A STUDY OF THE RELATIONSHIP BETWEEN ROAD TRANSPORT SYSTEM AND AGRICULTURAL RESOURCE DEVELOPMENT IN KINANGOP DIVISION, NYANDARUA DISTRICT.

BY

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DECLARATION

THIS THESIS IS MY ORIGINAL WORK AND HAS NOT BEEN PRESENTED FOR EXAMINATION TO ANY OTHER UNIVERSITY.

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THIS THESIS HAS BEEN PRESENTED FOR EXAMINATION WITH MY APPROVAL AS UNIVERSITY SUPERVISOR

SIGNED.....

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ABSTRACT

This study set out to establish the extent to which the government's endeavour to improve and develop the productivity of agricultural resources is either assisted or even hampered by the existence of suitable road transportation system in Kinangop Division, Nyandarua District, bearing in mind the fact that road transport sector is the key to unleashing the potential for increased productivity and income levels in the rural areas.

There are telling examples throughout the study area where transport bottlenecks have put brakes on agricultural production, marketing of produce and reduced farm-gate prices, hence rural incomes. Roads are in extremely poor state making accessibility to farms during the wet seasons almost impossible by motorised transport. The state of the roads in Kinangop might help explain the important role that non-motorised transport modes such as cycling, walking, animal-drawn carts among others.

This study established that the existing conditions of the roads is the leading constraining factor to agricultural resource development in Kinangop Division. The road conditions compels the few transport operators to hike their transportation charges of both passengers and farm produce, which in respect to the latter, affects their competitiveness in the markets if at all they reach them, and reduces potential income accruable to the farmers. In effect it was found that 89.3% of the farmers complained of being offered extremely low prices for their produce.

Other problems affecting the development of agricultural resource in Kinangop include; high incidence of perishability of farm produce particularly milk and cut-flowers (81.1% of the farmers stated that they experience loses of milk in varying quantities in a given month(wet) due to transport related problems; high costs of agricultural inputs; weak cooperative societies; lack of cooperatives to deal with the major food crops grown in the Division such as potatoes, cabbages, carrots and pulses among others; frost attack on some crops; poor extension services;

poor farming techniques; delays in the payments of delivered produce by some buyers (especially Kenya Cooperative Creameries) KCC, and some horticultural exporters); exploitative middlemen and generally, poor infrastructural services in the local market centres, that can attract potential investors and urban population that can provide markets for agricultural produce.

Local authorities should be allowed to retain at least 65% of the revenue collected from the recently introduced Road Development Levy Fund charged on petroleum products to maintain and develop roads within their jurisdiction, particularly access roads in high agricultural potential areas. The challenge is on our policy makers and implementors to have foresight and full awareness on the regional multiplier effects of improved rural transportation system on agricultural resource development and economic development of this country in general, given that agriculture contributes about 35% of the of the GDP, and employs over 75% of the population.

Chapter one looks at the statement of the research problem, objectives of the study, research methodology, justification and limitations as well as data analysis among others. Chapter two is the literature review of related studies, the conceptual framework and government policies. Chapter three focuses on the various aspects and characteristics in the study area that influence its development potentialities;-location, physical characteristics, agro-ecological zones, settlements and administrative boundaries.

Chapter Four focuses on the agriculture potentialities in the division and problems hindering its full development. Chapter Five attempts to analyze the existing road network and conditions in the division as well as problems associated with it. Chapter Six analyses the relationship and effects of existing roads on agricultural resource utilisation, while Chapter Seven is the summary of research findings, study recommendations and conclusion.

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CHAPTER ONE : ROAD TRANSPORT AND AGRICULTURE DEVELOPMENT

1.1 Introduction

Since the colonial days, Kenya has had unequitable distribution of transportation infrastructures. Consequently, this has resulted and will continue to have enormous repercussions and especially so in fostering regional development disparities. Although it is not easy to gauge the degree to which these disparities result from poor distribution of transport facilities, the impact of these unequal distribution is quite noticeable. **Madungha (1975)** states that there is an imbalance in regional development in both Kenya and Uganda, and that there is a close relationship between trunk road system and the economically better developed regions. Even several years after independence, government policies continued to emphasize the provision of trunk roads as opposed to the lower level feeder roads.

Nyandarua district is fairly rich in agricultural potential which has remained unutilized to full capacity due to mobility and accessibility constraints among others **(Nyandarua District Development Plan, 1989-93)**. This study was undertaken in an attempt to ascertain the situation at the field- the road transport system in relation to agricultural resource development and/or utilization specifically in Kinangop Division of Nyandarua District.

The needs of rural transportation in many of the developing countries have received comparatively little attention and most rural areas continue to depend on modes of transportation which have been in use for several decades. Since most of these countries are primarily agricultural economies, the inadequate growth of this basic infrastructure has been an important factor in the growing imbalance between the rural and urban sectors/areas **(UNIDO, No.2, 1979)**.

The provision of suitable transportation facilities in the rural areas of developing countries,(Kenya included) constitute an essential infrastructure for rural economic development.

Such transportation facilities need necessarily to be designed both for the adequate movement of people and goods/materials in the rural areas and at prices that the rural population in these areas can afford. With the majority of the population(mostly the poor section) concentrated in rural areas ,the provision of adequate rural transportation facilities constitute a basic socio-economic need **(Ibid)**.

In national development transportation plays a multi-faceted role: movements of inputs, both human resources and materials (such as fertilizers, chemicals, seeds among others), to the agricultural and manufacturing sectors/industries, as well as the transfer of the products(outputs) of these sectors between and within production and consumption centres, is one basic role of transportation **(Okushubira, 1977)**.

1.2 Statement of The Research Problem

Within a nation,the development of any region is directly related to its ease of access to resources and to outside markets,or more generally to its physical position relative to other regions. Transportation is the life stream of any country/region's economy upon which, flow of goods, people, information and ideas depend. The vibrancy and even existence of any viable economy hinges on it **(Ibid)**.

In Kenya where the agricultural sector and related activities employ over 80% of the populace,the government's aspiration is to expand and develop this sector. Although much is said to have been invested in the transport sector,there are major constraints to mobility and accessibility especially in rural Kenya **(National Development Plan 1994-96)**. The nature or magnitude of these problems vary considerably from region to region even within the same district(s).

'The main issues of transportation policy focuses on the assessment of the costs to be incurred and the benefits to be accrued. The art of road development planning lies in avoiding grandiose investments that the economy cannot afford, whilst not inhibiting economic growth through failing to provide facilities for the growing sectors of the economy' (Hawkins, 1962). In Kenya, it is not exactly clear whether the construction of some roads in certain areas, does not follow political considerations rather than economics in the commitment of public resources for such projects, bearing in mind the resource base of such regions.

In 1974, the Kenyan government established the Rural Access Road Programme (RARP) with the objective of improving accessibility in high potential agricultural areas. However,these successes have not been very favourable nor recorded in all parts of the country. In some districts/areas, for instance, the study area (Kinangop Division, Nyandarua District), intermittent supply of farm inputs or lack of them on one hand, and going to waste of farmer's produce, especially milk and cut-flowers on the other, is a common phenomena. To a large extent, this study found that these difficulties result from inadequacies in the road transport system- poor road conditions, inadequate transport means, and poor road network.

Kinangop Division is one of the divisions in Nyandarua District with extremely inadequate transportation infrastructure, despite its high agricultural potential. This is exemplified through poor road network and poor road conditions. This study found that these inadequacies have played a significant role in hindering the full exploitation of the areas agricultural resource potentialities.

According to a **World Bank study[1], 1991,** the core problem in the roads maintenance sub-sector is not rooted in technical matters, but in political and institutional

[1] 'Road Maintenance Initiative', under the Sub-Saharan African Transport Programme(SSATP).

spheres. Expertise is certainly needed but it is/will not be enough without institutional and policy changes that usually involve several ministries and government agencies. In Kenya, cases are common where decisions over where public investments are to be carried have deep political overtones, rather than economic rationality or viability. A glaring example is the Mombasa_Nairobi road which has been neglected over the years, despite its international importance, to the point of becoming totally impassable in some sections ***('Daily Nation', Dec.18, 1994)***. *Others include the decision to construct a third international airport at Eldoret, despite experts questioning its viability and necessity in the national priorities given the poor status of much of the road infrastructure in the whole country in general.*

Public expenditure in many of the developing countries has been largely concentrated on the construction of roads for conventional motorized transport, particularly in urban areas. Although in some cases, there has been extension of long distance transportation network, the needs of rural transportation in most developing countries (Kenya included), have received comparatively little attention. Rural areas continue to depend on modes of transportation which have been in use for several decades. Since most of the Developing Countries are primarily agricultural economies, the inadequate growth of this basic infrastructure has been an important factor in the growing imbalance between the rural and urban sectors **(UNIDO, No 2. 1979)**. This scenario is well depicted in the study area.

The provision of suitable transportation facilities in the rural areas constitute an essential infrastructure prerequisite for rural economic development. Such transportation facilities need necessarily to be designed both for the adequate movement of people and goods/material in the rural population (which comprise the majority of the poor), in these areas can afford.

Although there has been increased recognition of the need for evolving an appropriate strategy for rural transportation, emphasis has been given largely to the construction of roads of

varying standards and specification to meet rural needs. However, comparatively, little attention has been given to the design and manufacture of alternative and appropriate means of rural transportation both motorized and non-motorised, specifically to meet rural requirements. The consideration of appropriate modes of rural transportation will need to take into account the pattern and construction of rural roads including standards and specifications, construction and maintenance costs and appropriate technological alternatives and development in respect of:-

(a) Muscle-powered transport such as cycling, wheelbarrow,

(b) Animal-drawn vehicles/carts, and various forms of motorised transport **(Ibid)**.

The various alternatives must be related to distance over which goods/materials have to be transported; their size, weight, frequency of trips as well as terrain. Agricultural production must be widely dispersed. A correspondingly widespread transportation network is required to bring supplies and equipment to each farm, and to take products from farms to consumers in towns/cities.

As an incentive to farmers, transportation must be as inexpensive as possible. Differences in transportation costs make cultivation of certain crops advantageous even on farms of similar physical characteristics. The transportation that is available to a locality affects not only the rate of agriculture development there, it also affects the kind of agriculture - the particular crops and livestock products - that can economically be produced in the locality.

According to **Nyandarua District Development Plan (1989-93)**, all the divisions in the district have frequent interactions with Nyahururu Town, which until, April 1995, was the District Headquarters, except Kinangop. Kinangop is said to be disadvantaged due to its distance and impassable roads during the rainy seasons. Infact, Kinangop is supplemented with services by Naivasha Town (Nakuru District) and the adjacent centres of Kiambu District, such as Limuru.

In the whole Nyandarua District, there are a total of 99 classified roads, covering a total length of 1041 km. Only one trans-district road from Gilgil - Nyahururu and on to Nyeri. There are 37 unclassified roads all over the district covering a total of 332.18 km. Ol-Joro Orok and Ol Kalou Divisions are fairly well covered by roads, and most of them are passable. Kinangop, and parts of the neighbouring Kipipiri Division, especially along the Aberdares, are not well covered by roads and most parts of the available roads are impassable during rainy seasons. The division's water table level is high; subsequently, in periods of high rainfall, most roads are flooded, and impassable.

When the potential of an area is not being realized, frequently the blame is put on inadequate transport. The lack of success in stimulating agricultural development by road construction is striking in a wide range of environment. All too often, people overlook the fact that roads are not end in themselves, but rather a means to an end. Other modes of transport have featured significantly in transporting produce in many parts of the world. Transport should therefore be seen only as a means to get access to markets;- market which include those for produce and for all manner of input, including advice and social services. This study was conducted with all these factors in mind, to try and establish the reality on the ground in Kinangop.

All too often, planners assume the construction of roads is equivalent to the provision of transport. This is by no means automatic, especially where capital, foreign exchange and skilled labour are short in supply, a common occurrence in developing countries (D.C's). Because road construction is in the public domain, whereas road haulage is often in the hands of the private sector, the latter tends to be neglected. The result all too often is that the road remains under-used not because the agricultural potential is not there, but because the road haulage capacity is not.

There are a number of pre-conditions if roads are to have much positive impact on agricultural production. The marketing system has to be flexible enough not to stifle the road effort; the transport industry needs the capacity to carry the extra output or to expand to do so; transport cost reductions have to be passed on to the farmer (***'International Agriculture Development Magazine'*, Jan/Feb 1989 pp.7)**.

Rural road programmes have yet to alleviate rural poverty, largely because transport planning in most developing countries does not take into account the needs and requirements of the majority of the rural population). Most studies indicate that the majority of rural communities depend on foot paths and tracks, rather than engineered roads for most of their movements. For instance in Philippines, less than half the rural villages have access to the road system. In Bangladesh, 80% of the villages have no direct access to mechanised means of transport. This situation is a natural result of an exaggerated concern with economic rather than socio-economic development (Ibid). With these facts in mind, this study attempts to look at the relationship between the available road transport system and agricultural resource development in Kinangop area. This entailed the assessment of the available road network, type of roads, conditions and their impact on agricultural resource utilization and development.

In most Sub-Saharan African countries, skeletal transport networks, mean that many food markets are inaccessible to food producers. Small-scale farmers with meagre quantities of surplus food find it difficult to participate in the market economy. The economic structural Adjustment Programmes (SAPs) imposed on many African governments including Kenya in the 1990's are partly responsible for the deteriorating transport services **(Pirie, G.H, 1993)**. Governments are obliged to shed or cut down expenditure on unremunerative operations and/or to withdraw subsidies.

Lack of adequate motorized transport; use of the slow, limited capacity head-and back-loading, as well as poor road maintenance have had a big impact on agricultural productivity. All these factors affect the marketing of the produce, hence farmers' income. Even food production has been affected adversely by the amount of household time and energy that must be sent in off and on the road transport **(World Bank, 1989)**.

In the study area, farmers are forced to hire tractors, or animal carts, to get their produce to the main roads where the trucks are parked, during the rainy seasons. This further eats into their meagre earnings. For dairy farmers, they have to wake up at ungodly hours (3-4 a.m) to milk and deliver the produce to far-away collection points, where the trucks reach. In most cases, many farmers live many kilometres from any classified road. This situation is aggravated in Kinangop by the fact that all roads in the division are of class C and below. This means that the farmers face high transport costs for agricultural supplies and products.

For those farmers (small-scale) who grow horticultural products, esp. cut-flowers, basically means for export, delivery into the collection points is a big issue. This is because they don't possess specialized facilities to handle the delicate flowers. they are transported either on the back-load or on bicycles, which makes them very susceptible to breaking among other things, and thus lowering their grade - hence prices. Even four-wheeled vehicles are not spared by the conditions of the roads in the study area (Ref to Plate No.4 pg 76). Cut-flowers have to be transported to refrigeration/cooling facilities as fast as possible or be exported. As such, these delays leads to alot of losses, both to the farmers and exporters.

When the potential of an area is not being realized, frequently, the blame is put on inadequate transport. All too often, people overlook the fact that roads are not an end in themselves, but rather a means to an end. Other modes of transport have featured significantly in transporting produce in many parts of the world. What the farmers however need is effective

access to a market. If the farmer lived in a village with a lively source of demand for produce and the capacity to produce other commodities he/she wanted, the need for long distance transport might not exist.

" Transport should therefore be seen as a means to get access to markets, - markets which include those for produce and for all manner of inputs, including advice (Extension Services) and Social Services",[2].

The vital question to ask is whether the road in question will improve that access. Roads are needed, but certainly they may not be enough. If the profit is there, the transport problem can be solved without roads. Improved access therefore usually boils down to a reduction in the cost of that access. In order for road construction to have an effect, it must achieve savings in transport costs for the farmer, although in practice, this may not necessarily be the case **(Ibid)**.

The study of travel patterns of rural inhabitants in most cases neglect on-farm transport needs **(Barwell and Howe, 1979),** and concentrate on off-farm ones. Tasks related to crop production such as movement of seeds, plants, fodder, fertilizer, insecticides, agricultural implements and harvested crops among others consume considerable amounts of labour, time and transport between farm and farmer's dwelling and/or storage facilities. An understanding of these travel patterns is crucial to planners - i.e purpose, magnitude, frequency and duration of all trips performed by rural households.

According to various studies, **(Cook, 1993; Barwell, 1979)** the distance over which crops are transported to markets varies among countries. In Malawi, this distance is 6.5 kilometre, 8.7 kilometre in Mexico, while in Kenya it ranges between 5-15 kilometres.

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[2] Stephen Mandels: ''International Agricultural Development Magazine, Jan/Feb. 1989.pp.7.

Availability of both personal and commercial transport facilities, proximity of marketing centres and the ability of farmers to absorb transport costs have been found to be the principal three factors determining travel distance. Poor farmers who cannot pay transport costs for their produce may thus be forced to sell at low prices in local markets to a limited number of local or itinerant traders (middlemen) **(UNCHS, 1985 pp.25)**. This was found to be a big problem in the study area as middlemen take advantage of the transport problems in the rainy season, when most of the access roads become impassable. Farmers are forced to pay for the cost of transporting their produce to collection points, through deductions on the price of their produce it becomes a form of punitive tax for farmers to sell, hence productivity is curtailed.

1.3 Study Objectives

Generally, this study is focusing on the relationship between road transport system and agricultural resource development in Kinangop division, Nyandarua District. The study thus sought;

(a) to examine how the road transport network affects the marketing of agricultural produce and procurement of inputs, both within and outside the study area.

(b) to identify mobility and accessibility problems and their spatial distribution within the division.

(c) to explore the implications the transportation issues identified bear on agricultural resource utilization/ exploitation;

(d) to advance a set of proposals to alleviate the transportation problems identified, there upon and evolve a sustainable mobility and accessibility strategy for agriculture development in the region

1.4 Study Justification

Nyandarua is one of the districts in Kenya, that was designated as a settlement area for the landless by the government, soon after independence. It is predominantly a mixed farming district, now characterized by small-scale farm, over its former "Scheduled area" status, reserved for white colonial settlers, comprising of large tracts of land. According to the **National Development Plan (1994-96)**, small-scale farmers are presently, the major contributors to the agricultural GNP. Therefore, there is a need to evaluate and appreciate the role they play in our economy, and the problems they face in their attempt to ensure food security, to cope with the rapid increase in population, both in urban and rural areas.

Increasingly, Nyandarua District in general, and Kinangop Division, specifically has established itself as a major supplier of foodstuffs and cut-flowers (for export) to the greater Nairobi Market, even during dry seasons in other parts of the country. This is because, almost every month has some amount of precipitation. The major crops grown, in terms of cultivated hectarage are potatoes, vegetables, carrots, cabbage, kales), beans, pyrethrum, wheat and horticultural crops - flowers and fruits. An even large section of individual plots is allocated to dairy-rearing among other.

The district was one of those designated to benefit from the RARP/MR Programmes since it is a highly productive agricultural one. This study attempts to examine how the status/condition of the road network system including access roads has had, and the progress made, on agricultural resource development, or lack of it in the division.

Generally, the Nyandarua District, and specifically Kinangop Division has a rich agricultural base, both crops and livestock. It has fairly fertile soils which comprises 3/4 (60%) loam, while the rest is some poorly drained clay in certain regions. Rainfall is fairly well distributed, with the higher records being made in April/May and August while the lowest

records in January/February and December. As such, a study of the ways and means the local people utilises to deliver both inputs (seeds, fertilizers, pesticides etc), and products from their farm is essential so as to devise ways and means of realizing full and sustainable development and utilization of local resources. In this context, a study of the road transportation system is seen ambitiously from the point of view of enhancing production, consumption and trade in the long term.

1.5 Study Assumptions

(i) The road transport network and its conditions (surface condition and mileage) is primarily responsible for agricultural development in the division, and entire district in general.

(ii) The road transport network and its conditions is not primarily responsible for the agricultural development in Kinangop division, and the entire District in general.

1.6 Study Scope

This study is primarily based on the relationship between road transport network, and agricultural development in Kinangop Division, Nyandarua District, Central Province in Kenya. Other factors are only considered in so far as they assist in explaining this theme; or making this relationship explicit. It also looks at existing road network, production of agricultural output, transport and marketing problem as well as role played by non-motorised transport (N.M.T.) and other factors that directly or indirectly influence agricultural resource development within and outside the study area/ Nyandarua district.

1.7 Research Methodology

This study has utilized both Primary and Secondary sources of data. The data collected include:

(i) Data collected from administration of a closed questionnaire for both households and transporters

(ii) Series of scheduled interviews with relevant Government officials - Ministry of Agriculture, Livestock and Marketing, Public Works and Housing, Provincial administration.

(iii) Use of secondary data, through a literature review of existing works/materials on both agriculture and transportation, and/or related matters. These included Government Publications such as Development Plans, Maps, Reports among others.

(iv) Direct observation in the study area was utilized to gather information with regards to the nature / condition of roads, modes of transport in use, distances travelled, crops grown, livestock types / breeds.

1.7.1 Methods of Data Collection

(a) Secondary Data:

This was obtained basically through a review of related published works, regarding the subject of Agriculture and Road Transport. A thorough review of Government Publications such as Development Plans, Reports, Maps and other documents from Government offices and data

(b) Primary Data: Various methods were used including:-

(a) This type of data was collected in the field by way of administering closed questionnaires. Two sets of questionnaires were administered;

(i) one for the household or farmers, and

(ii) another for transporters of various farm products and inputs.

(b) Direct observation and recording, including taking photographs of the socio-economic activities:- road conditions, crops, livestock among others.

(c) The other method used to collect information on the subject was through interviews (scheduled) with key respondents such as officials of various Ministries represented in the Division, and District); Cooperatives, NGO's, Provincial Administration among others.

1.7.2 Data Analysis

Both quantitative and descriptive tests (statistics) have been used to test the correlation between road network conditions/or lack of it and level of agricultural intensity or production. Quantitative data was coded and computed to obtain frequencies. The statistical information derived has been used to verify the assumptions that the study had.

Data was basically analyzed using SPSS Package (Statistical Package For Social Scientists), and thereby generating various frequencies such as the measures of Central Tendency among other statistics. Cross-tabulations of various variables was carried out, to establish how certain variables influence others. The results were generated in terms of tables charts and figures.

Qualitative data has been synthesised to establish a running theme in issues the study had intended to address. Notes written during interviews with key informants in the Division/District

have been used to establish issues which questionnaires could not effectively address. Some of the recommendations drawn have been derived from the local people's views collected during the survey.

1.8 Study Limitations

This study experienced various short-comings, particularly, during the collection of primary data.

(a) Some data pertaining to the division were not accessible or were lacking. Most records available, are/were compiled based on the district in general. As such, some conclusions arrived at by the study, could be attributable Nyandarua District in general.

(b) Due to lack of adequate financial resources and time, it was not possible to literally carry out research in all the sixteen locations within the Division. Consequently, sampling was necessary. A total of Six Locations were included in the sample, after a process of random choice. These included Njabini, Kitiri, Bamboo, Githabai, Murungaru and Gathara. Each of these six sub-locations were randomly selected from each of the Five Locations, making up the Kinangop Division.

(c) Furthermore, travelling costs within the Division is extremely expensive, thus necessitating the researcher and his assistants, to trek long distances on foot. In addition, it's highly unlikely that one could travel at a given time as desired, due

to inadequate public or even private means. Road conditions see to it that very few operators of public vehicles are willing to risk their vehicles on such rough roads. Those who do, "insure" themselves by charging exorbitant fares.

(d) During the survey, some of the respondents earmarked for interviews either declined to be interviewed or were absent, even after repeated contacting efforts. These in away could have occasioned some element os technical bias,due to the fact that other respondents were chosen to take the place of those who were unavailable for interviews.

(e) The survey was carried out during a heavy rain seasons, accompanied by extremely cold spells. This to some extent interfered with mobility and accessibility to some farmers in some locations; interrupted some of the interviews necessitating postponements, thereby curtailing the researchers capacity to effectively extract some finer details on certain aspects. It also affected the researcher's health and quality of photographic prints.

CHAPTER TWO LITERATURE REVIEW AND GOVERNMENT POLICIES

2.1 Literature Review

Agriculture and transportation are important sectors in a country's total development effort. Majority of Africa's and indeed, Kenya's population are involved in agricultural or related activities. Both sectors are an indispensable source of revenue. Agricultural production can be made more efficient and intensive by encouraging regional specialisation. Improved movement channels and facilities do provide such encouragement **(Birdsall, S.S, 1968)**.

Birdsall further describes the procedures used for the determining the priorities for investments in agricultural roads. These include the calculation of the improvements which can reasonably be in the profitability of the agricultural production. The costs and advantages of improving one road rather than another are then compared with the agricultural potential located along the roads. The result will indicate which roads will assist the greatest agricultural change for least improvement of/on roads (routes, paths, tracks).

Development of road transport network is closely related to the general rural development, and to agricultural development in particular. Both agriculture and transportation system (ways and means) are important aspects of rural development. The development of one,where physical factors permit seem to influence the development of the other. Foe instance, the siting of a motorable road will enable the transportation of agricultural inputs and outputs. At the same time, rich agricultural land will enhance the provision of more transport facilities to exploit these resources **(Ocharo, 1977)**.

There is a historical correlation between the development of transportation and agriculture so that the parts of a given district served by an all weather road, transport system have a faster

rate of agricultural development than the relatively poorly served areas. Efficient transport channels facilitates the diffusion of agricultural innovation **(Ibid)**.

The total road network in Kenya has expanded from 41,900 kilometres in 1963, to 150,620 kilometres in 1992, out of which 63,120 kilometres are classified roads under the care of the Ministry of Public Works (MOPW). The government recognizes the fact that road transportation plays an important and pivotal role in the development and sustenance of the economy as a whole. Until recently, road construction and improvement have been the major thrust of road development. However, increasingly, attention is now being given to road repair and maintenance of those already existing and raising to motorable levels the existing earth roads **(National Development Plan, 1994-96)**.

Except for the only trans-district road that stretches from Gilgil through Ol Kalou, Ol Joro Orok, Nyahururu, Ndaragwa and Mweiga to Nyeri, as well as the Nakuru-Nyahururu road, Nyandarua district 111 classified roads, totalling 1276 kilometres. There are a total of 37 unclassified roads totalling 33 kilometres. The total extent of Bitumen-standard roads in the district is 141 kilometres. Kinangop division (study area) and parts of Kipipiri division, (especially those bordering the Aberdare Ranges) are not well covered by roads. Most portions of the existing roads are impassable during the rainy seasons, as they are mostly, earth roads and tracks. During the dry seasons, they become very dusty, making movement over them slow, uncomfortable and even unsafe **(Nyandarua District Development Plan, 1994-96).**

Although the district as a whole has agricultural potential, and particularly the Kinangop plateau which comprises the study area, it suffers from serious inadequacies in its road transportation system. This might be playing a big role in constraining the full development of the agricultural development process. This is because it inhibits the flow of both inputs and

outputs as a result of increased transportation costs. It also hinders the free flow of relevant innovations and information especially with regard to markets, to the farming fraternity.

The road network in Nyandarua district has remained unchanged since 1988. Priority is said to be now given to the improvement of existing roads through re-gravelling, spot improvement, drainage works and maintenance under the newly formulated Minor Roads Transition Project which is to replace the Rural Roads Access Programme (RARP).

Table 2.1 Distribution of Road Network in Nyandarua District

	DIVISIONS				
	Ol Joro orok	Ndaragwa	Ol Kalou	Kipipiri	Kinangop
Classified (km)	243.3	243.6	284.6	200.8	303.5
Tarmac (km)	27	27.8	37	Nil	49

Source: Nyandarua District Development Plan, 1994-96 : District Roads Office, Nyandarua, 1993.

Since Nyandarua district is a high potential agricultural area, the existing motorable road network is over-utilized and requires regular maintenance. There is particularly heavy traffic on the tarmac roads due to vehicles passing through the district to and from other neighbouring districts. The earth roads in the district are however under-utilized during the wet seasons, when they become impassable.

Table 2.2 Provision of Road Network (1988-92)

TYPE OF ROAD	1988	1989	1990	1991	1992
Tarmac	141	141	141	141	141
Gravelled	529.9	529.9	529.9	529.9	529.9
Earth	574.3	574.3	574.3	574.3	574.3

Source: Nyandarua District Development Plan, 1994-96: . (District Roads Office, Nyandarua, 1993).

Despite being the hub of agricultural and dairy activities are not well covered by roads. Those existing are mainly earth roads, which become totally impassable during rainy seasons. The worst-hit are those on the fringe of the Aberdare Ranges.

Table 2.3 National Road Network

Surface Type	1990	1994	1995	1996
(1) Bitumen	7943	9000	9240	9490
(2) Gravel	26,181	26400	26700	26900
(3) Earth	28543	28000	27800	27900
Total	62,667	63,500	63740	63,990

Source: National Development Plan (1994-96)

Under the Rural Access Roads Programme (RARP), the National Development Plan (94-96), further states that 8120 kilometres of rural access roads had been constructed by June 1992, countrywide. Out of these, 2390 kilometres had been developed to gravel standard. The RARP is to be phased out into the Minor Roads Transition Project.

The immediate effect of improving transport facilities is to lower costs of carriage, so that the total costs are reduced by the amounts of saving in the transport element. However, the supply of goods and services to the ultimate consumer involves more than just the costs of movement. Other related costs include, storage rates and charges, handling, loss, deterioration and insurance fees. It is always important to distinguish between the total costs of transport which the user has to meet, and the actual rates and charges demanded by the form of transport used. The farmer always exceed the latter, sometimes by a considerable margin. It is the final/total transport costs that affect the final delivered cost of the goods and services to the consumer **(Hawkins, 1962).**

Hawkins sees transport as having two dimensions; space and time. Better transport means that goods can be moved more cheaply through space, from production points to the point of consumption. In this context, transportation has the effect of widening markets with all the possibilities of economic growth that this entails. As regards time, improved transport enables big economies to be made in the use of capital. Markets can be served on a larger scale because capital in terms stocks or farmers produce can be turned over more quickly to consumers. This saving in time may often be more important than the growth of markets brought about by mere reduction in the cost of carrying per mile/kilometre.

Improved means and ways of transportation releases working capital which can be then used more productively as fixed capital elsewhere in the economy. Lower transportation costs as a result of savings in space dimension, widens the market, while lower carriage costs per mile reduces the economic gap between producers in the rural areas, and the consumers in urban settings such as Nairobi. This increases the effective area of the market because lower prices will

attract more consumers, and thus producers (farmers), will not only be able to sell over a large geographical area, but also more, within the already existing markets **(Ibid)**.

OKushubira (1977) Undertook a similar study in Bukoba District in Tanzania, in which he made an attempt to establish the transportation problems that serve to stagnate agricultural expansion in the district. He examined, among others, the role played by physical and socio-economic characteristics which could have bearings on agriculture and transportation system (air, water, rail, road). These comes out clearly. However, he down played the role that the community itself could play in shaping their own lifestyles. His recommendations to be implemented would have to depend entirely on Central Government assistance. With the current age of Structural Adjustment Programmes (SAPs) which requires governments to shed substantially some of their public expenditures, community involvement and education in use of local resources is of major importance/value, in ensuring sustainability. He failed to address adequately the role played by local cooperatives in solving farmer's problems regarding marketing, supply of inputs and other self-help measures, such as, repair of roads, construction of culverts to drain roads among others.

Transportation is a necessary concomitant of the exchange economy, and is indispensable to economic growth. Little or no accessibility to transportation means restricts economic activity to hand-to-mouth subsistence levels. Specialization and generation of surpluses for exchange on the basis of comparative advantages are not possible without capability to more goods and resources from one place to another. The demand for transport services increases with the extension of the input - output relationship of the economy and the provision of transport services can be an important determinant of the pace and locational pattern of development **(World Bank: Transportation, January, 1972).**

As a relatively, newly-settled district, Nyandarua full contribution to the country's food security, and indeed, out export's GDP, can be realized effectively when linked to market centres, both locally and abroad, through a cost-effective communication channels/routes. In this regard, on-farm transport, and the accessibility level of the farm to a major outlet channel is crucial to a farmers production morale.

Road conditions in most Sub-Saharan Africa (SSA) cannot however be isolated from the general economic situation prevailing in the region; - eg. negative or slow economic growth; declining agricultural productivity and heavy burden of external debt. Gross Domestic Product (GDP) and incomes per capital have been declining or stagnating, while population growth rates add 20 million people to the SSA per year **(World Bank's (ECA) Economic Commission for Africa, Sub-Saharan Africa Transport Programme (SSATP), 1991)**.

The transport sector, particularly roads, is a key to unleashing the potential for increased production and incomes in SSA. There are telling examples where transportation bottlenecks have put breaks on growth, especially, agricultural production. If farmers and/or manufacturers are to take advantage of reforms in agriculture and other productive sectors due to liberalization, they must have a dependable road system (Ibid). Without efficient transport (and consequently lower costs) (and in most SSA, transportation means, more than anything else, roads), there can be no supply response, to supported renewed growth and food security in this country. The objectives of transportation in this context is seen as ensuring Efficiency (lower costs) and sustainability.

In most cases, the poor economic performances of many developing countries, (including Kenya) has meant that levels of gross investment and maintenance expenditures on roads have not been sufficient to preserve and modernize infrastructure and equipments **(Ibid[2])**.

It is unrealistic to consider the feasibility of agricultural development in isolation of transport. It is one of agriculture's major service sectors. Poor transportation systems have negative impacts on the development of an economy, and on the regional integration. Agricultural sector has a relatively intense demand for transport.

Compared to industry, agriculture has per investment unit, a high transport demand. A ton of agricultural commodities is traditionally lower than a ton of industrial commodities which contain more value-added. As a result the movement of agricultural commodities is quite sensitive to transport costs. Combined with other factors, transport costs can easily become the decisive factor in the decision to grow crops, for other than the local markets **(F.A.O, 1973)**.

Rural accessibility and transportation services are critical for the modernization of agriculture and for the welfare of rural households. Agricultural constituencies /fraternity need to be involved fully in formulating priorities for road infrastructures and transport services. This participation should be expanded to include transporters (shippers) and suppliers of agricultural inputs and products. It should be institutionalized, rather than being undertaken on adhoc basis; to allow predictability and consistency.

Kimani B.K, (1990) undertook a study on the impact of rural road transport to agriculture, in Ol Kalou Division, Nyandarua District. However, his study was specifically dwelt on the RARP. He has stated the possible benefits that the local community stood to gain from the programme. He did not dwell on the future sustainability of the programme as and when the donors withdraw, as indeed they did in 1991-92 period. His recommendations are thus tailored on the improvement of the RARP and leaves out the fact that, quality leadership in any organization/or area, to a large extent determines or influence the development tempo of that region. Local initiative in the utilization of available resources, as well as community awareness through (improved accessibility to modern technology and information plays a big role in

equipping farmers to the challenges of self-help and survival in a liberalized economy. He does not give adequate emphasis on the fact that the opening of transport routes in a region is necessarily synonymous with development. Other ingredients of development have to be present, if any meaningful change have to be present, if any meaningful change have to take place. For instance, if a road is constructed through a given region, but it lacks water supplies, population (human) and raw materials among others investment in transport facilities will be wasted. It is a key factor in that it cannot be omitted; if means of transport exist, then development may take place, while if they don't, it is certain that no tangible development will result. The effects of improved communication links/routes can be reflected in the growth of traffic volumes, and costs can be compared with revenue.

According to the ***'East African'*****,(May 1-7,1995 pp.1 & 32)**, the World Bank has put on hold requests by Kenya for $ 260 millions in loans to finance three major infrastructural projects, demanding to know how the government was to fund Kshs. 3.7 billion ($ 84 million) Eldoret airport project, which is not perceived to be a priority, given the conditions of other important infrastructural facilities. Privately, donors are hard pressed to justify funding the Nairobi-Mombasa road project to their boards and constituents back home when the Kenya government was signalling that repairs of the highway was not a priority project. There are also fears on the impact such a high cost project will have on the fiscal balance especially when a tight monetary policy is seen as essential to hold down money supply and inflation.

2.2. Conceptual framework

(Note: By transportation, reference is on roads transport system (including road conditions and network) and its various users and modes).

The development of agricultural resources is dependent upon several factors; these include

land resource; human including technology available; social-economic and supply of agricultural inputs among others,such as government policies. Transportation as a production process serves as the link for the supply of agricultural inputs to the farmers from suppliers be they cooperatives, private firms or other middlemen. The timing of the supply of agricultural inputs to the farmers is crucial to the production process and unnecessary delays can disrupt the growing cycle and harvests.

Land resource in this context refers to among others, the type of tenure, farm sizes and traditional practices that limit accessibility to land by some sex (especially women, who are the major participants in the production process. This then affects their capability to develop such lands as they have no security to acquire credit facilities, particularly where men are absent. As such the type of tenure which one holds will influence a given farmer's investment motivation and capability to secure loans and other credit facilities to develop agricultural activities. The size of the farm is important given the fact that our population size is increasing rapidly. Given the fact that land sizes are fixed, this calls for intensification of production methods of farming.

The agro-potential of a given area depends on the natural environment endowment. In this respect, factors such as climate (rainfall, temperatures etc) and soils (type, fertility, drainage characteristics and maturity), influence the type of crops and animals grown and reared respectively. Topographical factors such as altitude will also impose restrictions on resources development and utilization.

There are also some human factors that influence agricultural resource development in a given region. These include the level of training/education one has attained, skills and experience as well as the expectations of the returns one can get from certain investments on land resource development.

The supply, affordability (prices) of various agricultural inputs such as fertilizers, capital seeds extension services, credit/loans in conjunction with all the other factors of agricultural production influences agricultural resource development. A resource which the small scale farmer lacks perhaps more than any other is relevant information, particularly regarding market conditions (especially of agricultural prices) such that sharing of agricultural produce is usually difficult.

Social-economic factors and policy orientations may also influence the agricultural resource development. These may influence a farmers decision on whether to cultivate cash crops, rear dairy cattle, diffusion of innovation among others.

However, for effective utilization of all these factors, and give them significance to agricultural productivity, transportation services comes as a vital link in the full development of a given region's potentialities. With the increasing significance of rural development as a strategy to bring about social-economic transformation in the lifestyle of the poor majority of the people, transportation is considered as an integral part of the agricultural production process as it can assist in creating producer surpluses by lowering transport costs of farm inputs and farm produce.

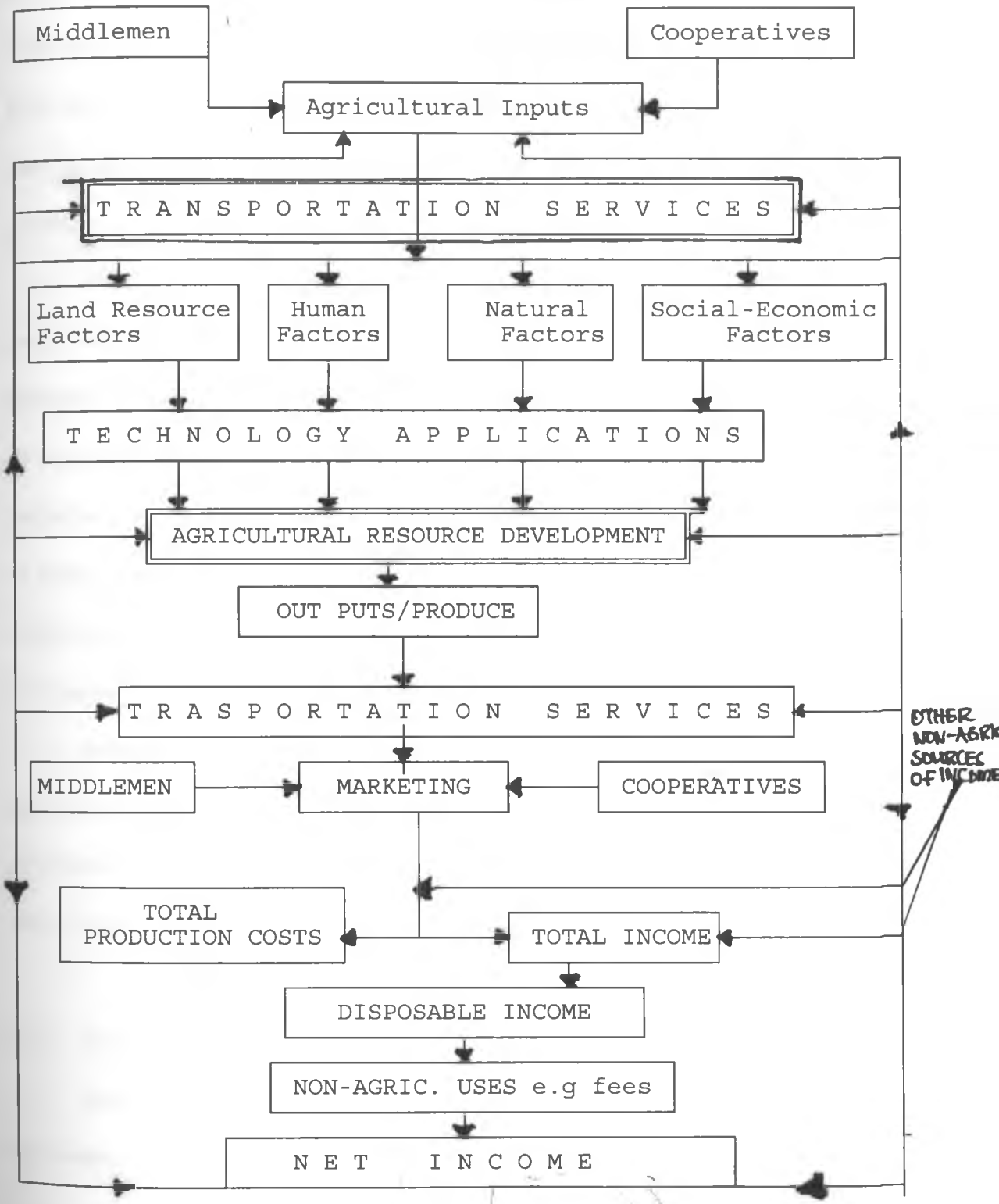
The condition of the rural poor farmers who in most forums happen to be forgotten, although governed primarily by access to markets for both inputs and sale of their produce is seriously affected by the quality of transportation. the quality of transportation facilities available within a region affects people's (farmers) ability to reach input suppliers and retailers as well as the reception of other goods and services, and the sending of their produce to the markets. Less directly, it affects employment prospects, the price of produce and the flow of information and extension services.

Improvements in transportation system can lead to savings in costs and/or time by both the producers and the final consumers, because of the decreased costs of farm inputs and outputs

as well as other consumption articles. The conditions of roads and footpaths and the quality of vehicular transport affect the safety and efficiency with which people and/or goods can travel. In most rural areas, very little has been put in place to deal with on the farm transportation and accessibility (**UNCHS, December, 1982**).

Marketing of agricultural produce is also done either through cooperatives or private individuals and firms. Depending on the level of organization and quality of management, cooperatives can assume a bigger share of the marketing viz avis other middlemen. Some farm produce require quick and efficient delivery to the consumers, such that the transportation system in place in a given region, will positively or adversely affect the production system and hence either cause high incidence of produce perishability or enhance earnings or whichever prevails. Provision of access roads, greater focus on-the farm transport and storage facilities, and appropriate vehicles are significant transportation factors, with great influence o the scope of movement of both passengers (farmers) and goods/produce.

Figure 2.1 **Conceptual Framework: Agricultural Production And Transport Linkage Model**



Source: Researcher's Own Derivation, 1995.

All these mentioned factors among others affect the total production cost and income level received by farmers. It is common to find some of the farmers engaged in other income generating activities to supplement their farm-based incomes. Farmers also have none agricultural-based avenues for spending their incomes, and which affect the amount of investment capital that can be pumped back to the agricultural production system.

Many of the rural poor in Kenya tend to be locked in a vicious circle involving lack of money, inadequate equipment, time-consuming and health-impairing methods of transport, lack of flexibility and exploitation by transporters and middlemen. Upgrading of existing paths to tracks usable by lorries, in a bid to reduce freight distances from individuals farm holdings, might be more beneficial than those obtained from upgrading of earth tracks to paved roads. Small scale remedial measures such as the construction of elementary bridge, drifts, culverts and drainage facilities on critical sections of track may produce very much greater benefits than general upgrading works.

Unless the prices of various farm inputs are made affordable to the poor farmers and their produce delivered to the most competitive markets using reasonable and affordable transport means our effort to enhance agricultural productivity won't bear much fruit and their farming activities will be limited mostly to subsistence agriculture.

2:3 Rural Development and Government Policies

Rural development can be referred to as a process of societal change in attitudes, behaviours and practices which aims at enhancing the standards of living of rural

households. This involves the mobilization, organization and utilization of local resources for the welfare of the people. Organization of the people is crucial in the realization of these goals. Rural development is thus signified through increased income levels, creation of more employment opportunities (including non-agricultural activities) for the rapidly increasing population, as well as the provision of essential infrastructural services such as roads, health facilities, schools, piped water, sewerage and waste disposal systems, electricity (to help stimulate Jua Kali sector) and credit facilities.

Community mobilization and participation in development programmes affecting their lifestyle right from the planning stage, through the implementation and maintenance is very crucial to the success and sustainability of any given community project. This gives the local community the feeling that their aspirations, needs and priorities have been considered, and thereby be committed to the success of such programs. This also applies to the introduction of new innovations or techniques in agriculture. In this context training of a few local farmers might be very beneficial, who later act as community trainers. This helps eliminate suspicion and reluctance to associate with a given innovation or idea or people **(Akungo, 1980)**.

2.3.1 Government Objectives in Rural Development

According to the **National Development Plan (N.D.P), 1979-83** the government's objectives in rural development are stated as;

(i) creation of employment to the increasing rural population;

(ii) dispersion of industries and development of non-farm activities in the informal

sector, which are labour-intensive and contributes about 40% of the small-holder incomes;

(iii) to research on and building development institutions to find appropriate inexpensive technologies;

(iv) stem the flow of rural to urban migrants.

The policy strategies guiding the government objectives in rural development are;

- increased rural incomes and production;
- increased equity in the distribution of resources and services;
- increased access to services;
- increased participation and decision-making at the district level- district focus on rural development strategy.

All these objectives assume that agriculture will continue to play an increasing role in their achievement. Due to various problems constraining industrial development in rural areas, for example, lack of financial resources, entrepreneurship skills, poor infrastructure among others in the national scale, it is in this context that agricultural development will continue to provide most of the rural incomes and hence its maximum development is imperative to both industrialization and rural development in Kenya generally.

Kinangop division is a high potential area with great agricultural resource development capability, but the full exploitation of these capabilities is curtailed by the poor infrastructural development, particularly, poor road conditions and network. Roads

generally become impassable during the rainy seasons making delivery of farm produce to markets extremely difficult and expensive. In this study, it was established that most farmers have suffered some losses due to transport related difficulties. The connection of Engineer to the national electrical grid has greatly contributed to its expansion, both in population, trading activities and Jua Kali workshops.

2.3.2 Government Objectives in Rural Agricultural Development

(a) to ensure better land use;

(b) to provide essential services; credit extension, inputs, markets, and transport to small scale farmers;

(c) construction of rural access roads to expand the flow of inputs versus outputs, extension services and credit, market accessibility, water and power;

(d) to identify and encourage inexpensive appropriate technologies for enhancement of small-scale farm productivity **(Ibid,pp.15)**.

However, at a national level, it is not clear to what extent the government has been able to achieve these objectives through the District Focus for Rural development (DFRD) strategy since its inception in 1983. This is beyond the scope of this study and might be the subject of another study.

Nevertheless, in Kinangop it is clear that the attainment of some of these objective has been constrained by certain factors such as ;

- poor infrastructural development; poor road network and impassable roads during the wet seasons, and very dusty during the dry seasons; lack of power (except

Engineer market centre) inadequate water supply and poor markets among others.

- poorly organized and managed cooperative societies
- Lack of specialized storage facilities for milk, floriculture and horticultural products
- Lack of credit facilities
- Lack of relevant information and technology
- High costs of transportation
- High cost of farm inputs

2.4 Role of Agriculture in Rural Development

Agriculture has a great role to play, not only in rural development, but in the national context of economic growth and development. These include;

(i) to provide food to both the rural populace and the urban dwellers, which is important in giving nutritional ingredients for good health;

(ii) provision of income earning opportunities through the growth and sale of farm produce, in a bid to alleviate poverty. this was the central theme of the 1979-83 planning period;

(iii) agricultural growth - higher production and improved marketing efficiency may lead to improvements of the balance of payments especially with regard to exported cash crops such as horticulture (fruits) and flowers.

(iv) agriculture also provides raw materials for industrial processes for example, cotton, sugar, fruits etc.

This study has made an attempt at assessing the impact of road transport network and conditions in the attainment and/or failure of achieving these objectives in Kinangop division. The division has a great potential not only for fulfilling Nyandarua district's food requirements, but also sufficient enough for export to the neighbouring districts and even abroad. However, this potentiality is constrained by costs of inputs such as fertilizers and chemicals, diffusion of technical innovations through extension services, availability of certified seeds in good time for planting , accessibility difficulties, efficiency in the use of labour, and poor marketing infrastructure and most importantly, the road conditions in the division.

Between 1960-70, the agricultural sector recorded a growth rate of 4.7% per year. In 1991, the sector however declined by 1.1% resulting in the need for substantial food imports over the 1992-94 period **(Sessional Paper No.1, 1994)**. Although the policy pronouncement on agriculture in this paper is the speedy recovery of agriculture production, covering food crops, industrial raw materials and export crops through increased resource allocation to support key farm services, the achievement and prosperity of the agricultural sector is now faced by serious challenges, either due to poor policy implementation by the government, lack of political will to carry through reforms to benefit a greater majority of farmers, or selfish interests of some of the high ranking leaders who in a bid to safeguard their own interests interfere with the implementation of the liberalization programmes, being effected by the government under SAPs. For instance, although the prices of various agricultural products have been liberalized, some of the institutions/ parastatals involved in agriculture such as the Kenya

Seed Company, perhaps need to be privatised. This will allow private firms, individuals and cooperatives to enter into the business of seed production while the government concern be limited to quality control. Otherwise, the recurrent shortages of quality seeds will still be with us,and hence affect productivity.

Generally, Nyandarua district is well endowed with good soils and climate (with few exceptions on those areas bordering the Aberdare Ranges, and Nakuru district, due to frost attack, and frequent dry spells, respectively). However, this study established that the road transportation system in the district in general and Particularly, Kinangop division is extremely poor. For instance, for one to travel to the old district headquarters in Nyahururu, one would have to travel to Naivasha and Gilgil (Nakuru District) and then though the new district headquarters in Ol Kalou, to Nyahururu, a total distance of about 200 kilometres. The road(earth) that connects Kinangop to Ol Kalou directly is severely pot-holed and impassable in the wet seasons and extremely dusty in the dry season.

The poor road network and conditions in the division leads to increased costs of transportation of both inputs(fertilizers, chemicals and feeds), outputs such as milk. potatoes, cabbages, flowers, carrots etc. as well as passengers. Dealers and transporters transfer these transportation costs to the farmers, by hiking the prices of their goods and services respectively. These become too expensive for most farmers to afford, and hence resort to either the use of organic manure, un-certified seeds, or non application of fertilizers and chemicals. Now that the economy has been liberalized, the expectation is

that the government will license more cooperatives and dealers to import various farm inputs from the lowest-priced countries in the international market. Its important fro the government to harmonize and regularize the import duties on agricultural inputs to make them affordable to the poor rural farmers. this will boast their application in farming activities and hence intensify productivity of the already cultivated land. The population pressure in Kenya requires that we utilize existing cultivated land most efficiently and economically, rather than opening up of new lands for cultivation.

Inadequate transportation means and ways indirectly causes food insecurity through its effect on the production and sale of non-food items. This implies that failure to market a surplus means reduced incomes and hence a reduced propensity to purchase other goods. These two effects may occur simultaneously. For example,'' *in 1988, in different parts of Tanzania, half the cotton harvests, 80% of the rice paddy, and half of all the seeds, fertilizer and herbicides were lost due to inadequate rural transportation''*[3].

In most Sub-Saharan countries, skeletal transportation networks mean that many food markets are inaccessible to food producers. Small-scale farmers with meagre quantities of surplus food find it difficult to fully integrate into the market economy. Kenya is not fully excepted from this scenario, going by the nature of the road transport system in Kinangop.

The technologies used in most regions is such that, there is inadequate motorized transport means, and poor roads, coupled with the use of slow limited-capacity head-and

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3 Gordon H. Pirie (1993): Journal of Transport Geography, Vol.1 No. 1

back-loading, and poor maintenance of existing roads **(Ibid)**.

The economic SAPs being pursued by many African Countries, especially since 1990, may be partly responsible for the deteriorating transport services and conditions. This is because the government in each case is obliged to shed unremunerative operations and to withdraw subsidies on most public ventures. Donors have also increasingly withdrawn much of their support to these governments, either due to mismanagement of disbursed funds, or its misallocation. For instance funds pledged for the rehabilitation of the Nairobi- Mombasa road have been withheld by the World Bank, because the Kenya government is involved in the construction of a new airport at Eldoret, which is not seen as a priority project for the country and the capacity for generation of returns on the initial investment to the economy ***('The East African', May 1-7, 1995 pp.1 & 32).***

In most regions, even food production has been affected adversely by the amount of household time and energy that must be spent in off-and on-road transportation **(World Bank: Transportation, 1989)**. As stated elsewhere in this study, farmers in Kinangop faces these same difficulties. It was established for instance that, milk farmers have to wake up at between 3 and 4 in the morning to milk their animals, and then deliver the milk to collection centres at varying distances, averaging between 2-4 kilometres. Given that the study area is susceptible to frost bites, and rogue wild animals, the farmers risk their lives and health, leave alone the arbitrary transport charges deducted by the transporters for delivering the milk to the K.C.C. factory at Naivasha. The farmers' plight worsens when they are subjected by the KCC to long delays regarding the payment of delivered milk, sometimes extending for more than three

months. These demoralizes the farmers and limits their capacity to purchase farm inputs and meet other needs for their families.

Overcoming the isolation of small-scale farmers is the decisive criterion in stimulating rural development. Many live more than on average, 4 kilometre distance from an all weather road, and face high transportation costs for both agricultural supplies and farm produce. This is because farmers who find themselves in such circumstances, far away from motorable roads either have to sell their produce at prices almost half those prevailing in the market, or hire their own transport means to deliver their produce to the markets or leave the produce to rot in the shambas or even feed them to their animals. The cost of delivering the farm produce to collection centres is solely borne by the owner of the produce. This eats substantially into any potential gains derived from the sales.

2.5 Government Policy on Transportation

Road transport is the most readily accessible and flexible transport mode that provides 'door-to-door' service to the bulk of passengers and freight. Therefore, it plays a pivotal role in the development and sustenance of the economy as a whole **(National Development Plan,1994-96)**. Until recently, road maintenance and maintenance have been the major thrust of road development, with the total road network in the country expanding from 41,900 kilometres in 1963 to 150,620 kilometres by 1992, out of which 63,120 kilometres are classified roads under the Ministry of Public Works (MOPW).

Under the Rural Access, and the Minor Roads Programmes (RAR/MRP), 8,120 kilometres of rural access roads had been constructed by June 1992, of which 7,552 kilometres had been gravelled. Similarly, a total of 3,100 kilometres of Minor roads had been constructed in the same period, with 2,390 kilometres of these being developed to gravel standards.

In the current Planning Period (1994-96), the principles of RARP will continue to be pursued under the new Minor Roads Transition Project which is to be formulated.

Although the government recognizes the importance played by the road transport in economic development in general, the attainment of its stated in improving accessibility of agricultural resources and materials (both inputs and outputs) to production and consumption centres, respectively, is compromised by budgetary allocations and resource distribution. This situation has been aggravated by the implementation of the SAPs, which has meant the reduction of funding of infrastructural and other public services such as health and education. The implementation of these reforms, although beneficial in the long run, may partly be blamed for the deteriorating transport services in most Sub-saharan Africa. For instance, poor maintenance of road construction equipments and machineries in most West African countries necessitates them to operate at between 30 and 60% of their capacity **(Journal of Transport Geography, Vol.1, No.1,1993).**

This scenario is not quite different from the conditions in Kenya. For example, at the MOPW's yard in Nyahururu, there is more than 10 graders and other road construction and maintenance machineries and equipments, grounded or rotting in the

open due to various mechanical problems. It was clearly put to the researcher that the Roads Department had no funds to rehabilitate these machines and equipment, since the Canadian International Development Agency (CIDA), withdrew its bilateral support for the Kenya government in 1991-92. They lack spare parts and have been vandalized. This might explain the sorry state of the roads in Kinangop division and Nyandarua district in general. The highest road category in Kinangop is **Class 'C'**, the 22 kilometre bitumen-standard road connecting Njabini and Magumu market centres in the division. The presences of this road has changed the land values and land-uses on either side of it. Even farm produce prices along the road and areas bordering it are different from outlying areas, further away. The road might be the single most important factor to the growth and expansion of Njabini as a market and collection centre of agricultural produce and inputs.

According to the **1994-96 National Development Plan**, the total classified road network recorded a growth of about 12.7 thousand kilometres. In an effort to improve communication and transportation in the rural areas, the government initiated the RARP in 1974, and later the MRP, both of which involved the gravelling, improved bridges and culverting programmes, all aimed at facilitating rural development activities. As at the end of June 1992, the two programs covered a total of 31 districts, mainly in Nyanza, Western, Coast, Central, Eastern and Rift Valley provinces.

In Nyandarua district, the programmes mostly covered divisions like Ol Kalou, Ol Joro Orok and Ndaragwa. In Kinangop, this study established that only about 93.3 kilometres have been covered by these programmes. The road between Njabini and

Engineer and on to Ndunyu Njeru to Ol Kalou is not tarmacked despite being very crucial to the overall development of agriculture and other economic activities in the division. Some sections of this road become impassable during heavy rain seasons thereby cutting off important production areas from potential buyers and occasioning severe losses of farm produce, due to delays.

Kinangop has three main trading/market centres with a population exceeding 2000 persons(by 1989). These are Njabini, Engineer and Ndunyu Njeru, and happen to be on the relatively all-weather motorable earth roads covered by the RARP. They serve as the main produce collection and buying centres as well as selling points of agricultural inputs, like fertilizers, seeds and chemicals.

All the divisions in Nyandarua district have frequent interactions with Nyahururu town, the former district headquarters[4], except Kinangop division which happen to be seriously disadvantaged by the distance (See Maps on Transportation and Administrative) and impassable roads during the rainy seasons. For these reasons, most of the division's requirements are supplemented by Naivasha town (Nakuru District) and Limuru town (Kiambu District). Most of the centres in the division including those listed above are not fully developed in terms of infrastructure and population and mainly engage in retail trade. They also serve as transit centres for agricultural products **(Nyandarua District Development Plan, 1989-93).**

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[4]. The District Headquarters has been shifted from Nyahururu to Ol Kalou as from May, 1995. Nyahururu has become part of the neighbouring Laikipia District.

Unlike in the past, government policies have shifted from an emphasis on the provision of trunk roads to that of the provision of lower level feeder roads, hence the establishment of the Minor Roads Programme (MRP) to take over the activities of RARP.

CHAPTER THREE

3.1 Location/Background History of the Study Area

Kinangop occupies an area west of the Aberdare Range where land drops in a series of fault escarpments westwards to the floor of the R. Valley around Nairobi. Kinangop Division, is one of the five divisions within Nyandarua District, Central Province of Kenya. It is bordered to the North by Kipipiri Division, to the East by Nyeri and Kiambu Districts, to the West by Nakuru District, and to the South at the extreme Southern part of Nyandarua District, and is the furthest, of all other divisions from the District headquarters, in Nyahururu. It's to the West of Aberdare Ranges on the Nyandarua-Nyeri border.

The main urban and rural market centres in the Division include Njabini, Engineer, Ndunyu Njeru, and Murungaru.

3.2 Nyandarua District Area by Divisions

Kinangop Division is the largest, covering a total of 932 sq.kilometres (See table below).

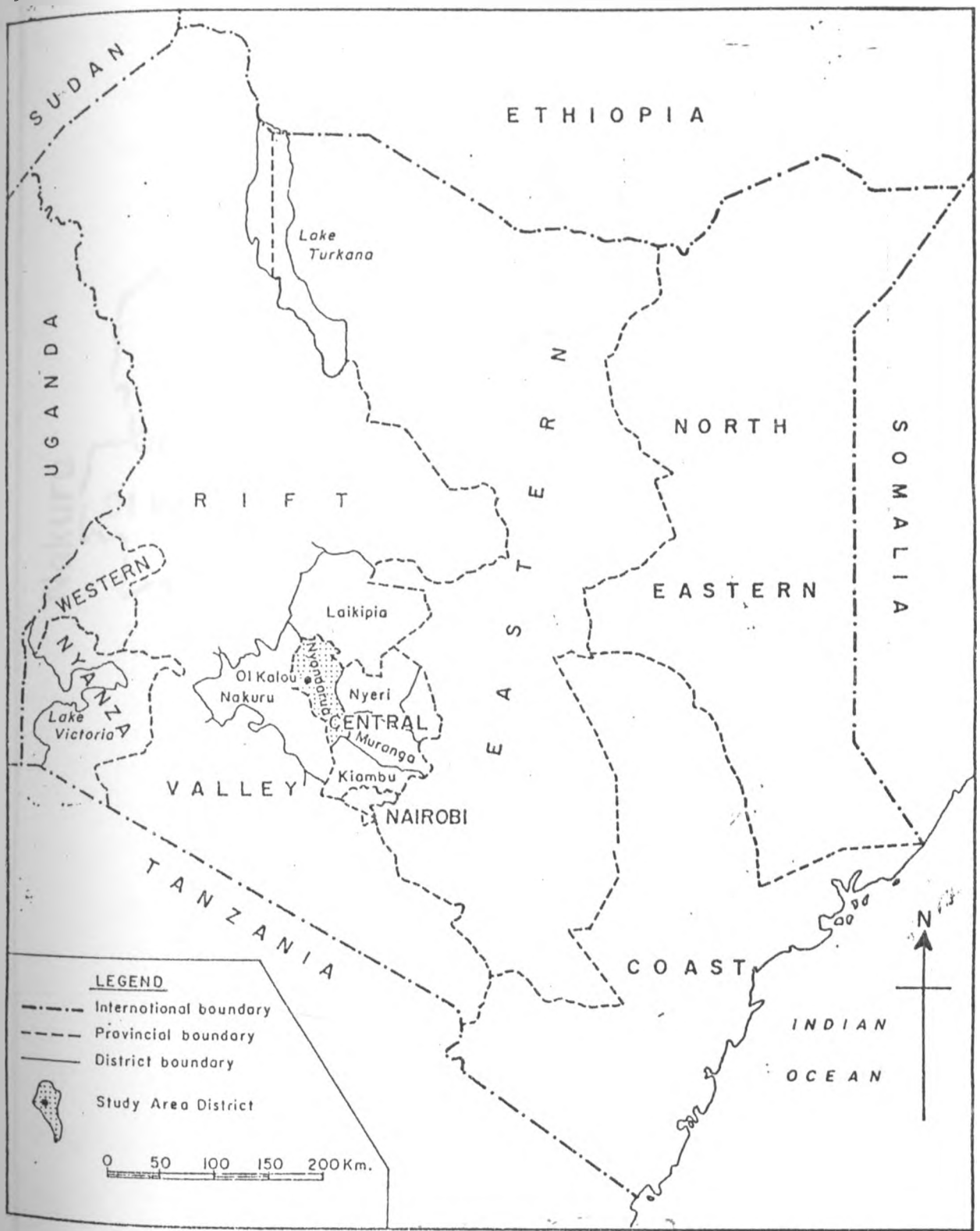
Table 3.1 Administrative Divisions in Kinangop and their Extent

Division		Area (sq.km)
1.	Ol Joro Orok	340
2.	Ol Kalou	672
3.	Kipipiri	713
4.	Ndaragwa	871
5.	Kinangop	932
	Total	3,528

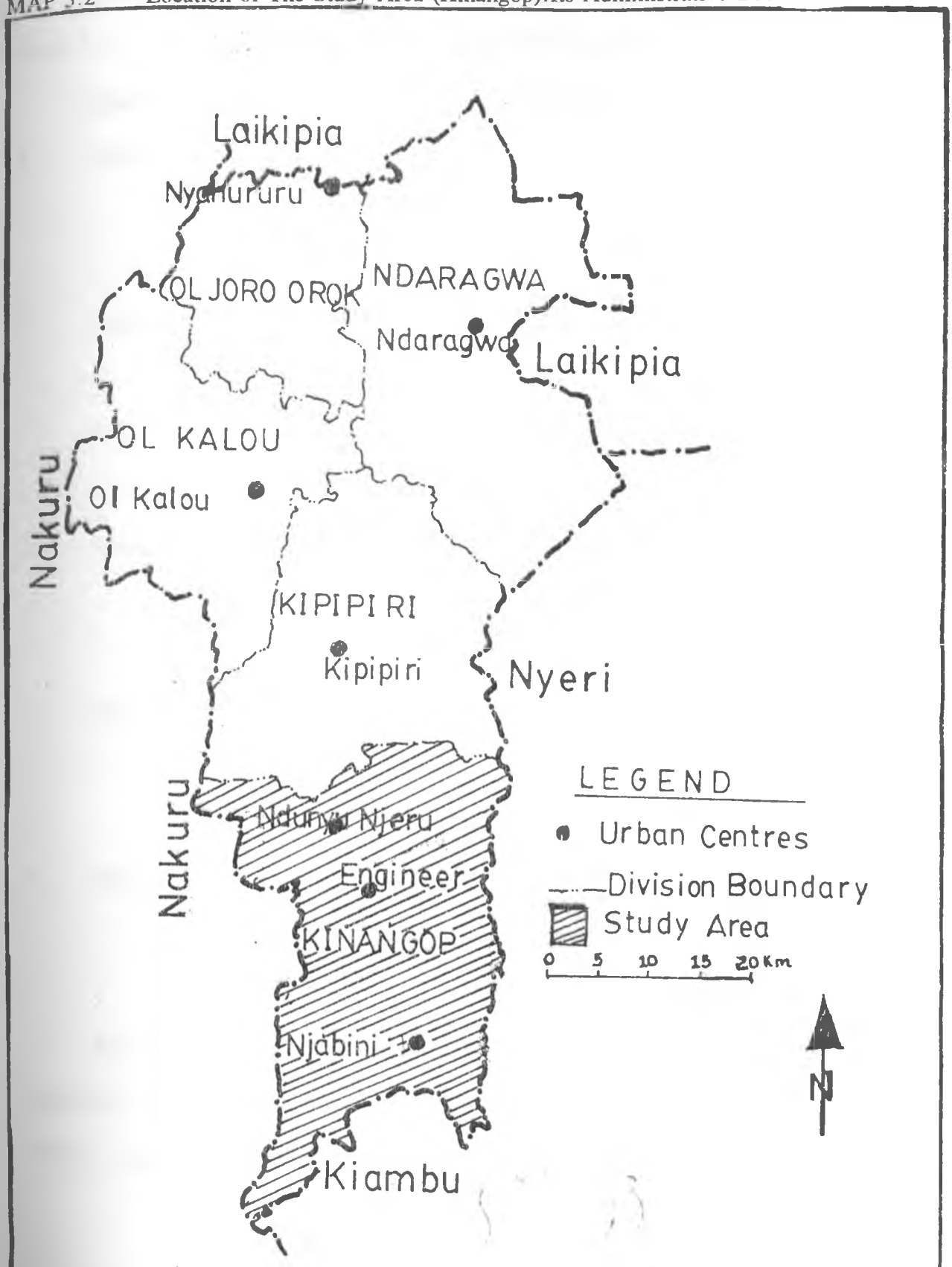
Source: Nyandarua District Development Plan, 1994-96.

Kinangop Division is made up of five administrative locations, namely:- Magumu, Njabini, North Kinangop, Nyakio and Engineer. These locations in turn comprise the sixteen (16) sub-locations as follows:-

MAP 3.1 LOCATION OF THE STUDY AREA IN THE NATIONAL CONTEXT



MAP 3.2 Location of The Study Area (Kinangop):Its Administrative Boundaries.



Source: Nyandarua District Development Plan 1994—1996

3.3 Administrative Boundaries in Kinangop Division

Table 3.2 Number of Administrative Locations/Sub-locations

	Location		Sub Locations
1.	Njabini	(1)	Njabini
		(2)	Muruaki
		(3)	Tulaga
2.	North Kinangop	(1)	Mikaro
		(2)	Nandarasi
		(3)	Mikungi
		(4)	Kitiri
3.	Nyakio	(1)	Githabai
		(2)	Rwanyambo
		(3)	Mukeu
4.	Magumu	(1)	Gitwe
		(2)	Karati
		(3)	Bamboo
5.	Engineer	(1)	Murungaru
		(2)	Kahuru (Muruaki)
		(3)	Gathara

Kinangop Division, and indeed, Nyandarua District as a whole, formerly comprised the "Scheduled Areas" or 'White Highlands', exclusively meant for the colonial white settlers. After independence in 1963, the Government designated the

District as one of the settlement schemes in the Republic for the landless and the poor, who had been dispossessed of their land by the colonialists. Approximately, 85% of the district is occupied by settlement schemes. There are 48 settlement schemes in the whole district, covering 198,996 hectares, and occupied by a total of 22,159 families (according to the 1984-88 Plan Period). Out of these 48 schemes, 44 have so far been title mapped, with 39 of them having their title deeds ready for collection in the lands registry (Nyandarua District Development Plan 1994-96). Kinangop had 11 title mapped and registered.

Kinangop Division has the highest population compared to the other divisions. The division had 61,199 ((1979) which is projected to have been 94,836 people by 1993 (District Development Plan, January, 94-96). According to the 1989 census, the division had 95,931, covering an area of 868 square kilometres, giving rise to a density of 111 person per sq. kilometre. The divisions projected population during the years 1994 and 1996 is 98,621 and 306,769 respectively. This represents 26% of the total district population (Ibid).

3.4 Settlement Scheme Accomplishments: 1984-88

Table 3.3 Registered Lands, Unregistered and Families Settled.

Division	Title Mapped	Unmapped	Hectare	Family Settled/Registered
Ol Joro Orok	4	2	32,356	4596
Kinangop	11	1	56,584	4281
Ol Kalou	13	1	48,726	4531
Ndaragwa	5	3	25,175	2671
Kipipiri	6	2	36,755	6080
Total	39	9	198,996	22,159

Source: Dept. of Lands, Settlement and Survey (Nyandarua district development Plan,1989-93)

Kinangop Division, as is the case with Nyandarua District in general, is predominantly mixed farming, with small scale farming increasingly supplementing the large-scale farms that characterized its former "Scheduled area" status. There is alot of land sub-divisions taking place in most high potential areas of the district in general. This calls for ways and means of intensifying crop production through modern farming techniques, use of fertilizers and tick killer chemicals.

Some of the major crops and animals grown and reared respectively include, wheat, barley and pyrethrum, as well as sheep rearing for wool, in the Upper Highlands zones. The lower highland zones are suitable for growing maize, beans, peas,

temperature fruits, vegetables (not tomatoes), horticultural crops (cut flowers) and for raising livestock.

The road network in the district has remained unchanged since 1988. Of the five divisions, Ol Joro Orok and Ol Kalou Divisions are fairly well covered by roads and most of them are motorable even during the wet seasons. Kinangop and Kipipiri Divisions, despite being the hub of agricultural and dairy activities, are not well covered and most parts of the available roads, especially those at the foot of the Aberdares Ranges, are impassable during the wet seasons. **(Field Survey, 1994 and NDD Plan 94-96 pp 57).**

3.5 Soils and Geological Characteristics

The District's soils are generally of two main types - Loams and Clay. The loams cover three-fifths ($^{3}/_{5}$) of the District, mainly on the slopes of the Aberdare Mountains, as well as the Bahati Escarpments. The clays, which are dark and poorly drained cover about two-fifths ($^{2}/_{5}$) of the District, mostly, the central belt - Ol Kalou, Ol Joro Orok, Kipipiri Divisions. A small area, near Murungaru, in Kinangop Division is covered by lava and ashes.

In sections of some locations such as Magumu and Nyakio, murram soils coupled with clay is prominent. These do not allow percolation of much of the run-off. This might explain the reasons why these areas are always susceptible to flooding during heavy rains seasons(See Plates 9 and 10) .

The geology and drainage pattern has influenced soil formation in Nyandarua District. The dominant soils (mentioned above) are developed from the tertiary soils (mentioned above) are developed from the tertiary basic igneous rocks and volcanic ashes. the dominant soils on plateaus and elevated structural plains, especially in the Kinangop area, vary from perfect to imperfectly drained, deep to moderately deep, and are darkish - grey brown. Soils on swamps are poorly drained and calcareous. The Aberdare mountains (highest part of the District, 3999 m) contain soils of moderate to high fertility, but are too cold for any cultivation to take place due to attitude. On slightly lower attitude, soils are humid and of high fertility, suitable for agricultural and livestock production.

3.5.1 Topographical Characteristics

In the whole of Nyandarua District, the attitude varies from approximately 3999 metres on the Aberdare Hills to the South-East of the District to about 1828 metres on the floor of the Rift Valley. The Aberdare has a height of 3999 metres, at the Nyandarua/Nyeri District boundary. It is characterized by a topography related to the dominating influence of the Great Rift Valley. Kinangop Division, specifically, and Nyandarua District in general is situated on an area West of the Aberdare Ranges where land falls in a series of fault escarpments westwards to the floor of the Rift Valley around Naivasha. Nyandarua District consists mainly of the Kinangop Plateau, which together with the Ol Kalou Salient, comprise parts of the Rift Valley, and are situated on the

leeward side of the Aberdare Ranges. As a result, rainfall decreases rapidly from the East, (1400 mm) at the food of the range, to 700 mm at the Malewa river valley, near Lake Naivasha.

3.5.2 Drainage Patterns in Nyandarua

The general direction of rivers in Nyandarua District is mainly to the South and North of the District. The Aberdare Ranges are drained by the Malewa River which flows into lake Naivasha; in the South. It has a number of swift-running streams that form its tributaries.

Another major river, Ewaso Narok, drains from the high hills of Ol Joro Orok, through Nyahururu Falls as it flows towards Laikipia in the north. Pesi river, which joins Uruku in Laikipia in the north is also significant.

Lake Ol Kalou Bolossat is the only large water mass in the district, covering 4 sq.kilometres. Swampy areas are found on the East and South-East of Ol Joro Orok and also in Ndaragwa Division.

As such, the study area (Kinangop Division) has no major drainage features, except the swift running streams, which pour into Malewa River.

3.6 Climate:

3.6.1 Rainfall:

Nyandarua District enjoys an annual rainfall of between 750mm and 1500mm. It has two rainfall maxima;- March to May (Long rains); and August to November (Short rains). Rainfall decreases from the East to the West of the Plateau (Kinangop) and Aberdare Ranges i.e 1500m at the foot, to about 700 around Naivasha. Only the Western Parts of the plateau, furthest away from the Aberdare Ranges has some months free of frost. However, these parts are too dry for some crops, such as potatoes and vegetables.

Although rainfall in the district is above average, reliability varies from more than 1000mm to 300mm in the long rains, and 600mm to 100mm in the short rains. This is because the rains become more scattered throughout the year and are not concentrated enough to create long pronounced agro-humid periods. Growing periods for cultivated plants decreases in the southern boarder of the District from East to West.

Due to seasonal heavy rains, the surfaces on steep slopes are subjected to intensive erosion, whereby thousands of tonnes of fertile soils are being washed away. If this trend continues unabated, there's a likelihood of leaving bare lands which cannot sustain crop production.

Furthermore, the earth roads, which comprise the study area becomes impassable and vehicles get stuck for long periods (even four-wheeled ones). As a result, alot of farmer's produce goes to waste, as they cannot reach the markets in good time, if at all.

3.6.2 Temperature

Nyandarua District in general has a climatic problem of too low-high temperature ranges which are generated during clear nights on the moorland of the Aberdare Ranges. The worst hit areas are the Kinangop Plateau and Ol Kalou Salient. These causes high frosts, nearly every month, which makes cultivation of certain crops such as maize and potatoes to be hazardous.

In the study area, Kinangop, the influence of the Aberdare Ranges in the East is overriding and much more felt, than elsewhere. they cause low night temperatures. On the Western part of the Kinangop Plateau, farther away from the Aberdare Range are outlets of this cold air which makes some months frost-free-but too dry for cultivation of some crops. January - March are usually the hottest months, while July-August and November/December have the lowest mean monthly temperatures. The highest recorded average annual temperature in Nyahururu and Ol Joro Orok over the last five year is 21.5^0c and the lowest 7.1^0c.

Temperatures generally average 24^0c in the district, but are modified by the influence of the Aberdare Ranges, especially in Kinangop and Kipipiri divisions.

3.7 Agro-Ecological Zones, Nyandarua District

On the basis of rainfall pattern, temperature and soil types in Nyandarua District in general, the land potential can be divided in to three categories;

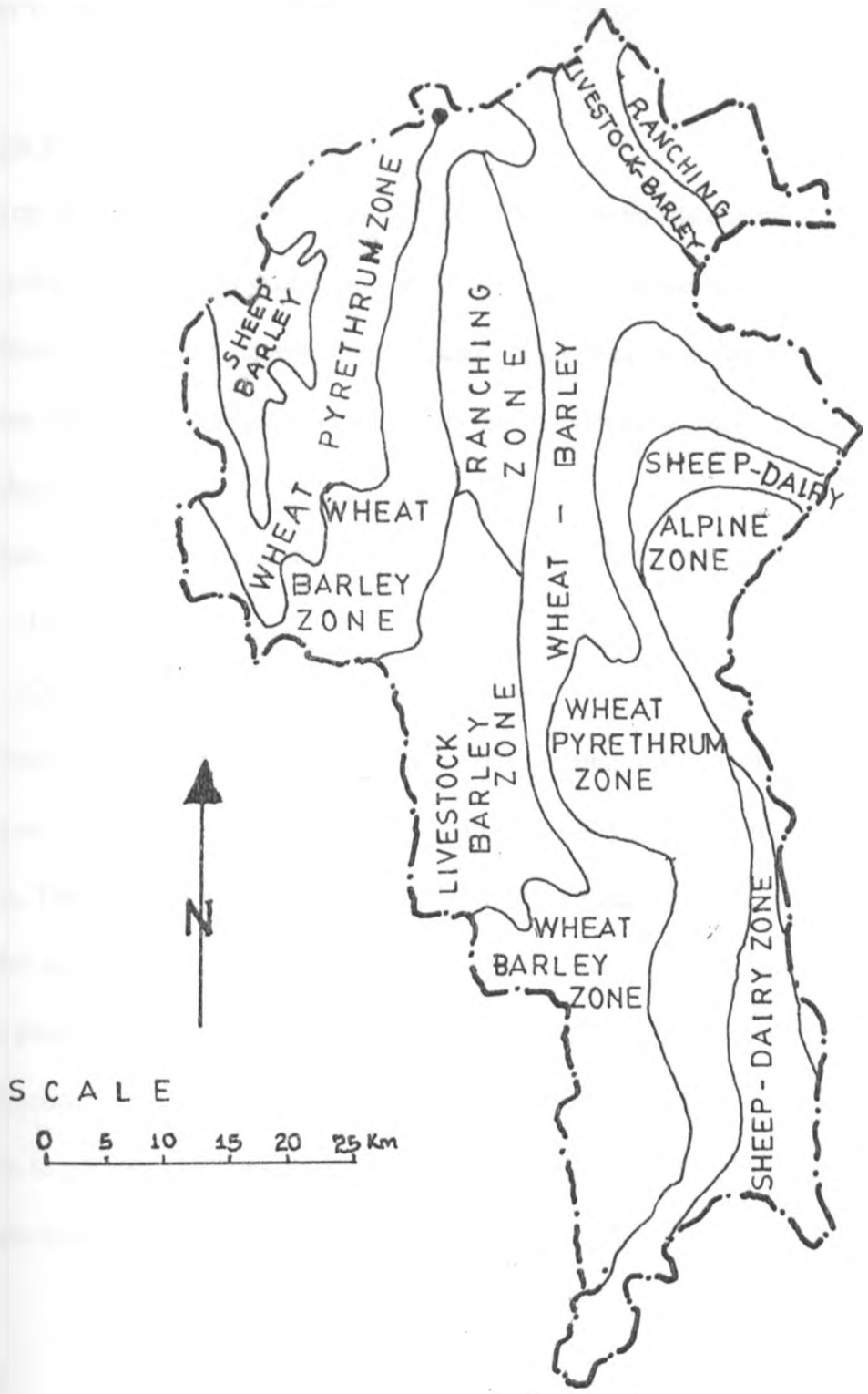
(i) High Potential Zone

This consist of 37% of the district's land area, (131,300 hectares), and is good agricultural land. These are areas with over 1000mm annual rainfall and are found around Geta, Leshau, Milangine and Ngorika areas. Much of Kinangop division falls in this area, except, Murungaru, which is covered by lava and ashes. Intensive farming in food crops such as potatoes, maize, cabbages and other vegetables as well as dairy farming is practised in this zone. Pyrethrum and, of late, horticultural products such as cut-flowers and fruits are the major cash crops.

(ii) Medium Potential Zone

This covers areas with 600-1000 mm annual rainfall. It is found around Dundori and the Central Belt of the district. It has a long cropping season with good yield

Map 3.3 **Agro-Ecological Zones in Nyandarua District**



Source: District Development Plan, 1994–96

potential of about 80% of the optimum sheep and dairy farming are found in this zone. Pyrethrum is grown as a cash crop.

(iii) Low Potential Zone.

It covers Murungaru in Kinangop Division. Soils are mostly covered by lava and ashes. Its the most westerly part from the Aborter Range, hence has some frost-free months. However, it is not suitable for cultivation of some crops because its relatively dry - as one approaches Naivasha, in the neighbouring Nakuru district.

(vi) Others.

These include other land such as;

- Forest reserves
- Other Government Reserves

Nyandarua District is predominantly mixed farming with small-scale farming increasing supplementing the large-scale farms , that characterised its former "Scheduled area Status, The district's potential differ in accordance with the ecological zones. There is increased sub-divisions of land in most high potential areas, as population increases and more people migrate to the district. This will call for further intensification of farming practices, given that land is a fixed factor of production, and cultivated land is most likely to get reduced as more settlements are set up and as additional mouths are brought into being.

3.7.1 Agro-Ecological Zones by Divisions (Square. KM)

Division	LH_5	LH^4	LH^3	UH^4	UH^3	UH^2	UH^1	Total
Ol joro Orok	0	0	8	65	62	150	25	310
Ol Kalou	32	130	50	62	224	338	126	962
Kipipiri	14	254	94	2	230	74	-	668
Ndaragwa	94	110	51	4	94	57	27	437
Kinangop	-	14	6	-	506	398	124	1048
Total	140	508	209	113	1116	1017	302	3425

Source: Nyandarua District Development Plan, 1994-96; Adopted from the Farm Management Handbook

Key - UH - Upper Highlands

LH - Lower Highlands

CHAPTER FOUR AGRICULTURAL POTENTIALITIES IN KINANGOP

4.1 Introduction

Kinangop, and indeed the entire Nyandarua District was part of the ''Scheduled Areas'' of the White Highlands reserved for white colonial settlers, prior to Kenya's independence in 1963. After the independence, the new government embarked on a resettlement programme of the local Kenyans who had been forcefully evicted from their land by the colonialist government, to the poor and marginalized areas, termed as ''Native Reserves''. Land in these Native Reserves was very poor agriculturally, and they were heavily congested. On the other hand, the White highlands have very fertile soils and suitable climate for agricultural production, and they were sparsely populated ; characterised by large plantations or farms of mixed farming.

The soils in the division are fairly fertile and climate suitable for most part of the year except in the months of May-June, when parts of the division particularly those of the fringes of the Aberdare Ranges, which are attacked by frost. People were resettled in schemes with individual holdings averaging 15 acres. Depending on the condition or terrain of the land, for instance, marshy or prone to flooding, some settlers got bigger land sizes. From an interview with officials of the Ministry of Lands and Settlement in the Division, it was confirmed that there are about 11 schemes with a total membership of 6,478 members.

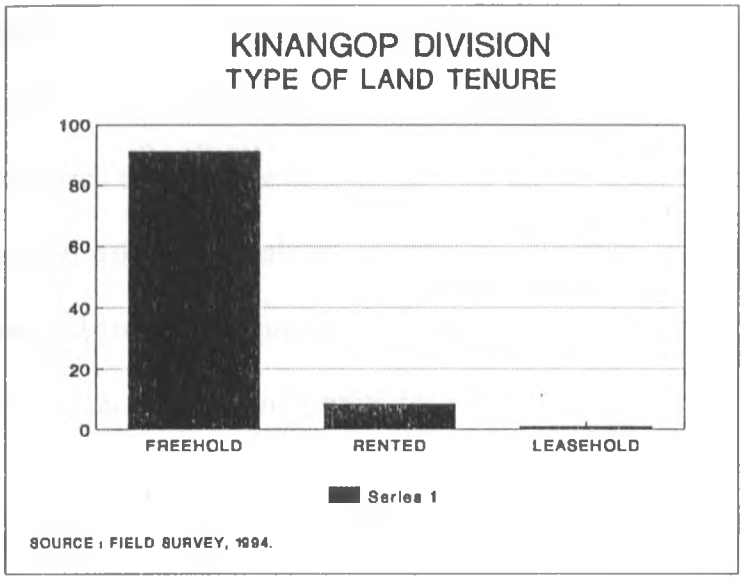
According to the 1989 population census, Kinangop had a total population of 95,931 persons, and a population density of 111 persons per square kilometre. The division has the highest population relative to other divisions. In 1979, it had 61,199,

while the projected populations for 1994 and 1996 are 98621 and 306,769 respectively. This represents approximately 26% of the district population. This high population in the division and to some extent, also in Ol Kalou division can be attributed mainly to new settlements in these areas during the 1980's and possibly even today. This can be explained by an increased rate of land subdivision and transactions in the division and Nyandarua district in general, especially since the infamous land clashes in October 1991 in the Rift Valley Province. In December, 1994, a number of families were forcefully evicted from Maela in Narok and transported to their 'home districts' in Central Province. Nyandarua was one of the recipients of those victims and many others who feared the escalation of the ethnic clashes in the Rift Valley (Ref.to the'Daily Nation', Dec.26, 27 ,28 1994).

People from the neighbouring congested districts of Kiambu and Nyeri are being attracted to Nyandarua district, particularly Kinangop division, by its endowment with rich farming lands. This is anther factor that may explain the rapid increase in population and land transfer/transactions in the division.

4.2. Land Tenure

Figure 4.1 Types of Land Tenure in Kinangop Division



The figure clearly shows that majority of the farmers have already acquired title deeds for their land plots. This implies that they have the potential to acquire loans and other credit facilities to intensify productivity of both crop cultivation and livestock keeping. Due to the rapidly increasing population in the division, and bearing in mind

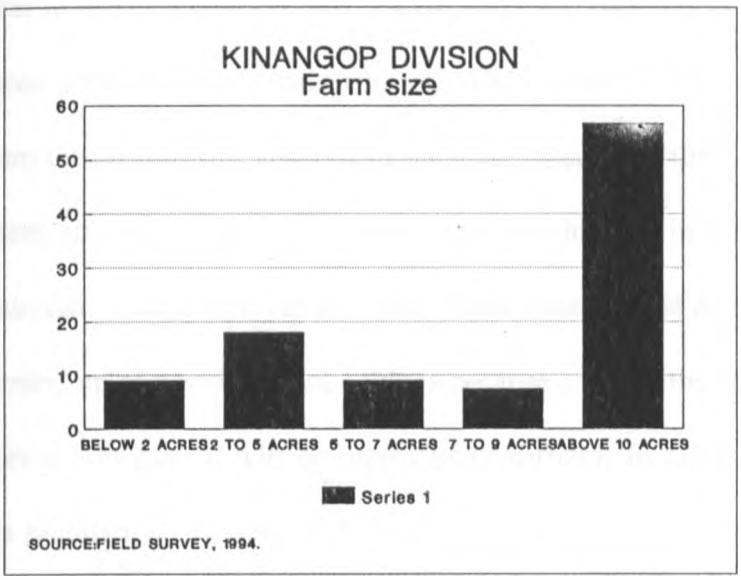
that the supply of land is inelastic, the only appropriate and sustainable way of enhancing agricultural production is through intensification of production on the already cultivated land plots, and animals reared.

This can be done through adequate supplies of certified seeds, fertilizers, spray and other chemicals at affordable prices, streamlined marketing channels through well organized and managed cooperatives to reduce the exploitation by middlemen, effective extension services on the most up-to-date production techniques, and proper timing of planting seasons :- staggered planting seasons are better to prevent the flooding of the markets with similar commodities, hence fetching low prices. Most important, the roads must be improved to allow the delivery of both inputs to the farmers and outputs to the consumers, and reduce perishability of these farm produce, especially milk, floriculture and horticultural products among others at affordable costs that allow farmers to not only break even but also make some profits for re-investment.

4.3. Farm Sizes

The survey also established that about 55.7% of the farmers interviewed had over 10 acres of land (see figure 4.2) below.

Figure 4.2 :Average Farm (Plot) Sizes in Kinangop Division



The figure shows that in relative terms, land sizes in Kinangop division are still sufficient for both intensive and moderate-extensive farming, whose full exploitation can possibly provide foodstuffs and other products for the entire district. At the present, pressure on land for cultivation, livestock rearing and settlement is still minimal in the division, but with the trend in population growth, it can be expected to rise. This then calls for the intensification of the existing land-uses, to enable maximum benefits are accrued.

It is now generally recognized that most economies in Africa, particularly Kenya, will only develop if there is a deliberate and concerted effort by the government(s) to facilitate growth in the agricultural sector, and thereby reduce risks of famine, increase our export earnings, reduce dependence on food imports, hence save foreign exchange, restrict rural-to-urban migration, and release sufficient incomes to establish a market for manufactured goods from our industries (UNCHS, 1982).

From the preliminary analysis of the data collected in this study, it is felt that the most prudent strategy to improve agricultural production in the division is through intensification of existing farming activities on the existing land plots rather the expansion and/or opening up of new land plots. this is because , whilst the latter is still possible in most farmer's holdings, it will be increasingly difficult in future due to the projected increase in population, as well as the possible danger of the soil losing its fertility or being degraded through continued cultivation. The loss of soil fertility could worsen given the ever increasing prices of farm inputs such as fertilisers, which means reduced application by most farmers.

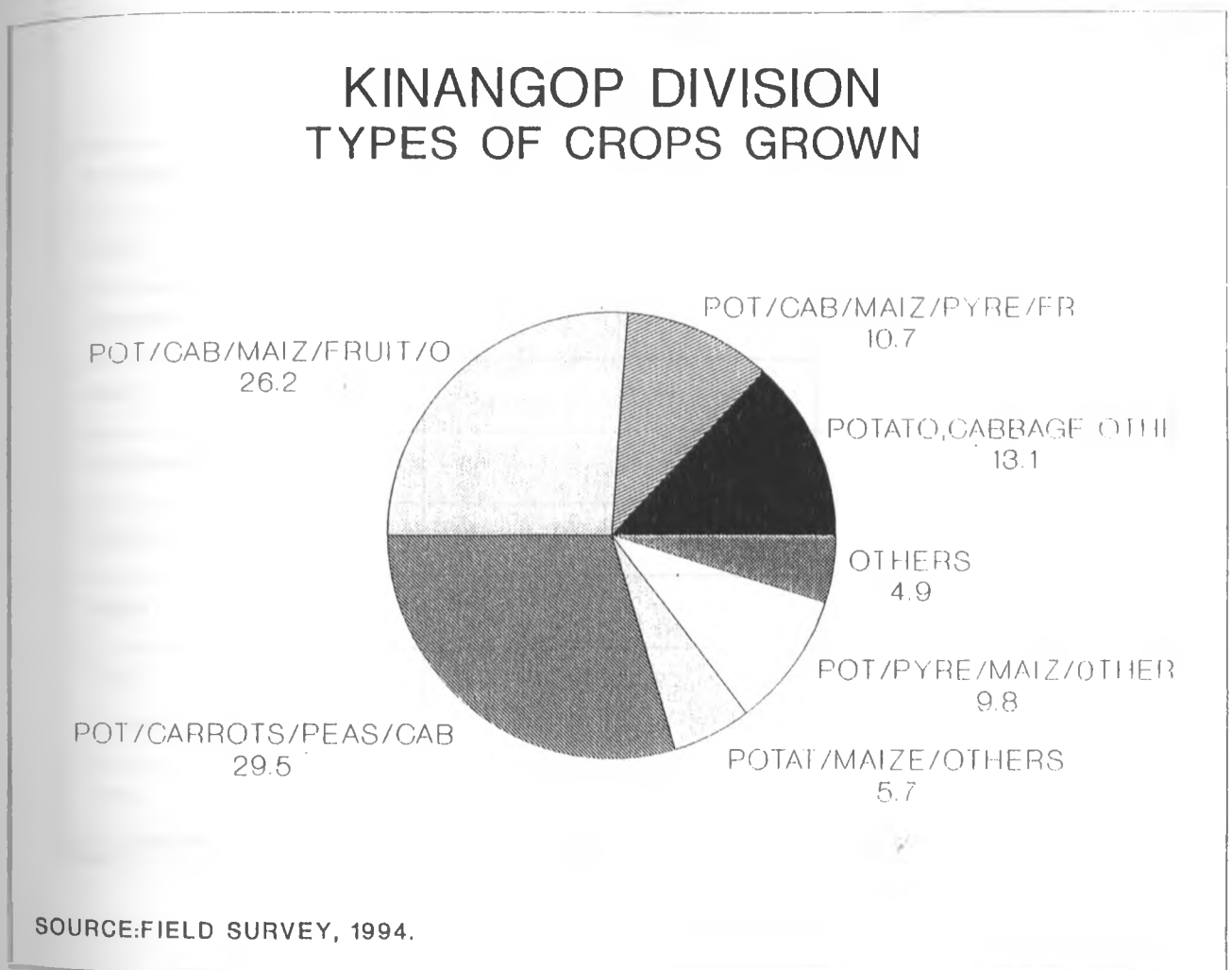
The underlying assumption is that the government will formulate and implement appropriate policies and strategies to encourage farmers to intensify production and increase labour productivity. Extensive and effective extension services, accessibility to markets, provision of credit facilities by both banking institutions and cooperatives, reduction of custom duties and other tariffs on imported farm inputs to make them affordable to most poor farmers, provision of certified seeds in good time for planting and quick dissemination of relevant information on market prices and appropriate

techniques of production, of various commodities to the farmers in good time to allow them make informed decisions and choices. These are some of the issues necessary to stimulate and rejuvenate the farmers, not only in Kinangop and Nyandarua district, but nationally.

4.4 Agricultural Potential in Kinangop

Kinangop division, being part of the former White Highlands is a high potential agricultural zone as is the entire Nyandarua district. The soils are generally fertile and well drained, apart from isolated sections which are susceptible to flooding, during the heavy rain seasons. The climate is fairly suitable for cultivation of certain crops and animals. the exception is the frost which falls between the months of May to July, and affects the production of maize and potatoes, particularly on areas bordering the Aberdare Ranges. Some sections of the division bordering Naivasha are too dry, limiting cultivation to those crops with a short growing season. The major crops grown in the division are Potatoes, Cabbages, Maize, peas, Pyrethrum, Carrots, Cut-flowers and Wheat. Livestock rearing is also a major farming activity, especially dairying. A fairly large number of farmers also keep sheep (for wool), poultry and rabbits.

Figure 4.3 Main Types of Crops Cultivated in Kinangop



SOURCE:FIELD SURVEY, 1994.

The table below shows the crop production statistics as per November, 1994.

Table 4.1 Crop Production in Kinangop Division (Nov. 1994)

CROP	TARGET (Ha)	Ha PREVIOUSLY PLANTED	Ha CURRENTLY PLANTED	TARGET YIELDS	TOTAL Ha HARVESTED
POTATOES	1120	732	780	80 BGS/ACRE	522
MAIZE	556	434	482	10 BGS/ACRE	* N/A
CABBAGES	671	520	511	28 BGS/Ha	312
PEAS	280	212	198	45 TONS/Ha	218
PYRETHRUM	194	58	64	15 TONS/Ha	66
CARROTS	184	16	18	15 TONS/Ha	32
WHEAT	20	18	18	8 BAGS/ACRE	46
CUT - FLOWERS	40	26	34	100 STEMS/M^2	16
TOTAL	3,065	2,016	2,105	N/A	N/A

Source: Divisional Agriculture office, Njabini, 1994.

4.4.1 Potato Production

Potatoes (Irish) and Cabbages/Kales are the two most common produce cultivated in the division, as the table above shows. Although Maize is cultivated by most farmers, it is usually for subsistence, and its commercial production is seriously constrained by frost attack, and water stress on the fringes of the Aberdare and sections bordering Naivasha, respectively.

Although Irish Potatoes is a major crop, both in the district and in the division (Kinangop) its full capacity has not been fully exploited due to various problems. These include bad weather, especially frost attacks, drought (water stress), diseases such as bacterial wilt and potato blight, as well as inadequate certified seed potatoes. The cost of inputs such as fertilisers and spray chemicals is so inhibiting to farmers, that they were found to be either using alternatives such as farm manure, or not using fertilisers at all. Thus, the costs of inputs could be said to be playing a hand in stifling full production capacities - hence failure to attain targets stated in the table above. The situation in the district in general is the same as in Kinangop as the table below shows.

Table 4.2. Potato Production in Nyandarua District (1989-91)

Year	**1989**	**1990**	**1991**
Target (ha)	13500	12000	13000
Achieved(ha)	12000	11520	13000
Yields (tons/ha)	13	10	13
Estimated Prod^{n} (tons)	156000	115200	54,427
Value K £	2,571,600	2,413,125	3,103,125

Other crops grown in Kinangop division are Barley, Field peas, Pyrethrum (major cash crop), Cabbages, Kales, Carrots, Onions, Shallots, Temperate Fruits (Pears, Plums, Apples, Peaches) as well as Floriculture (flowers).

Plate 1: Potato Crop Awaiting Delivery To The Market. Poor Roads and Lack of Coops to Deal With its Marketing, causes exploitation by middlemen; low prices

4.4.2 Pyrethrum

This is the major cash crop at present in the district, and Kinangop division has a large number of farmers involved in its production. Due to favourable prices, farmers are being encouraged to plant more acreage of the crop. In fact, the demand for seeds is so high that the material supplied by the Pyrethrum Board of Kenya is inadequate. Cumulative hectarage of the planted crop in the entire district was surpassed by 30 hectares (ha) in 1991, when compared to the previous two years.

Table 4.3 Pyrethrum Production in Nyandarua District (1989-91)

YEAR	1989	1990	1991
TARGET (Ha)	3,200	3,230	3,700
ACHIEVED (Ha)	3,175	3,480	3,730
Yields (ton/ha	0.4	0.4	0.4
Estimated production	1,329	1,392	1,492

Source: Nyandarua District Agriculture Annual Reports, 1989-91 * See production figures for the Division in Table 4.1 above

4.4.3 Cabbages

They are a major vegetable crop in the division, as well as other parts in the district. They are very susceptible to water stress during dry spells, since there are no irrigation facilities for the crop in the district. This affects yields, due to changes in transplanting. The seeds of this crop are mainly from Simlaw Company.

According to the 1990, Nyandarua district Agricultural report, the seeds from Simlaw had a very poor germination percentage, which when tested were found to have a germination percentage of 20. The reduction in targeted yields in the district led to fetching of good prices in local markets, relative to other years (1989). In 1991 were no reported cases of poor seed germination.

Table 4.4 Cabbage Production Trends in Nyandarua District. (1989-91)

Year	1989	1990	1991
Target (ha)	4,750	4,800	5,150
Achieved(ha)	4,800	4,730	4,798
Yields(ton/ha	17.5	13	15
Estimated Prod'n (ton)	84,000	61,490	71,970
Value K £	2,100,000	3,843,000	4,318,200

Source: Nyandarua District Agriculture Annual Reports, 1989-91

The production of other crops such as kales carrots, onions, shallots is on smaller plots. For instance, as regards kales, the districts targeted 600 ha was not attained only 572 ha with average yields falling to 6.5 ton/ha from 8.5 tons/ha. Estimated production of kales fell from 4.760 tons (1989) to 3,718 tons (1990). Much of the fall is attributable to poor weather conditions.

.4.4 Carrots

Carrots are generally planted on very small plots of land pieces. Although weather conditions is said to have affected the yields over the years, such that the district target of 1100 ha were not achieved, only 1,023 ha, was, it was also partly blamed on poor seeds from Simlaw. Between 1989 and 1990, production fell from 8,550 tons to 7,161 tons.

4.4.5 Onions

Onions are also grown all over the district and in this period (1990) the target set was surpassed by 13 ha, with farmers however realising yields of 4.5 tons/ha compared to 4.0 ton/ha in 1989. Estimated production rose from 900 tons /ha (1989) to 1172 tons/ha 1990.

4.4.6 Shallots

Kinangop division and parts of Kipipiri are also popular for the growth of shallots, even though they are susceptible to dry spells. However, production appear to be falling due to marketing difficulties as the table below depicts

Table 4.5 Shallot Production In Nyandarua District 1989-91

Year	1989	1990
Target (ha)	375	400
Achieved (ha)	388	360
Yields (tons/ha)	4	3.5
Estimated Prod'n (tons)	1,552	1,260

Source: 1990 Nyandarua District Agriculture Annual Report

4.4.7 Floriculture

Kinangop Division is the leading producer of cut-flowers in the district. It's most grown by small scale farmers under rain fed irrigation. As such, at times, production

is affected by variability in weather conditions especially dry seasons. Floriculture is increasingly becoming popular in the division, but the capacity to expand is said to be hampered by lack of suitable freight, and storage facilities, hence affect standards and prices offered by middlemen. Other problems facing floricultural farmers are the poor road conditions. This means that they have to load their flowers on bicycles, carts, back and head loadings which not only is slow and inefficient, but tampers with quality of the flowers. The major flowers grown are carnations, Alstromeria, Statice among others. Other varieties grown in small quantities include; Chrysanthemum and Allums. Production is mainly for export markets.

Plate 2 A Superb Potential For Cultivation Of Cut-Flowers Exist; Poor Roads are A Major Constraint.

Until recently (1990/91) when the South Kinangop Flower Growers Association was registered, with about 340 members, marketing was mainly done through middlemen entirely, who bought the crop and in turn sold to registered exporters. The formation of fee Association, was in response to the exploitation by these middlemen who were unreliable, paid low prices and even delayed payments. Being delicate, cut-flowers require a streamlined marketing channel.

The Association sells flowers to exporters (Licensed ones) such as Mac Limited, Bedya limited and Kenash limited. According to the Association's manager, occasionally, even these exporters pay poorly or delay payments, citing poor quality flowers, that fail to attract buyers abroad thereby disenchanting the farmers. The Association is said to be making spirited attempts to venture into the export business directly, with the assistance of the Horticultural Crop Development Authority (HCDA).

Plate 3: A Cut-Flower Carrier (4WD) Stuck in the Muddy Roads, Occasioning Perishability of the Flowers, among other produce.

Farmers take their cut-flowers to the society's collecting shade at Njabini, where they are graded and packed in boxes, according to type of flowers; Each lot is put together according to length ranging from 80cm, 70cm, 60cm and 50 cm, respectively, while removing any damaged leaves or buds etc.

Each packed boxes can hold between 200-500 stems, whose average price per stem was Ksh 1 (November 1994). With the assistance of local agricultural extension officers, the Association provides technical assistance such as recommending seeds varieties, fertilizer to be applied, plant spacing among others. The prime cut-flower growing season falls between August and November, and coincides with wet seasons when most roads are impassable. Increased supply coupled with poor road conditions-inaccessibility-leads to fall in prices. By 1993/94 seasons, the Association sold an average of over 180,000 stems, and was projected to increase substantially due to increased average under cultivation. Exports of flowers is mainly to Holland.

Plate 4: Poor Roads: Farmers Deliver Cut-Flowers By Use of Back-Loading; Affects Quality.

4.4.8 Constraints Facing Cut-Flower Production

The breeder's royalty charges are said to be too high for those who wish to start production (nurseries) of Alstromeria species. Consultations with a major flowering company-Oserian, however never borne any fruit due to the high standards of quality demanded, of the local farmers.

(i) Flowers are very delicate and require specialised handling and freight facilities. Farmers lack proper container/facilities to transport these produce to collection centres leading to alot of damages - loss of income.

(ii) Lack of adequate storage facilities

(iii) Cost of inputs such as fertilizers, pesticides, seeds etc are very high as opposed to the ever fluctuating prices of most farm produce.

(iv) During dry seasons there's no irrigation facilities, hence over-dependence on rain-fed irrigation.

(v) Frost affect flowers growing process - although spraying is said to reduce its effects.

(vi) Rain storms affect the quality of flowers - no protective sheds have be erected.

(vii) Some section of farmers are not accessible during rainy seasons due to the poor roads (see plate 3); Vehicles (4WD) are stuck while delivering farmer's cut-flowers; plucking of flowers at a very late stage, after the flower buds have already opened - hence such flowers mature up before reaching the consumers - hence fetch low prices, or discarded outrightly.

Plate 5: Grading and Packing of Cut-Flowers at Njabini. There are no specialised Facilities for handling the flowers

Lately, cut-flower farmers are increasingly being subjected to delays in the payment of the already delivered flowers by some exporters. The Manager of South Kinangop Flower Growers Association in an interview with the researcher expressed dismay by some exporters who never paid cash to the farmers, until they have sold their flowers to overseas markets. Occasionally, very low payments and even some times none is paid to the farmers by the exporters who claim that the flowers were rejected by their

clients due to poor quality. The gravity of this matter is given credence by press reports that Kinangop Flower Growers Society has written to FPEAK asking the organization to assist cut-flower farmers recover Kshs. 693,238 from three exporters (***"The East African Standard"*, August 2, 1995 pp.14**).

4.4.9 Temperate Fruits

These are the main fruits grown in Nyandarua district. In Kinangop, they are not grown in any matter-of-business order. On average, almost every homestead has a few fruit trees of some sort. The main fruit crops include pears, plums, apples and peaches. Production and expansion is being constrained by the several factors:

(a) Scarcity of planting material especially apples and peaches hence little increase in average cultivated

b) Area under plum is being reduced due to marketing difficulties over the years.

(c) Poor husbandry practices has affected productivity of the varieties available.

According to the 1991 Nyandarua District Annual Agricultural Reports, the two Farmers Training Centres (FTC's) in the district- Njabini and Ol Joro Orok have a nursery each for raising temperate fruits (seedlings) tree seedlings and vegetable seedlings. To ease shortages of planting materials, bulking and grafting of apples commenced in 1990 at the Njabini F.T.C., and provision of seedlings (are) now expected to be improved and sold to the farmers. In 1991, 12 licences were issued to individuals, women groups and the two FTC's (above) by the Horticultural crop Development Authority to operate commercial nurseries for fruit trees.

Table 4.6 Analysis of Temperate Fruit Production - 1989

Crop	Target(ha)	Achieved (ha)	Yields (tons/ha)	Estimated Production
Apples	55	48	9	432
Pears	72	70	11	770
Peaches	3.5	12.5	2	25
Plums	400	389	4.9	1,920

Table 4.7 Temperate Fruit Production - 1990

Apples	55	51	6	288
Pears	78	72	9	630
Peaches	15	12.5	1.5	18.8
Plums	380	359	3	1,077

Source: Dist. Agriculture Office- Nyahururu.

According to a report, from the District Marketing Office, the main importers of cut-flowers are:

U.K.	26.7 %	Holland	25.2%
France	19.8%	Germany	8.2%
Scandinavia	4.2%	M. East	3.2%
Switzerland	1.9%	Others	10%

In 1992, Kenya contributed upto 30% of the total cut-flowers at the Dutch Auction. In 1993, the production of cut-flowers was 23,600 tons valued at Ksh 2.3 billions, accounting for about 50% of the total export from fresh produce. The world market is said to be expanding at the rate of 5% per year, but production is also expanding at a higher percentage, due to the lucrativeness of the flower business, thus, prices are said to be under pressure.

Kinangop thus has the potential to produce large quantities of cut-flowers, if the marketing channels are stimulated, road conditions improved prices of farm inputs reviewed - through lowering of import tariffs or subsidization of farmers, and effective extension services, and fast dissemination of information on market conditions.

4.5 Average Plot Sizes for Cultivated Crops in Kinangop Division

Table 4.8 Crops Cultivation by Lots (Acreage)

CROP	MEAN ACREAGE	S/DEVIATION	MODE
POTATO	2.041	1.665	2.000
CABBAGE/KALES	1.171	1.151	0.250
PYRETHRUM	0.810	1.237	0.500
MAIZE	1.425	1.503	1.000
FRUITS	0.232	0.166	0.250
* OTHERS	12.728	14.917	3.000

Source: Field Survey, 1994.

NOTE: Others, in the table represent other land use practices particularly, pasture lands for livestock rearing, especially dairy cattle, and sheep for wool. Most farmers were found to have set a side fairly large portions of their farms for animals. The rest of the land is used for the cultivation albeit in small plots, of other crops, such as carrots, peas, beans, cut-flowers and shallots. It also include the area taken up by the farmer's structures such as houses, stores, *bomas* for animals, among others.

Most farmers in the division practice mixed farming. They grow a combination of various crops. Over 60% of the farmers interviewed grew a combination of potatoes, cabbages, maize, pyrethrum, fruits, peas and carrots, as well as rearing of livestock. Flori culture is steadily catching up as popular cash crops, but it is constrained by the poor marketing channels and lack of specialized facilities to handle cut-flowers, and the very poor road conditions in the division, which causes delays in the transportation of the delicate produce, leading to serious losses (see Plate).

4.6 Livestock Keeping and Production in Kinangop

Generally, the entire Nyandarua district is a major producer of livestock products, particularly milk. The main animals reared are dairy cattle, sheep (for the production of wool), rabbits and some beef cattle for the local supply of meat.

Dairy keeping is an important farming activity and source of income to most farmers in Kinangop. According to the survey carried in the division, out of the 122 farmers interviewed, only 11 of them had no dairy animals and/or were not selling their milk to a cooperative or other consumers (see table below).

Table 4.9 Analysis of Cattle keeping in the Division

No. of Cattle	Frequency	Percentage
1	9	8.1
2	18	16.2
3	20	18.0
4	17	15.3
5	17	15.3
6	11	9.9
7	7	6.3
8	3	2.7
9	4	3.6
10	1	0.9
12	1	0.9
20	3	2.7
N/Applicable	11	9.9

Source : Field Survey, 1994.

From the table above, it is seen that on average, each farmer has an average of 4 dairy cows, with a standard deviation of 3. Most of the farmers practice small-scale farming. Due to the transportation costs and difficulties involved from Kinangop to Nyahururu, the milk sold is delivered to the K.C.C. factory at Naivasha and not Nyahururu as would be expected.

However, in their effort to promote food security and improve nutritional values

of our diet, the farmers in the division are facing various constraints, which include; high transportation costs; delayed payments; high costs of inputs such as spray chemicals and animal feeds; and poor marketing channels among others.

4.6.1 Impact of Road conditions on Production:

In general, roads are very poor in the division and their impact is felt more with regard to milk and cut-flower marketing than any other product. For instance , according to the survey done for this study, it was established that for example, among other things, the distance over which the farmers have to commute to transport the milk to a collection centre (on a motorable route) increases during the rainy seasons. About 34.45% of the respondents interviewed, had no choice but to commute a greater distance from their homestead, to reach trucks that transport milk that transport milk to Naivasha.

Production amounts of milk (and even cut-flowers) increases substantially during the wet season, and hence correspond to the season of poorest road conditions. Abundant production of milk has therefore come to be associated with increased distance, poor prices and perishability.

Table 4.10 Milk Price Per Litre

PRICE RANGE	FREQUENCY	PERCENTAGE
Below Ksh.10/-	7	5.7
Kshs. 10 -15/-	97	79.5

Source: Field Survey, 1994.

Table 4.10 shows the prices of milk as sold by the farmers in the division. At least 79.5% of the farmers sold their milk at between Ksh.10 and 15/- per litre to the KCC and other consumers. At the time of the survey (November,1994), the prevailing market prices of processed milk ranged between Kshs.10.50 and 12.00 per half-litre packet. This means that for one litre, the price was between Kshs.21 and 24/-. This shows a big disparity between producer prices of milk and those that the consumers pay for the processed milk. This discrepancies can be attributed to the costs of transportation, which necessitates the private transporters of milk to charge excessively in abide to meet the high operation costs in the division. This implies that even though the prices offered for the farmer's milk may be favourable and fair, the deductions made from their gross earnings by either the transporters and/ or the cooperative societies for their services, bearing in mind the state of the roads in the division, substantially reduces the farmers income. The situation ii aggravated by the recurrent delays by KCC in the payment of the already delivered milk.

Table 4.11 Milk Transport Charges Per Kilometre

RANGE OF CHARGES	FREQUENCY	PERCENTAGE
BELOW Kshs 1/-	9	7.4
Kshs. 1 - 2/-	44	36.1
Kshs. 2 - 5/-	4	3.3

Source: Field Survey, 1994.

Most the farmers interviewed complained that alot of their potential earnings goes the transporters and cooperatives rather than the producers. An even greater number of the farmers were ignorant of the transport charges deductions from their milk earnings, and this makes them even more vulnerable to manipulation by unscrupulous transporters and officials of the cooperatives. About 36.1% of the farmers stated that they were charged between Kshs.1 and 2 per litre,(which is about 6.7% of the amount paid for a litre of milk) for the delivery of their milk to the factory at Naivasha, and which they felt was exorbitant and demoralising. However they blamed their predicament on the poor road conditions. Improved road conditions and accessibility might substantially help save some of the earnings and reduce the time and energy put in the production of the farm produce.

The survey further found out that in the rainy seasons, distances over which both the farmers have to walk or cycle, and the routes through which transporters have to follow changes. Individual farmers particularly those far away from motorable roads are forced to commute further away to reach collection centres of farm produce. This is because the trucks that transport the produce (milk) cannot manage to venture beyond these points as the roads become impassable. Milk farmers are forced by circumstances to milk their cows at around four (4 am) in the morning, early enough to allow, them travel the increased distances to the collection centres. On the other hand even the transporters at times are forced to hire tractors to tow their trucks when they occasionally get stuck in the mud while transporting some of the perishable farm produce, particularly milk and cut-flowers.

4.7 Respondents Opinion on Prices By Markets:

This study found that 89.3% considered the prices of various farm produce as low while only 10.7% considered tem as fair. Of the 4.9% whose sold their products in Nairobi 3.3% considered them low and 1.6% as fair. Of the 89.3% whose stated that they sell their produce within Kinangop 82.0% of them considered these prices low, and 7.4% as fair. The table below illustrates these facts;

Table 4.12 Markets of Farm Produce(Crops) versus Prices (Percentage)

Opinion	Nairobi	Within Kinangop	Kinangop/ Nairobi	Kinangop/ Naivasha	Total
Low	3.3	82	1.6	2.5	89.3
Fair	1.6	7.4	0.8	0.8	10.7
TOTAL	4.9	89.3	2.5	3.3	

Source: Field Survey, 1994.

The table shows that, generally, prices of farm products are considered low by the farmers, when compared to the energy, time, and other resources (inputs) put in place to produce them. It does not matter which market; the prices are low. The total represent the percentages for the entire sample size in the study.

The high percentage of sales within Kinangop (89.3%) is explained by the fact that, accessibility to the farm-holdings, as well as to the local markets is made extremely difficult and expensive due to the nature and conditions of the roads in the division. This limits the number of potential buyers and transporters, leaving the farmers at the mercy of middlemen, and transporters who risk to put their vehicles on such roads. Since majority (in fact, almost all) of the farmers can't afford to transport these produce to

distant markets, they are forced to sell at very poor prices, or else, their produce goes to waste. The marketing situations is worsened by lack of cooperatives that handle some farm products such as potatoes, cabbages, kales, carrots, beans, peas, shallots among others. Those existing handle milk, pyrethrum and woo, and a newly formed one is dealing with floriculture. They are said to be poorly managed, except one - Tulaga Farmers Cooperative Society. This means, most farmers have no collective bargaining leverage, and deal directly with middlemen.

4.8 Perishability of Farm Produce (Milk)

In the entire division, it was found that about 81.1% of the respondents have had their milk rejected at the KCC factory due to delays and other difficulties associated with transportation.

An analysis of the regularity of milk going bad in the Division show that in relative terms, about 15.6% of the respondents had their milk going to waste at least once; 55.7% had their milk lost between three to five times in a month, and about 10.7% had lost their milk more than five times in a given month, due to difficulties in reaching the KCC factory in Naivasha, due to the conditions and nature of the road, particularly in the wet seasons. The delays usually result from long distances over which farmers have to commute (mostly, walking and cycling), the long and costly detours that trucks have to make to reach and leave milk collection points, and the sticking of the delivery trucks in the muddy roads for long hours, while carrying the milk, or other goods.

Table 4.13 How Regular Milk Goes Bad in Kinangop Division (Percentages/Month)

LOCATION	ONCE	TWO-FIVE TIMES	MORE THAN FIVE TIMES
NJABINI	25.0	45.0	10.0
	(4.1)	(7.4)	(1.6)
KITIRI	5.3	63.2	10.5
	(0.8)	(9.8)	(1.6)
BAMBOO	25.0	50.0	---
	(4.9)	(9.8)	---
GITHABAI	6.7	66.7	20.0
	(0.8)	(8.2)	(2.5)
MURUNGARU	11.1	55.6	11.1
	(1.6)	(8.2)	(1.6)
GATHARA	15.4	57.7	15.4
	(3.3)	(12.3)	(3.3)
	15.6	55.7	10.7

Source: Field Survey, 1994.

NOTE

1. *The first figures in the table above represent the percentage of respondents who cited loss of milk in the various categories, in each Location.*
2. *The figures in bracket represent the percentage of respondents in the entire Division who stated having lost milk at respective periods per month. The total below each column is of these figures.*

According to the table above it can be seen that two locations, Githabai and Kitiri, have over 60% of the respondents interviewed, stating that they have experienced loss of milk at least two-five times in a month, particularly the wet seasons (May-July, and October to December). In Githabai, its plateau-like topography is seriously susceptible to flooding and poor drainage of the roads. This limits the penetration of delivery trucks in the division and when they do, they often get bogged down in the muddy roads for very long hours, or farmers have to hire tractors to unstuck or tow them. Individual farmers also are forced to commute extended distances to deliver their milk to collection points which are usually shifted to new areas accessible to the delivery trucks.

The high percentage in Kitiri Location can be explained by its proximity to the Aborter Ranges. Road gradient is very steep, making the earth roads susceptible to erosion and difficult to use during the rainy seasons. Therefore, milk collection is severely made difficult by the nature and conditions of the roads in the location.

In Bamboo Location, some sections of it particularly those bordering on Kenyatta road, near the Kiambu-Nyandarua boundary are liable to flooding, due to poor drainage and the nature of the soils, which have high content of clay. At the time of the field survey, most of the access roads and tracks were flooded, thus cutting off any potential motors to collect the farm produce. Most of the farmers use animal-drawn carts, wheel-barrows and bicycles to deliver the produce to the collection centres along the motorable roads.

The relatively low incidence of perishability in Njabini is attributed to the presence of the all-weather Njabini-Magumu road, which is tarmacked. However,

farmers in further away from the motorable road find themselves in accessibility difficulties, just like the others in other Locations.

Table 4.14 Milk Transport Charges/Kilometre in Various Locations

LOCATION	BELOW SHS.1/-	SHS.1/-TO 2/-	SHS.2/-TO 5/-
NJABINI	15.0	15.0	10.0
	(2.5)	(2.5)	(1.6)
KITIRI	5.3	6.8	5.3
	(0.8)	(5.7)	(0.8)
BAMBOO	8.3	50.0	---
	(1.6)	(9.8)	---
GITHABAI	6.7	33.3	---
	(0.8)	(4.1)	---
MURUNGARU	5.6	61.1	---
	(0.8)	(9.0)	---
GATHARA	3.8	23.1	3.8
	(0.8)	(4.9)	(0.8)
TOTAL	7.4	36.1	3.3

Source: Field Survey, 1994.

NOTE: Totals above represent the sum of the respective percentage of total cases occurring in each cell. They are a sum of the total responses on various charges levied on the farmers produce in the various Locations in Kinangop.

A comparative analysis of the charges for the transportation of milk by private transporters in the division, show that, about 36.1% of the farmers stated being deducted between one and two shillings per kilometre for the delivery of milk to the factory at Naivasha. An even greater number (53.3%) of the farmers who sold their milk were not aware or could not remember the charges the pay. This put them in a very precarious position to be manipulated and ripped off by unscrupulous individual transporters and cooperative officials.

Most farmers interviewed complained of the exorbitant charges on transport of their produce, but felt helpless due to the nature of the roads. Transport charges severely affects the income earned on sale of produce, and hence their capability to buy and meet other necessities/needs.

Bamboo, Murungaru and Githabai had no farmers charged between Shillings two-five due to various reasons. For instance, Bamboo Location has benefitted to some degree form the tarmacked Njabini-Magumu road, hence parts of its areas near the road benefit in having reduced transport costs. Sections of Githabai and Murungaru have benefitted from improved accessibility as a result of the RARP, hence improving accessibility generally to most farmers holdings.

Plates 6 & 7: Most farmers are small-scale producers. Delivery of Milk is mostly by use of NMT modes, particularly due to the nature of roads.

4.9 Milk Transport and Marketing

About 81.1% of the farmers interviewed stated having their milk rejected on account of poor road conditions, forcing them to trek long distances to reach transport means. Since most roads became impassable during rainy seasons, farmers find themselves travelling further distances, to reach collection centres where trucks can reach.

In Njabini, of the 20 respondents, 16 of them reported having had their milk going to waste (or rejected), which represent 80% of the respondents. Most of those who reported experiencing accessibility difficulties, are those far (about 2 kilometre and more) from the major access roads, especially areas on the fringes of Aborter Ranges. This represented, 16.4% of all the cases (22 respondents).

Kitiri Location had 19 respondents, 15 (or 78.9%) of whom stated that they have had their milk gone bad at some time. The percentage of farmers who stated having lost some milk at some time or another in the other locations is shown in fig 4.15 above. Murungaru (72.2%), Bamboo (70.8%) and Kitiri (78.9%) have relatively lower figures (Percentages) of respondents, who claimed to have experienced losses. This is partly because they are on access roads covered by the RARP, or in cases of Bamboo, astride the Magumu - Njabini tarmacked road. This means, in relative terms, parts of their roads are passable during wet seasons.

A survey to determine how regular, or the number of times, farmers have had their milk rejected by K.C.C. authorities at Naivasha, due to difficulties, related to transportation, per location established the following Constraints;-

(i) Poor roads; high costs of transportation leads to reduced net incomes for re-investment.

(ii) Lack of milk-cooling plants, increases chances of perishability of some produce such as milk and flowers.

(iii) High costs of inputs - Acaricide, animal feeds and veterinary services.

(iv) Inadequate Artificial Insemination (A.I) services, dips are poorly managed and utilized, poor extension services,(probably due to transport difficulties- both poor roads, and inadequate transport and means), inadequate information on appropriate feeds and fodder crops.

(v) Delayed payments for the delivered produce, particularly milk and flowers.

Plate 8: The various transport modes used to deliver milk to the K.C.C. Factory in Nyahururu.

4.10 Marketing, Distribution and Storage of Farm Produce

Kinangop has only a few active cooperatives for marketing farmers produce. There are 11 active cooperative societies, mainly involved in the marketing of milk, pyrethrum, wool and cut-flowers.

Table 4.15 Distribution of Cooperative By Division

Division	Active	Dormant	New	Total	Membership
Ndaragwa	19	3	1	23	3,547
Ol Joro Orok	13	5	3	21	7,803
Ol Kalou	20	5	4	29	7,450
Kipipiri	11	-	1	12	5,269
Kinangop	11	-	1	12	3,922
Total	74	13	10	97	27,991

Source: Nyandarua District Development Plan, 1989-93

4.10.1 Distribution of Cooperatives in the Division

The survey carried out in the division showed that about 66.4% of the respondents belonged to a cooperative society. Of these, 18% belonged to Tulaga Farmers Cooperative Society (TFCS). As the table below shows, this is the cooperative society with the majority of members. In fact,this was confirmed by the Divisional Cooperative Officer, who further stated that Tulaga FCS is the only well managed and properly run

cooperative society in the division. This was attributed to a high degree of the community participation in the general administration and decision making affecting the members. The officials are elected according to ones track record of serving the public diligently and consistently defending the interests of the members. The officials can be impeached for misconduct while in office at the annual general meetings or special meetings called to sort out difficulties affecting the society. Most of the officials are usually those who hold or have held public positions, and have a pleasant public record and image.

TFCS is involved in the marketing of milk, pyrethrum and wool, on behalf of its members. It has also been involved in stocking of some farm inputs, such as seeds, fertilizers, animal feeds among others, and avail them on credit terms to the members and later deduct their worth from respective members earnings. However, the cost of these inputs, coupled with delayed payments of produce by the buyers such as KCC, and increasing cost of transportation given the nature of roads in the division have adversely affected the provision of these services and threatening its sustainability.

A recently formed (1991) cooperative society for the marketing of cut-flowers is the Kinangop Flower Growers Association. It is involved in the assembly of cut-flowers from the small scale farmers in the division, grading these flowers and selling them to registered exporters, who are members of the Fresh Produce Exporters Association of Kenya (FPEAK). FPEAK provides the logistics and market information apart form negotiating policy issues with the government (Public Sector). Prior to the formation of the Society of flower growers in Kinangop, middlemen bought flowers directly from farmers and then sold to either users in the local and surrounding urban centres, or

Nairobi. Exporters do export cut-flowers directly to importers or to their agents abroad who in turn might sell to the supermarkets abroad or take them to the Dutch Auction in Holland, where buyers come from different parts of the world.

4.10.2 Some of The Active Cooperatives in Kinangop

Table 4.16 Membership in Cooperative Societies

Cooperative	Frequency	percentage
Tulaga	40	18.0
Njoya	22	2.5
Githabai	4	3.3
Kitiri	12	9.8
Muruaki	12	2.5
Njabini	3	13.1
Githioro	16	6.6
Olaragwai	8	8.2
Kinale	1	0.8
Withare	1	0.8
Itheru-thi	10	1.6

Source: Field Survey, 1994

From the table, it is clear that most of the respondents were members of Tulaga cooperative society i.e 18% of the respondents. According to the Divisional cooperative officer, Tulaga FCS is the only one that is well managed and run. It handles milk, pyrethrum and wool marketing, and occasionally provides credit facilities - seeds, fertilisers and feeds for animals to the farmers, and later deduct from their produce sales. However, the sustainability of these services is threatened by the increased cost of farm inputs, delayed payments of farm produce, especially milk by KCC, and the increasing cost of operation, especially transportation.

4.11 Some of The Problems Constraining Agricultural Development in Kinangop

As alluded to in earlier sections of this chapter, Kinangop is a high potential agricultural zone which mainly produces food crops such as potatoes, cabbages, kales, peas, carrots, and also dairy products especially milk. The main cash crops grown is pyrethrum. Cut-flowers and temperate fruits are increasingly being grown as cash crops. The division is also a major producer of wool from sheep.

However, the full exploitation of these and other agricultural products is constrained by various factors. These include;-

poor state of roads: The roads in the division are mostly earth roads with only the Njabini-Magumu road being the only tarmacked road in the division. The earth roads become impassable during the wet seasons, leading to massive loss of farm produce, particularly the highly perishable milk and cut-flowers, both of which require speedy and efficient delivery to the markets. For instance, this study found that about 34.4% of the

farmers are forced to change the distance over which they have to transport these commodities during the wet seasons because the roads become totally impassable in some sections by motorized transport vehicles such the delivery lorries. Further more, about 81.1% of the farmers stated that during wet (months) seasons, they have suffered some losses resulting from the rejection of their milk at the KCC factory at Naivasha due to delays as delivery vehicles get stuck in the muddy roads.

From the foregoing, it implies that the transportation costs in the division are also very high, due to high costs of operation and maintenance of the few vehicles available. Those that have 'risked' putting their vehicle on these roads charge excessively high charges as an insurance against regular breakdowns and high fuel consumption. The few transporters operating in the division operate like a private club and arbitrarily fix the charges to levy on the transportation of both farm produce and inputs as well as passenger travel.

The transportation problems, particularly of the farm produce is worsened by the fact that most the cooperatives in the division are poorly managed and have weak capital base. This implies that they are not able to operate their own transport fleet and have to hire private means to deliver farm produce to the markets. This gives room to middlemen to take advantage and either charge high transport charges, or purchase the produce at extremely poor prices.

High costs of inputs such as fertilizers, seeds and farm chemicals for spraying against both crops and animals are another constraint because this limits their affordability and hence application by the poor farmers. For instance, a bag of 50

kilogram of fertilizer was retailing at Kshs.1200 in the local market centres. Considering that about 49.2% of the farmers were found to earn between Kshs. 3000 and 7000 per month as gross income, and the general high cost of living in the country as a whole, most of the farmers expressed their inability to afford these inputs and hence consistently apply them in their farms. Lack/(limited) of application of these essential inputs is likely to affect production of agricultural produce.

The package of fertilizers in 50 kg bags was perceived to be too cumbersome by most of the farmers in the division, given the fact that they mostly depend on non-motorized means of transport such as head-and back-loading, cycling, wheelbarrows and animals. The high transport costs and high costs of farm inputs affect their affordability and therefore farm application. This limits efforts of intensifying productivity as advocated by extension officers and as necessitated by rising population sizes.

Relatively low incomes affect the overall capital and other investment in agricultural production. The high costs of transportation, high costs of farm inputs, the poor state of the roads and dominance of middlemen in the division all have a great influence on the income levels that reaches the farmer as disposable income that can be re-invested in agriculture. For instance, about 36.1% of the farmers were being deducted between Ksh 1-2 per litre of milk for delivery of milk to the factory. Thus for any given amount of milk which has to be taken to the factory, it is discernible that these accumulated deductions severely reduces a farmers potential earnings. When coupled with the fact that the delivery of the milk to the factory is not guaranteed in the rainy seasons due to the nature of the roads, it implies that these factors have great influence

on a given farmers production morale. Furthermore, there are regular delays in the payment of delivered milk by the KCC.

Low prices: For the marketing of the Division's traditional outputs, especially potatoes, cabbages, peas, kales and carrots, the problem is that production depends on rain-fed irrigation such that there is over-supply during the harvest season. Since there are no cooperatives that handle the marketing of these produce, it means the farmers are at the mercy of middlemen who exploits these farmers by paying them almost half the prevailing market prices. Farmers are forced to sell at these poor prices, or risk their produce going to total waste. It is common for the farmers to feed some of their produce to their animals during the rainy seasons when such produce mature and accessibility to the farms is difficult using motorized means. For instance this study found that 89.3% of the respondents were bitter that the prices of these farm produce were extremely low, and were forcing them to grow crops for subsistence only.

When accessibility to the farms become totally impossible by motorized transport during the rainy seasons, the delivery of farm produce such as potatoes and cabbages to the distant motorable roads is the responsibility of the individual owner. Despite the low prices offered for various food crops, they are forced to hire at their own costs either tractors, or animal-drawn carts to deliver these produce to the collection centres, which further eats into their potential income levels, and hence the capacity to adopt to new techniques of enhancing productivity.

Weak community-based organizations and poor management of the existing cooperative societies is another obstacle to agricultural resource development. Poor

mismanagement is exemplified by frequent cases of financial embezzlement, that contributes to the low capital base and poor service delivery to members. As a consequence, they are not able to offer credit facilities, and often delay payments for delivered produce. This alienates the farmers, and forces them to deal with the middlemen who despite paying low prices, however do pay cash. Only, one cooperative society was seen as an exception- Tulaga, and was said to be fairly well managed. This was also confirmed by the Division's cooperative officer.

There are also no specialised storage facilities for the storage of various farm produce in the division. This may explain why there are numerous cases of farm produce being purchased poorly, and going bad. If the roads are impassable especially in the wet seasons, then the farmers have no where to store their surplus produce and are therefore compelled to dispose them even though at poor prices to avoid total loss.

Access for the small-farmers to public passenger vehicles is limited by the costs of travelling, poor roads few such vehicles. The problems faced by small farmers,who constitute a large part of the farmers in the division in moving produce and materials between different parts of their farms, as well as between farms and markets, are also exacerbated by a shortage of appropriate vehicles, both passenger and goods carriers. This is attributed to the poor road conditions which keeps off potential transport operators.

The state of the road, among other reasons, limits the number of visits to farmers by extension officers. Accessibility to farms, particularly in the wet seasons becomes almost impossible. The situation is worsened by the fact that, the whole division has

only one vehicle earmarked for extension service officers. When it breaks down,(and this is often, according to the extension officer, Njabini), then, their operation comes to a standstill, except only those farmers, bordering the divisional offices within a radius of 2 kilometre around Njabini. Occasionally, it's also grounded due to fuelling problems.

Climatic factors also have an effect on crop growing. The division particularly those parts bordering the Aberdare Ranges are prone to frost which adversely affects, maize and potatoes mostly. The lower parts of the division, bordering Nakuru District are relatively dry, and have short-growing seasons. This causes water stress in plants, and only crops with very low growing seasons can be cultivated. Some sections of the division are also prone to water logging (Bamboo, parts of Githabai locations).

From the foregoing, this study confirmed the alternative hypothesis that road transportation is primarily responsible to agricultural resource development in Kinangop. A bonafide case has been established depicting the various woes regarding transportation that farmers in the Division experiences, in their individual and collective bid to ensure food sufficiency and security for the entire country in general. Chapter Six further looks at the road transport-agricultural resource development relationship, and gives more weight to this hypothesis.

CHAPTER FIVE : ROAD TRANSPORTATION SYSTEM IN KINANGOP

5.1 Overview

There are a number of pre-conditions if roads are to have much positive impact on agricultural production. The marketing system has to be flexible enough not stifle the road improvement effort; the transportation industry needs the capacity to carry the extra output or to expand to do so, transport cost reductions have to be passed on to the farmer.

Improved access to the market will remain a mere theoretical concept if the farmer is forced to sell to a marketing agency which cannot pay cash (KCC) or which cannot buy when the farmer needs to sell, and even if this is not the case, there may be nothing in the shops for the farmer to buy, which again prevents such a farmer from achieving any improvement in his/her standard of living, or enhance productivity.

All too often, planners assume the construction of roads is equivalent to the provision of transport. This is by no means automatic, especially where capital, foreign exchange and skilled labour are limited, particularly in most developing economies such as Kenya. Because road construction and maintenance is in the public domain, whereas road haulage is often in the hands of the private sector, the latter tends to be neglected. Donor funds are often more readily available for the former than the latter. The result is that all too often, the road remains under-utilized, not because the agricultural potential

is not there, but because the road haulage capacity is not[5].

The poor nature of the roads in Kinangop limits the number of transport operations, willing to 'risk' their vehicles on such roads to only a few, who also double-up as middle men. Most rural access roads become impassable during rainy seasons, thereby occasioning massive loss of farm produce especially milk, cut-flower, and cabbages/kales. By comparison with a good road, the life and effectiveness of vehicle without maintenance and reasonably efficient is much shorter. If roads are not maintained, their effect is very dramatically felt, through production and transportation costs.

If there is no reduction in input costs or increase in farm-gate prices there is unlikely to be any effect on agricultural output. Very often, the official marketing agencies such as K.C.C. have a policy of nation wide pricing, and is itself a major constraint to increasing output because of its inefficiency, mismanagement and shortage of working capital.

5.2 Road Network

Kinangop Division not only has poor roads, but the network is also very poor. For instance, to connect to the district headquarters (now in Ol Kalou) but formerly in Nyahururu, one had to travel to Naivasha (Nakuru District) and on through Gilgil - Ol

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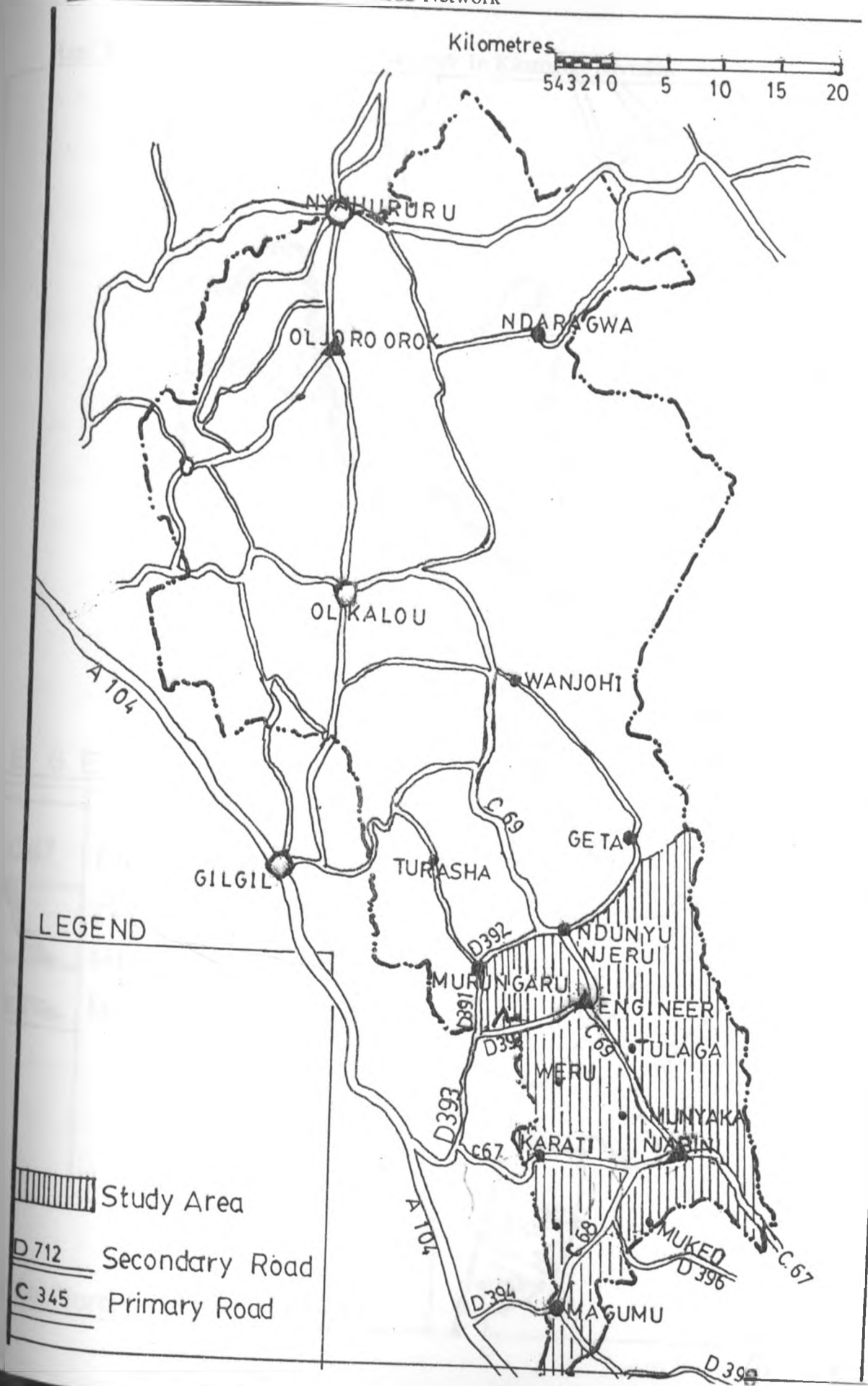
5 (International Agricultural Development Magazine, Jan/Feb. 1989 pp.8)

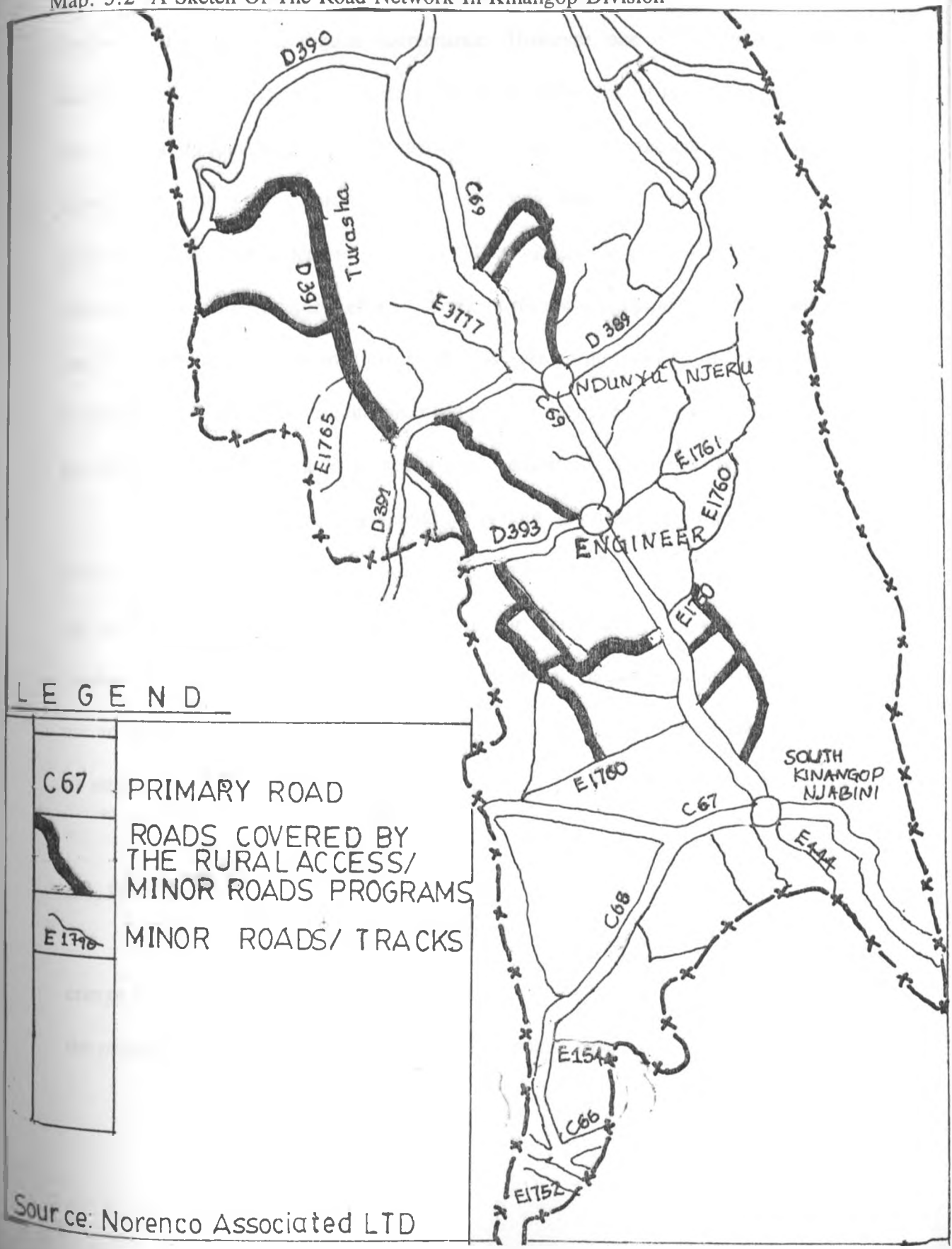
Kalou to Nyahururu, a distance of about 120 km. The direct roads linking the main centres in the division to Ol Kalou and Nyahururu through Ndunyu Njeru - Githioro - off Wanjohi to Ol Kalou (see Maps 5.1 and 5.2 pps.108 & 109 respectively) is totally impassable during the rainy season. It is poorly maintained, and has deep crater - like pot holes and water - cut ruts. In the dry season, it becomes very dusty and travelling along it is very slow and uncomfortable

As earlier stated in the section on literature review, the road network in the entire Nyandarua District has remained unchanged since 1988. Priority is said to be focused on improvement of existing roads through re-gravelling, spot improvement, drainage works and maintenance under the minor roads transition project which replaced RARP.

Map. 5.1 Nyandarua District Road Network



Map. 5.2 A Sketch Of The Road Network In Kinangop Division



The division has a total of 303.5 km classified roads, and less than 49 kilometres tarmacked roads. As a high potential agricultural zone, the existing road network is over-utilized and requires regular maintenance. However, one of the donors (C.I.D.A) involved in the improvement of rural access roads in the district pulled out in 1991-92, due to poor diplomatic relationship between Canadian Government and the Kenyans Government over a wide range of issues, including, mismanagement of donor funded projects through embezzlement of funds. The withdrawal of C.I.D.A has seriously affected the road improvement efforts. Some of the road equipment and machinery key had donated to the government through MOPW, are going to waste in Nyahururu, due to lack of spare parts, poor maintenance and general negligence. So far, only about 93.3 km have benefited from the Rural roads improvement project in the division.

The key point in planning should be to think in terms of a system with defined procedures through which key constituencies can be involved. Priorities should reflect the factors that determine community demand for rural roads, such as population area, production, social and cultural services, among others. Increases in personal travel also are an important benefit of improved rural access, which may in itself lead to adoption of innovations in production methods.

5.3 On-Farm Transport

On-farm transport act activities account for a sizeable part of the work, time and energy in agricultural production and household upkeep. However, programs to raise the productivity of farmers in most of our rural areas, have by and large failed to focus

on them. Increasing productivity of on-farm transport and movements could be covered under extension programs; should rely primarily on the initiative of farmers or organised local groups such as cooperatives; need to be encouraged by demonstrations and through advice by NGO's.

Such on-farm productivity improvements include transport technologies especially alternatives to head loading (such as wheelbarrows, bicycles, and animal carts, path improvements and changes in post harvest practices. Airey, T. (1992) , in a survey of the transport requirements of rural households confirmed that it is important to broaden rural transport programs beyond roads. The survey points out that there are considerable differences in ownership and use of intermediate means of transport (IMT) among farmers in a given area, whereby most households considered to be successful (high income) also owned and used the most IMT's.

In Kinangop, the capability of a particular farmer's produce to reach the market, especially during the rainy season depends on one's ability to hire a tractor, animal carts or four-wheeled vehicles to deliver the produce either to the local markets and collection centres or neighbouring large urban centres. It follows, that, only those who are relatively better-off are able to spend a little more, on top of the production costs, to deliver to the market places[6].

Since women undertake most of the household transport (70% of the total as

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T. Airey; "Transport as a factor and constraint in Agricultural Production and Marketing" draft, Sept. 1992, part of the series of reports under preparation under the Rural Travel and Transport Program of the SSATP".

measured in time and in ton/km in Tanzania), increasing attention to the improvement of on-farm transport would be particularly important for them, and thereby releasing them to concentrate more on agricultural productivity and related activities. Women headed households covered in the Bank Surveys had less access to IMT's and included a disproportionate share of the least successful household (Ibid). In Kinangop, the poorer farmers suffer more losses, especially due to their incapacity to hire other modes of transport to deliver the produce to markets.

Comprehensive programs dealing with rural transport at the community level need to be given emphasis, by

- promoting IMTs and facilitating the obtaining of credit;
- involving women in Planning Community-based access to IMTs;
- rehabilitating and maintaining roads and paths,
- reviewing policies affecting transport.

The point that may have the broadest application is the need for more-systematically involving agricultural producers in formulating and overseeing transport policies and programs.

5.4 Accessibility:

Accessibility improvement has generally been treated as the central goal of transportation planning. As a concept, accessibility is a measure to denote the ease with

which land-use activities (markets, socio-cultural centres, health and educational facilities, credit facilities etc) can be reached using a transport service, involves a combination of two elements; the cost and quality of a transportation system linking points in space, and the spatial location of activities **(UNCHS, 1985 pp.12)**.

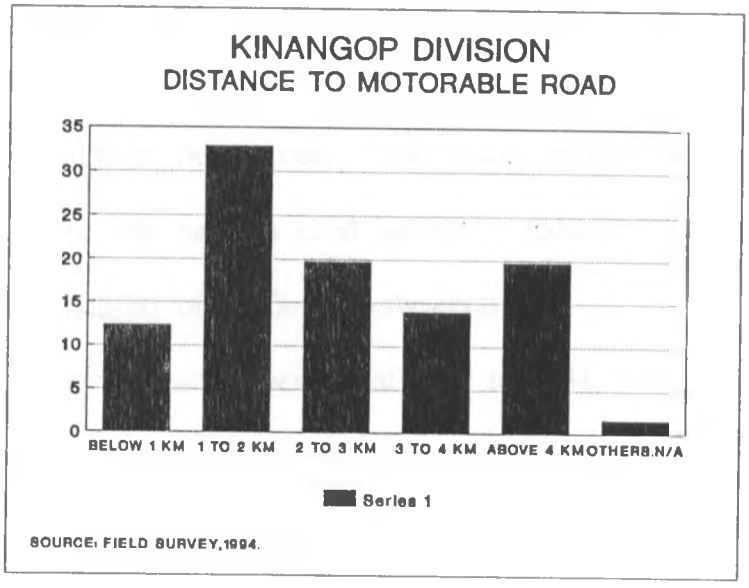
Plate 9: Poor Access Roads; Narrow, muddy and flooded.

Accessibility improvement has been treated by economists as being synonymous with cost minimization; whereby, in practice, savings in time and/or cost of travel for a given distribution of activities have been considered to reflect changes in the level of access **(Niedercoorn, Behodolt, 1969)**. For planners, measures of accessibility should reflect the fact that the level of access can be changed by bringing a particular facility in proximity to the users, and/or improving the transport service between facility and user, which influences the form of land use.

An improved transportation system may improve information flow (knowledge, skill, incentive, technology etc) and service deliveries (farm inputs, pest control health and educational services etc). These improvement can have an impact on crop production and the personal mobility of rural inhabitants.

In Kinangop Division, the poor state of the roads, and poor network, which leads to high cost of transportation is major constrain to the general development of the division. Some inhabitants are forced to walk extremely long distances to reach service centres, during the rainy season when most of the earth roads become impassable.

Figure 5.1 Average Distances Farmers Walk to Motorable Road



The figure above shows the various travel distances between a farmer's house to a market/collection centre on a motorable route. It is clear that, most households are not easily accessible, particularly during the wet season when, occasionally, these distances, changes especially with regard to the delivery of milk. Poor roads forces the delivery trucks, to erect new collection sites, for away - hence increasing some farmer's travel distance-substantially. Given that, they mostly use bicycles, animal carts and walking

as the major modes of transport to these centres, it implies slowness, and energy-draining endeavour, which limits, potential time and energy devoted to agricultural productivity.

5.5 Benefits of The Rural Access/Minor Roads Programs

Although Kinangop was covered by the RAR/MR Program, only a limited number of earth roads have so far benefited (93.3 km). About 59% of the respondents stated having benefited from the programs in one way or another even if indirectly. For those sections covered, the benefits cited include:- reduced losses of farm produce and improved accessibility of the farms to the centres.

It was established however that prior to 1984, before the programs had been started in the Division, was almost always cut off from the rest of the country. This is because even the Njabini-Magumu road had not been tarmacked, and transport and communication networks were virtually non-existence in the Division. To some degree, the RAR/MR programs have opened the Division to outside influence, which is crucial for the development of any region.

Table 5.1 Advantages associated with Rural Access Roads

Benefits of RAR/MR	Percentage (respondent)
Reduced loss of farm produce	6.6
Improved accessibility and reduced perishability of produce	41.0
Reduced losses & employment opportunities	11.5

Source: Field Survey, 1994.

Plate 10: A Rural Access Road Completely Flooded

The accessibility index to most services and activities is poor in Kinangop. Not only is it located far away from the District headquarters (now in Ol Kalou), but the level of infrastructure development is low, which further acts as a deterrent to potential investors, in both the transport industry, as well as commercial and agricultural business. Only Engineer, a designated Rural Trade and Production Centre (RTPC) has been supplied with electricity. All the other centres, are not, and although the road between Njabini and Engineer is a class C type, and gravelled, it occasionally becomes impassable in some sections. According to the District's Roads Superintendent officer, the Road is marked as fully tarmacked in government's documents. The money earmarked for it

is said to have been misappropriated/or embezzled by politicians, but this researcher/study couldn't certify these claims.

5.6 Weakness of The RAR/MR Programs

In Kinangop, only 93.3 km have benefited from the programmes rehabilitation and improvement. The withdrawal of CIDA sometime in 1991-92 no doubt affected its operation. CIDA provided the biggest share of funds and road construction and repair machineries and equipments. The MOPW's yard in Nyahururu is littered with lots of these machineries and equipments, which are said to be lacking spare parts, and which can only be obtained from Canada. The Ministry (Government) probably lacks the funds, or the political will to rehabilitate these machineries, and hence the road conditions in the division. This is the general problem with overreliance of foreign funding, without adequate measures being put in place, to sustain initiated projects.

The other major weakness of the programs is the poor community involvement or sensitization by the government, to participate in road improvement projects Due to the foreign funds, the project implementors probably did not find it necessarily to involve the project beneficiaries in the implementation. As such, the local people felt that the program was a government (public) venture and not 'theirs', hence the poor concern for the state of the roads. In fact, most of the transporters and enlightened farmers, who are familiar with the recently introduced petroleum levy system argued that, the massive earnings obtained from the levies on petroleum products, should be pumped back to the road rehabilitation programs. Poor involvement of the local people in the project right

from planning through the implementation might explain the apathy of the local people to the programs. Only when a section of a given road becomes totally impassable do the local people close by team up to try and either cut drainage channels, or construct some temporary bridge, using wooden (logs) plants.

Table 5.2 Disadvantages associated with Rural Access Roads

Weakness of RAR/MR Programs	Percentage of Respondent
Poor Community Involvement	24.6
Poorly Constructed roads	26.2
Political interference/slow Implementation	13.9
Poor Community involvement and Poor road construction standard	14.8
Limited Coverage	12.3
Others	8.2

Source: Field Survey, 1994.

The study found that, presently, there are no NGO's that are working with the local people to help solve some of the problems afflicting farmers, be they transportation difficulties, procurement of inputs, marketing of farm produce or community education and sensitization, on involvement in public projects, such as road rehabilitation.

5.7 Vehicle Fleet and Load Capacity

In Kinangop, there's a very low vehicle-ownership ratios, given the percentage of people who use non-motorized means, and the responses of those who stated lacking

alternative modes. Infact, this is supported by the fact that 75.4% of the farmers derive their income from farming only, and also the fact that, most respondents (27.9%) stated that their average monthly income are between Ksh. 3000 - 5000/+. This means that, majority of the farmers depend on commercial transport services provided by private individuals, and some cooperatives society. These services are however seldomly satisfactory in terms of the routes served, frequency of services, capacity offered and, particularly, charges. The private transport operators have a monopoly in the division, and dictate prices/transport charges, and thereby, often capture most of the benefits resulting, for instance, from improvement of roads. The publicly-owned (cooperatives) are often few, poorly managed and ineffective. Generally, the vehicle operation costs are quite high in the division, due to the poor state of the roads, and poor network linkages, with higher order roads, that necessitates, expensive by-passes.

The type of motor vehicles commonly used to transport farm produce and inputs are lorries, which are restricted to the few all-weather roads in the division particularly the road between Magumu-Njabini and Engineer. Some sections of the road between Njabini and Engineer, and on to Ndunyu Njeru become impassable during heavy rains. These lorries are mostly 7-12 tons load capacity carriers, which when loaded with cabbages and potatoes (120 kg bags) have a devastating impact on the earth roads that are the dominant road type in the division. The roads in the division are so poor that, even specialized four-wheeled-drive vehicles, also find the going very rough (see plate 4) in the wet season.

Recognizing the resource constraints to building motorable rural roads and the low

level of motorized-vehicle ownership, particularly among small land holders and low income farmers who constitute a high proportion of the rural population not only in Kinangop, but the entire country, it is desirable to identify and promote appropriate technologies for vehicles. The factors to consider when evaluating vehicle technologies to provide in our rural areas include;-

- Social acceptability and/or affordability
- Use of local resources (skills and materials) in the production and maintenance of vehicles
- Efficiency in use of energy (fuel, physical exertion etc)
- Capital and operating cost-effectiveness;
- Flexibility in use (no restriction on its use on motorable roads, usable both on and off farm, service to both passenger and goods movement **(UNCHS, 1985 pp.17)**.

Appropriate technologies range from head-loading surface and unit-cost of operation condition the use of a particular vehicle. For conditions prevalent in the study area, the animal-drawn vehicles (carts) is seemingly cheap for short hauls. The use of the few public transport vehicles for whole-hire is probably the most expensive form of transport for the small-holder for journeys from road sides to markets (ref. to Table 6.1). The study found that the ownership of animal carts depends to some degree on the income (marketable surplus per household) of the farmers, and that in far-away sections from the main motorable roads, and among the poorest (low income earners), head-and back-loading, bicycles and wheelbarrows are the most prevalent modes of transport.

Howe, (1983) has illustrated the performance characteristics of some vehicles

popularly used in rural areas of developing countries. He states that the traditional vehicle technologies such as wheelbarrows and animal-carts which have along history of development in each socio-economic and physical environment, and they cannot be replaced completely in the foreseeable future by motorized modes in many countries. What need to be done is to gradually modify the design, in order to enhance their efficiency. Research efforts have produced modifications such as the bullock cart designs India **(Ramaswamy, 1977)** and the Chinese wheelbarrow.

The various types of vehicles listed below should be researched on further in a bid to establish the most suitable, affordable and acceptable to the local community. The aim is their fabrication using the locally available materials and labour. This will go along way in alleviating the transportaion problems afflicting the farmers in Kinangop, by not only increasing the load capacity, but also cutting on costs, improving efficiency and reducing loses.

Table 5.3 Performance Characteristics of Some Basic Vehicles

Vehicle	Load	Speed (Km/h)	Range	Terrain
Western W.Barrow	120	3-5	1	Reasonably flat, smooth surface
Chinese W.Barrow	180	3-5	3-5	Reasonably flat, tolerates rough surface
Handcart	180	3-5	3-5	Reasonably flat, very smooth surface
Bicycle	80	10-15	40	Reasonably flat path
Bicycle and trailer	150	10-15	40	Reasonably flat wide path
Tricycle	150-200	10-15	40	Reasonably flat, wide path
Animal-drawn cart	1000-3000	3-5	50	Reasonably flat wide path
M/cycles & Trailers (125 cc)	200-300	30-60	100	Reasonably flat wide track

Source: Howe, J.(1983): Conceptual Framework For Defining and Evaluating Improvement to Local Level Rural Transport in Developing Countries, ILO, Geneva.

The supply of electricity, and improvement of roads to motorable levels, particularly to the local market centres such as Njabini, Murungaru and Ndunyu Njeru among others, can boast Jua Kali artisans to start informal fabrication and manufacturing of these appropriate vehicles.

Appropriate policies to promote Jua Kali sector, needs to be put in place, to manufacture some of the modified vehicles to suit local needs. These can go along way in saving valuable foreign exchange, as the designs should be suitable to local needs, and repair and maintenance carried out locally.

The promotion of the use of simple forms of motorized transport such as motorized bicycles or tricycles and motor cycles may help in the transport of large loads and reduce the time taken by a farmer to get to the market. Their use might help the farmer to reach distant markets, and thus reduce the farmer's dependence on middlemen and improve the marketability of their produce.

5.8 Terminal and Maintenance Facilities

Lack of storage facilities in the division for farm produce is a serious set back to agricultural development. Storage areas are an important element of overall rural transportation systems, as they perform functions which affect the price of farm produce and the capacity of the transport network. In Kinangop, there are no storage facilities to handle milk, cut-flowers and other perishable produce such as cabbages, kales, and this is why most of the produce is susceptible to perishing, given the nature of the roads. There are no milk cooling plants nearby - the closest being the KCC factory in Naivasha

around 50 km away, and the other factory in Nyahururu is quite far. This coupled with poor road conditions and network work against the farmers by subjecting their produce to high risks of perishing.

5.8.1 Functions of Storage Units

Storage units can help accommodate supply and demand peaks in order to reduce investment in the enhancement of transport-service capacity to meet seasonal peaks. At the same time, this stabilizes the market price of farm produce.

- To preserve perishable produce (milk, vegetables etc) in the absence of timely transport and in the face of fluctuation in market demand.
- To avoid the return of unsold produce from market to village

With storage facilities at the farm or village, overall travel demand (i.e frequency of trips) related to food-crop and farm-input purchases from the market can be reduce.

Maintenance facilities are another important component of a transportation system. Maintenance of transport facilities and equipment can enhance their efficiency and lifespan, hence reduce transportation inadequacies, operation costs and deterioration rates.

Table 5.4 Lack of Storage Facilities

Rank	Percentage
2	1.1
3	5.6
4	49.4
5	27.0
16	10.1
7	4.5
8	2.2

Source: Field Survey, 1994.

The table above shows the respondent's opinion (rank) of the impact of lack of storage facilities for form produce on agricultural development. It shows that majority ranked lack of storage facilities as the fourth and fifth factor in constraining agricultural growth in Kinangop.

5.9 Problems Facing Transportation in Kinangop

The major obstacle to potential and operating transporters include, the poor road conditions which are mostly earth roads which become impassable during the rainy seasons. Access roads covered by RAR/MR Programs are very few and only 93.3 kilometres have been improved. Accessibility to some sections of the division, especially those on the fringe of the Aberdare Ranges, for example, Kitiri, and those in the Kinangop Plateau which is susceptible to flooding especially Githabai and Bamboo

Locations. In such circumstances, such areas are completely cut-off, and only limited use of non-motorized transport modes are feasible, - bicycles, wheelbarrows, animal - drawn carts and head and back loading. As a consequence, lot of farm produce such as milk, cut-flowers, cabbages and kales are susceptible to perishing, due to delayed transport to the markets.

In relative terms, farmers closer to motorable roads such as the Njabini-Magumu tarmac road reported few losses of farm produce, and even higher selling prices of their produce, due to easy accessibility. The poor state of the roads might explain the high prevalence of NMT modes of transport in the division, especially human porterage (wheelbarrow and back-loading), cycling and animal cart transport.

The roads conditions have limited the number of potential transport operators to only a few, who operate like a club, and set arbitrary transport charges to the farmers for both passenger travel, and transport of farm produce. It was established that, majority of the transporters hike their charges, citing high cost of operation, in the division, that necessitates them to charge more to compensate for regular breakdowns, and high fuel consumption particularly in the wet seasons.

As a settlement scheme zone, the division's land parcels were well planned with adequate room for roads. However, some of the roads, have been encroached by some of the farmers, while others have been neglected and are now covered by grass and bushes, and are now too narrow, to allow commercial vehicles such as lorries, to access to the farms. Limited accessibility by motor vehicles forces the residents in such places to walk long distances to reach motorable roads, thereby wasting alot of time, energy and

resources which could effectively be utilized to enhance productivity. During the wet seasons, these distances vary, and majority of the farmers commute between 2 and 4 kilometres to deliver milk to collection centre, on motorable roads.

Plate 11: Poor State of the Roads Necessitate the Use of NMTs.

The road network in the division is so poor such that, for one to travel to the district's headquarters (now in Ol Kalou) from Kinangop, one cannot use direct routes, but has to use the Naivasha - Gilgil - Ol Kalou route. The other routes through Ndunyu-Njeru, - Wanjohi to Ol Kalou is very poorly maintained, and is totally impassable. The distance is, also very prohibitive in terms of cost and kilometres (see Fig 5.1).

In some locations such as Bamboo, some of the existing bridges, which are wooden, are susceptible to collapsing or being swept by floods. In such circumstances,

only certain types of vehicles especially light trucks and mostly NMTs can use these bridges. This implies that, accessibility to some sections is extremely limited due to these type of bridges, which are not sustainable or have a short lifespan.

There has been a tendency to assume that whereas roads and other types of infrastructure are the government's concern, vehicles are the concern of individuals. As such the vehicle ownership ratio in the division is extremely low, and virtually little or no attention has been paid to the way in which the effort and time taken to transport produce by porterage on farms or between farms and roads, where trucks/lorries reach, can be reduced by the use of appropriate carts or wheelbarrows. Government initiatives can lead, at a little cost, to research, development, education and even training which by changing transport practice, may revolutionize the economic potential of small farmers, and reduce wear and tear on the roads and trucks.

Some of the farmers bordering on the access roads are said to be interfering with the storm drainage channels by blocking them to prevent water flowing into their farms. In away the farmers cannot be fully blamed because some of the access roads had poor workmanship, which leads to massive erosion of some of the farmer's *Shambas*. The roads are also very narrow in some sections which hinders their use by large trucks/lorries. However, the problem with some of the farmers is that they never allow the road constructors to put in place conservation measures that would allow their farms to be safeguarded against soil erosion, and also allow proper drainage of the storm water. The result is deep, stagnant pools of water on the roads, which not only makes it impassable by motor vehicles, but continue to 'eat up' the soil creating massive potholes.

Some of the road furnishers, for instance, sign posts are said to be in high demand among *jua kali* artisans for the fabricating of some domestic and farm tools and equipments. This can be attributed to ignorance and greediness. Infact, In an interview with the District's Roads Superintendent Officer, it was learnt that majority of the local people have not been sensitised on the importance of their participation in road repair and maintenance. They are passive participants unless the local administrators demand, and intervene. They see the issue of roads as the concern of the government , despite the massive loses they incur regularly, and the benefits they stand to gain from their active participation. Massive public education and sensitisation campaigns through *barazas*, field days, workshops, shows and other forums is urgently required to change their perceptions and attitudes.

Plate 12: Most Access Roads Are Not Yet Gravelled, Hence, Impassable, during the wet seasons.

CHAPTER SIX: RELATIONSHIP BETWEEN TRANSPORTATION AND AGRICULTURE DEVELOPMENT

6.1 Transport Modes Used, and Transportation Problems

Table 6.1 Modes of transport Commonly used and Problems Associated with them

MODES OF TRANSPORT	INCREASED CHARGES/ POOR ROADS/PERISHING OF PRODUCE	HIGH CHARGES/ PERISHABILITY/ SLOWNESS	HIGH CHARGES/PERISH ABILITY/INADEQ UATE MEANS	HIGH CHARGES ;PERISHABILITY;POOR ROADS; SLOW; INADEQ TRANSPORT MEANS;	TOTAL
Porterage/ Cycling/M .vehicle	10.3 (3.3)	- -	2.6 (0.8)	87.2 (27.9)	32
Porterage/ cycling/an imal carts	15.0 2.5	- -	- -	85 (13.9)	16. 4
Porterage; Cycling;an imals; M/vehicle		10.0 (0.8)	- -	100 (0.8)	4.1
Animal carts and m/vehicle	40.0 (3.3)	- -	- -	40.0 (3.3)	8.2
Cycling	25.0 (1.6)	- -	- -	75.0 (4.9)	6.6
Human Porterage	25.0 (8.2)	- -	- -	70.0 (23.0)	32.8
TOTAL (%)	18.9	0.8	0.8	77.0	

Source: Field Survey, 1994.

Note: *1* *Column totals represent the sum of the percentages in brackets (percentage of all cases occurring in each respective cell) on the various transport problems in the division.*

2 *Row totals represent the percentage of respondents using various transport modes to deliver their farm produce to various collection points.*

6.2 Significance of Non-Motorized Transport In Kinangop

From the table above, which shows the various transportation modes used in Kinangop Division, and the various difficulties associated with their utilization, it is clear the important role played by non-motorized transport (NMT) means. For instance, human porterage (on the back-or head transport of farm produce) accounted for 32.8%. About 32% of the respondents used a combination of human porterage, cycling and motor vehicles. 16.4% of the respondents stated that they used bicycles, human and animal-drawn carts to transport their produce to the various collection and market centres in the division.

The prevalence of non-motorized mode of transport in the division is attributed to the poor road conditions which limits accessibility of the farms to only tractors, specialized four-wheeled drive vehicles and the various NMTs. Occasionally, even these four-wheel drive vehicles are unable to penetrate or tackle the roads in Kinangop (Plate 4). Some sections of the division are cut-off during the rainy season, and the heavy-laden vehicles cannot manage most of the earth roads and tracks.

Marketing of the produce in the division is made even more difficult by the production cycle. Nearly all the farmers in the division depend on rain-fed irrigation for the production of their crops. This implies that crops grow and mature for harvest during the same season. Unfortunately, harvest season in the division coincide in most cases with the rainy season, when most existing roads become practically impassable. Abundant production of similar produce, harvesting during the same season, ensures oversupply, coupled with inaccessibility. The few buyers who are bold enough to place

their vehicles on these roads, or even hire tractors to deliver the produce from the farmers, purchase these farm produce at throw away prices. Farmers have to take what they are offered as they lack specialized facilities to store some of their produce, as well as cooperatives to market some of their predominant products such potatoes, cabbages, carrots and peas. Alot of the produce is thus bought at half the market prices, otherwise, farmers incur total loss and feed some of these produce to their livestock.

Plate 13: Given the existing road conditions, use of NMT is inevitable, despite being slow, inconvenient and energy usurping.

6.3 Average Walking Distances And Transport Rates

Table 6.2 Average Walking Distance. and Passenger Fares Charged to Nearest Market Centres

Distance	FARE CHARGED Below Ksh 20/-	Ksh 20-60/-	Ksh 60-100/-	Above 100/	TOTAL
Below 1km	1.6	8.2	1.6	0.8	12.3
1 - 2 km	4.1	14.8	13.1	-	32.8
2 - 3 km	0.8	13.1	5.7	-	19.7
3 - 4 km	-	9.0	4.9	-	13.9
Above 4 km	-	10.7	9.0	-	19.7
Total	6.6	56.6	35.2	0.8	0.8

Source: Field Survey, 1994.

The table above shows that about 32.8% of the respondents walked between 1 and 2 kilometres from their homesteads to a market centre, which is synonymous with a road on which public transport vehicles ply. Of more significant is the fact that 33.6% of the respondents stated that they walked between 2 and 4 kilometres and, 19.7% walked beyond 4 kilometres to reach these centres/points. The worst hit are the milk farmers who have to milk their animals at the wee hours of the morning (between 4 and 6 a.m), and then walk or cycle over these distances on a daily basis during the wet seasons,

which also happen to have unfavourable weather, particularly frost bite, descending from the Aberdare Ranges.

These long distance over which farmers have to commute are necessitated by the cost of transportation, and inadequacy of transport means, due the nature and conditions of existing roads. Alot of time and energy, which can be put in productive ventures is wasted in the movement of people, and this limits their productive efforts, especially if one is to transport some farm inputs such as the 50 kilogramme bag of fertilizer or animal feeds. Distances over which one is to travel and the mode used is likely to affect substantially, the application of these inputs. This is further complicated by the ever-increasing prices of farm inputs when compared to the ever fluctuating prices of farm produce.

Generally due to the nature and road conditions in the division, transport costs are quite high. This limits the frequency of trips to only essential ones, which most probably affects the dissemination and reception of ideas and innovations by the farmers. From the table above, it is seen for instance that, 14.8% of the respondents paid between Kshs.20 - 60/- for a journey of between 1 and 2 kilometres for a single passenger without any luggage/loads. As can be seen, its quite expensive to travel in the division. For instance, the researcher paid Kshs. 60/- for an 18 kilometre stretch between Njabini and Engineer centres. A similar distance from Nairobi to Kinoo (Kikuyu) along the Nakuru-Nairobi highway during the same period cost Kshs.15/-. While this comparison is inadmissible due to various factors involved in each case, the discrepancy can be attributed to the very limited number of operators in Kinangop (an oligopoly), and the very poor road

conditions, which raises the maintenance and operation costs for the operators who 'risk' deploying their vehicles on these poor roads.

The high charges (fare) could in a way be hindering the delivery and reception of new innovations and farming technologies. This is because it limits the capacity for social interactions between the farmers and other persons from the urban areas, which mostly are the hotbeds of invention and innovations. It also interferes with the flow of important market information, especially market prices of various produce in various markets in and outside the Division.

Table 6.3 Walking Distances to Market Centres/Collection Centres

DISTANCE (Km)	FREQUENCY	PERCENTAGE
Below 1	15	12.3
1 to 2	40	32.8
2 to 3	24	19.7
3 to 4	17	13.9
Above 4	24	19.7

Source: Field Survey, 1994.

The table above tells clearly the distances over which various farmers commute to deliver their farm produce to various collection centres. A cumulative 66.1% percent

of respondents, walked between 1 km and 4 km 19.7% of the respondents, argued that they commuted over 4 kilometres, to reach a motorable route (where market centres and public services vehicles ply, during wet seasons). This means that, alot of valuable time is lost, during travelling to and from these centres, which could be put to better use by the farmers. After the exercise, they reportedly become too tired to work effectively on their farms.

Responding to whether, they have had their milk rejected at the factory due to transport related problems, this study established that, 99 out of the 122 interviewed (i.e 81.1%), have had their milk rejected due to being late, due to vehicles getting stuck or breaking down, while on transit, during any given month. This is particularly so during the wet seasons when most of the earth roads in the Division become totally impassable by motorized transport (see table 6.4 below).

Table 6.4 Percentage of Farmers Losing Milk/Month

Response	Frequency	Percentage
Yes	99	81.1
No	5	4.1
N/A	18	14.8
Total	122	100

Source: Field Survey, 1994.

Transporters claimed that transportation costs in the division are very high due to the nature of the roads. Their charging of exorbitant costs to transport farm produce eats into the farmers income substantially given that the road conditions in the division necessitates only a few transporters, who sets the terms and conditions to the farmers.

Table 6.5 Ranking of Road Conditions and Perishability of Milk

	RANK (POOR ROADS)		
	1	2	N/A
REGULARITY OF LOSS PER MONTH			
Once	14.4	-	14.4
Two - Five Times	52.5	4.2	56.8
More Than Five Times	11.0	-	11.0
Total	77.9	5.9	

Source: Field Survey 1994.

The table above shows that in general, 77.9% of the respondents ranked the road conditions as the prime factor in the perishability of their milk, while only 5.9% considered them as the second factor. This shows the important role that the rural roads play in marketing of farm produce, flow of agricultural inputs, information flow and potential incomes, and agricultural productivity in general.

The table further shows that due to the poor roads, 14.4%, 56.8% and 11.0% had their milk perishing once, two-to-five times and more than five times in a month

respectively. These loses are attributed to the poor state of the roads in the division and low local demand, as the local urban centres have very low population involved in non-agricultural activities. Otherwise almost all the local farmers keep dairy animals, and the milk has to be sold to either the KCC, or major neighbouring urban centres such as Limuru, Naivasha and even Nairobi.

6.4 Costs of Transport and Choice of Transport Mode

An analysis of the cost of transportation in the division and the most common modes used revealed that, these costs are relatively very high, and this explains the relative importance attached to the non-motorized means, such as walking, cycling and the use of animal carts to transport various farm produce.

About 64.5%, and 30.1% of the respondents ranked the costs of transportation as either number two and three respectively, in constraining agricultural development in the division in general after poor roads. Of these, 74.2% cited lack of alternative affordable means as the major reason behind the use of a particular mode. Other reasons include, relative affordability or cheapness, and the ease of availability.

The high cost of transportation, coupled with the poor state of the roads in the division limits the number of potential transport operators, for both passenger and cargo transport to only a few who then take advantage and fix the transport charges arbitrarily. However, these transporters cannot be fully blamed, because the vehicle operation cost on the roads in the division is certainly high, which partly necessitates high charges.

Table 6.6 Reason for Choice of Mode of Travel

RANKS OF COSTS	NO ALTERNA-TIVE	RELATI-VELY CHEAP	EASE OF AVAILA-BILITY	EASE/NO ALTERNA-TIVE	L/ALTERNATIV E/CHEAP/AVAIL ABILITY	N/A	TOTAL
1	1.1	-	-	-	1.1	2.2	4.3
2	43.0	1.1	1.1	3.2	6.5	9.7	64.5
3	29.0	-	-	-	1.1	-	30.1
4	1.1	-	-	-	-	-	1.1
TOTAL	74.2	1.1	1.1	3.2	8.6	11.8	

Source: Field Survey, 1994.

Legend Lack of alternative; Ease of availability; Not Applicable; Cheap, stand for the acronyms used in the table above.

From the table above, which is a cross tabulation of the reasons attributed to choice of transport modes and the relative ranking of cost of transportation, it is discernible that 74.2% of the respondent have little or no choice in the modes they use and most of them cite transportation costs as being the number two and three factors respectively, that dictate the choice of the mode.

Improvement of roads should be given priority because all other factors of production; inputs, land uses, information (reception) and marketing of produce hinge upon it. This was exemplified by the assessment of the prices of both land and farm produce along the tarmacked Magumu-Njabini road. The presence of this 22 kilometre tarmac road has influenced land use patterns and land values for an average 2 kilometre zone on either side of the road. It was established that farmers bordering the road fetch relatively better prices for their produce, because the farms are accessible at almost all seasons. They also experience fewer incidence of farm produce wastage compared to other far distance sections, that are mostly served by impassable earth roads.

6.4 Market Sources of Farm Inputs By Location

Table 6.7 below shows the various sources or retail outlets of various farm inputs, including fertilizers, plant and animal chemicals, seeds etc. They also retail farm implements and equipments such as wheelbarrows, hoes, animal feeds among other farm requirements.

It is clear that Engineer (a designated RTPC) is a major outlet followed by Njabini, Magumu and Murungaru, each serving 36.1%, 25.4% and 18.0% of the respondents, respectively. However, poor infrastructure facilities in these market centres, especially roads, water, housing and electricity (but for Engineer, which is already supplied) could be a constraining factor to the full development of these centres to major towns in the Division.

Table 6.7 Sources of Various Farm Inputs/Location

Location Supplying Market Centres

	Engineer	Njabini	Magumu	Murungaru	Naivasha	Others
Njabini	0.80	15.6	-	-	-	-
Kitiri	13.9	-	-	-	-	1.6
Bamboo	-	0.8	18.0	-	-	0.8
Githabai	-	8.2	-	-	0.8	3.3
Murungaru	1.6	-	-	9.8	1.6	1.6
Gathara	19.7	0.8	-	0.8	-	-
Total	36.1	25.4	18.0	10.7	2.5	7.4

Source: Field Survey, 1994.

Njabini is potentially capable of growing into a major urban centre given the fact that it serves as the terminal point of the Njabini-Magumu road, the tarmacked road in the Division. Lack of electricity however has constrained the starting up of various enterprises, including Jua Kali fabricating industries for various farm tools and equipments, agro-based industries, particularly those dealing with fruits and animal products among other businesses.

The poor level of infrastuctural development in Kinangop could partly be blamed for the lack of/low levels of industrial and urban development. Poor roads, inadequate water supplies, lack of electricity, lack of sewerage facilities among other public and private investments has a link to agricultural development. This is because the development of these public physical infrastructure will attract potential investors and population (migrants) to the local centres, who will be engaged in agriculture supporting

Plate 14: Poor/Lack of Infrastructure in the Local Market Centres discourages potential investors

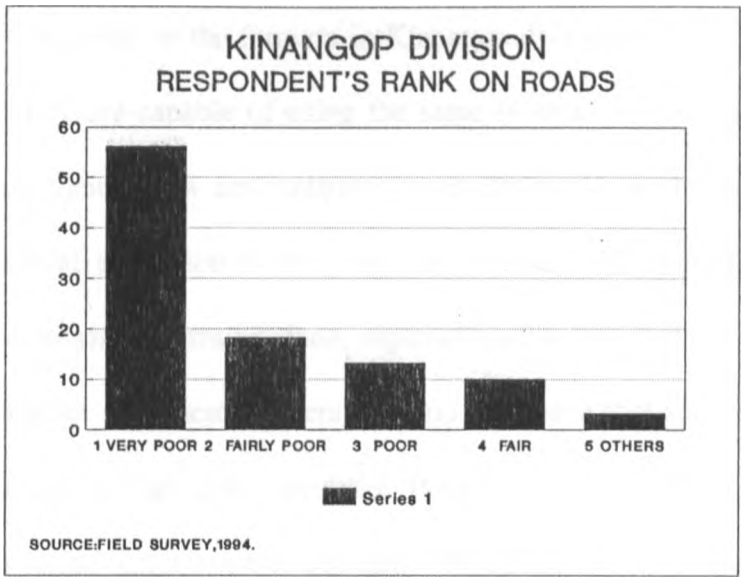
Plate 15: Engineer, A designated RTPC. Poor infrastructure particularly roads hinders its full development.

activities as well as providing local markets for agricultural products. The opening up of the Division through improvement of roads and other communication links will open the gate to 'foreign' investments. As **Friedmann (1970)** postulated, the growth impulse of any given region is usually externally induced and such growth occurs in the matrix of urban centres. The development of infrastructural facilities in the Division will stimulate the local market centres to attract investments, a large urban population engaged in non-agricultural activities and create interdependent linkages with other major towns in the

country. The poor situation in which local farmers in Kinangop find themselves can be blamed to a very large extent on the poor state of the roads and other infrastructure facilities, and confirms the alternative hypothesis that roads are primarily responsible for the existing level of agricultural development in the Division. Improvement of the existing roads to a condition where they become motorable throughout the year could enhance greatly the agricultural development potential of the Division, and integrate it fully to the national and regional economies. This will also attract other investors in agriculture related industries using local produce and also other non-farm economic ventures that would provide employment opportunities to the local populace

The existing state of the roads is seen as the single most important hindrance to agricultural development in Kinangop as the figure below depicts. It shows the respondent's ranking of the importance of roads to agricultural development in the division. The poor state of the roads has not only stagnated the growth of local market centres, but also severely limited the vital linkages with outside markets and outside influence. For the division to assume its rightful place in our national output, the local economy must be opened to external influence, capital, information and technology through improved road conditions and communication networks among other physical infrastructural facilities. With the rapid expansion of horticultural crops, unlimited potential waiting to be exploited exists. The key is the improvement of the roads to allow easier accessibility and reduction of transportation costs.

Figure 6.1 Respondents opinion on State of the Roads in Kinangop Division.



CHAPTER SEVEN: SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

7.1 Summary of Findings

Majority of the farmers in Kinangop division have freehold titles for their land, hence they are capable of using the same to secure loans and other credit facilities to develop their farms and enhance productivity. However the major obstacles to full agricultural expansion is the poor state of the road transport system, which leads to serious losses of farm produce, especially milk, cut-flowers, cabbages and kales. This then implies that these farmers have no guarantee that such loans once secured can be repaid due to high risks involved. Poor roads means that only a few are able to get access to the various farms, and hence buy the produce at almost half the market prices. In most cases, farmers are unable to break even with the costs of production.

Kinangop is part of the former 'White Highlands' which had been reserved for the colonial settlers, and which was earmarked after independence, for the resettlement of the landless Africans who had been displaced from their native lands. Most farmers are small scale producers practising mixed farming. On average terms, about 56.6% of the respondents were found to have land exceeding 10 acres. Although pressure on land is currently not as severe as the other districts in Central Province, there are signs that this may not remain so for long, given the natural population increase as well as immigration from other districts. This can be explained by the high number of land subdivisions and transfers in the division. This calls for the intensification of the methods of production on the existing cultivated lands through increased use of appropriate

fertilizers (including manure) and certified seeds, soil conservation techniques among other modern farming techniques.

The major cash crops grown in the division include pyrethrum and increasingly, the cut-flowers (floriculture). Fruits are also becoming important sources of earnings. The farmers are being forced by circumstances to diversify the range of crops grown from the traditional ones-potatoes, cabbages, kales, carrots, and peas.

Dairy cattle keeping is a major activity and income earner. Almost every household in the division keeps some dairy animals and milk production is a major farming activity. However, the increased production of milk in the division is hampered by the poor road conditions, that constrains fast delivery to the markets (especially K.C.C), and leads to high incidence of perishability. For instance, it was found that about 81.1% of the respondents have lost their milk, due to transport-related difficulties such as vehicles getting bogged down in the muddy earth roads for long periods or making costly (in terms of time, fuel requirements etc) and lengthy detours.

Due to hardships inherent in the road transportation system in the division, there are only a few transport operators, who work in an oligopolistic manner and fix arbitrary fares for both passenger and produce transport. These transport charges are very high and substantially undercut the farmers potential income levels. The transporters cite the high cost of operation in the division as the main reasons for the high transportation charges.

The few cooperative that are active in the division are said to be poorly managed and organized, and mostly lack sufficient operation capital to provide services such as

transportation, credit facilities for seeds, fertilizers, animal feeds and chemicals to the farmers. The only cooperative cited as an exception is the Tulaga Farmers Cooperative Society, which is said to be well-run. Some of these coops have to hire private trucks and tractors to deliver milk to the market and inputs to their stores, where applicable. Given the state of roads in Kinangop, there is no doubt that costs of operation and hence transport charges are bound to be high.

The active cooperatives in the division deal with the marketing of milk, pyrethrum and wool. The poor management of these organizations could explain the thriving of middlemenship in both transportation and marketing in the division. The confidence of the farmers in these cooperatives is further eroded by delays in the payment of monies for delivered produce. This in turn was blamed on the delays from the KCC, which has been in the spotlight over the delay of payments to farmers all over the country, for up to four months, due to mismanagement and political interference.

Most of the farmers interviewed cited (in order of importance) the following issues as the major constraints to full agricultural resource development in the division;

(i) poor road conditions, causing frequent losses of farm produce,

(ii) low prices of farm produce,

(iii) high costs of farm inputs,

(iv) high costs of transportation,

(v) Delays in the supply of certified, appropriate seeds, from both the Kenya Seed Company and Simlaw Company, fertilizers, as well as payments for delivered farm produce, particularly milk and cut-flowers.

(vi) Inadequate extension services, hence poor farming techniques. Poor road conditions and inadequate transport means were blamed for the poor services.

(vii) Exploitation by middlemen due to weak cooperatives. About 71.3% complained that middlemen paid them unrealistic prices for their farm produce and hence deny them potential income.

(viii) Poor weather has occasionally worked against the farmers. This is particularly the case with the frost attacks on some crops particularly, potatoes and maize. Prolonged dry spells also cause water stress in plants especially to wheat and barley, cultivated on the lower sections of the division bordering Naivasha, in Nakuru district. Sometimes, high intensity downpours causes the flooding not only of roads but also of cultivated fields, submerging the crops, causing them to rot/die.

7.2 Recommendations:

7.2.1 General

The development and existing conditions of all sections of society in both rural and urban areas is affected by the quality of transport facilities (both means and ways), and services, and the direction of transportation policies. Access by the rural small scale farmers to markets and services is particularly constrained by lack of roads and appropriate vehicles. The improvement of transport facilities and particularly road conditions will enable those with limited means to contribute fully to economic

development.

The government should frame its transportation policies with intent to appraise the plight of the poor farmers by giving special consideration of the transportation problems and needs of Kinangop Division, which has a rich agricultural potential to feed a greater proportion of the people in the country, especially in urban areas.

The government's transportation policy need to be reviewed by laying emphasis on small-scale schemes, instead of large-scale schemes; from investing in new road constructions to making better use of existing facilities and equipments, to rehabilitate and maintaining existing road network; and also shift its very formalized procedures and approaches, to informal approaches, which allows the target communities to identify plan and implement their own development agendas. People should be helped to meet their own needs, using locally available resources where permissable. If followed on a broad scale, these strategies will benefit under-privileged groups of the population. However, to achieve these, numerous political, psychological, institutional and educational constraints, will have to be overcome first, if new approaches to urban and rural transportation are to be accepted and widely implemented in this country. As agricultural-based economy, Kenya should strive hard to overcome any obstacles that stand in the way of enhancing agricultural outputs especially in those regions, such as Kinangop, which have shown great potentialities, despite their poor infrastructural development, especially roads.

The government should encourage and promote all efforts aimed at the creation

of favourable condition for rational decision-making on transportation in human settlements. During the planning process, particular attention should be given to the definition of basic aims and to implementation mechanisms of its policies. Every possible effort need to be made to involve local communities in decision making on transportation plans and their implementation. This helps eradicate the feeling, that such plans or intended project is foreign-imposed, or alien, thus giving the people reasons to bear no commitment or responsibility.

It's important for the government to strengthen institutional frameworks for coordinated decision-making on transportation and urban and rural development and on the operation of transportation systems. In this context, this needs to be integrated with the government's policy of promoting economic development in smaller towns and market centres, in a bid to strike a balance in the distribution of employment generating development, concentrated in large towns. Provision of good roads, water, electricity, postal and telephone services in small market centres such as Engineer, Njabini, Murungaru and Ndunyu Njeru will go along way to start and boost jua kali activities, to manufacture improved wheelbarrows, particularly of the kind widely used in China, which have a large-diameter wheel placed directly below the load, strong bicycles and bicycle trailers, hand carts and bullock carts. These will help cut down on time and energy spent on transporting goods by portering on farms or between farms and roads.

If by means of modified legislation or modest loans, vehicles such as those referred to above, could help to break the vicious circle that the rural poor find themselves locked in, involving lack of money.

Inadequate equipment, time-consuming and health-impairing methods of transport, lack of flexibility and exploitation by transporters and middlemen. By so doing, the rural poor may be assisted appreciably, and stimulate them to boost their productivity, because, this is likely to cut down on costs - both time and money. Simple forms of motorized transport such as motorized bicycles or tricycles and motor cycles (towing trailers) may help in the transport of large loads and reduce the time taken by a farmer to get to market. This will also help reduce the farmer's dependence on middlemen, and improve the marketability of his/her goods.

According to UNIDO[7], "the development of low-cost two-three and four-wheeled vehicles in a number of countries and experience in marketing them suggests that these vehicles have major part to play in economic development. Moreover, the simpler production technologies involved mean that manufacture can be more readily undertaken at low volumes of production in countries (such as Kenya) at an early stage of industrial development. This feature can reduce the foreign-exchange cost of providing an adequate transport system and contribute directly to the enhancement of productive abilities and technical skills. To secure these developments, the flow of information on vehicle types and productive techniques should be promoted to a matter or urgency. Governments of developing countries should pay attention to the possible role of low-cost vehicles in their economies and frame development polices accordingly."

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[7] The Manufacture of Low Cost Vehicles in Developing Countries, UNIDO Development and Transfer of Technology Series No. 3, 1978, pp.23.

Some few areas in Kinangop have benefited from the RARP/MRP projects by improving accessibility of farms at all seasons, the project performance can be improved. Although a universal rule for the density or quality of access works cannot be prescribed, it is necessary for the project implementors to carry out a detailed examination of the local level of the needs of farmers and community and to develop a strategy for each location or region in the light of local conditions, needs and resources. In considering access networks, it is also necessary to weigh the potential savings in infrastructure costs of the use of appropriate vehicles for different classes of networks, to maximise their lifespan.

Furthermore, its important to consider employment factors in such projects. *"The use of low-cost, labour-based techniques of road construction and rehabilitation generates employment in rural areas. For instance, the rural feeder-road programme created in Mexico in the early 1970's created employment opportunities which reduced under-employment by 7 per cent"*[8]. However, in comparison to other types of employment, construction work is transitory, and the main direct employment benefit is the full and effective involvement of local people in road maintenance.

The poor are more likely to be willing to help themselves and contribute to the economic process if they feel assured that their circumstances (problems) are understood, and that some action, however little, is being taken to improve their situation, whether in form of transportation, or other matters. Transportation policies in Kenya should be

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8 L. Odier (1980): ''Labour-Intensive Methods In Road Construction''; Paper presented to the IVth IRF African Highway Conference, Nairobi, pp.10.

tailored in such a way that, they have an element of public relations, particularly with regard to relations between policy-maker and those of limited means. Liaison between government officials and local residents can lead to the need for formal methods of information gathering being reduced or eliminated. Local people should have a strong say in the future development of their communities, and in many practical ways, can contribute actively to that development (through, for instance, footway and road maintenance, drainage and storm-water channelling as well as conservation of soils. There are great benefits to be obtained by exchange of information.

7.2.2 Rural Transport and Roads

There is need to establish a coherent framework for rural transport and rural roads programs. The framework is needed to; organize collaboration among various agencies and groups at the central, regional and local levels; develop clear planning and findings guidelines; and address capacity-building requirements. The most effective institutional arrangements could involve a small centralized agency for overall policy development, program planning and management funding, and monitoring the decentralized authority that are responsible for local planning and operations. Such units could be placed within main road agencies, but with adequate autonomy and separate funding.

This study strongly puts a case against the establishment of feeder-road units within other ministries or parastatals, because, such arrangements often driven by political expediencies, have led to a lack of continuity, neglect and poor use of resources

- e.g those on tea and coffee growing zones.

Funding and budgeting arrangements should consider maintenance along with improvements and rehabilitation. Typical rural earth roads have an expected life of about 5 years. A consolidated framework encourages mobilizing local resources through matching fund mechanisms (harambee spirit) which is essential for community projects' success. Mobilizing local resources is essential in developing rural transport policies. Programs that involve local communities in all stages of planning, construction and maintenance have a higher chance of succeeding than those that do not. Mostly, it would be prudent to build up local capacity in order to mobilize local resources and to promote country-wide policies. The starting point would be making up an action plan covering;

- a national strategy for rural transport;
- development of labour-based capabilities
- a review of policies affecting transport service in rural areas.

In the development of rural road design standard, key considerations should include;

- emphasizing serviceability in terms of access for specific vehicles, especially trucks; (heavy-carriers).
- seeking reliability rather than width and speed
- adopting labour-based approaches, thereby providing local income
- developing capacities for maintenance and off-road improvement

Government intervention is an important component of control in a transportation system. Through regulation, pricing and fiscal incentive, the government can manipulate the supply level, cost and quality of transport services, and have a direct and indirect

impacts on issues such as availability of transportation options to rural people, supply of spare parts, cost of transport modes, trip-making behaviour, safety in travel, cropping patterns etc.

Tools of intervention can play an important role in:-

(a) Promoting use of appropriate vehicle technology;

(b) Raising low-cost vehicle ownership to maximise the benefits of investment in road infrastructure

(c) Encouraging the development of self-help community based transport services;

(d) Encouraging the development of rural para-transit services affordable by local people, and

(e) Ensuring safe and comfortable travel, by regulating factors such as vehicle weight, passenger-carrying capacity vehicle condition (inspection), speed of travel etc.

The monies accrued from the recently-introduced petroleum levy on consumption of petroleum products, should be pumped back (reinvested) in to the rehabilitation and construction of roads, particularly in high agricultural potential areas. The law should be reviewed to allow local authorities retain at least 60% of the revenue collected from the levy fund to rehabilitate roads within their jurisdictions. Provision of transport networks is crucial to reinforce the marketing and other links between farms and market centres,

that will naturally grow in the wake of a developing agricultural sector. If farmers are to intensify production and move from subsistence farming then, efficient and fast marketing channels in terms of both roads, and cooperative organization must be developed and promoted. The revenue collection should be invested solely on road improvements, if the governments effort and goals of raising agricultural productivity, raising of rural incomes, promoting of rural non-farm activities (jobs) and reducing rural urban migration. The challenge is on our policy makers and implementors to have foresight in the prioritisation of funding of public projects and investment to ensure that only those programs that have strong forward linkages, and have real and tangible benefits to the public through improved productivity in the economy are promoted. Political expediency in decision making with regard to government expenditure should as far as is practically possible be discouraged. Only those projects with a clear benefit to the economy and stimulate the creation of wealth both at the individual and national level should be given priority. Improvement of access roads particularly in high agricultural potential areas is one aspect of public projects that have strong forward linkages and promote agricultural productivity and hence food security and sufficiency in Kenya in general.

7.2.3 Improving The Supply of Inputs Factors of Production

A better distribution of inputs and factors of production to farmers is a prerequisite to agricultural intensification. Price incentives, now that we have liberalised the agricultural sector, and extension services can not be effective if farmers do not

possess the material means to increase productivity. The major constraint most African countries (including Kenya) encounter in tackling these issues is the lack of substantial and clearly specified policies to supply the agricultural sector with the industrial products it needs. To overcome these, two possible courses of action; the development of local industries and, imports. A balance must be struck between these two. Although all government, quite rightly, wish to develop domestic production, but they must above all, decide what, when and how to industrialise and at the lowest possible cost.

Since independence, most African Governments have shown a preference for large-scale industrial operations located mostly in urban areas. Although in some sectors, the technological constraints leave them with no choice, numerous industrial activities could be developed in the form of small decentralised units. Kenya has its jua kali (informal industries) sector, which requires considerable governmental support to get fully entrenched/established. Despite, the considerable benefit this form of industrialization offers, especially in the rural areas, the government must provide clear policy guidelines to support the sector, which is set to be out industrial springboard. The operators should be assisted to procure working tools and simple equipments, soft loans and a streamlined market channel. They should be assisted through organization of exhibitions and formation of cooperatives. For instance, Njabini, Murungaru and Ndunyu Njeru Centres in Kinangop, have the potential for these small-scale industries, to fabricate or manufacture minor agriculture implements equipments, which could be undertaken in small workshops. These include making of where tricycles, jambes, ox-ploughs, animal-drawn carts, sprang among others.

However, these centres lack electricity and other infrastructural services, coupled with poor accessibility due to impassable road conditions in wet seasons. This study recommends the improvement of accessibility conditions to these centres, and provision of basic infrastructural services, especially electricity. This is expected to attract more investors and jua kali operators, to service the local farmers. Government policies should shift from setting up relatively large production plants using heavy machinery and requiring foreign expertise. From the rural development stand point, the alternative offered by small-scale decentralised industrialisation has a very special importance.

7.2.4 Fertilizers:

From the study findings, many farmers expressed their inability to apply fertilizers, as required by the agricultural extension officers, due to its inhibiting costs. By time of the survey, a 50 kg bag cost the farmers Ksh 1200/-, which is well beyond the means of an ordinary small farmer, and whose produce is not guaranteed to reach the markets. Farm-gate prices of farm produce are quite low due to accessibility difficulties as a result of poor roads.

The price of fertilizers and other chemicals have been escalating, while farm produce prices fluctuate substantially forcing farmers to incur major losses, as they cannot recover initial costs of investment. The cheapest short and medium-term solutions has been to import. This however does not exclude some local industrialization (especially with regard to mixing and bagging) to reduce costs, and improve flexibility. It's important to re-pack the 50 kg fertilizer bags into smaller portable sizes such as 10 kg to 15 kg

lots, for easier transport and affordability by the rural poor, who mostly use non-motorized means of transport such as walking, cycling, pushing wheelbarrows and handcarts. The government should give tax concessions to importers of agricultural inputs, by reducing import duties, so that, majority of the farmers can afford to use them to improve their yields. Importation of fertilizers should be made well in advance, to eliminate artificial shortages, that cause skyrocketing of prices. High costs of fertilizers affect intensification efforts in agricultural productivity as they key limit its application. The quality of imported fertilizers need to be confirmed, through local testing, before application by farmers.

The supply of good quality seeds, in good time is essential to agricultural development. In recent times, there has been public outcry over the quality and amount of certified seeds, provided by the state-owned Kenya Seed Company, and other research bodies. In the March-April planting season, this year, there was shortage of certified seeds countrywide, especially maize seeds. In Kinangop, farmers complained of insufficient supply of pyrethrum and temperate fruit seedlings, although these are supplied by the Pyrethrum Board of Kenya (PBK) and Njabini F.T.C. respectively. For the sake of future countrywide certified seed production and supply, it would be prudent to liberalise fully, the seed production and supply sector. One possible approach would be a government/private sectors combination, whereby, the government would be primarily responsible for quality control and the production of basic seeds, while the private sector would be responsible for seed multiplication and distribution. In this context, seed producers need access to funds and an effective credit policy to encourage

the farmers to use the final product.

The price margins for retailing fertilizers and other inputs have been too small to encourage local shopkeepers to transport and stock them. As a result small-holders have difficulty obtaining fertilizers even when it is available nationally. Also, long distances from farms to retail outlets discourage farmers, and the existing cooperatives often lack the managerial abilities and cash-flow to satisfy member's needs for fertilizers. Removal of these impediments will not only increase agricultural productivity, marketing, activities, they will also create employment opportunities in rural areas.

7.2.5 Electric Power

The provision of electricity, under the Rural Electrification Programme to the other market centres in the division, (Engineer, a designated Rural Trade and Production Centre [RTPC], already has) will help stimulate *jua kali* sector, which can then fabricate and repair most farm implements. Such as hoes, forks, wheelbarrows, and even tricycles and trailers for both animal to draw, and bicycle-riders. These will help deliver much of the produce to the market/collection centres, thereby reducing wastage. In this context the reduction of tariffs on electricity generation and supply equipments, and those of bicycles during the 1995-96 annual budget speech by the Minister for Finance, are a welcome relief, which will ensure supply of electricity at much cheaper rates, and more affordability of bicycles to most low-income people (farmers included) as their transport mode; given the rising cost of transport using other modes.

7.2.6 Education and Training

Farmers in Kinangop require extensive education and training campaigns by extension officers with regard to an effective production calendar to enable them take advantage of market supply and demand. The present situation is such that the harvest season in the months of June, July and August coincide with the heavy rains, when the roads in the Division are mostly impassable, hence marketability of produce is severely constrained. In this regard, staggered planting may be advisable, to ensure that farmers do not oversupply the markets and thereby fetch favourable prices. One of the constraint for implementing this strategy is the lack of or poor distribution network of water to irrigate the crops in the relatively dry months. As such, to take advantage of the liberalized market, water supply schemes must be put in place to provide water for irrigation.

Radio and television broadcasts of relevant information of farming, marketing and new innovations and ideas to the farming fraternity is another strategy that can be utilised to reach and educate the farmers. In this context, the timing of the broadcast should be such that it considers most farmers working schedules in order to ensure that maximum number of the targeted groups are reached. For instance, reports on prices of produce of various produce in various markets should be aired either late in the evening (between six and eight o'clock) or very early in the morning (before six), or any other suitable time[9].

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[9] The appropriate time for radio broadcasts is possibly an area that requires further research in order to reach maximum audience. As for T.V. a special time can be slotted between 8 and 9 pm.

7.2.7 Co-ordination of Agencies:

In both rural and urban areas, the responsibility for planning and administration is divided among many different agencies, so that actions are un-coordinated and often haphazard. Co-ordination is required for e.g. between proposals for agricultural development and for road improvements worked out at a high level.

Full expansion and commercialization of agriculture in Kinangop is to a large extent constrained by both poor road network and conditions, and lack of suitable vehicles. Farmers also face serious difficulties in moving produce and materials (inputs) between different parts of their farm, and constraints on social and economic contact caused by shortages of appropriate tracks and vehicles. In the past, the rural transportation investment has been directed mainly towards the provision of main roads, and, in so far as past programmes have been concerned with access roads, they have tended to place too much emphasis on high-quality design and to help large and medium sized farms at the expense of small farms. The Government should now direct its attention to the provision of access facilities to rural settlements of all types and to the promotion of the development and widespread use of appropriate vehicles and devices. This can be done by:-

- Extending the road network by the construction of feeder roads and farm access roads, with priority being given to the provision of essential elements such as bridges, culverts and drainage at critical points (followed by upgrading at a later date).
- Reviewing standards of design and construction at all levels of the provision of

roads and tracks (pathways), so that the resources available give the maximum return in terms of routes passable by single lorries.

- Reviewing maintenance procedures, so that repairs are carried out regularly and effectively and so that local people are employed to the greatest possible extent,
- Promoting the development and marketing of indigenous low-cost vehicles and establishing self-financing schemes for the provision of loans to farmers for the purchase of appropriate vehicles (from wheel-barrows upwards) and upgrading of on-farm access paths and tracks.

The study of the travel patterns of rural inhabitants should consider both on-farm and off-farm transport-needs categories. In the past, most rural transportation studies neglected on-farm transport needs **(Barwell and Howe, 1979)**, although tasks related to crop production such as movement of seeds, plants, fodder, fertilizer insecticides, agricultural implements and harvested crops consume considerable amounts of labour, time and transport between farm and farmer's dwelling and/or storage facilities similarly some domestic needs - collection of firewood and water, generate a note worthy amount of travel time, which takes up the amount of quality time and energy put to agricultural production. Up-grading of on-farm access paths and tracks, and provision of agricultural inputs at local retail shops at affordable prices, will reduce time wasted on walking or travelling and release it to production of outputs.

7.3 Conclusion

Agriculture is the heart but not the whole of rural development. The end product of any transportation project is basically improved access;- a facility to be used by means of conveyance. Access can be defined for each village/location in terms of:

(a) optimum mode of conveyance for the access;- large trucks, small trucks (pick-ups), animal carts, walking or cycling;

(b) seasonality of that access, whether it is open all the year round or only in the dry season.

The effect of a transportation project, say, the RAR/MR programs is to move a certain localities (villages) up the scale of access quality. This enhances the marketability of farm produce, reduces perishability of produce and increases farm incomes. In fact those homesteads that were near or bordering motorable roads were found to have characteristics of modernity (permanent houses, new and improved farming practices) and with higher income levels than those further away in the interior, where accessibility is a major problem, particularly in the wet seasons, which incidentally coincide with the harvesting seasons in the Division.

The improvement (if only to a level where roads are passable during the rainy seasons) of most rural roads and transport services linking rural households to the broader economy through the network of towns and market centres on which they depend for the marketing of the produce and obtaining their supplies (inputs) and other services

will in away help eliminate or reduce substantially, the level of subsistence cultivation, and allow rapid diffusion of innovation, necessary for agricultural intensification, to cope with the rapidly increasing mouths to feed.

Transport systems define the reach of the markets and circumscribe opportunities for the rural people. In many Locations, in Kinangop, farmers do not have easy access to the markets and incur great expenses, loss of produce and poor prices for their produce to transport related difficulties.

Provision of transportation networks is crucial to reinforce the marketing and other links between farms and market centres that will develop in the wake of a growing agriculture.

Inadequate transport and communication means in the division are partly responsible for the continuance of subsistence farming to some degree, the division tends to be 'cut-off' from outside supplies and markets. The first step in the improvement of agricultural marketing is to provide transport facilities where they are inadequate or lacking. Many farmers are forced, through lack of farm market roads, especially in the wet seasons, or high freight charges resulting from poor, inadequate roads and transport operators to grow crops other than those most profitable and most needed, particularly, the case of perishable crops, milk and bulky produce intended for distant markets.

This study has established the important influence that the existing road transport system has played towards the present level of agriculture production in Kinangop Division. Although not by any means the only factor influencing production, roads were found to be very basic for the successful transportation of local agricultural produce to market centres. To a large extent, some of the sections of the division are literally cut

off during the rainy seasons and no motorised transport vehicles can reach the farms. Farmers are left with the option of using non-motorized means to deliver their produce to distant collection and marketing centres. In such circumstances, the motivation to produce surpluses is severely threatened as farmers pay a high cost in terms of time, energy, and even money in the delivery of both produce and inputs to the centres and farms respectively.

When such transport difficulties are coupled with the poor gate-prices of farm produce vis avis the ever-rising costs of inputs; delayed payments for some of the produce (particularly, milk); weak cooperatives, which has prompted the exploitative middlemen to get an upper hand; lack of organized marketing channels for some of the traditional food crops such as potatoes and cabbages as well as the lack of storage/other specialised preservation facilities, rising production costs among others, imply that, farmers in the division are extremely disadvantaged to take proper advantage of the liberalised agricultural sector and the economy in general.

A good transportation (road) system is a crucial vehicle for attaining full development of the agricultural potentialities in our rural areas. Provision of a good road transport system (easier accessibility, affordability of the means (vehicles) and their suitability to local conditions) will most certainly turn today's subsistence farmers into commercial ones, thereby not only raising their income levels and food productivity, but also the national wealth (GDP) and employment opportunities. Kinangop division was found deficient on almost all of those scores.

If producers (farmers) are to take advantage of reforms in agriculture and other productive sectors due to economic liberalization, occasioned by the implementation of Structural Adjustment Programmes (SAPs), they must have a dependable road system, otherwise there can be no supply response to support renewed growth. In this context, the objectives of transportation can be seen in two words: efficiency,- hence lower costs; sustainability, affordable and locally adapted vehicle technologies, as well as involvement of the local communities in the planning, construction, repair and maintenance of local access roads. This can be achieved through public awareness campaign on the need to participate in development programs that affect their lifestyles. The notion that people have of 'development' as being brought to them by a government or donor must be changed and encourage the local people to be active partners in development projects such access road rehabilitation and maintenance.

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UNIVERSITY OF NAIROBI
DEPARTMENT OF URBAN AND REGIONAL PLANNING

HOUSEHOLD QUESTIONNAIRE

Name of interviewer.....
Date.....Respondents' Name.(optional).....Location.....Sub-Location....

1. What is the size of your farm in acres? (tick once)

   (i) below 2 acres
   (ii) 2 - 5 acres
   (iii) 5 - 7 ,,
   (iv) 7 - 9 ,,
   (v) above 10 ,,

2. Under what tenure do you own the land ?
   (i) freehold title deed
   (ii) rented (specify the duration)
   (iii) lease ,, ,, ..
   (iv) communally owned
   (v) Others (specify)

3. Which of the following crops do you grow in your farm?
   (i) crops; (please tick accordingly)

   Acreage (acres)

   (a) potatoes . [ ]
   (b) tomatoes. [ ]
   (c) cabbages /sukuma wiki [ ]
   (d) pyrethrum [ ]
   (e) maize [ ]
   (f) fruits [ ]
   (g) Others (specify) [ ]

4. What is the selling price of the following products in the nearest market centre ? (please specify the weight)

Produce	Quantity/bag/box/Kg	Price
(i) potatoes		
(ii) tomatoes		
(iii) fruits.		
(iv) pyrethrum		
(v) cabbages/kales/spinach		
(vi) others (specify)		

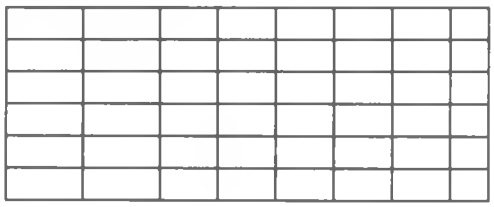
5. What is your opinion with regard to these prices when compared to other parts of the district \ and country. (Tick only one).

   (a) low
   (b) fair
   (c) high

6. Where do you sell your farm produce listed in Q.3 above ? (please tick accordingly)

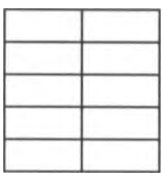
crops; a b c d e f

(i) Naivasha
(ii) Nairobi
(iii) Nyahururu
(iv) Within Kinangop Division
(v) Others (specify)



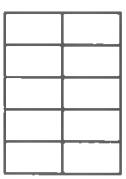
7. Which is the shortest distance that you need to travel to reach a market centre? (Tick once)

(a) below 1 km.
(b) 1 - 3 km.
(c) 3 -5
(d) 5 - 7 ,,
(e) Above 7 km



8. How do you transport your produce to the market? Please tick accordingly)

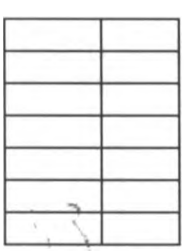
(a) high cost of transport
(b) unreliable/inadequate transport means
(c) arrogant transporters
(d) poor road conditions leads to delays
(e) Others (specify).



9. What problems do you encounter in transporting your produce, especially during the rainy season?
(a) increased transport charges
(b) rotting/going bad of farm produce
(c) lack of/inadequate public transport
(d) lack of storage facilities
(e) very poor roads (vehicles get stuck for days in the mud occasionally)
(f) others (specify)

10. What are the types and number of animals that you do rear?

(i) dairy cattle
(ii) beef
(iii) poultry
(iv) sheep
(v) goats
(vi) pigs
(vii) others (please specify)



11. What is the selling price (in Kshs) of milk per litre/kg to the cooperatives/ or other consumers (tick one these below)

(i) below 10/-
(ii) 10-15 /-
(iii) above 15/-
(iv) Others (specify)

12. Does the distance over which you have to transport milk change during the wet and dry seasons? (tick one of the below)

(i) Yes (ii) No

13. What are the present problems with the mode of transport you are using?.
(i) costly
(ii) slow and uncomfortable
(iii) lack of choice (no alternative)
(iv) arrogance of the operators
(v) others (specify)

14. I chose this mode because of; (tick below)

(i) lack of choice/alternative
(ii) relatively cheap compared to others
(iii) ease of availability
(iv) others (specify)

15. Have you ever had your milk rejected for going bad due to transportation difficulties?

(i) Yes
(ii) No

16. If yes to Q15, how many times in a month/year and what quantity of milk was involved?

Quantity (Litres) Period

(i) Below 10
(ii) 10-20
(iii) 20-40
(iv) 40-60
(v) Above 60

17. For the amount of milk stated above, how regular has it occurred in a month/year (specify in each case)

(i) Once
(ii) two to five times
(iii) more than five times (specify)

18. What are the charges for milk transportation per kilometre? (tick one of the alternatives below)

(i) Below 1 Shilling
(ii) 1 - 2 ,,
(iii) 2 - 5 ,,
(iv) Above 5 ,,

19. Where do you get your farm inputs from, and how far is it from your shamba/farm? (tick below)

(i) Engineer
(ii) Njabini
(iii) Magumu
(iv) Murungaru
(v) Naivasha
(vi) Nairobi
(vii) Nyahururu
(viii) Others (specify

How far is it from your homestead/farm in kilometres.....

20. What problems do you encounter in transporting these inputs, especially during the rainy seasons? Please list/rank them starting from the most acute to the least one; use No. 1, 2, 3 etc

(i) high cost of transport
(ii) unreliable/inadequate transport means
(iii) arrogant transport operators
(iv) poor road conditions leading to delays
(v) others (specify)

21. What is the shortest distance that you have to walk to catch a public transport vehicle and how long doe it take you ?

Distance (km) Time taken (hours)

(i) Below 1 kilometre
(ii) 1 - 2 ,,
(iii) 2 - 3 ,,
(iv) 3 - 4 ,,
(v) Above 4 kms. (specify)

22. How much do you pay to travel to the nearest urban/town centre (please name it) in terms of ;-

	below 20	20-60	60-100	above 100
(i) fare (in kshs).				

(ii) loads(a kg.of produce).....

(iii) Others.....
(please estimate their distance from your homestead)

23. What in your opinion are the major factors hindering agricultural development in this area,in order of acuteness ?
Scale (rank) these problems accordingly, using 1 - 10

(i) poor condition of the roads (impassable in wet seasons)[
(ii) high transportation costs [ ]
(iii) low prices of farm produce [ ]
(iv) inadequate means of transport [ ]
(v) lack of storage facilities [ ]
(vi) inappropriate farming techniques/methods [ ]
(vii) high cost of farm inputs [ ]
(viii) delays in the supply of inputs e.g,seeds,fertilizers and chemicals. [ ]
(ix) Others (specify) [ ]

24. What are some of the measures that you (residents) are taking to solve these problems?. (please tick below)

(i) formation of cooperatives to market farm produce
(ii) community participation in road repair/maintenance
(iii) search for distant markets
(iv) formation of transport organization
(v) improvement of non-motorized transport routes
(vi) Others (specify)

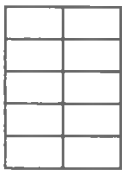
25. In your assessment what role has the government played in alleviating transportation problems in this area? (please tick below),

(i) provision of technical personnel/funds/raw materials as well as machinery/equipment.
(ii) organizing the community
(iii) construction of rural access roads
(iv) Others (specify)

26. How have you as a community benefited from the Rural Access Road Programme (RARP)?
(i) Yes [ ]
(ii) No [ ]

27. If yes ,which are some of these advantages?

(i) accessibility to distant markets
(ii) reduced loss of the farm produce
(iii) employment opportunities
(iv) stabilized transportation costs
(v) Others (specify)



29. What are the weaknesses of the programme, and in your own opinion, how can it be improved to realize more benefits to the farmers and the community in general?

(i) poor involvement of the community in decision-making over where the roads will pass. [ ]
(ii) political interference by powerful personalities [ ]
(iii) poor workmanship in road construction (poor materials used) [ ]
(iv) slow pace of construction/implementation [ ]
(v) taxes are increased [ ]
(vi) Others (specify) [ ]

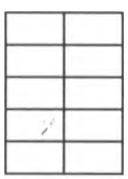
30. What role have NGO's (including women groups and the church) played in alleviating;

(A) transportation

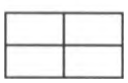
(i) provision of raw materials for road repair/maintenance [ ]
(ii) provision of transport facilities [ ]
(iii) organizing the farmers into an association/cooperative [ ]
(iv) provision of credit facilities [ ]
(v) Others (specify) [ ]

(B) marketing

(i) provision of loans/credits to farmers
(ii) storage of farm produce
(iii) seeking of distant markets
(iv) purchasing in bulk at fair prices
(v) Others (specify)



31. Are you a member of any cooperative society?



(i) Yes
(ii) No
What is its name(s)?.....

32. If yes, What does it deal with in terms of functions ?

(i) marketing of farm produce e.g milk [ ]
(ii) provision of credit facilities [ ]
(iii) provision of technical expertise to farmers on the most modern farming techniques [ ]
(iv) provision of transport means (facilities) [ ]
(v) provision of farm inputs e.g.seeds,fertilizers,pesticides etc. [ ]
(vi) Others (specify) [ ]

33. State all your sources of income

(i) salaried employment
(ii) business
(iii) farming
(iv) others (specify)

34. What is your average income per month ?

(i) below Kshs.3000
(ii) 3000 - 5000
(iii) 5000 - 7000
(iv) 7000 - 9000
(v) 5000 - 6000
(vi) above 9000 (please specify)

35. OTHER COMMENTS:

UNIVERSITY OF NAIROBI
DEPARTMENT OF URBAN AND REGIONAL PLANNING

INTERVIEW SCHEDULE; TRANSPORTATION PERSONNEL

Interviewer's Name.....Date.....
Respondent's Name..... Position.....
Location.....

1. What is the number of kilometres that have been developed in this district / division in terms of
   (i) Earth roads.....km.....

   (ii) Murram roads.....,.....

   (iii) Bitumen/tarmac.....,.....

2 Has the division benefited from the RARP (Rural Access Road Programme)? If yes,when did it start and how many kilometres have been covered under the programme?
.....
.....

3. Given the current transportation situation in this division / district, how do you think it (RARP) will/or has affected agricultural productivity inthis division (please specify).

   (i) increased productivity of farm produce
   (ii) reduced losses as much of the produce can now reach the markets
   (iii) reduction in transport costs
   (iv) easier accessibility to other parts of the district throughout the year
   (v) others (specify)

4. How have you involved the local people in the programme in terms of;

   (i) Identification of the roads to be graded
   (ii) Views on where the roads should pass
   (iii) Provision of labour and/or materials
   (iv) Maintenance

5. What is the accessibility index in Kinangop division and/or Nyandarua district in general ?
.....
.....
.....

6 In your opinion, at what stage of involving the local community led to the greatest achievement of the objectives of the programme?

(i) planning stage
(ii) implementation
(iii) provision of labour and /raw materials
(iv) maintenance
(v) others (specify).....
.....

7. In the ares that the program has covered so far, what is the nature of the roads, i.e are they;

(i) all-weather roads
(ii) gravelled (murrammed)
(iii) earth roads
(iv) Others (specify)

8. What would you state as the major successes and weaknesses/problems of/ faced by RARP ?

Problems

(i) Inadequate funds
(ii) poor construction material and workmansip
(iii) poor communty involvement in the decision making process
(iv) Inadequate technical personnel
(v) others (specify)

Success

(i) improved accessibility to distant markets
(ii) reduced wastage / loss of farm produce
(iii) helped mobilize community participation
(iv) Others (specify)

9. What measures are being taken to improve the programme's performance in this area?.
(i) educating the community on the need for self- reliance instead of waiting for governmental aid through public rallies/seminars.
(ii) involving the local people in decision making right from planning to implementation.
(iii) opening of the division's produce to distant markets
(iv) Others (specify)

10. Other comments.....
.....

UNIVERSITY OF NAIROBI
DEPARTMENT OF URBAN AND REGIONAL PLANNING

INTERVIEW SCHEDULE : LOCAL AGRICULTURAL OFFICIAL(S)

Interviewer's Name.....Date.....
Location.....Respondent's Name.....
Position.....

1 How often do you visit the farmers,given the nature of transportation in this region?

.....
.....

2 How has the condition of the roads affected the discharge of your duties ,and hence agricultural growth in the division?

.....
.....

3 Which are the agricultural marketing bodies/organization in this area?

.....
.....

4 What impact has liberalization of prices of both farm inputs and produce had on agricultural productivity in this area?

.....
.....
.....

5. Does the government has any plan of establishing a cold storage facility in the division to reduce losses/wastage of agricultural produce ?

6. What strategies have the ministry put in place to enlighten the farmers on sound farming and marketing practices?

(i) organized agricultural shows
(ii) farmers field days
(iii) setting demonstration farms
(iv) frequent visitation by extension officers

7. What effort has the ministry made to seek distant markets for the areas' agricultural produce?

(i) organizing of agricultural shows
(ii) exchange programmes for farmers with other areas
(iii) organizing farmer's field days
(iv) others (specify)

8. Other comments.....

Part Two

UNIVERSITY OF NAIROBI
DEPARTMENT OF URBAN AND REGIONAL PLANNING

QUESTIONNAIRE FOR TRANSPORTERS

Interviewer's name.....
Date.....
Respondent's name(optional).....

1 What exactly do you transport ?

(i) milk [ ]
(ii) potatoes [ ]
(iii) passengers [ ]
(iv) vegetables -
(onions, tomatoes, cabbages/sukuma wiki, fruits) [ ]
(v) Others (please specify) [ ]

2. From where to where do you transport these products?

(i) Kinangop to Nairobi [ ]
(ii) Kinangop to Nakuru [ ]
(iii) ,, to Naivasha [ ]
(iv) ,, to Nyahururu [ ]
(v) Others (specify) [ ]

3. What are the charges that you demand per kg/bag of farm produce/or input per kilometre? (please explain in each case).

(i) less than Kshs.5/- [ ]
(ii) 5 - 10/- [ ]
(iii) above 10/- [ ]

4. Do these charges vary with seasons i.e. wet or dry periods?

(i) Yes [ ]
(ii) No [ ]

5.If yes,please state these variations in charges and explain whether the difference occurs because;

(i) more fuel is consumed in the wet [ ]
(ii) frequent vehicle breakdown during wet seasons [ ]
(iii) increased production of farm produce [ ]
(iv) Others (please specify) [ ]

6. What determines the fixing of these charges?

(i) costs of fuel [ ]
(ii) ,, ,, spare parts [ ]
(iii) distance. [ ]
(iv) Others (specify) [ ]

7. What are the problems that you do encounter in the running of your transport business?

(i) poor roads, vehicles get stuck in the mud. [ ]
(ii) high running costs (spare parts, and fuel)[ ]
(iii) harassment by the authorities (specify,how) [ ]
(iv) Others (please specify) [ ]
.....
.....

8. In your opinion, what measures need to be taken to improve road transportation in this area?

(i) increase taxes. [ ]
(ii) involve local people in construction and maintenance of roads. [ ]
(iii) borrow money from foreigners /banks etc. [ ]
(iv) Others (specify). [ ]

9. Do you have a transporter's association in this area?

(i) Yes
(ii) No

(What is its name)?.....

10 If yes, what are the functions of this association?

(i) brings all the transporters in the area together,i.e. gives a sense of identity. [ ]
(ii) gives loans/credits to members [ ]
(iii) sets fares/charges [ ]
(iv) helps to maintain/improve roads [ ]
(v) Others (specify) [ ]

8. What future plans do you have to ease transportation problems in this area?

(i) undertaking the repair and improvement of existing roads
(ii) form a lobby group to sensitise the government on the transport problems in the district in general
(iii) hold field days,whereby transporters jointly purchase road repair and construction materials
(iv) form cooperatives to allow pooling of resources, and articulation of issues/problems
(v) Others (specify)

9. Other comments.....