level has become handy as it absorbs many youths that are leaving school.

Nevertheless, caution should be taken to ensure that children don't drop out of school to join the operation. As it was indicated earlier, AIDS as disease has wiped out many families and due to poverty levels in the division the youths have no option but drop out of school to join the operation. Level of education has a direct linkage as to the reasons why operators ventured into the business.

Fig 5-12 Level of Education

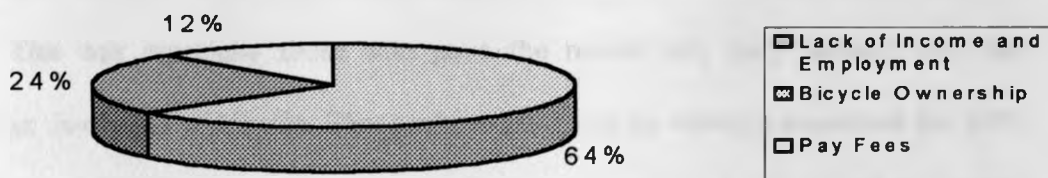


Source: Field Survey, 2000

5-4.2.Reasons for Venturing into the Business

The operators gave reasons the following reasons as to why they joined the business. The reasons are summarised below.

Fig 5-13: Reasons for Venturing into the Business



Source: Field Survey 2000

Field survey indicates that 64 percent of the operators joined the operation due to lack of alternative employment and source of income. As it was discussed earlier, Busia as a district is starved of industries and plagued with unemployment, the boda boda is fast becoming an informal business that is attracting idle youths who would otherwise fall into crime and delinquency (Daily Nation, 17th January, 2001). Ownership of bicycles has also encouraged youth to join the operation. Out of the operators interviewed, 28% said that they ventured into the business because of bicycle ownership. While 12% joined the operation so that whatever income earn, would enable them to pay their own school fees and for their brothers and sisters as their parents had died of AIDS.

Note: Busia district has been the most hard hit by the AIDS epidemic and as such so many orphans have been left behind to fend for themselves.

5-4.3 Bicycle Ownership

There were a number of operators who owned bicycles were more than the non-owners. Out of all operators interviewed, 87 percent owned bicycles while 13 percent did not own. For those who own bicycles, 54% purchased the bicycles from personal savings, 32% from farm produce 7% from hire purchase and 7% were given by their employers. On the other hand, 60% of non-owner operators said that the bicycles belong to their parents. This was especially those who gave the reason why they ventured into the business as ownership of bicycle. Those who were given by relatives accounted for 20% while 20% had hired the bicycle. Other than ownership, operators were asked how many bicycles they owned 74% had one bicycle, 15% two bicycles while 11% had three bicycles. The operators who own more than one use them for different purposes. For instance, out of the operators interviewed, 50% were found to be using one of the bicycles for transportation (boda boda), 23% for meeting domestic needs, 12 % for hiring out, while 15 % said that one of the bicycles was used for personal tours and travels.

For the non-owner operators, 60% said that they were given by their parents. These were either young men who fell in 20-24 years bracket and were still students or polytechnic trainees who were on vacation. Others engaged into the business to supplement what their parents give them as pocket money.

Table 5-3: Bicycle Ownership

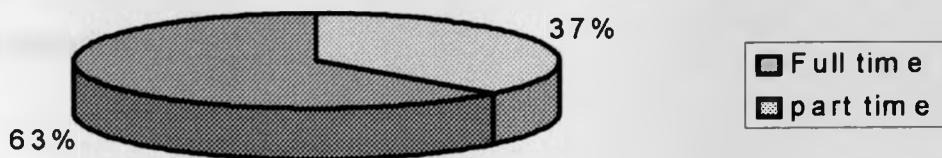
<i>Ownership</i>	<i>Percentage</i>	<i>Method of Acquisition</i>	<i>Percentage</i>
Owner-operator	87	Personal Savings	54
		Farm Produce	33
		Hire purchase	7
		Employer's gift	8
Total	87		100
Non-owner	13	Given by parents	60
		Given by relatives	20
		Hired	20
Total	100		1000

Source: Field Survey, 2000

5-4.4. Operation

The operators were found to be operating on full time basis while others were on part time. Information in Figure 5-14, indicate that 63% were operating on full time. They cited the reasons as being lack of employment especially after they completed school. They considered boda boda as a form of employment and profession. While 37% who operated on part time were found to be involved in other businesses. Fig 5-14 presents the type of operation that operators are involved in.

Fig 5-14: Type of Operation

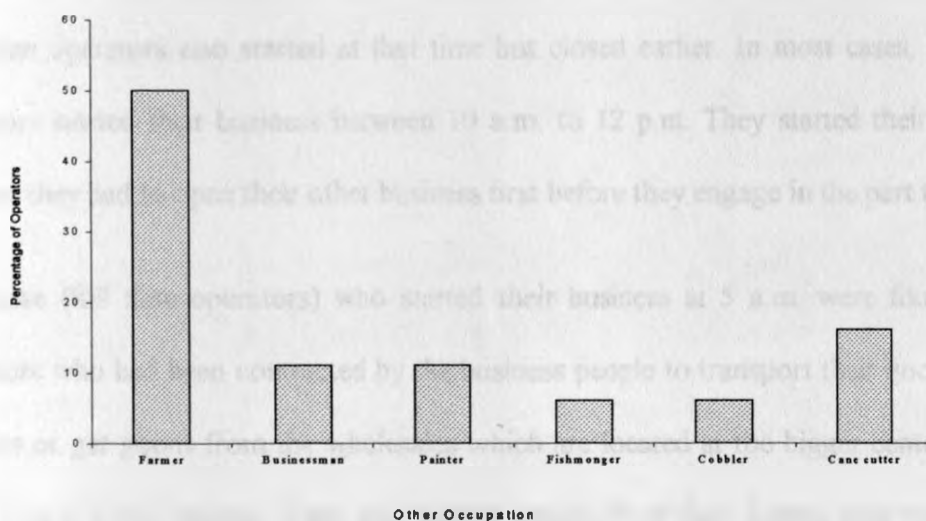


Source: Field survey 2000

5-4.5. Operators' Other Occupations

The operators who were operating on part time had other occupations such as farming, painting and other businesses. Fig 5-15 shows the other occupation of bicycle operators.

Fig 5-15 Operators' Other Occupation



According to Fig 5-15, 50% were involved in farming activities, 11% in business, 11% were painters, 6% fishmonger, 6% shoe repairers and 26% were cane cutters. This explains why some of the operators operate on part time basis. It is also important to understand why they operate on part time as this also explains the time they start and close their operation.

5-4.6. Time of Starting and Closing Business

Time of starting and closing the operation is determined by the other occupations that the operators are engaged in. From Figure 5-14, 63% of the operators operate on full time while 37% are part time operators. This further explains why starting and closing of the operation varies. The operators start their business at 5 a.m. and close at 11 p.m.

From the field survey, it was found out that 47% start their operation between 5-6.30 a.m., 32% between 6.30 – 7.30 a.m., 6% between 7.31-8.30 a.m. The operators who start their business between 5-7.30 a.m. were found to be operating on full time basis but even part time operators also started at that time but closed earlier. In most cases, part-time operators started their business between 10 a.m. to 12 p.m. They started their business because they had to open their other business first before they engage in the part time job.

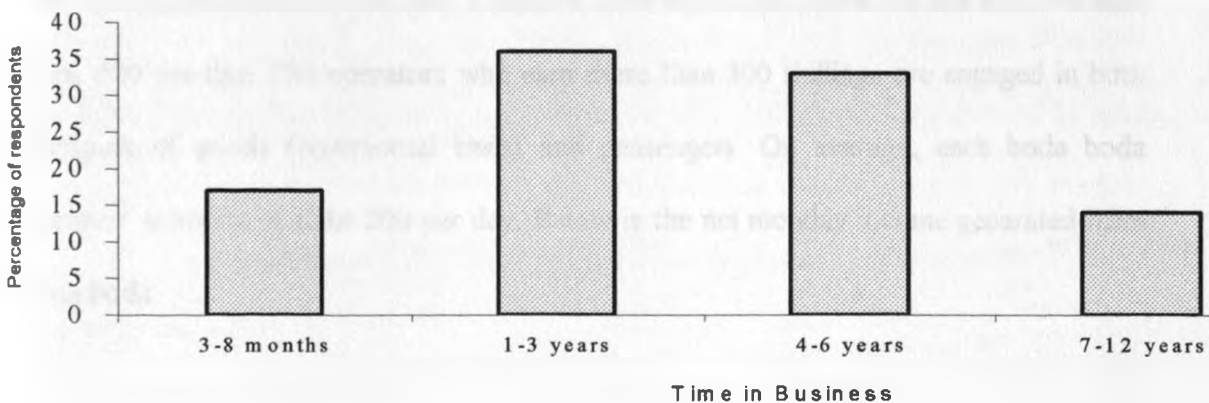
For those (full time operators) who started their business at 5 a.m. were found to be operators who had been contracted by the business people to transport their goods to the markets or get goods from the wholesales which are located at the bigger centers to the small shops in the interior. They also picked people from their homes who make prior arrangements and are traveling outside the division. The operators who closed their

businesses earlier were found to be part time operators, 6% close between 3-4.30 p.m. while full time operators wait for customers to as late as 11.30 p.m. especially during holidays. Nevertheless, during this time, customers are charged exorbitant fares because the operators have to ensure security of the passengers by taking them upto their destinations.

5-4.7. Duration in Business

The period in business range from three months to 12 years. Out of operators interviewed, 17% said that they have been in operation for 8 or fewer months, 36% between 1-3 years, 33% between 4-6 years and 14% between 7-12 years. The operators who have been in the business for long fall under the age bracket of between 31-50 years. The operators were asked whether they had previous occupation, 76% said that they have never been employed, 10% have their own occupation while 16% were previously employed in different forms but were either sacked or abandoned their jobs due to poor pay. Fig 5-16 presents duration in the operation.

Fig 5-16: Duration in the Operation



In conclusion, it can be deduced that operations of boda boda has a greater potential of absorbing many youths in the division that are not employed. Boda boda play a vital in providing for transport services that are not being offered by other modes of transport in the area and this clearly explains why users from different occupations and different income levels approve of it. For this case planning should take the central part in ensuring that the mode is sustainable and available to the majority of the population in the rural areas.

5-4.8 Employment and Income

According to the World Bank (1989), rapid population growth is causing an acute employment problem especially amongst the youth. Therefore, the creation of jobs for the rapidly expanding labour force can be a positive trend. Boda boda as an industry has the potential of absorbing the ever-growing population.

5-4.8.1. Operators' Daily Earnings

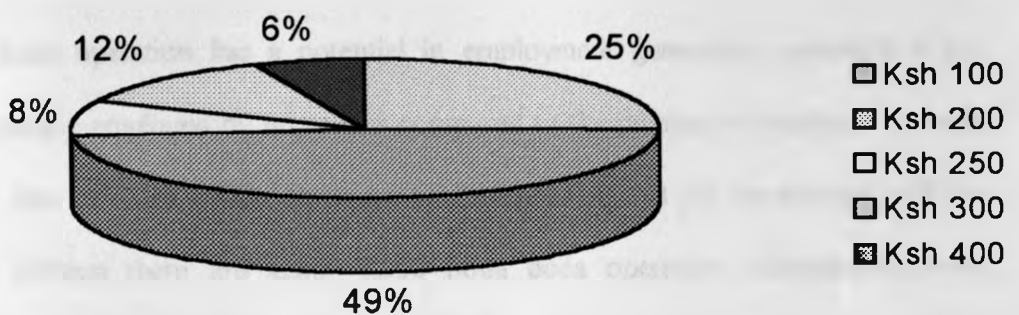
One of the objectives was to find out whether boda boda operation has a potential in income generation and employment. From Fig 5-17, 25 % of the operators earn Kshs 100, 48% earn Kshs 200, 9% earn Kshs 250, 12% earn Kshs 300 while the least 6% earn Kshs 400 per day. The operators who earn more than 300 shillings are engaged in both transport of goods (contractual basis) and passengers. On average, each boda boda operator earns about Kshs 200 per day. Below is the net monthly income generated from boda boda.

Average Monthly income (200x24) = 4800

Average monthly maintenance cost = 200

Net monthly income 4600

Fig 5-17: The Operators' Daily Earnings.



Source Field Survey

As it was indicated above and as concerns the operators other occupation, it was found out that 50% were farmers. Therefore, comparing income earned from farming and from boda boda operation, the conclusion that can be drawn is that boda boda operators earn more than their counterparts who are farmers. An interview with the operators indicated that they preferred the operation to any other occupation because they are assured of daily income. However, it was established that the operators lack accounting and book keeping skills and as such they cannot be able to account for the money that they make and how they have spend it.

5-4.8.2. Employment

One of the major problems facing Kenya today is high rate of unemployment in both rural and urban areas. The situation has been made even worse with the current retrenchment, which has affected many people. In the division, many people have resorted to boda boda operation as a source of livelihood. Currently, the operation is really picking up and as such giving a stiff competition to the other public transport vehicles like matatus.

The boda boda operation has a potential in employment generation especially if the number of people employed by matatus is compared to the number of employed by boda boda. As it was indicated earlier, there are only 10 matatus that ply the corridor while in the whole division there are about 1,350 boda boda operators. Information about employment by each mode is presented in Table 5-4.

Table 5-4: Level of Employment by Mode

<i>Employees</i>	<i>Level of Employment by type of Operator</i>	
	Matatu	Boda boda
Drivers/operators	10	1200
Conductors	10	-
Agents	6	-
Total	26	1200

Source: Field Survey, 2000

The results from the table indicate that boda boda has employed more people as compared to matatus that have different types of employees but has on average only

employed 26 people. Therefore, it can be said that if boda boda operation is recognized as a sub-sector in the overall transport planning, it will be able to absorb even more youths.

The operation also offers indirect employment especially for bicycle repairers, dealers of spareparts, the hotel and kiosk owners. Bicycle repairers are found all over the division – at the junctions, local and market centres. Table 5-5 shows the number of repairers per centre/junction.

Table 5-5: Number of Bicycle Repairers

<i>Center/ Junction</i>	<i>Number of Repairers</i>
Bumala	20
Ikonzo Junction	3
Murumba	7
Butula	3
Bulwani	1
Buhuyi	16
Total	50

Source: Field Survey, 2000

There are about 50 people who are employed as bicycle repairers. At the same time, there are repairers who have employed assistants; this was found to be a common practice at Bumala center.

In order to establish how much income the boda boda repairers make in month, a sample of bicycle repairers was interviewed at the junctions and centers. Most of the operators

said that they make on average Kshs 250 per day. Below is a monthly net income for the bicycle repairers.

Average monthly income (Ksh. 250x24 days)	=Ksh. 6000
Assistants salary (Ksh.50x24 days)	= Ksh.1200
Miscellaneous	= Khs. 800
Net monthly income	= Khs. 4000

This is also a good indicator that if boda boda operation is well managed and organized, it has even a much bigger potential of employing more people. However, in order to ensure the sustainability of the operation, the stakeholders should undergo some basic training in bookkeeping and micro-enterprises.

5-5 Corridor and Hinterland Characteristics

The main corridor forms the basis of this study (section 1.8). Therefore it is important to understand and also to assess the salient factors that guide the operations of boda boda along the main corridor and along the feeder roads.

5-5.1 Nodes of Operation

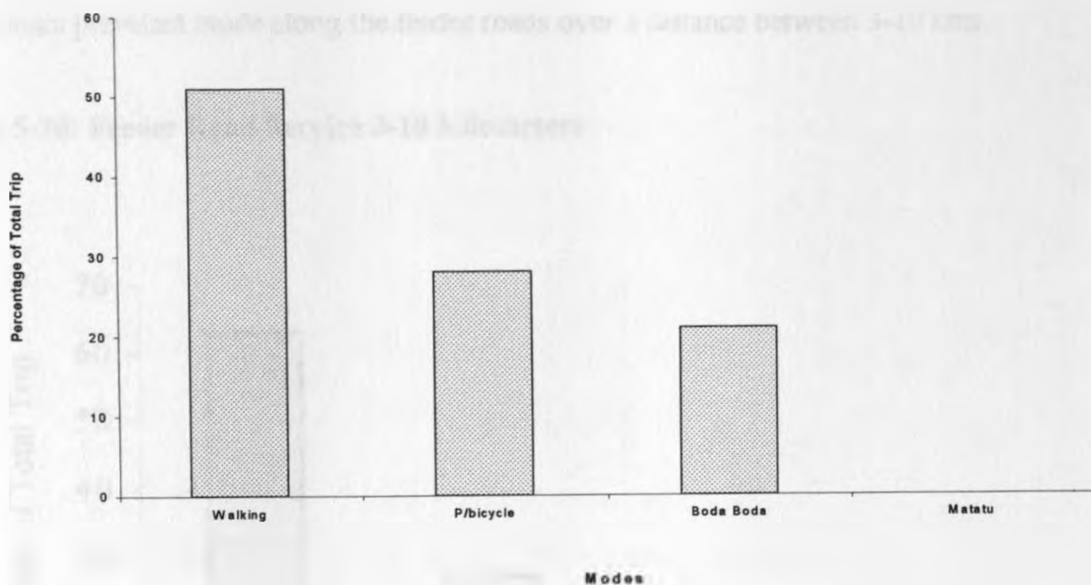
The nodes of operation for boda boda operators were found to be at the junctions and the market centers. These are nodal points that serve as origins and destinations. Fig 5-18 shows the nodes of operation for boda boda operators.

Fig 5-18: Nodes of Operation

Source: Field survey, 2000

The operators' main nodes of operation are the trade centers found along the main corridor. They are at the same time transport junctions (Plate No 5-1). A good example is Butula, which is a center along the corridor, and at the same time it is a junction to Nambale. The two (junctions and centers) attract traffic from the interior to the corridor and vice versa. The origins of both the operators and the users of boda boda were found to be at the centers along the corridor while their destinations were either along the corridor, hinterland or even beyond the division.

There is a close linkage between the corridor and the hinterland and it was found out that boda boda filter traffic into and out of the hinterland to the main corridor. In order to assess the linkage, a thorough analysis was carried out to establish which are the most prevalent modes along the main corridor and feeder routes over specified distances.

Fig 5-19: Trip Making 0-3 Km

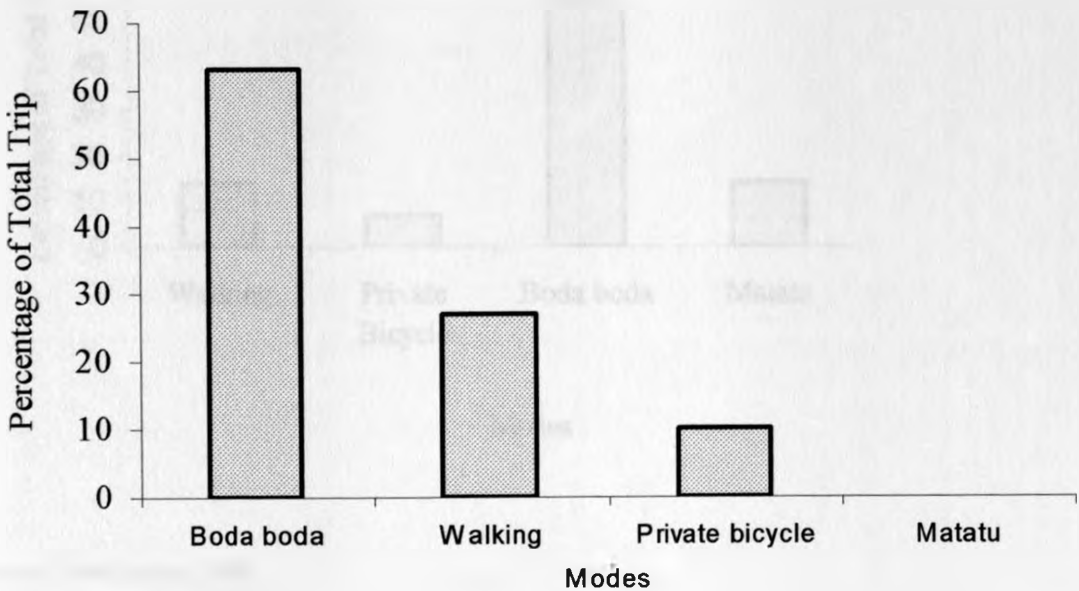
Source: Field Survey, 2000

According Figure 5-19, it is clear that walking commands the highest percentage (51%), 28% use a private bicycle while 21% use boda boda. The reasons why walking is the highest can be related to (table 4- 1) in that people travel to different places for different trip purposes but in most cases, they were found to be within a radius of 3 kilometers (farm, river, firewood, market). A survey with the households shows that most of them use their private bicycles for short distances because it is not strenuous. Those who use boda boda for shorter distances (that is below 3 kilometers) were found to be businesswomen and men who hire boda boda to take their merchandise to the market

5-5.2 Feeder Road Service 3-10 Kilometers

The feeder roads or the off-corridor roads were found to be the main channels of transport between the centers along the main corridor and the hinterland. Fig 5-20 shows the main prevalent mode along the feeder roads over a distance between 3-10 kms.

Fig 5-20: Feeder Road Service 3-10 Kilometers



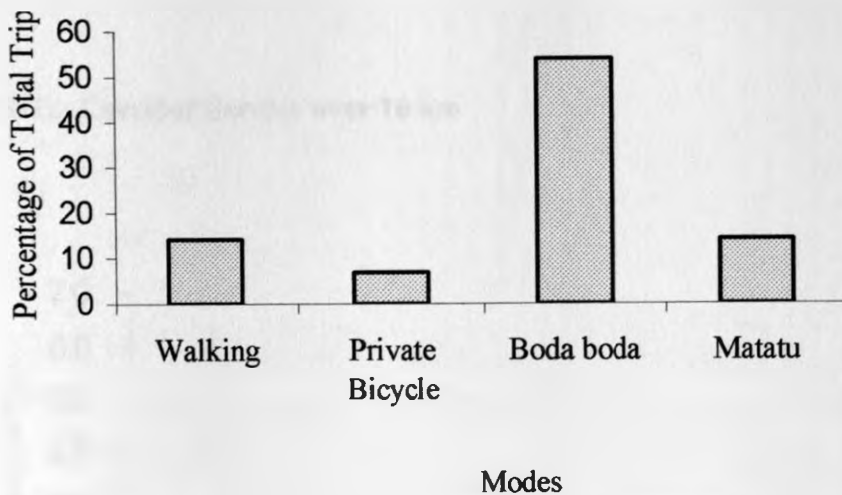
Source: Field Survey, 2000

Boda boda taxis play a very important role in the provision of transport services along the feeder roads. It was found that 63% of the boda boda operate along the off-corridor routes (feeder roads) where motorized vehicles cannot reach. These taxis use even narrow paths and tracks to get traffic to the main corridor and vice versa (Fig 5-24). As such the boda boda offer supplementary services to other modes of transport including the matatus, which were initially supposed to offer public transport services in the rural areas.

5-5.3. Corridor Service 3-10 Km

It was established from the field survey that boda boda offer complementary services to the other modes of transport especially the matatus. Fig 5-21 presents the prevalent modes along the main corridor between 3-10 kms.

Fig 5-21: Corridor Service between 3-10 kilometers



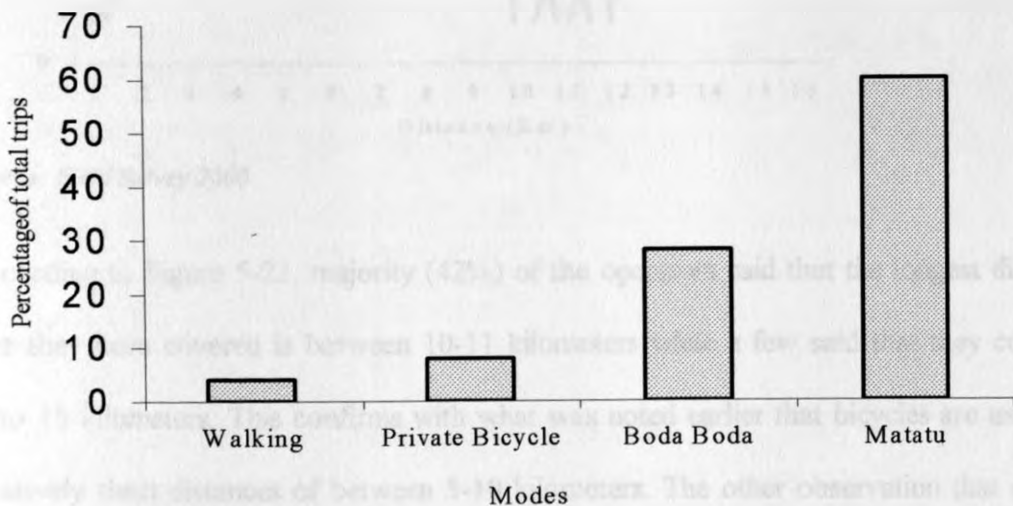
Source: Field survey, 2000

From the figure 5-21, it is evident that boda boda taxis compete with matatus even on the main corridor because 54% of boda boda were found operating in parallel with matatus for a distance upto 10 kilometers depending on circumstances. As it will be shown later, boda boda normally operate upto 10 km. But still, from the study, it was established that they operate beyond a distance of 10 km. This happens along the main corridor and even on the feeder roads leading into the interior particularly for transportation of passengers and goods from origin and destination directly.

5-5.4. Corridor Services Over 10 Kilometers

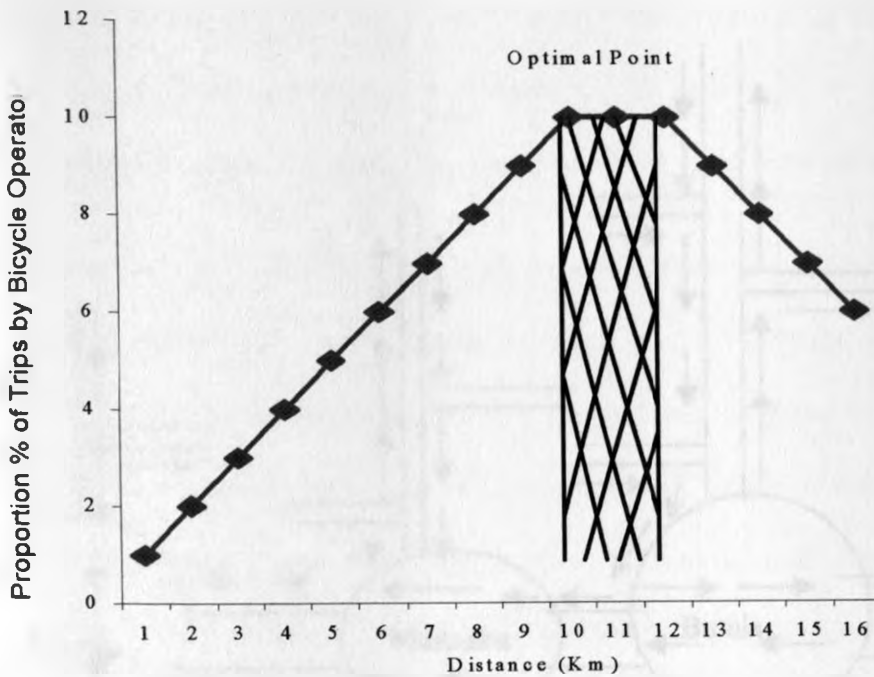
From the few researches that have been carried on bicycle transport in rural areas, boda boda has been considered as a minor mode in that it is usually concentrated along the off-corridor routes (and not along the main corridor) but the scenario in Butula is different. Fig 5-22 indicates the modal split along the main travel corridor in the division for over 10 km.

Fig 5-22: Corridor Service over 10 km



Source: Field Survey, 2000

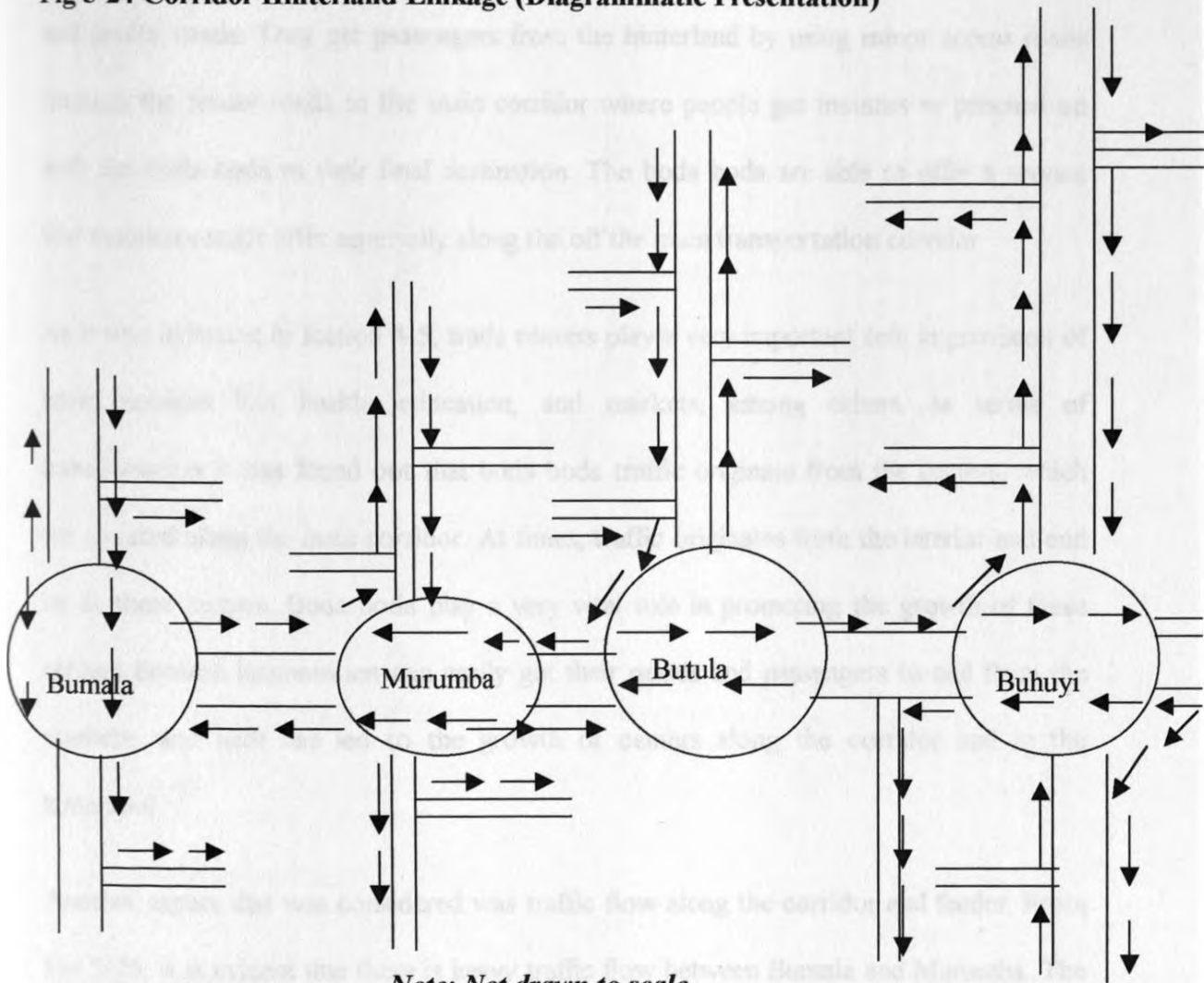
For longer distances, it was found out that matatus offer transport services (59%) but boda boda taxis still compete with them along the corridor to over 10 kilometers. In regard to this, an analysis was carried out to find out the longest distances that the bicycle is capable of covering. The results are as shown in Fig 5-23.

Fig 5-23: Longest Distance Covered by Boda Boda

Source: Field Survey 2000

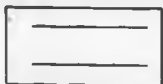
According to Figure 5-23, majority (42%) of the operators said that the longest distance that they have covered is between 10-11 kilometers while a few said that they covered upto 15 kilometers. This confirms with what was noted earlier that bicycles are used for relatively short distances of between 5-10 kilometers. The other observation that can be drawn from the figure is that the optimal point for boda boda is between 10 and 11 kms but it was found out that they still go beyond 10 kilometers along the feeder roads and the main travel corridor. Therefore, what is emerging from the corridor/hinterland analysis can be represented in a diagrammatic model as shown in Fig5-24.

Fig 5-24 Corridor Hinterland Linkage (Diagrammatic Presentation)



Note: Not drawn to scale

Legend



The main corridor



The feeder and Minor Roads



Movement of boda boda along the Corridor, the Feeder and Minor roads



Trade Centers

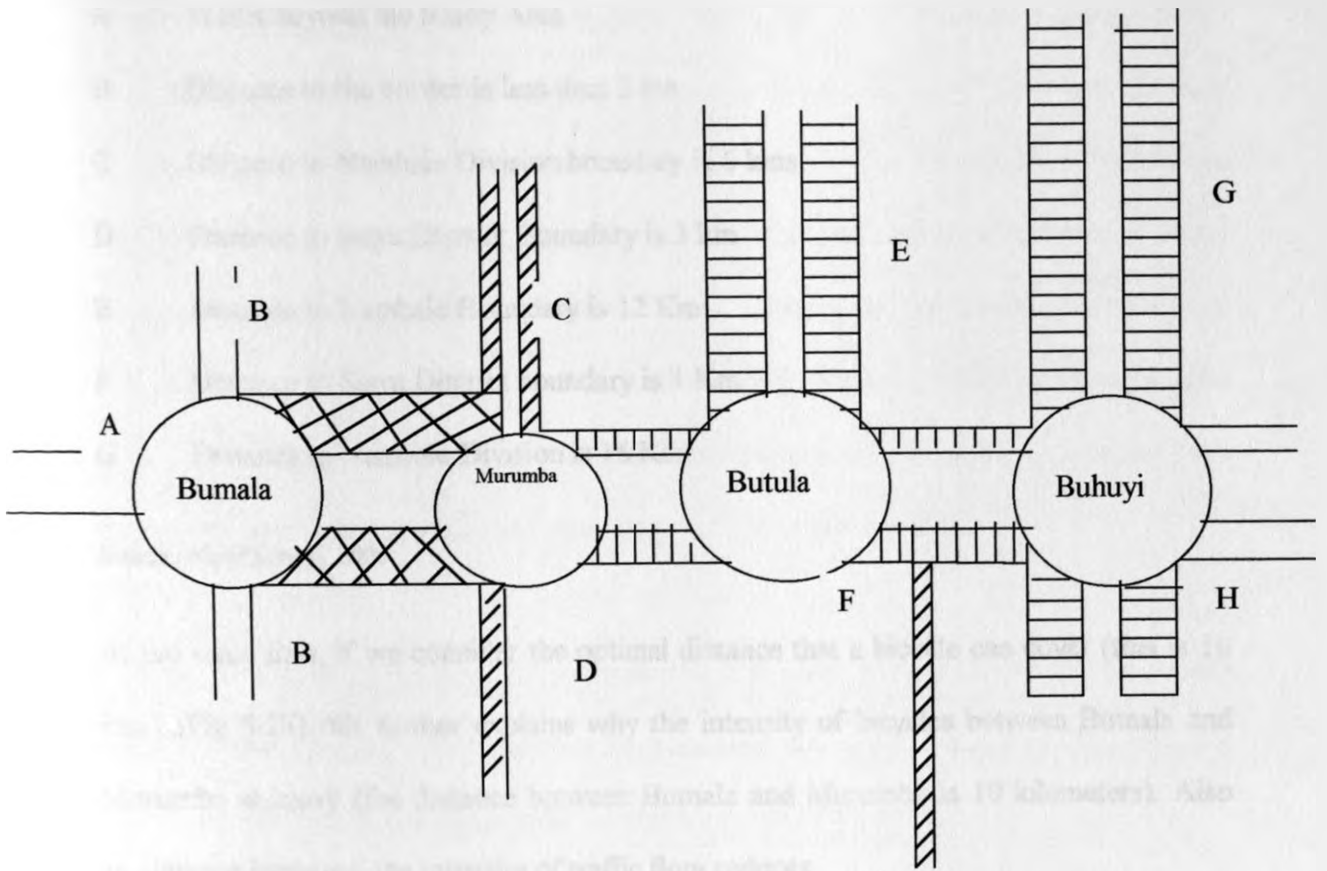
Source: Field Survey, 2000

Figure 5-24 illustrates how boda boda are playing a very important role along the corridor and feeder roads. They get passengers from the hinterland by using minor access roads through the feeder roads to the main corridor where people get matatus or proceed on with the boda boda to their final destination. The boda boda are able to offer a service that matatus cannot offer especially along the off the main transportation corridor.

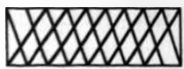
As it was indicated in section 4-5, trade centers play a very important role in provision of basic services like health, education, and markets, among others. In terms of transportation it was found out that boda boda traffic originate from the centers, which are situated along the main corridor. At times, traffic originates from the interior and end up at these centers. Boda boda play a very vital role in promoting the growth of these centers because businessmen can easily get their goods and passengers to and from the markets, and such has led to the growth of centers along the corridor and in the hinterland.

Another aspect that was considered was traffic flow along the corridor and feeder. From Fig 5-25, it is evident that there is heavy traffic flow between Bumala and Murumba. The reason behind this is that the existence of a tarmac road to Busia generates a lot of traffic and in most cases passengers alights at Bumala and takes bicycles to Murumba or the hinterland. It is also interesting to note that the administrative boundary for the division is 2 kilometers on either sides of the corridor therefore boda boda users prefer to take boda boda to their final destinations.

Fig 5-25: Traffic Generation at the Centers.



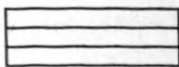
Note: Not drawn to scale



Heavy traffic flow of boda boda along the main corridor



Light traffic flow of boda boda along the main corridor



Heavy traffic flow of boda boda along the feeder roads



Light traffic flow of boda boda along the feeder roads

Notes

- A Traffic beyond the Study Area
- B Distance to the border is less than 2 km
- C Distance to Nambale Division boundary is 6 kms
- D Distance to Siaya District Boundary is 3 km
- E Distance to Nambale Boundary is 12 Km
- F Distance to Siaya District boundary is 3 Km
- G Distance to Nambale Division is 16 Km

Source: Field Survey, 2000

At the same time, if we consider the optimal distance that a bicycle can cover (that is 10 kms) (Fig 5-23) this further explains why the intensity of bicycles between Bumala and Murumba is heavy (the distance between Bumala and Murumba is 10 kilometers). Also as distance increases, the intensity of traffic flow reduces.

On the one hand, there is heavy traffic flow of Boda boda along the feeder road (Butula – Lugulu). One of the factors explaining this heavy flow is that Butula is a main junction and as such passengers drop from matatus along the corridor and take boda boda to the hinterland of the division where there no matatus or buses.

5-6 Transportation of Goods

In the division, there are various types of goods transported by different types of modes such as tractors, matatus, lorries, bicycles, animal drawn carts and bicycles. The goods include cereals, furniture, building materials, farm produce, personal goods and fish.

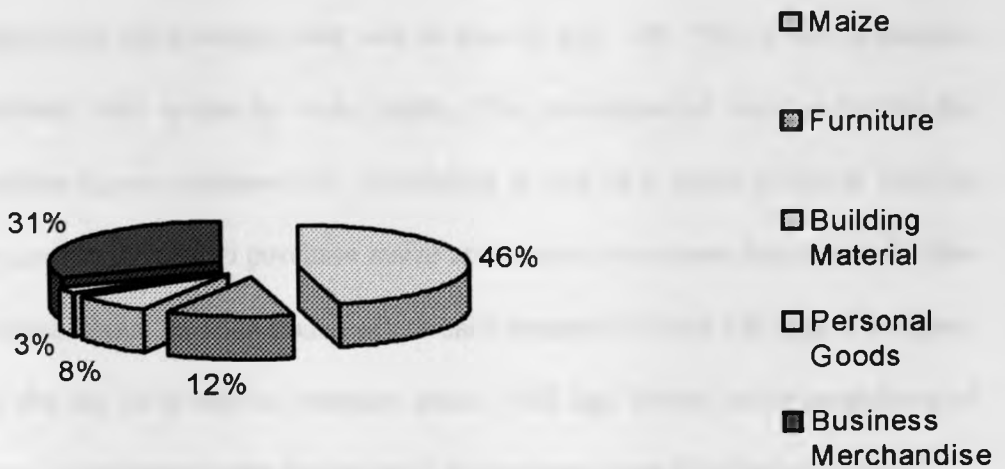
Distance, weight, bulkiness, time and the state of the roads are major determinants of transportation of goods. As it was indicated earlier, the use of tractors is limited in the division because all of them belong to Mumias Sugar Factory. They are used in transportation of sugarcane from the farms to the factory. The few matatus that ply the corridor mostly transport passengers with some light goods such as fish, maize of about 90 kilograms, business merchandise such as soap, cooking fat, tea leaves, among others. The matatu operators confirmed that they do not carry passengers and at the same time goods. Goods were found to be bulky and therefore during rainy days, the vehicles have major problems crossing the impassable sections of the main corridor.

Animal drawn carts are limited in the division and the few that are there transport mostly farm produce especially for farmers who own land elsewhere. Therefore, this leaves a gap that is supposed to be filled by an alternative mode of transport.

5-6.1. Boda boda and Goods Transport

The boda boda operators, who were interviewed, 97% said that they transport goods only at a time. These include building materials (cement, ballast, sand and iron sheets), furniture (beds, stools, cup boards, chairs and marachi sofa sets), cereals (maize, beans, millet, sorghum), farm produce, personal goods, water, fish, business merchandise (mitumba clothes, cartons of soap, tea leaves, among others). As it was mentioned earlier, boda boda operation started as a mode for transporting goods and as such has taken over all other modes in goods transport (Plate No. 5-3 and 5-4). Fig 5-26 summaries the types of goods transported by boda boda.

Fig 5-26 Goods transported by boda boda



Source: Field Survey 2000.

Maize is the highest good (46%) that is transported by the boda boda. The time of the survey coincided with the period when there was no maize in the division, so most households were relying on the supply from either Uganda or Kitale. For the Uganda case, boda boda are contracted by the business people to get maize from the border of Uganda while lorries to the big centers in the division always transport maize from Kitale. In cases where businessmen buy maize from the lorry hawkers, they always get boda boda to transport the maize to the smaller centers along the corridor or in the interior. *(One boda boda can transport between 100-150 kgs of maize over a distance of 10-15 kms)* (Plate No. 5-5).

The other goods that are transported by boda boda are business merchandise. They include fish, *mitumba* clothes, fruits among others. Businessmen and women who were interviewed indicated that they use boda boda because they are cheaper as compared to other modes like pick ups and matatus. They said that if one hires a pick up, he will pay

more regardless of the quantity and distance. For instance, to hire a pick up to transport fish from Sio Port to Bumala, the transport charges will be Kshs 1500 while hiring four boda boda operators, the transport cost will be less by Ksh. 300. This is very important for a businessman who is out to make profit. The economics of using a bicycle for business activities can be examined by considering a case of a maize dealer at Bumala Market. He travels regularly to purchase maize and in most cases uses boda boda for this purpose. He hires about 10 boda bodas where each transports about 150 Kgs. Therefore, at the end of the day he is able to transport about 1500 kgs. Below is the breakdown of profits that maize dealers get after deducting all the expenses including transport costs.

Buying price for a bag of maize	= Kshs	1,300
Transport costs	= Ksh	100
Selling Price	= Ksh	1,600
Profit	= Ksh	300

By using boda boda rather than hiring a pick up or a matatu, he is able to reduce the transport cost and double his profit.

The other goods transported by boda boda are furniture and building materials. The operators who were interviewed indicated that they the transport charges for these goods are a bit high. This is because these goods are heavy and bulky. They therefore damage the bicycles and at times such goods can lead to very bad accidents especially where the roads are narrow and yet there are other road users like tractors and matatus. For personal

luggage, operators confirmed that they transport both passengers and their luggage because most of the time they are light (Plate No. 5-4).

Indeed we can conclude that boda boda is a viable mode for both passenger and goods transport.

Plate 5-4: Boda Boda Carrying a Passenger with her goods

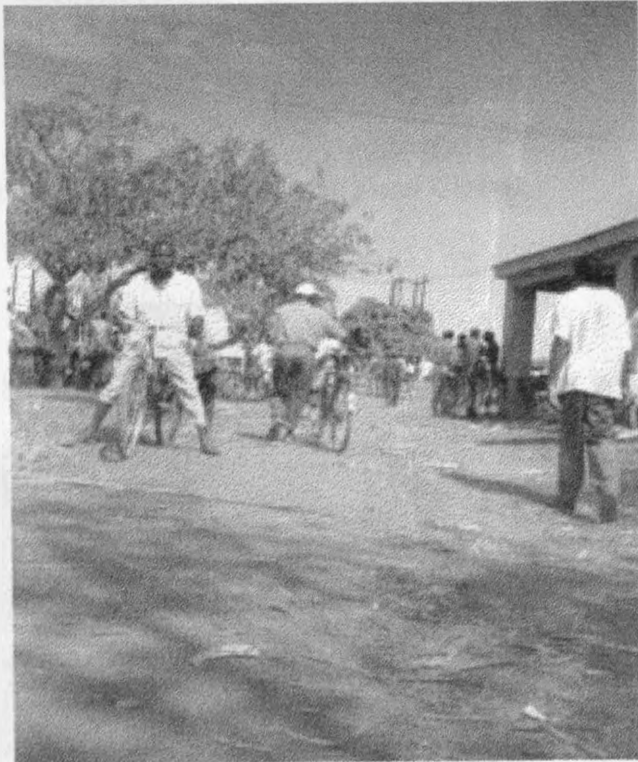


Plate 5-5: Boda Boda Transporting Maize



Plate 5-6: Boda Boda Transporting Second Hand Clothes



5-6.1.1. Charges for Passengers

Field survey findings revealed that bicycles and matatu operators charge different fares basing on distance. The fares also differ because mostly boda boda operate along off the transportation corridor where matatu services are non-existent. In other cases, boda boda charge more fare, for example they charge Ksh.50 from Murumba to Butula while matatus charge Ksh.30. The reason is that since the boda boda operator is not assured of coming back with the passenger, he is forced to charge double the fare to recover his costs and time. There are also so many cartels, which have been put forward by the Associations such that an operator from another center is not allowed to pick a passenger from a center where he is not a registered member.

Despite the fact that boda boda charge higher fares, people still prefer bicycles because they are convenient, accessible and reliable. Charges are also determined by the prevailing circumstances. From the field survey, it was found out that boda boda charge exorbitant fares especially in the evening and during holidays. In the evenings two-three boda boda operators accompany a passenger who is supposed to pay all of them at the agreed cost. This is meant to ensure the security of both the passenger and the operator.

On certain occasions, boda boda may be hired to transport students for games. In such circumstances, the charges include even the waiting. It was established from Busiada girls that for one to be transported from the school to Butula Girls (which is about 10kms), the school is charged normal fare of Ksh.100 for trip but at same time pay Ksh.20 as waiting charges. This totals up to Ksh.120.

However, the operation of boda boda in the division has acted as a measure in the control of transport fare. Before boda boda emerged as a mode of public transport, there was no control in fares as the few matatus, which used to ply the corridor used to charge exorbitant fares even for short distance trips.

5-6.1.2 Charges for Goods

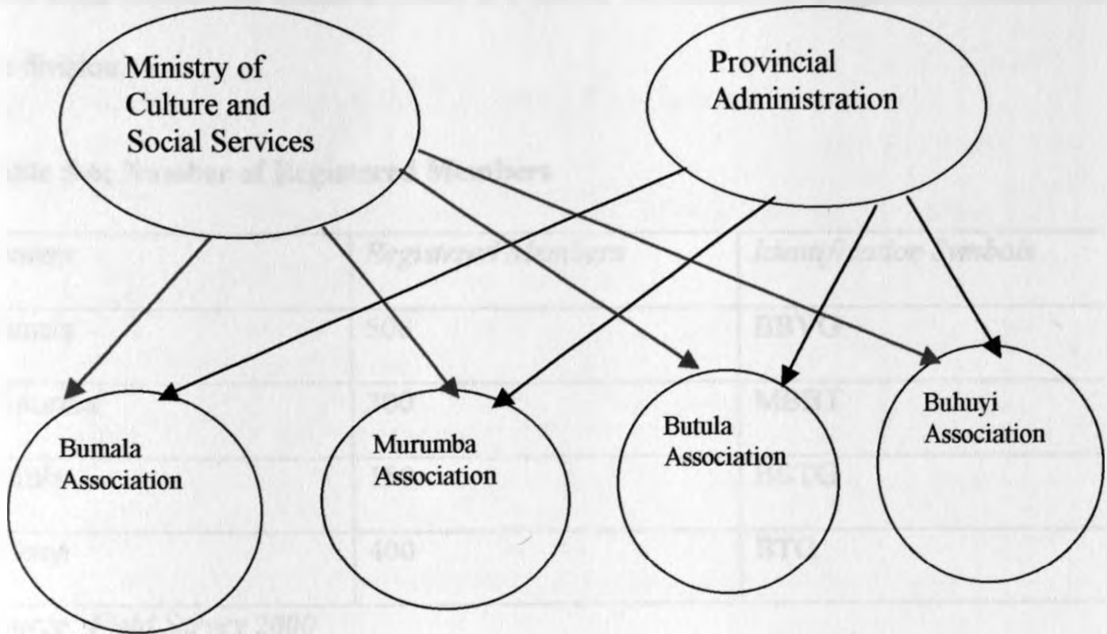
It was established from the field that goods are charged according to distance, weight and bulkiness of the goods. For a distance between 0-3 kms, boda boda charge Ksh.50 for a bag of maize, this is about 100kg. For the same distance, they charge Ksh.60 for 10 *Marachi* mats; the problem is not weight but bulkiness of the goods. Indeed transporting of mats has posed a very big danger to the bicycle operators as they occupy bigger road space and as considering that the corridor is narrow, most operators have been knocked down by tractors and matatus. In most cases, matatus do not like transporting goods especially maize and beans as these goods wreck their vehicles. Therefore, boda boda as a public transport is not only offering supplementary services but also complimentary services along the main corridor.

5-7 INSTITUTIONAL, MANAGEMENT AND LEGAL FRAMEWORK

Boda boda as a transport service is registered under the Ministry of Culture and Social Services and licensed by the Provincial Administration through the local chiefs. Each center has an Association and all the registered members' names and identification numbers have to be taken to the Police Stations or Posts. This is to ensure the security of both passengers and operators. This being the case, what is the relationship between the

Ministry of Transport and Communication, Ministry of Public Works, the Police and the Associations?

Fig.5-27: Stakeholders in charge of Boda Boda Registration



Source: Field Survey 2000.

As it has been mentioned above, the Ministry of Culture and Social Services and the Provincial Administration are the only agencies in charge of Boda Boda Operations. Their operation is regarded as a Community Based Organization (CBO) in the transport sub sector. The local chiefs have played a very important role of ensuring that the operation runs smoothly. However, the Ministry of Transport and Communication, and the Ministry of Public Works, which are charged with the responsibility of transport, have no direct linkage with the operation while Traffic Police involvement is minimal. There is need for planning intervention to regularize the situation.

5-7.1 Associations

There are four Boda Boda Registered Associations in the divisions. Under each Association, there are also sub-groups, which serve different areas of the division and even areas beyond the division. Table 5-6 shows the number of Registered members in the division.

Table 5-6: Number of Registered Members

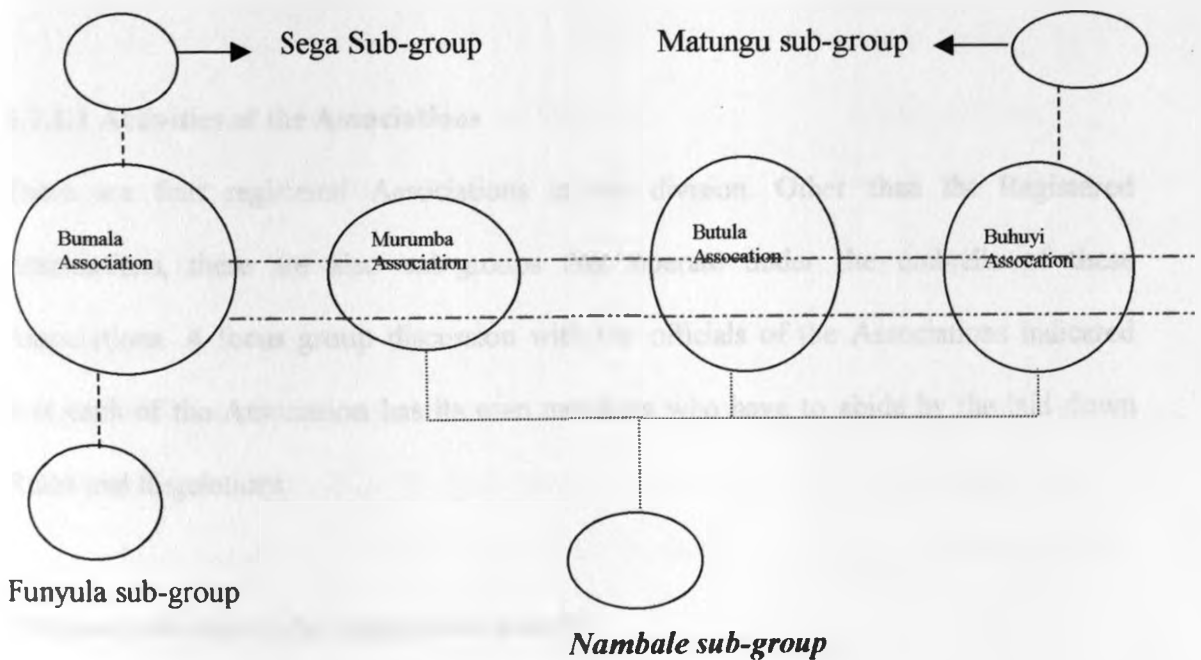
<i>Centers</i>	<i>Registered Members</i>	<i>Identification Symbols</i>
Bumala	500	BBYG
Murumba	300	MBBT
Butula	150	BBTG
Buhuyi	400	BTG

Source: Field Survey 2000

According to table 5-6, Bumala and Buhuyi are the biggest centers in the division and each has 500 and 400 registered members respectively while Murumba and Butula have 300 and 150 members respectively. As it was mentioned earlier, Bumala and Buhuyi experience management and organization problems because their catchment population is not only from the division but also from other divisions and districts. For instance, at Bumala, there are four sub-groups; Ukwala – Sega, Funyula, Matayos and Bumala. This has contributed to conflicts among members because each group has its own rules and regulation especially on routes of operation.

On the other hand, the relationship amongst the Associations is not cordial. For instance they have never come together as one group to discuss the problems that each Association faces so that they come up with a common solution. There is a lot of suspicion and conflicting issues which further divide the Associations. Fig 5-28 represents this information.

Figure 5-28: Conflicts among the Registered Associations.



Note: Not drawn to scale

Legend

- Corridor Frictions
- External Frictions

Source: Field Survey, 2000

An interview with the officials of the Associations revealed that, the relationship is not smooth because the associations have put forth a lot of cartels and consequently each of

the association is operating on its own. The operators are not allowed to transport a passenger beyond his specified area of operation. Consequently, the passengers are charged exorbitant fares to recover the costs and time. For instance, a passenger is required to pay ksh 50 from Murumba to Butula while matatus charge ksh. 30. This is because the bicycle operator who drops a passenger at Butula is not allowed to pick another one from there.

5-7.1.1 Activities of the Associations

There are four registered Associations in the division. Other than the Registered Associations, there are also sub-groups that operate under the umbrella of these Associations. A focus group discussion with the officials of the Associations indicated that each of the Association has its own members who have to abide by the laid down Rules and Regulations.

The main activities of the Associations include

- Registration of new members- scrutinize their behaviors;
- Route allocation;
- Monitor the operation of operators;
- Ensure security of the users and their goods, and
- Control money contributed by members.

A further interview with the Association officials indicated that there are only two Associations (Bumala and Butula) with Bank Accounts. Therefore, cash from the account

can only be withdrawn if one of the members has a problem – funeral, hospital bill among others. Nevertheless, this area requires improvement and proper management. For example, Bumala Association, at the time of the survey had about Ksh. 500,000 in their account. The treasurer gave out a breakdown of the cash and how they acquired it. The breakdown is as follows.

Registration: 500 Members x Ksh.600	= Ksh. 300,000.00
Monthly contribution Ksh. 100 x 500 x 12 Months	= Ksh. 200,000.00
Insurance contribution Ksh. 50 x 500 x 12 Months	= Ksh. 300,000.00
Total income for the Association	= Ksh. 500,000.00

If the total income for the association is Kshs 500,000 then, planning should intervene to ensure financial sustainability for boda boda operation. The associations can come up with a project specifically dealing with bicycles for hire or a Cooperative Society, which will be able to handle all financial matters.

5-8 MAJOR HINDRANCE TO BICYCLE TRANSPORT DEVELOPMENT.

In the course of daily transport activities, the operators and users of boda boda face problems may hinder the development of boda boda. From the operators point of view poor road conditions affect their operation. The roads are narrow and due poor road maintenance, there are many potholes especially along the feeder roads. This has had adverse effects on boda boda operators due to regular bicycle breakdown and conflicts with motorized vehicles– along the main corridor. Adverse weather conditions also affect

the smooth operation of boda boda taxis; the operators indicated adverse weather limits the number of trips that they are supposed to make in a day. Lack of credit facilities also featured as a problem, the operators said that they don't have access to credit from formal, private or government agencies. The operators are further hampered by overdependence on internally generated capital-like own savings, family, friends and inherited bicycles. Consequently, there is vicious circle of low savings and low investment.

On the other hand, the formal institutions are very cautious especially when it comes to their lending operators. They are not willing to lend because the risk of non-payment is very high. The operators lack collateral or security and they also operate from hand to mouth hence their inability to repay the loans. A further discussion with the District Officer, Project Coordinator of Busia Town Boda Boda Association asserted that the government through the established agencies like KIE have their own restrictions which also exempt the operators from getting any loan.

Accidents were identified as a problem affecting the operation of bicycles; the operators indicated that they have once been involved in road accidents. The accidents according to the operators are caused by the poor state of roads; narrow roads hence conflict with motorized vehicles who do not respect the other road users (Plate No 5-7) and the inexperienced operators. Some users jump off the bicycles when it is in motion and in the process they get hurt. The problem is even worse considering the fact that boda boda do not have an Insurance Cover. Harassment by the police and insecurity at night

although did not feature low, they should not be fully ignored. Operators indicated that police officers always harass them especially when they are consigning the goods. Due to the trust that users have with the operators, they always give them goods to deliver to their homes. At times, policemen stop them and it has been found transporting dead bodies for babies or bhang. In such a situation, who is to blame?

On the other hand, bicycle users are also important as they form part of the public transport stakeholders (Fig 2-3). Therefore, their point of view is important, as it will assist in coming up with policy recommendations.

From the users' point of view, poor road conditions (45%) adverse weather (14%) and poor bicycle maintenance (14%) ranked 1, 2, 3. Insecurity, which accounted for 9% is worthy to be mentioned. The users complained of insecurity especially during the late hours whereby they are robbed of money and whatever goods they are carrying. Accidents (9%) are also a manifestation of poor road conditions and careless boda boda and matatu operators. The users also complained of overcharging but the operators on the other hand argued that they base their charges on distance, the state of the roads especially along the paths and tracks, time and also partly to cartels which have been put forth by the Associations (the operators are not allowed to ply a route if he is not a member of that particular Association). The above problems if not addressed will have adverse effects on the operation and development of boda boda in the division.

Plate 5-7 Boda Boda Carrying a Passenger along the Main Corridor**5-9 Suggestions, Alternatives and Comments by the Boda Boda Operators and Users.**

The operators and users came up with their own suggestions to improve and enhance the development of boda boda transport.

- Roads rehabilitation and proper maintenance;
- There is need for ways to avoid conflicts with motorized vehicles;
- Financial support from the NGOs, the government and any other financial institution;
- The government through the Ministry of transport and Ministry of Public Works to recognize bicycle transport as a transport sub sector;
- The carrier to be enlarged to carry more goods;

- There is need for training especially in bookkeeping and micro-enterprise, finance and traffic codes
- They should have access to credit and this can be attained through formation of a bicycle cooperative society.

The users on the other hand had their own suggestions as follows

- Maintain and widen the narrow roads.
- Financial assistance and access credit to boda boda operators.
- The government to come up with TLB for bicycles, which will put forward rules and regulations for bicycle operators.
- Other than bicycles operation, there should also be other income generating activities like selling bicycle spare parts.
- Boda boda operators to have uniforms and registration numbers for easier identification.
- Fixed fares for particular distances.
- Training of boda boda operators.

The suggestions given by the operators and users are very important as they form part of the policy recommendations, which are discussed in the next Chapter.

5-10. LESSONS LEARNT

A synthesis of the findings clearly indicate that boda boda is a viable mode in meeting transport demands in the division and at the same time complementing and competing with other modes of transport. Below is a summary of the lessons learnt.

5-10.1. Provision of Transport Services

Boda boda taxis increase efficiency and therefore minimize the burden of walking over long distances and headloading by women and children. Walking competes cycling over a distance between 0 – 3km but boda boda takes over as it can go upto 10 kilometres. They are economical and cheap to maintain. The study revealed that operators use a minimum of Ksh 200 per month on repair. The bicycle does not require fuelling; it only requires regular greasing, a tyre or a tube. They are reliable, affordable, frequent, comfortable, and convenient that is why most people go for them. They offer transports Services that are not offered by other modes especially buses, which are limited to the Kisumu – Busia Road. In the process of offering their services they assist in traffic build up along the main corridor.

5-10.2 Access to Services and Opportunities

Contrary to Authors' perception that transport in rural areas is borne out of agricultural activities the situation on the ground is that there are non-agricultural activities that are classified under transport demand. They include social trips, work trips, business trips among others. These are very important generators of traffic and from the analysis, these demands are mainly met by the boda boda. The bicycles have assisted in transporting

both the passengers and goods to even areas that cannot be accessed by motorized vehicles. As it has been the case, many activities in the rural areas have been hampered due to lack of an alternative mode of transport. The boda boda taxis have become handy in the study area as people can access facilities without much strain.

5-10.3 Creation of Employment and Income Opportunities

Compared to other sources of employment, boda boda emerges as the highest employer. It was found out that boda boda has employed about 1350 operators as compared to matatus which has only employed 25. In relation to income, boda boda operators and repairers earn a net income of Ksh 4800 and Ksh. 4,500 respectively while those engaged in agriculture earn about Ksh.2650.

5-10.4 Institutional Arrangements

In any transport system, institutional, management and legal framework are very important as they assist in formulation of rules and regulations. The situation on the ground in Butula Division indicates that the three are too weak and as such the operation is compounded with management and institutional problems.

5.10.5 Major Hindrance to Bicycle Transport in Butula

The bicycle is emerging as a mode of transport which offers both inter and intra transport services but in the course of their operation, they are faced with problems like poor road conditions, insecurity, accidents and adverse weather. All these issues retard the growth of bicycle transport.

5-10.6 Gender Implications

Women, for along time have been overlooked in the overall transport planning. It was found out that women play a major role in transport as much of the daily trips are borne by women. They are the homekeepers and managers. Other than that, they are also engaged in income generating activities like selling fish, vegetables, fruits among others.

5-10.7 Rural Development and Transportation

The government since 1970 has recognised rural areas as a focus for development since the majority of the population stays there (80%). It has come up with road programs which have given greater emphasis to secondary, feeder and minor roads, this are supposed to enable the rural population to travel more easily and get their crops to markets more cheaply. But in most case, emphasis has been given to conventional vehicles, which in reality cannot be afforded by the rural people. Therefore, it is important to plan for rural development and transport by considering the most appropriate mode of transport, which can be affordable to the majority of the rural population.

Policy Implications

It is evident from the study that bicycle mode of transport is a viable mode in satisfying different transport demands. Therefore it is important to plan for it thus drifting away from the motorization culture and it should also developed as a service that is guided by rules and regulations to ensure efficiency.

CHAPTER 6: SUMMARY OF THE FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

6-1 Introduction

The study set out to assess the viability of the bicycle as a mode of transport in satisfying transport needs in the rural areas, identifying the potentiality of bicycles in job creation and income generation as well as problems that bicycles operators and users encounter. The three objectives formed a basis for formulating policy recommendations. From the study key issues were identified and they include.

- Provision of transport services,
- Boda boda transport as an industry,
- Gender implications,
- Institutional and legal arrangements, and
- Major hindrance to bicycle development in the division.

6-2 SUMMARY OF THE FINDINGS

6-2.1 Provision of Transport Services

An understanding of rural transport indicates that one of the transport demands arise from agricultural activities, which are divided, into on-farm and off-farm. On-farm means movement of agricultural inputs within the farm while off-farm means movement of farm produce from home to the market. Contrary to the above, it was also found out that people are engaged in both on-farm and off-farm (non -agricultural activities), which also generate traffic in the division (Table 4-1, Fig 5-7). It was found out that walking is the

prevalent mode for on-farm activities while the bicycle (boda boda) is generally used for off-farm activities for relatively short distances of between 5-15 kms. Therefore it is important to consider demand factors that are related to both agricultural and non-agricultural factors when planning for rural transport.

In order to determine whether boda boda is a viable mode of transport in the study area, a modal split count was conducted at four centers as it was indicated in sections 5-2.1 to 5-2-6. The results show that there are various transport modes, which are used to meet transport demands. They include buses, matatus, tractors, bicycles, and animal drawn carts among others. Matatus and buses are limited to the main corridor and the Busia-Kisumu Road, but they do not offer any services along the feeder roads. This being the case, bicycles have come in to supplement and complement the services.

Further findings show that bicycles play a very important role in provision of transport services. As a public transport mode, boda boda transport both passengers and goods and they also facilitate access to economic and social services such as markets, schools and health centers.

On average, 45% of all personal trips including trips to work, business and social places are met by bicycles. The bicycle is looked at as a social good' but in the recent past people have diverted their idle bicycles into boda boda (bicycle taxis). As such, they compete matatus along the corridor and offer feeder road services that are not offered by matatus. It was found out that walking is the prevalent mode over a distance between 0-3 kilometers. This is because all trip purposes like fetching water, firewood, school and

farm are within a radius of 3 kilometers. Boda Boda operation is minimal over this distance except for traders who have contracted the operators to carry their goods to the markets.

Boda boda operation is highest over a distance between 3-10 kilometers along the corridor and the feeder roads. In the process of offering the transport services, they complement matatus and motorized modes by offering services along the main transport corridor. Boda boda as a complementary mode to motorized vehicles, get passengers and goods from the interior of the division to the motorable roads and then to the corridor where passengers who intend to take to make long distance trips take buses or matatus to their final destination. The bicycle plays a very vital in sustaining the motorized modes, which are only confined to the main corridor and the National Trunk Road. It was also found that as much as bicycles are offering supplementary and complementary services, they are limited in such a way that they optimally operate to distance of 10 and 11 kms.

6-2.2 Factors Influencing Modal Choice

The factors influencing mode choice were found to be convenience, comfort, reliability, frequency of service, connectivity (point to point), fastness and accessibility. The bicycle users who were interviewed confirmed that they preferred bicycles because of the above named factors while the few who preferred matatus said that they are fast over long distance and that they are assured of protection from the hot sun or rain. But all in all, majority preferred boda boda taxis. Matatu operators confirmed that they always delay

due to competition from boda boda taxis and also due to the perception by people that they would rather take a bicycle instead of delaying for hours waiting for a matatu.

6-2.3 Boda Boda as an Industry

As it was indicated in section 5-4.8.2, unemployment is one of the major problems facing Kenya today. The bicycle transport was found out to have potential to employ more people (over 1000 operators as compared to 25 employed by matatus). On average each boda boda operator earns about Kshs. 4,800 per month, which cannot be compared to what a subsistent farmer earns (Kshs 2680) per annum. In relation to this, the industry has absorbed quite a substantive number of young men, between ages 20-35 years. This is a clear indicator that the industry has a potential to even absorb more young men who are leaving school every year.

Other than direct employment, there are other indirect employment services like food kiosks, bicycles repairs and spare parts shops. These have also employed quite a number of people. The operation of boda boda transport has direct impact on operators and other stakeholders who are not directly involved. Therefore, in order to tap its potentiality, there is need to come up with lasting solutions to the management and organization problems that the industry is facing currently.

6-2.4 Gender Implication

When planning for transportation, it is important to consider the roles played by women. In most cases, women generate a lot of traffic because they are involved in different

chores. It was found out that woman other than being involved on on-farm activities, they are also engaged in other business such as selling fish, cereals, fruits among others. They have contracted boda boda operators to transport their goods to market in the morning and then back to their homes in the evening. On the same basis, boda boda operators who were interviewed confirmed that most of their customers are women. This is because the bicycles are used by men for external purposes-most commonly for going to the market.

6-2.5 Institutional, Organization and Management Arrangements

These are important aspects in any transportation system as they assist in maintaining law and order. It was found out that boda boda associations are registered under the Ministry of Culture and Social Services as a Community Based Organizations (CBO). The whole operation has not been recognized as a transport sub-sector. The Ministry of Information, Transport and Communication and the Ministry of Public Works, which are charged with the responsibility of Roads Maintenance and Traffic Laws and Regulations, are not involved. There is need for boda boda to be operation considered in the overall transport planning.

There are four Registered Associations in the division at the four major centers but there are also other sub-groups that are affiliated to these Associations. The Associations are concerned with registering new members; ensure security of both the passengers and operators. At every center, members are required to pay some fee for registration and at the end of the month each member contributes some amount of money that is used in case

of the members have problems. For example, Bumala as one of the largest centers has 500 registered members. In order to become a member, each operator is expected to pay Kshs. 600, at the same time, each member contributes Kshs. 150, whereby Kshs 100 is banked while Kshs. 50 goes towards insurance cover for both users and operators. It was established that the total income for the Association is Kshs 500,000 per year. This type of resources could be used to establish a credit scheme or a project, which deals specifically with *bicycles for hire* for members.

On the other hand, these Associations are faced by organization and management problems. As it was indicated in the study, Bumala and Buhuyi have bigger catchment population from other adjacent districts. As such, each district has a representative sub group. For example, at Buhuyi, there is Matungu, Nambale and Buhuyi sub groups. Each of them has specified routes of operation. But there is an element of cartels operations, which have hampered the smooth running of the operation. Other than cartels, there is no cordial relationship amongst the Four Center Associations in that they have never come together as one group to look into the problems that they are facing. Therefore, there is need to harmonize the Associations to ensure the smooth running of the operation.

6-2.6 Constraints to Boda Boda Operation

Although boda boda has a potential to grow, there are some formidable obstacles to its development. The boda boda users and operators cited the poor road conditions as one of the major constraints to the proper operation of boda boda operations. The poor road conditions coupled with many potholes have led to conflicts between motorized and

NMT vehicles (boda boda) and as such there have been reported cases of accidents especially in Buhuyi areas. Adverse weather, lack of credit facilities, overcharging, and insecurity are also very important issues which are supposed to be considered when planning for boda boda transport in the rural areas.

After identifying the major constraints to boda boda operations, the users and the operators were asked to come up with their own suggestion and alternatives that will enhance the development of boda boda transport which included:

- Roads rehabilitation and proper maintenance;
- Need for cycle ways;
- Financial Assistance from the government and NGO's;
- Training of boda boda operators;
- Access to credit facilities;
- Start other income generating activities; and

6-3 OPPORTUNITIES AND CONSTRAINTS

In order to ensure a brighter future for boda boda operation and efficiency, the study identified the opportunities and constraints to the development of the industry. The opportunities included:

- The ownership of the bicycles are an opportunity if well planned;
- The main corridor, the feeder roads and the centers (infrastructure);
- The cyclists or the operators
- The attitude and perception of the community towards the boda boda operation

The major weaknesses that were identified included:

- Lack of knowledge on transport needs of the rural people;
- Lack of national policy framework on bicycle transport;
- Institutional management and organization problems with the bicycle transport;
- Poor state of roads;
- Lack of government and NGO financial support;
- Lack of access to credit facilities; and
- Lack of training for bicycle operators on traffic rules and conduct, micro enterprise activities.

In order to address these weaknesses, the following policy goals are recommended to guide proper planning of boda boda transport in the study area and rural areas in general.

1. Strengthen Institutional and legal framework;
2. Establish credit schemes for boda boda operation;
3. Train boda boda operators on traffic rules and conducts, micrometer price activities;
4. Encourage donor, NGO and government financial support;
5. Promote gender equality in rural transportation;
6. Improve the current state of roads; and
7. Rural transport planning.

1. Policy Goal: Strengthen Institutional and Legal framework

Objectives

- To Come up with a Corridor Association

- To Incorporate the Bicycle Transport into Overall Transport Planning
- To Establish credit schemes for boda boda
- To Come up with Cooperative societies
- To ensure that Associations become lending firms

2. Policy Goal: Improve the Current State of Roads

- Widening the roads
- Upgrading some of the feeder roads
- Cycle way and walkways
- Construct and improve tracks and paths to allow efficient movement of boda boda

6-4. Recommendations

As it was stated in Chapter 2, the government's main emphasis has been on the construction of secondary, feeder and minor roads which will lead to increased use of conventional motor vehicles which will in turn stimulate household demand for travel. One of the major barriers to the formulation of alternative strategies is lack of knowledge on the transport needs of the rural communities by transport planners. Their needs are assumed to be taken into account within the overall framework of transport planning (Barwell et al, 1985). In order to achieve an effective transport system for rural areas, emphasis should be put on affordable means such as bicycles, that the majority of the population could afford.

This section lays a basis for reorientation in the approach to rural transport planning which has always been viewed in terms of roads and conventional vehicles. Below are

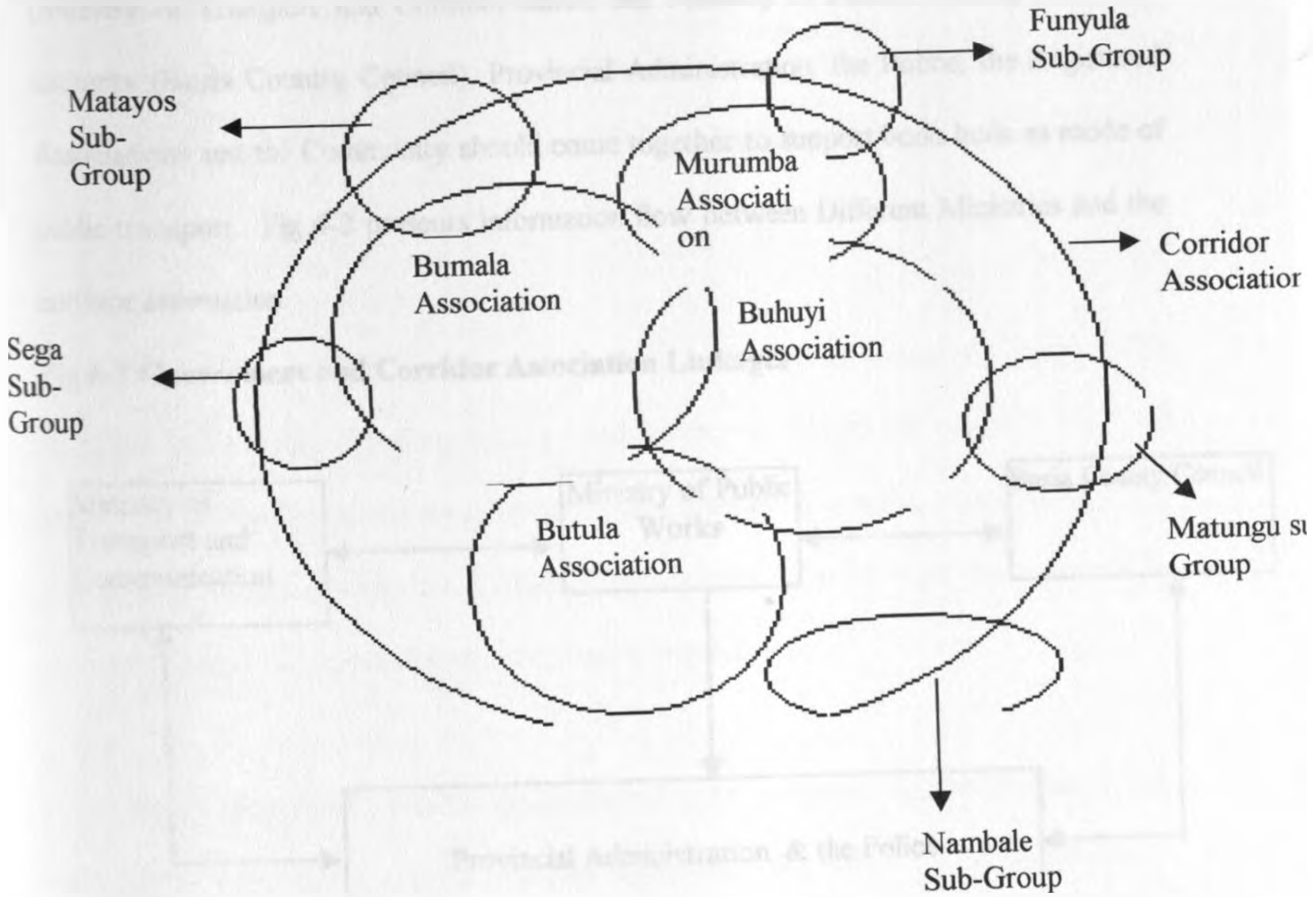
strategies, which can be adopted to enhance the bicycle transport in the rural areas in general and the study area in particular.

6-4.1 Strategies to Strengthen the Institutional and Legal Framework

One of the main problems facing the operation of boda boda as a mode of transport is a weak institutional and legal framework. This has led to both management and organizational problems. As it was mentioned earlier, there exist a number of Registered Associations in the division, which regulated the boda boda operations. Nevertheless, each Association operates on its own and as such there is disharmony amongst the Associations. Therefore, in order to ensure proper operation of boda boda along the main corridor, a Corridor Association should be formed. This will be able to bring together all the Registered Associations and the Sub Groups and harmonize their activities. This will ensure the containment of cartels which have existed for a long time. This in turn will enhance the smooth running of the Associations. The Corridor Association should also operate beyond the major market centers (especially those whose catchment population is Siaya, Bungoma and Mumias Districts). At the same time, the Corridor Association should be guided by National and Legal guidelines.

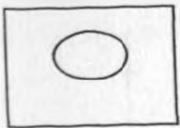
Fig 6-1 shows a diagrammatic model representing the Corridor Association.

Fig 6-1 Corridor Association



Source: Field Survey 2000

Legend



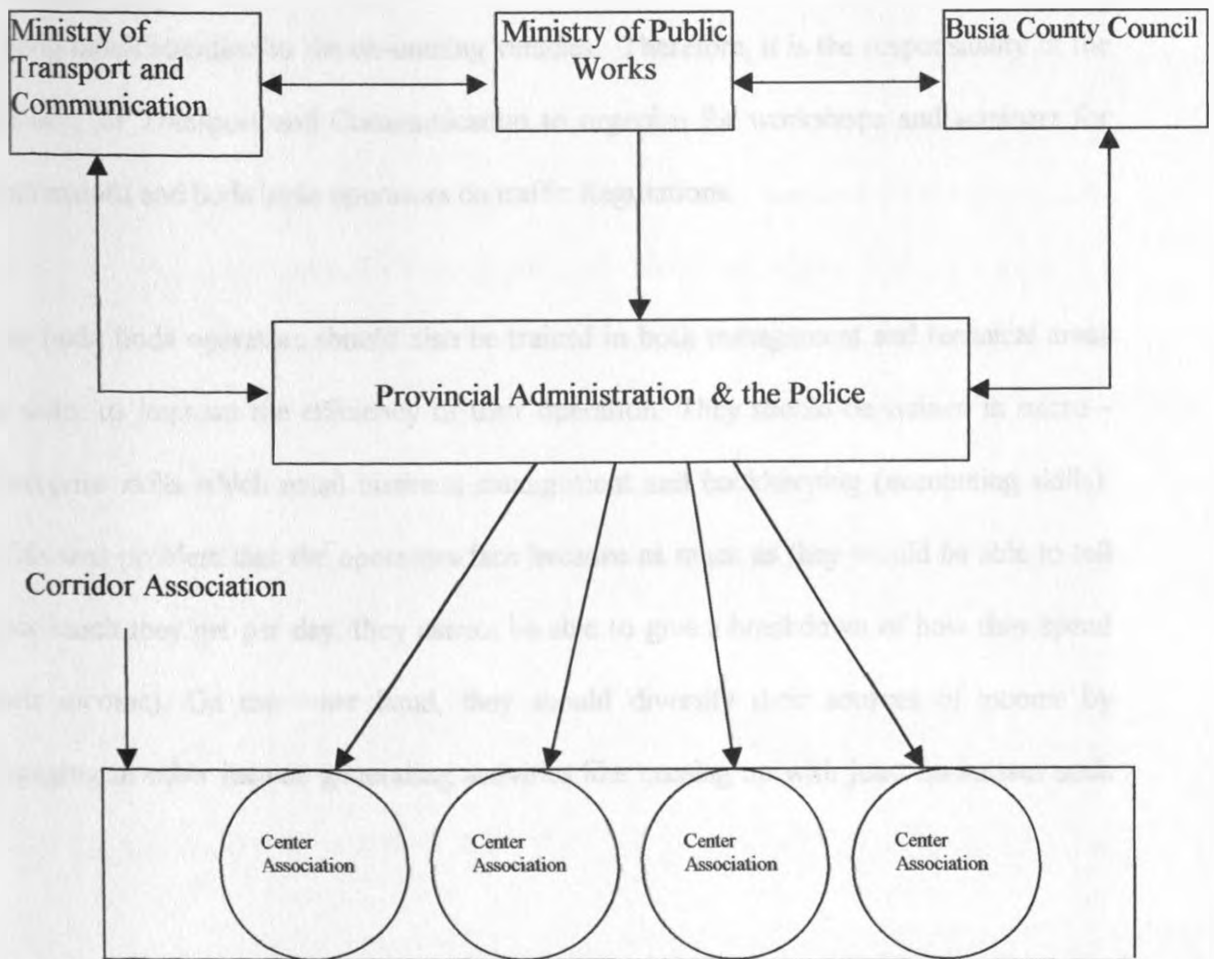
Associated Boda Boda Groups in adjacent districts and Divisions



Sub-Associations of Corridor Association

On the other hand, the Associations are registered under the Ministry of Culture and Social Services as Community Based Organizations and at the same time are licensed through the Provincial Administration offices. Therefore the planning and implementation of Boda Boda Operations should be taken up by the Ministries concerned (Ministry of Transport and Communication and Ministry of Public Works), the Local authority (Busia County Council), Provincial Administration, the Police, the Registered Associations and the Community should come together to support boda boda as mode of public transport. Fig 6-2 presents information flow between Different Ministries and the corridor association.

Fig 6-2 Government and Corridor Association Linkages



The Ministries of Transport and Communication and Roads and Public works are charged with the responsibility of traffic rules and regulations. Therefore, they should include the boda boda mode of transport in the Traffic Act so that the operators abide by traffic regulations, which are stipulated in the Act. At the same time they should work hand in hand with the Provincial Administration, the Police and the Corridor Association. In that respect, boda boda should be able to be monitored, hence to ensure security of the users, the operators and other stakeholders who are not involved directly.

6-4.1.1. Training

One of the major causes of accidents along Kisumu-Busia road is lack of keeping traffic rules for example there are boda boda operators who crisis cross the road without much paying much attention to the on-coming vehicles. Therefore, it is the responsibility of the Ministry of Transport and Communication to organize for workshops and seminars for both matatu and boda boda operators on traffic Regulations.

The boda boda operators should also be trained in both management and technical areas in order to improve the efficiency of their operation. They should be trained in micro - enterprise skills which entail business management and bookkeeping (accounting skills). (This was problem that the operators face because as much as they would be able to tell how much they get per day, they cannot be able to give a breakdown of how they spend their income). On the other hand, they should diversify their sources of income by engaging in other income generating activities like coming up with joint businesses such

as posho mills and bicycles for hire. This will in turn boost their operations and at the same time will act as a source of employment for other people.

6-4.1.2 Identity

For identification purposes, each operator should have a uniform and a number on the shirt for easier identification. They can emulate Busia Town Boda Boda Association that has ensured that all operators have uniforms and registration numbers and the routes of operation (each route has its own color of uniforms). This will in turn enhance security because the uniform makes it easier to know the route of operation and in case of any problem the operator will be easily identified.

6-4.1.3. Credit Schemes for Boda Boda Operators

In order to enhance the operation of boda boda, credit should be advanced to them. This can be done in two ways. The Associations can be used as a source of credit schemes. As it was earlier indicated, Bumala Association alone has about Kshs. 0.5 m in its account. This cash can be lent out to the operators at a reasonable interest rates. They can adopt NCCCK's Lending Scheme Policy whereby any member of an Association can borrow money while other members become his guarantors. Whoever has borrowed the money is expected to pay weekly with low interest rates of about 0.5%. The lending scheme can be divided into three phases. Phase 1 is open to all registered members. The members are entitled to borrow a maximum of Ksh 5,000, which is repayable within three to four months. After the member repays the loan, he is entitled to Phase two stage where he can borrow up to Ksh 10,000. The same procedure for repaying is as in the

phase one stage. Under phase three, a member is required to borrow upto Ksh 30,000. The members should monitor the expenditure pattern of the borrower lest he engage the loan in other businesses so that at the end of the day he is unable to repay the loan back.

A member who has borrowed the money should be able to repay the loan weekly of about Kshs.250, Kshs.200 towards the loan repayment and Ksh.50/= as interest.

The Corridor association should come up with a Co-operative society that will protect and promote the interests of the boda boda operators. This is a very important institution, as it will ensure increased credit to the operators.

The government and NGOs should also come in to give financial support to the operators. Boda boda transport in the study area and other parts of Western Kenya is a reality therefore the two stakeholders should support it fully.

6-4.2 Strategies to Incorporate Transport Demands in the Overall Transportation Planning.

Over the years, rural transport needs have been planned in support of agricultural production. In reality demands arise from both on-farm and off-farm where for the former case, walking is the predominant mode while for off-farm other modes such as bicycles take over because the distance is generally longer. Therefore, planning for rural transport should not only be confined to agricultural production but should include the whole range of economic and social activities. It should also include the possibility of

constructing and improving tracks and paths for easier movement of passengers and goods by bicycles.

6-4.3. Strategies to Eliminate Gender Bias in the Provision of Transport

In most parts of the country, a man's primary role is to earn income and the trip to work is the major transport activity for man. In contrast, women perform three roles, as workers as home keepers and community managers (Replodge 1987). From observations and other studies, women spend a significant part of their time and resources on local transportation of goods (both on-farm and off-farm). Men are more accessible to bicycles while women depend on public transport or resort to walking. In this regard, it is very important for transport planning policy to consider women's transport needs, since women head many of the households in the division. As a matter of national Policy, bicycles convenient for women should also be imported in the country.

6-4.4. Strategies to Improve the Current State of Roads

The government through the Rural Access Road Programme (RARP) should upkeep the bicycle tracks, which are not classified. Given that so much rural travel is NMT and remote from the road network, priority should be given to the improvement of the conditions of footpaths and tracks. This in turn will have significant impact on the efficiency of rural travel and transportation.

6-4.5 Insurance Policy

As part of incorporating boda boda services in the National Rural transport Policy, consideration should be given to insurance issues (see also section 6

There should be provision for bicycles riders on the main corridor. This should include bicycle-dedicated tracks along the main corridor to reduce friction between bicycles and motorized vehicles especially sugar cane tractors.

6-5 CONCLUSIONS

Planning for rural transport in Sub-Saharan Africa has been viewed in terms of roads and motorized vehicles. However, in the countries where poverty is greatest, rural transport modes are largely non-motorized (mainly on foot). The role played by NMT is important for all movements. This includes the use of wheelbarrows, bicycles and various forms of animal drawn carts. Therefore, it is essential to plan for both roads and appropriate modes, which can suit the rural set up.

Boda boda as modes of transport in Butula Division remains a viable and most appropriate mode. They are fast, reliable, convenient and offer frequent services. Due to the diverse spread of landuses in the division, most people use boda boda for their daily travels. They include markets, school, hospital and other social functions.

Boda boda as an industry is one of the solution to mass poverty and unemployment. It has been able to employ quite a number of youths that leave school every year and yet there is scarcity of jobs. On the same basis, it can assist in rural poverty alleviation through

raising their income levels. This is determined by the fact that an efficient transport system will ensure fast movement of passengers and goods. The bicycle is economical since its maintenance is minimal. What a bicycle requires is greasing, a tube or a wheel. The bicycle can be sustainable because the community has accepted it and this is seen by the fact that people from all income levels use them. In addition, the continued rise in fuel prices makes public motorized transport charges very high.

Therefore, for better utilization of the bicycle including boda boda, it is essential therefore to be given a due place in any integrated transport policy. Once its place is conceded in the set up, the next thing to do is to make a better use of the existing facilities. The rural access roads should also be given a higher priority than before. This will in turn ensure accessibility to opportunities and services by the majority of the rural people.

6-6 Areas for Further Research

- Improving bicycles for riding, carrying passengers and goods. The most common type of bicycle, manufactured mainly in India and china but exported to Africa is only used to carry one passenger (Plate No. 5-2, 5-5, 5-6 and 5-7). Therefore, in order to improve the load carrying capacity, it is important to carry out a research that will specifically deal with the design of bicycles.
- Insurance for boda boda operators and users should also be considered when planning for rural transport.

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APPENDIX 1: HOUSEHOLD QUESTIONNAIRE**UNIVERSITY OF NAIROBI****DEPARTMENT OF URBAN AND REGIONAL PLANNING**

INTRODUCTION: The interviewer is a Second Year Masters Student at the above institution. As part of her course work, she is required to conduct a research and write a paper(thesis) on a subject of her choice. Therefore, the information given will enable her to meet the degree requirements. This is purely an academic research and every information will be treated with a lot of confidentiality

HOUSEHOLD QUESTIONNAIRE**A. PERSONAL DATA**

1. Name of the interviewer-----
2. Name of the interviewee-----
3. Location-----
4. Sub-location-----

B. SOCIO-ECONOMIC CHARACTERISTICS

No	R/ship to hh	Age	Sex	Level of educ	Occupation
1	hh				
2	wife				
3	daughter				
4	son				
5					
6					
7					
8					

5. What is the average size of your land in acres?

b) Which crops do you grow ?

Cash crops	Food crops

6. Who undertakes the following activities and modes of transport used?

Activity	Responsible person	Mode of transport	distance	Time taken
Fetching water				
Firewood				
Hospital				
School				
Farm produce				
Market				
others				

7. What are your sources of income?

Source	Approximate amount per annum

C OWNERSHIP OF VEHICLES

8. a) Which modes of transport do you own?

Vehicle type	Number	Year obtained	New	Second hand
Bicycle				
Hand cart				
Ox-cart				
Donkey				
Wheel barrow				
Pick up				
Others(specify)				

b) How did you acquire the above modes?

- 1) personal 2) employer's 3) family gift 4) hire purchase 5) farm produce 6) others (specify)

c) From the above modes which ones do you use frequently?-

d) For what purposes?

10. Who are the usual users of the bicycle in your home?

- 1) father 2) mother 3) children 4) luggage 5) others(specify)

11. When do you use it?

12. How many times can it be used in a day?

13. If you own a bicycle, do you at times use boda boda?

a) If not, why?-----

b) If yes, when did you use them?

15. Do you think boda boda fares are fair (i) Yes (ii) No

16. Do you think boda boda taxis have a role to play in the rural economy?

17. Which problems do you face while using boda boda taxis?

16. How can the above problems be solved?-----

APPENDIX 2: CYCLIST/OPERATORS QUESTIONNAIRE

A PERSONAL DATA

Name of the interviewer-----

Name of the interviewee-----

Location-----

Sub-location-----

B. SOCIO-ECONOMIC CHARACTERISTICS

1. Age-----

2. Sex-----

3. Marital status-----

4. Level of education-----

5. Other occupation-----

6. Do you operate a bicycle taxis (boda boda) on full time or part time?

1). Full time 2). Part time

a). If it is part time, what is your main occupation?-----

b). Why did you decide to operate on part time?-----

c). On average, how much do you make (money) per day? -----

d). Comparing boda boda and the other occupation, which one earns you more money?

C. OWNERSHIP

7. Are you the owner of this bicycle?

1)yes 2) no

b) If no, whose is it?

1) Parents 2) Relative 3) Friends 4) Employer 5) Hire 6) Others (specify)

D. AREAS OF OPERATION

8. Which routes do you operate on?

Nodes	Distance	Frequency
Buhuyi-Butula		
Butula-Bukhalarire		
Bukhalarire-Khunyangu		
Khunyangu-Igonzo		
Igonzo-Bumala 'A'		
Others(specify)		

E. CO-OPERATIVE

9. Are you a member/official of a bicycle association?-----

10. How much do you pay to become a member?-----

-----11. How often do you meet?-----

12. Do you think that the Association is of great help to your business?

a) If yes, how?-----

-----b) If no why?-----

-----13. Why did you venture into this business?-----

14. What is your total income per day?-----

15. What is your total income per month?-----

16. What are your other sources of income?-----

17. Do you face any problems in your business?-----

18. What are the possible solutions?-----

APPENDIX 3: USERS'S QUESTIONNAIRE

A. RESPONDENT'S IDENTITY

Name of Interviewer-----

Name of Interviewee-----

Location-----

1. Sex 1) Male 2) Female

2. Occupation-----

3. Marital status 1) Married 2) Single

B. TRAVELLING PURPOSES

4. How many trips do you make per month?-----

5. What is the purpose for your trip?

1)Private 2) Business 3) Hospital 4) Social 5) Others (Specify)

6. What is your regular mode of transportation?

1) Motorized 2) bicycle 3) Others (specify)

7. How much do you pay for this trip?-----

8. Do you use boda boda to transport your goods?

1) Yes 2) No

If yes, which goods-----

If no, why?-----

9. If you use a bicycle, how much are charged?-----

b) Are the charges fair? 1) Yes 2) No

10 What are the advantages of using a bicycle?

1) Speed 2) Comfort 3) Accessibility 4) Others (specify)

11 What problems do you encounter while using a bicycle?-----

12 What are the possible solutions?-----

13 How can the bicycle transport be enhanced in the division?-----

APPENDIX 4: REPAIRERS QUESTIONNAIRE

PERSONAL DATA

1. Location-----

2. Age-----

3. Sex-----

4. Marital Status-----

5. Occupation-----

6. Level of education-----

7. Why did you start this business?-----

8. How many bicycles do you repair in a day?-----

9. How much money do you make in a day?-----

10. Are you the owner of this repair shop?-----

1) yes 2) no

b). If yes how many employees do you have?-----

11. Do you think bicycle transport has a role to play

1) Yes 2) No

b) If yes how?-----

12. What causes major damages to bicycles?-----

13. What problems do you encounter in your business?-----

14. What are the best solutions to the above problems?-----

APPENDIX 5: MODAL SPLIT AT BUMALA CENTER

Modes	In Bound	Out Bound	Total
B/loaded	531	389	904
B/unloaded	290	204	502
Walking	662	430	1092
Matatu	6	2	8
Others	4	2	6

APPENDIX 6: Total Modal Split at Butula Center

Modes	In Bound	Out Bound	Total
Bicycle loaded	250	317	567
Unloaded	531	541	1072
Sub total	781	858	1639
Walking	841	815	1656
Hand carts	2	2	4
Matatu	8	8	16
Lorries	6	1	7
Pick – ups	3	5	8
Buses	0	1	1
Tractor	0	7	7

Source: Field Survey, 2000